

# Center for Functional Nanomaterials (CFN) Student Safety Orientation



**June 6, 2018**

**BROOKHAVEN**  
NATIONAL LABORATORY



# Safety: A Core Value at BNL

## PRINCIPLES FOR A STRONG SAFETY CULTURE

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1. Everyone is **personally responsible** for ensuring safe operations.
2. **Leaders** value the safety legacy they create in their discipline.
3. Staff raise **safety concerns** because trust permeates the organization.
4. **Cutting-edge science** requires cutting-edge safety.
5. A **questioning attitude** is cultivated.
6. **Learning** never stops.
7. **Hazards** are **identified** and evaluated for **every task, every time**.
8. A **healthy respect** is maintained for **what can go wrong**.

Safe, efficient, secure operations are crucial for us to succeed in all that we do at Brookhaven Lab.

Brookhaven National Laboratory Practices

### THE SAFE CONDUCT OF RESEARCH



# Safety is Everyone's Responsibility

## Students' Responsibilities:

- Ensure understanding of training.
- Follow rules and requirements.
- Follow the Experimental Safety Review.
- Be aware of the hazards of chemicals and control them properly.



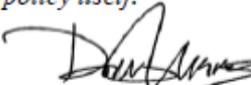
*This document is a statement of Brookhaven National Laboratory's (BNL) Environmental, Safety, Security, and Health (ESSH) policy. BNL is a world leader in scientific research and performs this work in an environmentally responsible and safe manner.*

*I expect every employee, contractor, and guest to take personal responsibility for adhering to the following principles:*

- Environment:** We protect the environment, conserve resources, and prevent pollution.
- Safety:** We maintain a safe workplace and we plan our work and perform it safely. We take responsibility for the safety of ourselves, coworkers, and guests.
- Security:** We protect people, property, information, computing systems, and facilities.
- Health:** We protect human health within our boundaries and in the surrounding community.
- Compliance:** We achieve and maintain compliance with applicable ESSH requirements.
- Community:** We maintain open, proactive, and constructive relationships with our employees, neighbors, regulators, DOE, and other stakeholders.
- Continual Improvement:** We continually improve ESSH performance.

*In addition to my annual review of BNL's progress on ESSH goals and adherence to this policy, I invite all interested parties to provide me with input on our performance relative to this policy, and the policy itself.*

Signed \_\_\_\_\_

  
Doon Gibbs, Director

April 15, 2013

**BROOKHAVEN**  
NATIONAL LABORATORY

# Be Safety Conscious

***Many injuries occur when an individual is not paying attention, does not plan work properly, or exceeds physical limitations.***

- **Be aware** of your surroundings.
- **Watch out** for one another—sometimes a “second eye” can prevent injury or near miss.
- **Check** for postings before entering areas.
- **Have** a questioning attitude (ask yourself, “What could go wrong?”).
- **Be open** to feedback.
- **Ask** if you are not sure—don’t try to “fix it” yourself.
- **Know** who is in charge.



# Recent Student Injuries/Events at the Lab

Incident Description	Event/Injury Type
Student <b>sprained</b> an ankle while playing soccer.	<b>Recreational Injury</b>
Student was cutting plastic with an Exacto knife and <b>lacerated</b> the opposite thumb.	<b>First Aid</b>
During an emergency drill, a student crouched on the floor and got a small <b>shard of glass</b> stuck in their hand.	<b>First Aid</b>
Student <b>lacerated</b> a finger on a poplar plant leaf while moving a plant in a greenhouse.	<b>First Aid</b>
Student received <b>splinter</b> in hand while pulling fiberglass pole out of ground.	<b>First aid</b>
A student was handling material in a lab when a part broke off and <b>imbedded in</b> finger.	<b>First aid</b>
Student was walking up the stairs in the Physics Department and <b>fell</b> , bruising both knees.	<b>First aid</b>
Student sustained two superficial <b>lacerations</b> on finger while sliding the lid off of a desiccator.	<b>First aid</b>
A student reported a <b>burning sensation</b> to his face while working with chemicals.	<b>Chemical exposure</b>

# Injury Precursors

- Distraction/“Multi-tasking” (cell phone use)
- Time pressure (deadlines)
- Fatigue
- Working alone in the lab
- Lack of familiarity with laboratory equipment
- Incomplete understanding of procedures, Experimental Safety Review, or Work Permit
- Incomplete training



➤ ***If in doubt, ask your supervisor/mentor***

# Am I Ready? Checklist

- Do I understand the task?
- Can I do the task safely?
- What error situations exist?
- What error reduction tools will I use?
- What can go wrong?
- What's the worst that can happen?
- What conditions stop this task?
- Am I qualified and ready to start work?
- Is my supervisor aware of what I am doing?
- Do I have the proper personal protective equipment?



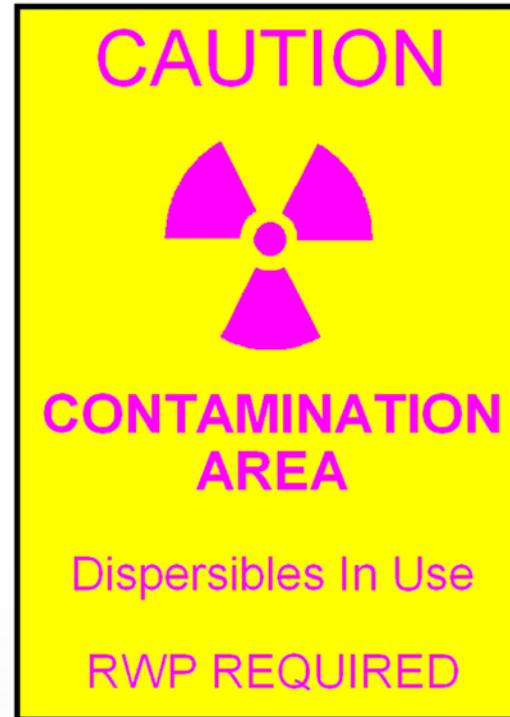
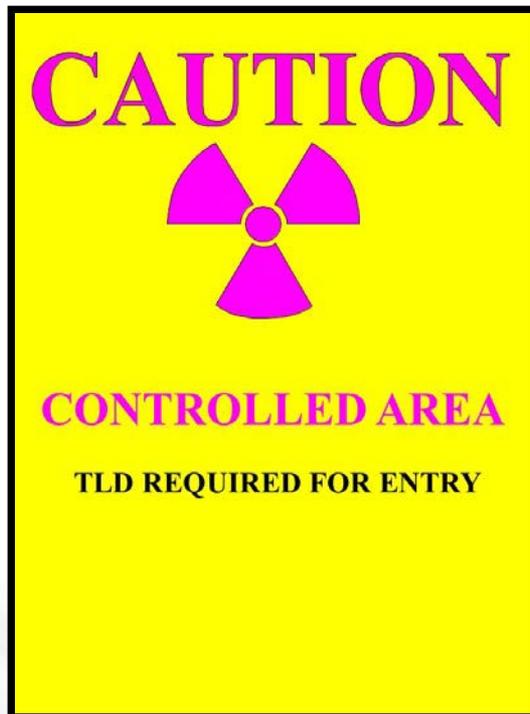
# Barricades & Hazard Postings

- **Do not** cross barricades (tapes, chains, fencing, etc.).
- **Observe** hazard signs for high noise areas, radiation areas, and construction zones.
- **Training** is required for entry into certain areas.
- **Avoid** areas with “Wet Floor” placards; walk carefully when necessary.
- **Stay** out of construction areas.



# Radiological Postings

In order to enter any area with this type of radiological posting, additional training is required:



# Working Alone/After Hours

- Working alone (after 5 p.m. and on weekends) is strongly discouraged.
- If unavoidable:
  - **Obtain** Supervisor approval;
  - **Determine** if your Department requires supervision and/or a buddy system;
  - **Identify** special hazards;
  - **Plan** what to do in case of emergency;
  - **Ensure** that someone else in the area is aware of your laboratory activities.
  - **Contact** Lab Protection if you need assistance (Ext. 2222).



# Personal Protective Equipment (PPE)

- **ALL** staff members and students are **required** to wear posted PPE, such as safety glasses, lab coats, long pants, and enclosed shoes.
- **Check** placards outside of your work area for Area-based PPE requirements.
- Follow the **Experimental Safety Review** requirements for Task-Specific PPE.

ACCEPTABLE	UNACCEPTABLE	WHY?
		Openings in front and back
 <i>Leather or plastic, no cloth fabric surfaces</i>		Openings in front and back
		Openings in front and back
		Heel too high and insufficient coverage in front
		Heel too high and not a closed toe

# PPE Demo Room

- Gloves
- Face Shields
- Hard Hats
- Ear Plugs
- Safety Glasses
- Lab Coats
- Safety Knives
- And More!



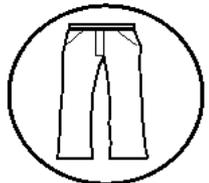
**Location:** Bldg. 30 (Brookhaven Center)  
**Hours:** Thursdays 9 a.m. to 12 noon



# Typical Lab Posting

Area-based PPE required for entry

This is the minimum PPE required for entry into the lab.

HAZARD INFORMATION PLACARD				
Bldg: 0555.13	Room: 1-165	Emergency Contact #:		
Dept: CO Chemistry Department		NO FOOD OR DRINK ALLOWED NO OPEN FLAME NO SMOKING		
Print Date: 05/25/18 10:34 AM				
PROTECTIVE EQUIPMENT REQUIRED FOR AREA Area Designation: Chemical Laboratory				
				
SAFETY GLASSES	LAB COAT	LONG PANTS	FULLY ENCLOSED SHOE	
CHEMICAL HAZARDS OF THE AREA				
				
FLAMMABLE SELF REACTIVE WATER REACTIVE PYROPHORIC	SELF REACTIVE	CARCINOGEN RESPIRATORY SENSITIZER REPRODUCTIVE TOXICITY	DERMAL SENSITIZER	HIGHLY ACUTE TOXIN
				
OXIDIZER	CORROSIVE			
ADDITIONAL HAZARD INFORMATION				
ESR / SWP / RWP / PI: CO-4-13				
Utility Isolation: Electric: Electric Panel LP-E-12 in chase Steam: controls in chase and main control in basement Ventilation: ventilation controlled by K-2, cutoffs in loft and basement.				

# HAZARD INFORMATION PLACARD

Bldg: 0555.13 Room: 1-165 Emergency Contact #:  
Dept: CO Chemistry Department  
Print Date: 05/25/18 10:34 AM

**NO FOOD OR DRINK ALLOWED  
NO OPEN FLAME NO SMOKING**

## PROTECTIVE EQUIPMENT REQUIRED FOR AREA

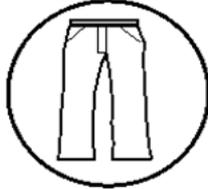
Area Designation: **Chemical Laboratory**



SAFETY GLASSES



LAB COAT



LONG PANTS



FULLY ENCLOSED SHOE

Area title: Gives the type of lab.

Minimum PPE required for entry into the area.

## CHEMICAL HAZARDS OF THE AREA



FLAMMABLE  
SELF REACTIVE  
WATER REACTIVE  
PYROPHORIC



SELF REACTIVE



CARCINOGEN  
RESPIRATORY  
SENSITIZER  
REPRODUCTIVE  
TOXICITY



DERMAL  
SENSITIZER



HIGHLY ACUTE  
TOXIN

Hazard symbols for the chemicals in the area.



OXIDIZER



CORROSIVE

## ADDITIONAL HAZARD INFORMATION

ESR / SWP / RWP / PI: CO-4-13

Utility Isolation: Electric: Electric Panel LP-E-12 in chase

Steam: controls in chase and main control in basement

Ventilation: ventilation controlled by K-2, cutoffs in loft and basement.

Additional information for entry and working in this area.

# Lab Safety – Keep It Clean

- **Inspect** your area for clutter on a daily basis.
- **Wipe** work surfaces with an approved disinfectant at least once daily.
- **Don't** leave a mess or let items collect, assuming someone else will clean it.
- **Maintain** an up-to-date inventory of chemicals, reagents, and compressed gas.
- **Identify and clearly label** all chemicals and other materials prior to leaving.
  - For overnight experiments, use the **Unattended Experiment Form**.
- **Keep** eyewash, safety shower areas, fire sprinklers, and exits clear and accessible.
- **Do not** let unused reagents or chemicals collect over long periods of time.
- **Do not** store chemicals or waste in an unsecured location or where it can be spilled.



# Driving at Brookhaven

Brookhaven Lab observes

NYS traffic laws:

- Obey the speed limit: **30 MPH.**
- Come to a **full stop** at stop signs.
- **Slow** down or for slow-moving vehicles (e.g., Kubotas, site maintenance vehicles).
- **Yield** to emergency vehicles.
- **Stop** for pedestrians in crosswalks.
- Use **hands-free** electronic devices.
- ***You could get a ticket for violations.***



# Pedestrian Safety

- **Cross** street at marked crosswalks and observe traffic-control signals.
- **Before** crossing in a crosswalk, make sure cars come to a complete stop.
- If you have to cross the street where there is no crosswalk, **yield** to oncoming traffic.
- **Use** the sidewalk when available.
- If no sidewalk is available, **always** walk or jog facing traffic.
- In darkness, at dawn or dusk, wear **reflective gear or bright clothing**.
- **Don't text or email** while you are walking.



# Biking Safety

- **Helmets** are **required** while biking onsite.
  - Order a helmet through your department.
- **Cyclists** are required to obey the same rules as drivers:
  - ✓ Follow traffic.
  - ✓ Stop at stop signs.
  - ✓ Obey red lights.
  - ✓ Observe right-of-way rules.
  - ✓ No texting or talking on a cell phone while riding.
  - ✓ Don't wear headphones in both ears.
- **Use** a light, head lights, and tail lights (NY State Law) and reflective clothing when riding in dusk or darkness.
  - ✓ These items are also available through your Department or call Safety and Health Services at Ext. 4056.
- **Give** pedestrians the right of way in crosswalks.
- **Don't** ride on sidewalks.
- **Be alert** for road hazards such as potholes, drains, and construction sites.



# Recreational Activities

- Brookhaven has over 5 thousand acres of trails and woods...
- When running, walking, or biking in wooded areas, follow these precautions:
  - Stay on trails
  - Tell someone where you are going
  - Bring a cell phone with you
  - Study a site map
  - Go with a friend
  - Do not smoke/use open flame
- If injured, report to the Clinic (or to Fire/Rescue during after-work hours).



# Dorm/Fire Safety

- **Never** leave stoves on unattended.
- Use of hot plates is **prohibited**.
- **Always** heed fire alarms in building.
- **Know** nearest exits.
- **Do not throw** cigarette butts on the ground; always use designated receptacles.



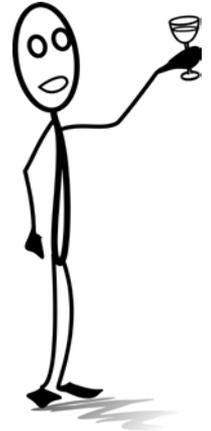
# Smoking/Fire Safety

- Smoking (including e-cigarettes) is **prohibited** inside all buildings.
- **Discard** cigarette butts in designated receptacles outside of buildings.
- **Do not throw** burning or lit cigarettes outside or while driving.



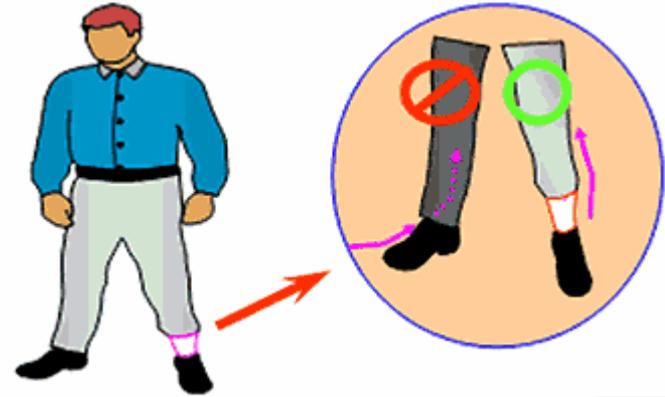
# Alcohol & Substance Abuse Policy

- BNL is “committed to a workplace free from alcohol and drugs used illegally or unsafely to assure a safe, healthy and productive workforce and working environment.”
- Per New York State Law, only those 21 and older may consume alcohol.
- Per Lab’s Alcohol and Substance Abuse Policy, no employee, student, or contractor may use alcohol, illegal drugs, or legally prescribed or over-the-counter drugs “in a manner that adversely affects ability to safely and effectively perform work. “
- Must not be under the influence of alcohol while on-duty at any location. **Doing so may result in immediate removal from the site or permanent disbarment.**
- Must not engage in the illegal use, possession, distribution, dispensation or manufacture of controlled substances or illegal drugs at BNL.
- Alcohol consumption is allowable in on-site housing during non-work hours.
- If drinking onsite during non-work hours, **drink and act responsibly.**



# Natural Hazards

- To avoid **ticks**, avoid grassy or wooded areas and wear protective clothing (i.e., long pants).
  - If you have a tick or suspicious rash, go to the Medicine Clinic (Bldg. 490).
- **Watch out** for wildlife, especially deer, when walking, bicycling, and driving.



# What Should I Do In Case of an Accident or Injury?

- If an **emergency**, call **Ext. 2222** or **(631-344-2222** from a cell phone) or **911** from any Lab phone.
- **Report** the injury to your supervisor immediately if injury is not an emergency *regardless of how minor it seems at the time*.
- **Seek** medical attention at the Occupational Medicine Clinic (Bldg. 490, Ext. 3670).
- **Contact** Fire/Rescue (Bldg. 599, Ext. 2222) if the Clinic is closed (after hours). **Do not leave site without following this step.**
- **Report** near-misses (close calls) to your supervisor/host or Environment, Safety and Health (ESH) Manager immediately.



# Safety Resources

- Your Mentor/Supervisor
- Your Dept./Division Safety and Health Representative or ESH Manager
- Police and Fire/Rescue (Ext. 2222)
- Occupational Medicine Clinic (Ext. 3670)
- Safety Hotline (Ext. 8800)
- Safety Website:  
<http://intranet.bnl.gov/safety/>



## Avoiding slips, trips, and falls

Slips, trips, and falls are among the leading causes of recordable injuries at BNL. The seemingly simple act of walking can easily result in injuries and lost work days. See what you can do to avoid a fall.



## Safe Videos

Safe Driving Tips

## Other Safety News



Learn About Safety Day, June 17, 2015



BNL Safety Survey: Summary of Results and Path Forward



Distracted Driving: Risky Behavior

## Latest Safety Video



## Securing Your Facility

Brookhaven Laboratory's Laboratory Protection Division asks all staff to be mindful of securing buildings after hours, on weekends, or when they are otherwise left unattended.

## Incidents & Statistics

### 15 Safety Statistics

DART: 6 Recordable: 11

### Recent Safety Incidents

- ▶ Employee Feels Sharp Back Pain While Entering Van
- ▶ Employee Twists Knee While Walking on Incline
- ▶ Employee Steps on Broken Stair Tread, Injures Knee

All Incidents »

# Don't Miss Safety & Wellness Expo on June 20 — Berkner Hall

Student Safety Quiz Bowl,  
Hands-on Activities,  
Subject Matter Experts,  
Giveaways & Prizes, and More!



# Local Emergency Plan

## EMERGENCY INFORMATION

YOU ARE IN BUILDING #

735

### PROTECTIVE ACTION ZONE - YELLOW

**IN THE EVENT OF A BUILDING/FIRE ALARM- PROCEED TO OUTDOOR ASSEMBLY AREA:**

CFN West side parking lot - near curved wall

**IN THE EVENT OF A CONTINUOUS SITE SIREN - PROCEED TO INDOOR ASSEMBLY AREA:**

CFN South side of Central Hallway on the first floor

**SHELTER-IN-PLACE AREA:**

CFN South side of Central Hallway on the first floor

**Local Emergency Coordinator**

Lorraine Davis

**Phone**

631-344-4156

**Cell**

631-275-6201

**Alternate Local Emergency Coordinator**

James Buddenhagen

**Phone**

631-344-2422

**Cell**

631-276-4413

## **Mass Notification Systems**

1. Phone Emergency Notification System (PENS)
2. Site sirens:
  - Continuous sound – Go to building assembly area
  - Intermittent sound – Evacuate site
3. Everbridge
  - Text messages/ emails sent to employee's work, cell, home phone
  - Employee determines how they are contacted (PeopleSoft)

## **Building Fire Alarm or Toxic Gas Alarm Systems**

- Evacuate and report to assembly area
- Take personal belongings
- Lock your computer/ use screen saver
- Close office door (do not lock)

## **Shelter in place/ Indoor Assembly Area**

### **Automatic External Defibrillators**

- Next to revolving door (1<sup>st</sup> fl.)
- Balcony by Seminar room (2<sup>nd</sup> fl.)

## **Hosts are responsible for Guests and Visitors**

### **Personnel Accountability**

- Users report to functional group in whose labs they are working in that day

# Emergency Information

## Building 735

### Protective Action Zone - Yellow

In the event of a Building/ Fire Alarm - Proceed to Outdoor Assembly Area



Outdoor: Parking Lot

- CFN West side parking lot by the curved concrete wall.
- Assemble quietly with your group.
- Local Emergency Coordinators. (in green hat/vest) will be taking names

# Fire Alarms at the CFN



There are **two** different alarms at the CFN.



1. Normal fire alarm will ring if a fire/ smoke is detected.
  - Exit building by nearest exit. (*Do not use the elevator*)
  - Go to the outdoor assembly area in the west parking lot.

Click the icons to hear the alarms



2. Toxic gas alarm (**T-3 Alarm**) – series of three bongs followed by message on speaker:  
*“Hazardous gas release, Exit from the north (front) side of the building only.”*
  - Go to the outdoor assembly area in the west parking lot, unless otherwise directed.

# In the event of a Continuous Site Siren Shelter-in-Place

Proceed to Indoor Assembly Area

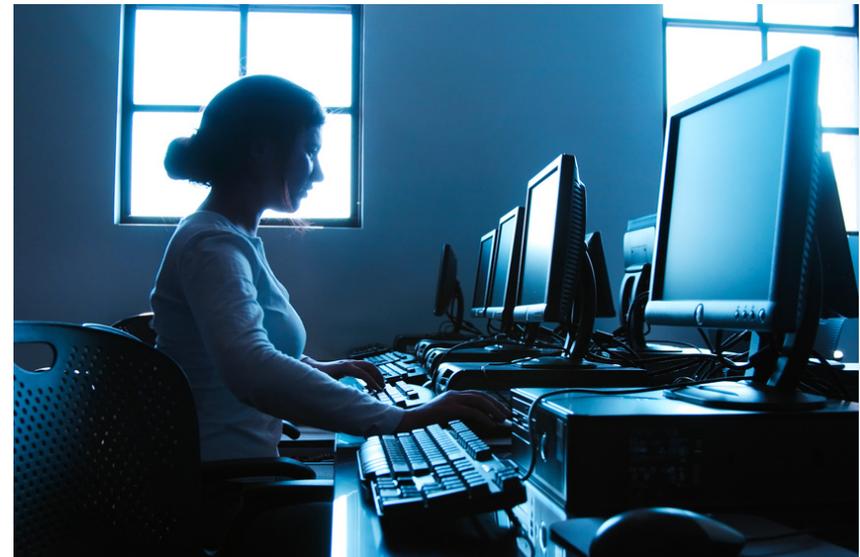


Indoor: Central hallway

CFN central hallway on the first floor towards the rear doors

# Working Alone/After Hours

- Normal CFN working hours are 8:00 am - 6:00 pm.
- If unavoidable:
  - **Obtain** Supervisor and ES&H approval After-Hours Form
  - **Identify** special hazards
  - **Plan** what to do in case of emergency
  - **Ensure** that someone else in the area is aware of your laboratory activities
  - **Contact** Lab Protection if you need assistance (x2222)



# Lab Safety – Use of Chemical Fume Hoods

- Use hood when handling toxic or volatile materials
- Check for annual hood certification sticker
- Position sash at or below arrow for safe use
- Work at least 6” inside the hood face
- Keep hood clean and free of clutter
- Do not block rear exhaust slot or airfoil opening
- Keep storage inside hood to a minimum
- Raise large items 2” above work surface
- Verify proper airflow during high hazard procedures

***Do not ignore hood alarms!***

*Contact ESH Coordinator for evaluation x7153*

# safety glasses vs. goggles

Protective Eyewear - Meets ANSI Z87 Standard



- Impact
- Optical radiation (99.9% UV)



- Impact
- Dust/ Airborne Particulate
- Chemical Splash

Required for corrosives, formaldehyde, materials that cause serious eye damage (see Safety Data Sheet)

Check out product selector: <https://www.uvex.us>

# An injury that didn't happen...

## (Safety awareness at the CFN)

I used to think that we might have been unnecessarily and overly cautious, but now I couldn't appreciate more of its importance in this shared facility, where everyone needs to take responsibility in making sure that us and people around us are safe. J

“One day in April 2016, I was doing e-beam evaporation. I saw that the shape of the aluminum boat, which I used for the experiment, had deformed. So I attempted to fix it by bending it slowly. This was when it accidentally fractured and a shard flew right onto my safety glasses. This happened before I could respond, so if I weren't wearing safety glasses, I might have been injured.”

-Zheng

# Reminders:

- ✓ Do not access “inappropriate” web sites.
- ✓ Don’t prop open doors.....
- ✓ Be clear on who authorizes and approves your work.
- ✓ Refer to CFN Contacts (card) for ESH questions

**Wai Lin Ng, ESH Coordinator**

Email: [wailin@bnl.gov](mailto:wailin@bnl.gov)

Phone 631-344-7153

# Safety Resources



**Wai Lin Ng**  
ESH Manager  
Ext 7153, Room 2002



**Ryan McFadden**  
ES&H Representative  
Ext 6086, Room 2010

- **Your Mentor/Supervisor**
- **Police and Fire/Rescue  
(Ext. 2222)**
- **Occupational Medicine Clinic  
(Ext. 3670)**
- **Safety Hotline (Ext. 8800)**
- **Safety Website:  
<http://intranet.bnl.gov/safety/>**

# CFN Administration



**Grace Webster**  
User Program Admin.  
Ext 3227



**Judy Badal**  
User Program Admin  
Ext 3008

- **Badging and lab access**
- **After-hours access**
- **Safety Training**



**Donna Storan**  
Assistant to the Director  
Ext 2716, Room 2005

# Operations Staff



**Lorraine Davis**  
Operations Manager  
Ext 4156, Room 2001



**James Buddenhagen**  
Electrical Technician  
Ext. 2422

- **Electrical equipment inspections**
- **Design and manufacturing of experimental components**
- **Mechanical support for setup and operations of scientific equipment**



**Al Langhorn**  
Mechanical  
Ext 4566



**Bob Hoade**  
Mechanical Technician