Welcome
NIST Safety Update

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Visiting Committee on Advanced Technology
February 8, 2017

AGENDA

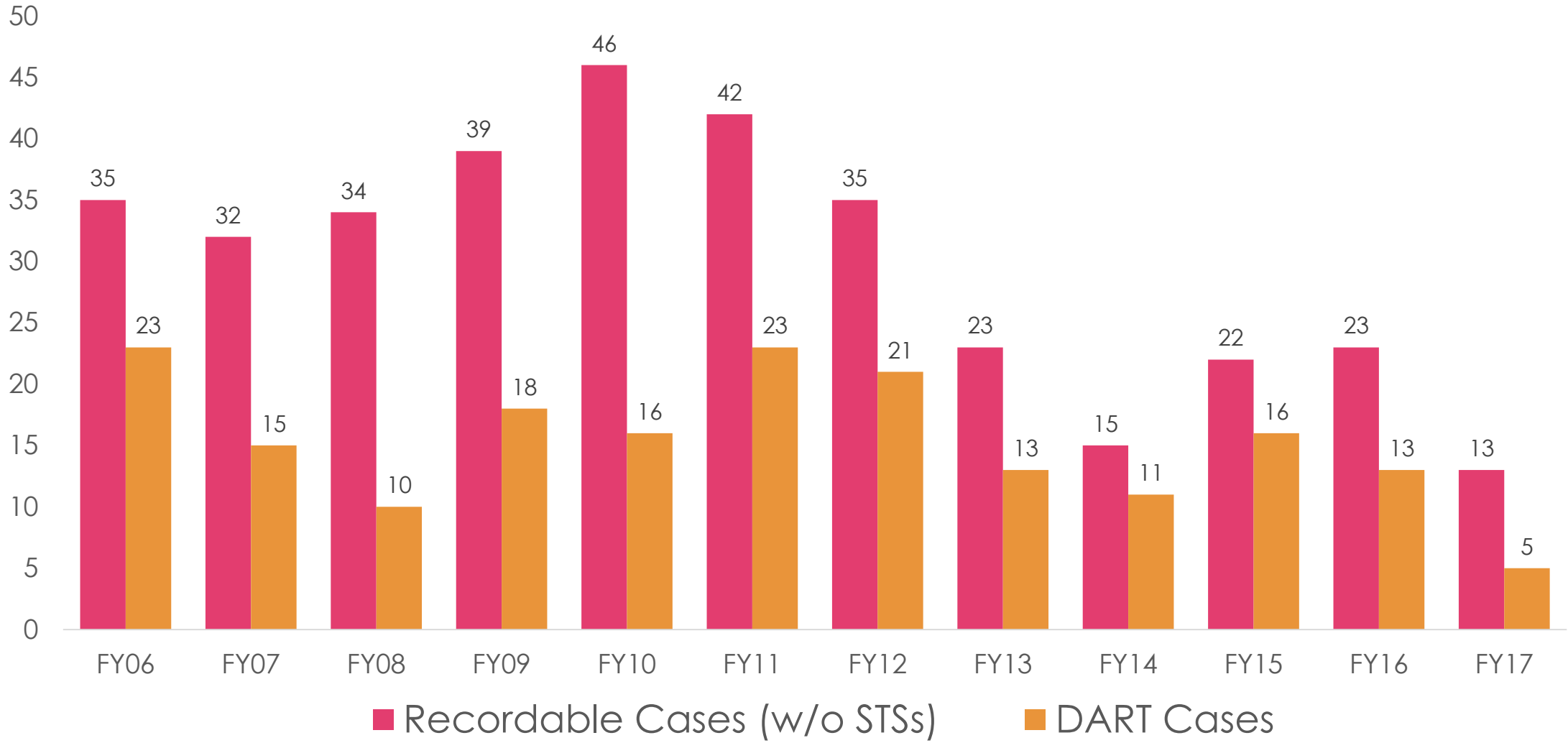
Report regularly to VCAT on NIST's safety improvement efforts.

SAFETY INCIDENTS

CONTINUAL IMPROVEMENT

ACTIONS TAKEN

NIST Safety Incident Metrics



FY2017 OSHA Recordable Cases

EVENT	INJURY
Employee was descending stairs when knee buckled	Employee experienced pain in the knee
Employee was working in an area where fans were blowing	Debris became entrenched in employee's eye resulting in irritation
Employee was entering building when door hit employee in head	Employee received concussion
Employee was cutting a pipe with a powered pipe cutter	Employee lacerated right thumb
Associate was reattaching a cover on piece of equipment, a bolt was sheared, and the employee's hand slipped and struck the sheared bolt	Associate lacerated knuckle
Associate (DOC employee) slipped on a piece of broken plastic laying on walking surface	Associate experienced pain to the left side of the body, specifically shoulder and wrist
Employee fell descending stairs	Employee tore knee ligament
Employee was using a folding knife while cutting plastic band on package	Employee lacerated thumb
Employee was walking across grassy area, stepped in a hole, and fell	Employee sustained bruises and scrapes to the face; experienced pain in the shoulder and arms
Employee was prepping glass slides when one slipped and hit knuckle	Employee lacerated knuckle
An odor from a roofing chemical permeated an office area	Employee became ill
Employee was walking down a hallway when a piece of debris entered the eye	Employee received scratched cornea
Employee stood to walk away from desk when the individual fell due to a numb foot	Employee fractured ankle

Incident Reduction

OBJECTIVE

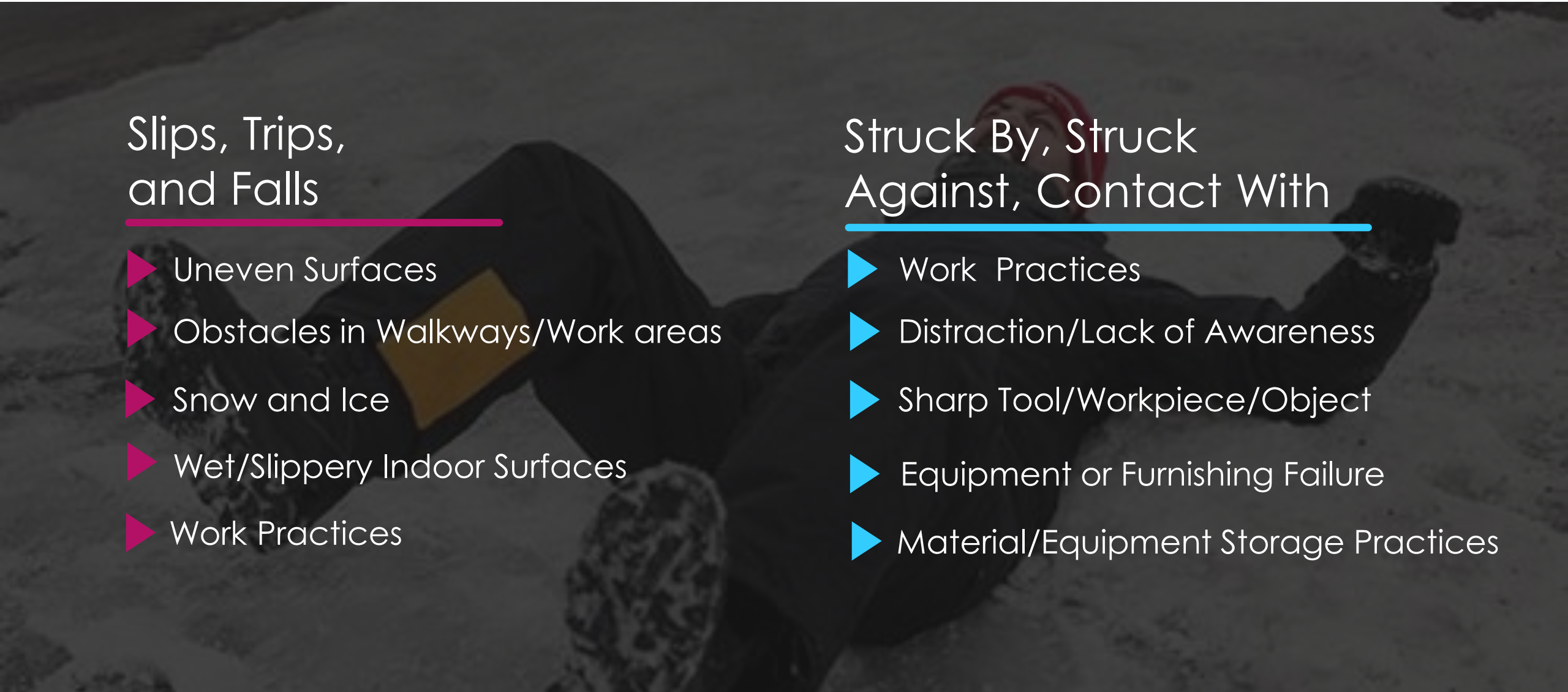
Reduce the occurrence of the most common types of incidents by identifying and eliminating their causes.

Reported Incidents
FY 2013 – FY 2016

Slips, Trips, and Falls	42%
Struck By, Struck Against, Contact With	23%
Overexertion	17%

Incident Causes

PRELIMINARY ANALYSIS



Slips, Trips, and Falls

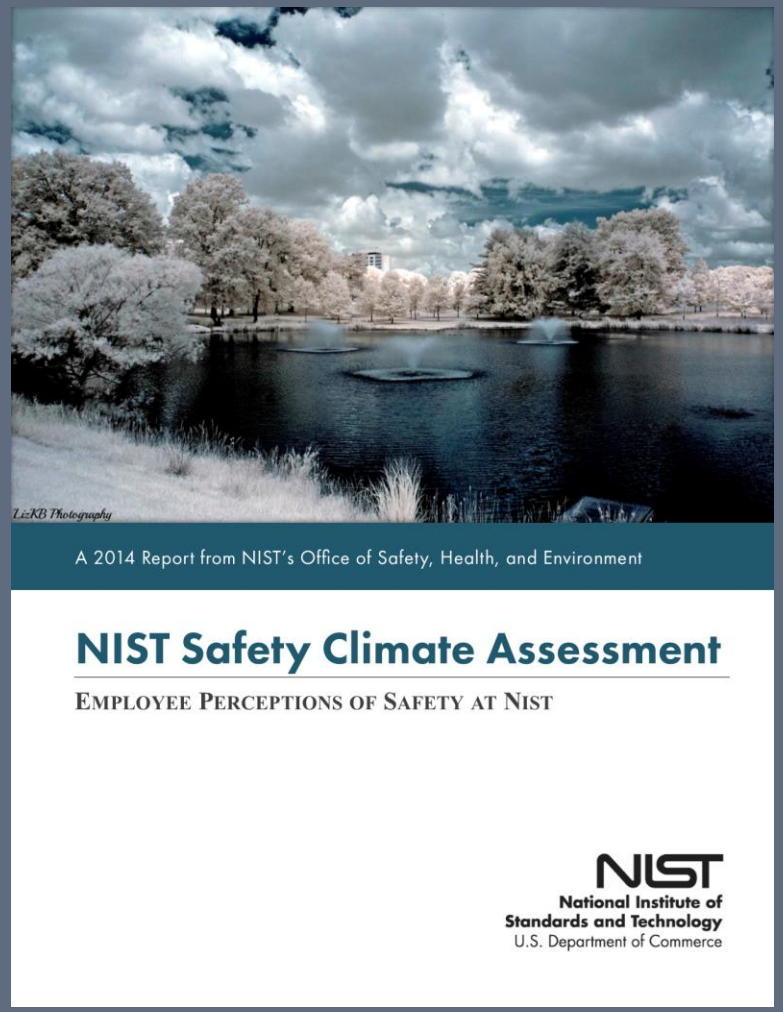
- Uneven Surfaces
- Obstacles in Walkways/Work areas
- Snow and Ice
- Wet/Slippery Indoor Surfaces
- Work Practices

Struck By, Struck Against, Contact With

- Work Practices
- Distraction/Lack of Awareness
- Sharp Tool/Workpiece/Object
- Equipment or Furnishing Failure
- Material/Equipment Storage Practices

OUR COMMITMENT TO CONTINUAL IMPROVEMENT

Safety Performance Improvement Drivers



- ✓ VCAT and VCAT Subcommittee recommendations
- ✓ Safety climate assessments
- ✓ Incidents, unsafe conditions, and management/staff observations
- ✓ Enhanced workplace inspections (NEW)

ACTIONS TAKEN

2014 NIST Safety Climate Survey Planned Actions

01 **EMPLOYEE RIGHTS AND RESPONSIBILITIES**
Improve communication to employees of their safety rights and responsibilities.

02 **UNSAFE CONDITIONS AND PRACTICES**
Provide guidance on addressing unsafe conditions and practices.

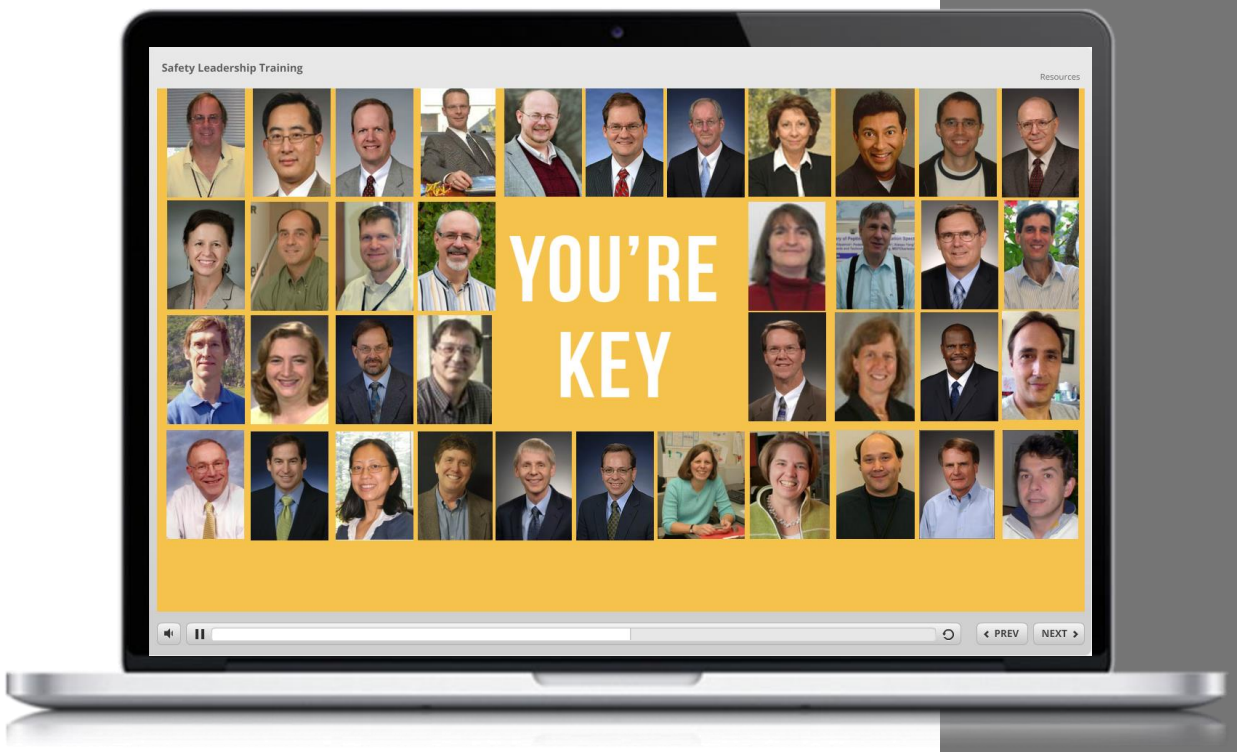
03 **INCIDENT REPORTING & LESSONS LEARNED**
Implement improved incident reporting processes and mechanisms for sharing lessons learned.

04 **SAFETY TRAINING**
Improve the quality of safety training.

05 **MANAGEMENT OBSERVATIONS**
Incorporate discussions of safety culture issues into management observations.

06 **PERFORMANCE APPRAISALS**
Re-emphasize the importance of employees receiving safety performance feedback during performance appraisals.

NIST Safety Leadership Training



Why

To foster a shared understanding and sense of purpose

Who

All managers, supervisors, and safety personnel

What

Why we value safety, our safety policy, engaging the staff, managing risk, learning from our mistakes, ….

Preparing Supervisors to Support Employees' Safety Rights

Colleagues,

Early next week, I will be sending an all-staff email on the safety rights and responsibilities of NIST employees and associates. This email will constitute one of the planned actions I committed to take in response to the 2014 NIST Safety Climate Assessment. The goal is to communicate clearly to every NIST staff member his or her safety rights and responsibilities.

I am providing you with this heads-up because you are a manager or supervisor, OU/Division safety program coordinator, DSR, or OSHE safety professional who recently completed the NIST Safety Leadership Training. As you know from that training, you play a critical role in ensuring that our employees and associates understand and exercise their safety rights and carry out their safety responsibilities.

roviding a safety-rights-and-responsibilities flyer with my all-staff email. Please take
iew the flyer and associated information on the Supervisor Safety Resources
T Safety Policy, the Nuclear Regulatory Commission Safety Culture
d Responsibilities Suborder of particular interest.

port your staff members in exercising th
-conscious work environment in w
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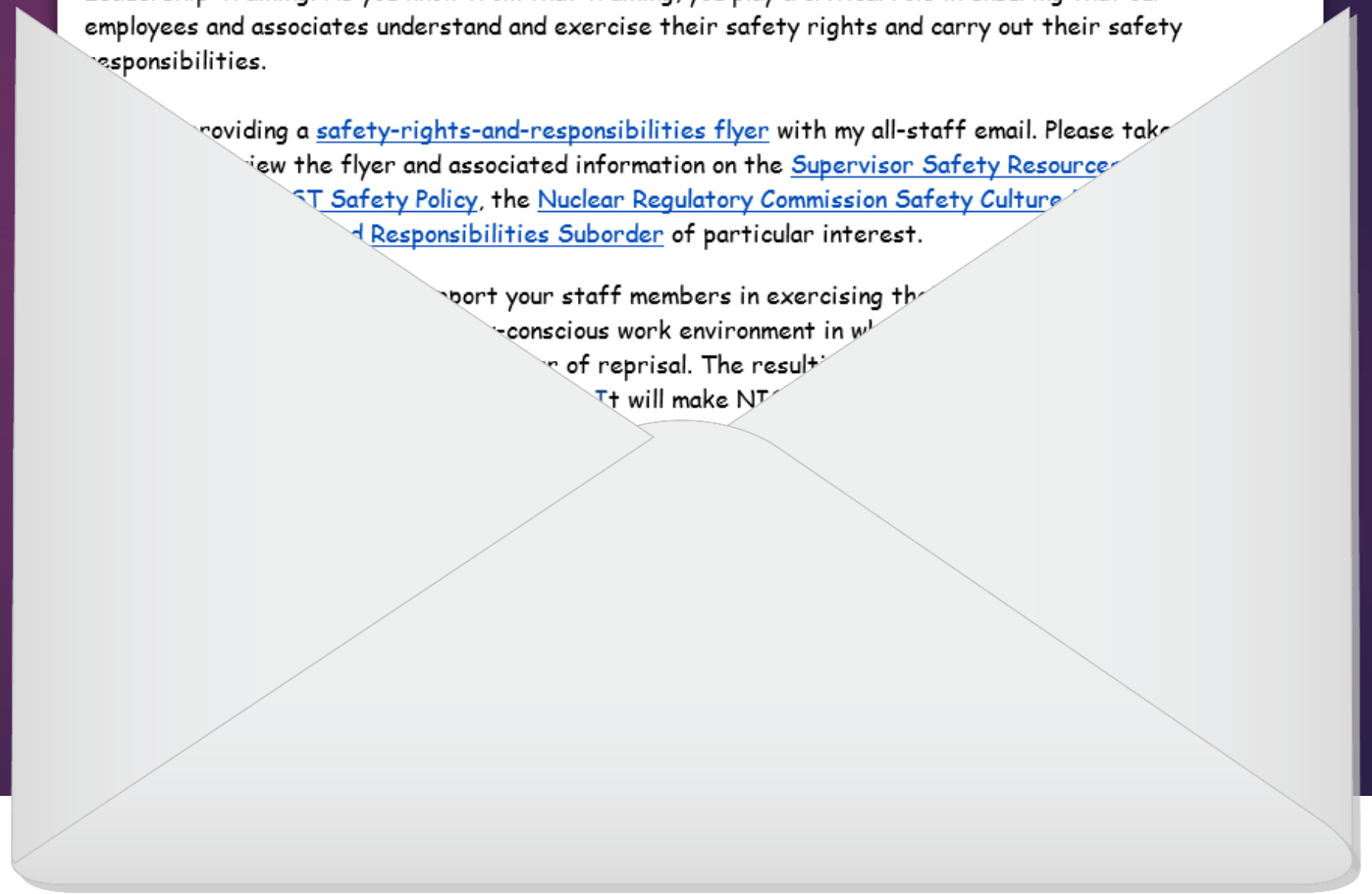


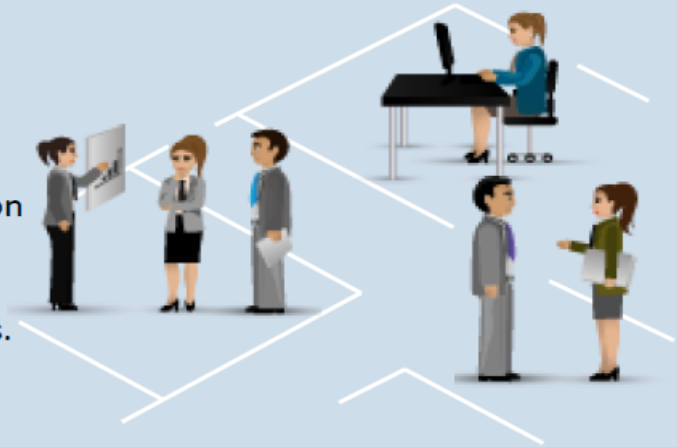
YOUR SAFETY RIGHTS & RESPONSIBILITIES @ NIST

NIST employees, associates, and visitors are entitled to a workplace free of safety and health hazards.

YOUR RIGHTS

1 SAFETY REQUIREMENTS

You have the right to receive information about NIST safety requirements and Occupational Safety and Health Administration (OSHA) standards that apply to your job and the benefits of complying with those standards.



2 HAZARD INFORMATION

You have the right to receive information and training on the work-related hazards you could be exposed to and on the methods to prevent your exposure.

3 DATA AND RECORDS

You have the right to obtain copies of injury and illness statistics, your NIST medical records, and exposure test results.

4 SPEAKING UP

You have the right to talk with your management about work-related safety and health matters, to ask safety-related questions, express safety concerns, and receive safety information.

5 REFUSING TO PERFORM UNSAFE WORK

You have the right to refuse to perform an assigned task when you believe it could seriously harm you.

6 REQUESTING INSPECTIONS OF UNSAFE CONDITIONS

You have the right to request formal inspections of unsafe conditions by NIST's Office of Safety, Health, and Environment or OSHA.

7 EXERCISING SAFETY RIGHTS WITHOUT FEAR

You have the right to exercise your safety rights without restraint, interference, coercion, discrimination, or reprisal.

8 FILING GRIEVANCES

You have the right to file a grievance with NIST's Office of Human Resources Management or a complaint with the U.S. Office of Special Counsel if you believe you have been subject to restraint, interference, coercion, discrimination, or reprisal.

YOUR RESPONSIBILITIES

1 TAKING PERSONAL RESPONSIBILITY FOR SAFETY

You are responsible for your own safety and the safety of others, including visitors. This requires speaking up when you have safety concerns.

2 FOLLOWING SAFETY REQUIREMENTS

You are responsible for following all NIST and OU safety requirements that apply to your work.

3 IMPROVING SAFETY

You are responsible for participating as appropriate in the development, implementation, and continual improvement of NIST's safety program and culture.

REPORTING UNSAFE CONDITIONS AND PRACTICES AT NIST

Everyone at NIST has the authority and responsibility to fix or report unsafe conditions and practices observed at work. This includes the right to do so without fear of reprisal.

NIST has a system to enable you to notify your management or others about work conditions or practices that appear hazardous and receive a timely response to your concern.

REPORTING METHOD

If you observe a condition or practice that appears unsafe, take the following actions. You are encouraged to follow steps 1 or 2 first.

1. Identified in *your* work activity or space or in a common area:

- Fix it if you know how to and can do it safely. If you can't fix it immediately, take measures to protect other people from it, if necessary, such as blocking off the area or posting a warning sign. If you fix a serious or possibly life-threatening condition, tell the appropriate managers so they can verify the actions you took were adequate.

  If you fix a condition in a common area, tell the responsible party.

- If you don't know how to fix it safely, you're unable to fix it, or you lack the resources to fix it, take measures to protect other people from it, if necessary. Then request assistance from your management, OU/division safety personnel, the Office of Safety, Health, and Environment (OSHE) at x5375, Option 3, Gaithersburg Plant Service Desk at x6928, or the Boulder Maintenance Service Desk at x3191, or others.

2. Identified in *someone else's* work activity or space:

- Inform the activity or space owner of your concern. If the activity or space owner agrees with your concern, that person should take steps to protect other workers from the hazard, if necessary; fix it; and then let you know that they've fixed it. If the activity or space owner doesn't agree with your concern, that person should explain why.

Continued on back...

3. If you're not satisfied with the way your safety concern was addressed or you choose not to follow steps 1 or 2:

- You have the right to request an inspection of the condition or practice by reporting it to NIST's Chief Safety Officer (CSO) at x5375, Option 3. The OSHE staff member taking your call will verify that you are requesting an inspection (not merely asking for assistance). You will be asked if you prefer your name to be kept confidential.

4. If you're not satisfied with NIST's response to your concern or you elect not to follow steps 1, 2, or 3:

- You have the right to report your concern to OSHA by calling 800-321-OSHA (24 hours a day, 7 days a week). Your name will be kept confidential.

REPORTING RESPONSE FROM CSO

If you report an unsafe condition or practice to the CSO, expect to receive a response within a time frame based on the seriousness of your concern.

- Suspected Imminent-Danger Conditions: OSHE will advise you or a line manager in the responsible OU to secure the work activity or space, and it will inspect the condition **as soon as possible**.
- Suspected Serious Conditions: OSHE will inspect the condition within **3 business days**.
- Suspected Other-than-Serious Conditions: OSHE will inspect the condition within **20 business days.**

EXAMPLES OF UNSAFE CONDITIONS AND PRACTICES

Unsafe Conditions:

- Defective tools, equipment, or supplies.
- Inadequate supports or guards.
- Workplace congestion.
- Inadequate warning systems.
- Fire and explosion hazards.
- Poor housekeeping.
- Hazardous atmospheric conditions.
- Excessive noise.

Unsafe Practices:

- Not following required procedures.
- Lacking or improperly using required PPE.
- Bypassing or removing safety devices.
- Using defective equipment.
- Using tools for unintended purposes.
- Working in hazardous locations without adequate protection.
- Making improper repairs to equipment.
- Wearing improper clothing for the workplace hazards.

The FY 2014 Shared Standard of Safety Performance (3SP) provides specific examples of unsafe conditions and practices related to:

- Tripping hazards.
- Safe use of electrical cords.
- Proper chemical container labeling.

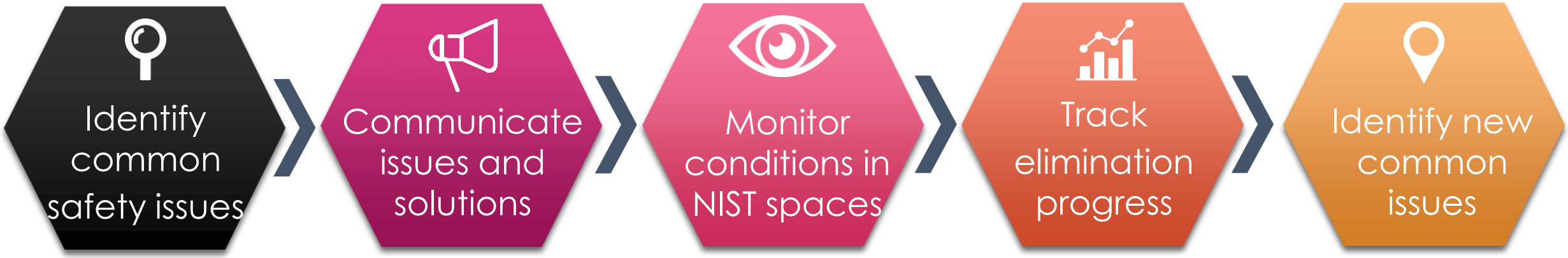
NOTE: Unsafe conditions/practices are NOT considered incidents because they are being caught before events occur that could hurt someone or something. Report incidents using NIST's Incident Reporting and Investigation System (IRIS).

Our Shared Standard of Safety Performance

OVERARCHING PRINCIPLES

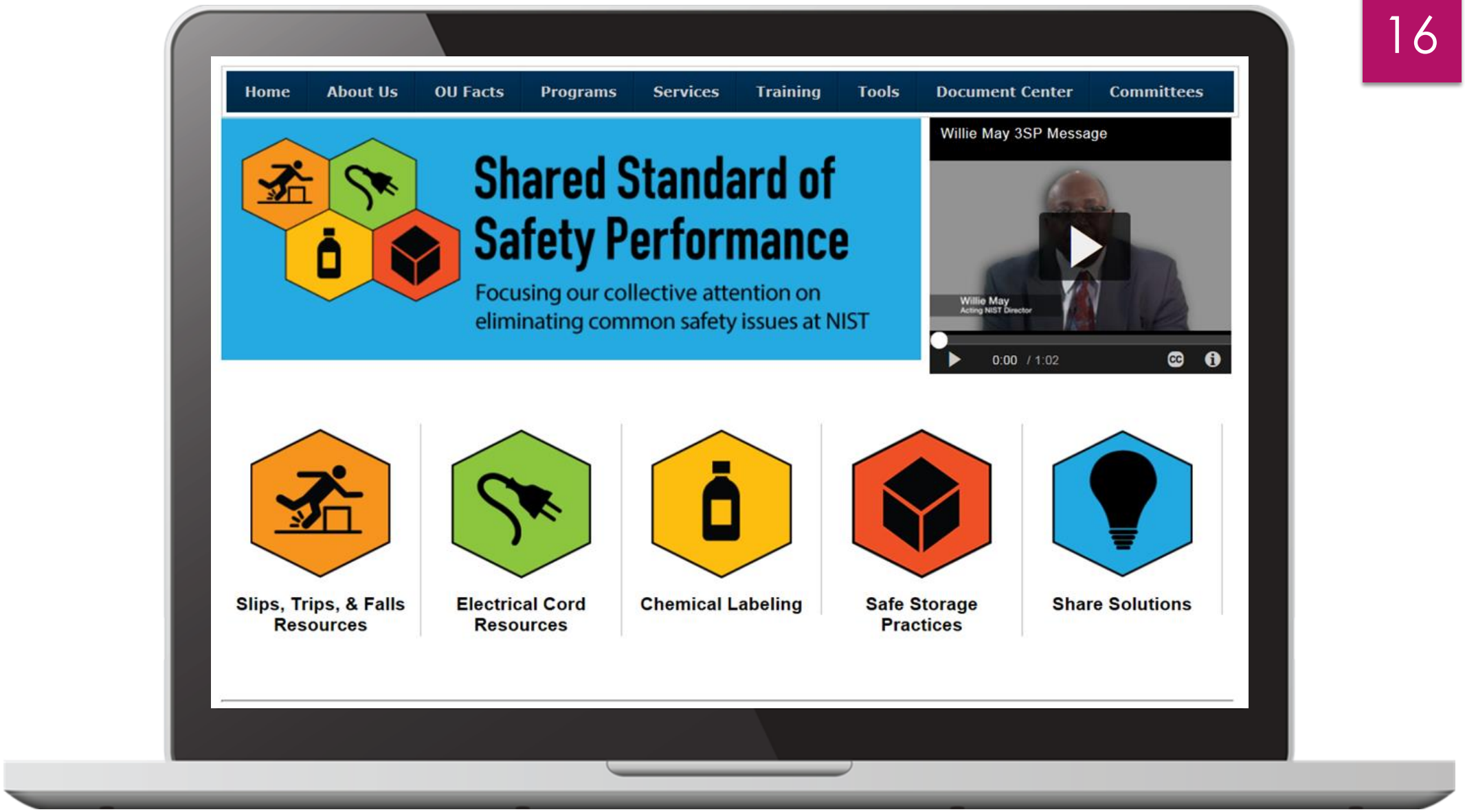
The content of the "Shared Standard" is owned by NIST leadership.

Meeting the "Shared Standard" is owned by all.



Communications: Provide senior executives with training; provide resources to management and staff.

Monitoring: Senior leadership conducts periodic and focused walkthroughs during routine safety management activities, e.g., management observations, laboratory visits. Common issues integrated into the Workplace Inspection Program.


Home
About Us
OU Facts
Programs
Services
Training
Tools
Document Center
Committees
Shared Standard of Safety Performance
Focusing our collective attention on eliminating common safety issues at NIST
Willie May 3SP Message
Willie May
Acting NIST Director
0:00 / 1:02
Slips, Trips, & Falls Resources
Electrical Cord Resources
Chemical Labeling
Safe Storage Practices
Share Solutions

NIST Safety Minutes

Sharing lessons learned across NIST

Strongly Motivated

- INTERNAL AND EXTERNAL INCIDENTS
- WORKPLACE INSPECTION DATA
- MANAGEMENT & STAFF OBSERVATIONS

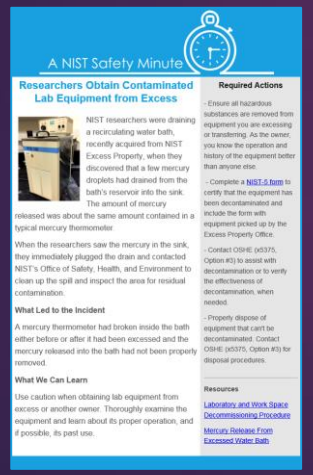
Engaging Content

- CRITICAL-THINKING EXERCISES
- VIDEO STORYTELLING
- PEER-TO-PEER CONVERSATIONS, GOOD CATCHES

NIST Safety Minutes

Sharing Lessons Learned Across NIST

Decontaminating Equipment


A NIST Safety Minute

Researchers Obtain Contaminated Lab Equipment from Excess

NIST researchers were draining a recirculating water bath, recently acquired from NIST Excess Property, when they discovered that a few mercury droplets had drained from the bath's reservoir into the sink. The amount of mercury released was about the same amount contained in a typical mercury thermometer.

When the researchers saw the mercury in the sink, they immediately plugged the drain and contacted NIST's Office of Safety, Health, and Environment to clean up the spill and inspect the area for residual contamination.

What Led to the Incident

A mercury thermometer had broken inside the bath either before or after it had been excessed and the mercury released into the bath had not been properly removed.

What We Can Learn

Use caution when obtaining lab equipment from excess or another owner. Thoroughly examine the equipment and learn about its proper operation, and if possible, its past use.

Required Actions

- Ensure all hazardous substances are removed from equipment you are excessing or transferring. As the owner, you know the operation and history of the equipment better than anyone else.
- Complete a NIST-5 form to certify that the equipment has been decontaminated and include the form with equipment picked up by the Excess Property Office.
- Contact OSHE (x5375, Option #3) to assist with decontamination or to verify the effectiveness of decontamination, when needed.
- Properly dispose of equipment that can't be decontaminated. Contact OSHE (x5375, Option #3) for disposal procedures.

Resources

Laboratory and Work Space Decommissioning Procedure

Mercury Release From Excessed Water Bath

Turnstile Safety Revisited


A NIST Safety Minute

Security Turnstiles Reactivated

The Building 101 security turnstiles were reactivated today (Monday, Jan. 30, 2017) after some changes were made to make them safer. The changes include:

- **The turnstiles will allow one-way traffic only.** When approaching the turnstiles, always stay to your right. Follow the posted entry signs.
- **Sensors will now prevent the doors from closing on people or objects within the turnstile lane.**
- **The turnstile doors are now smaller and lighter.**
- **A security guard will remain posted at the turnstiles during business hours.**

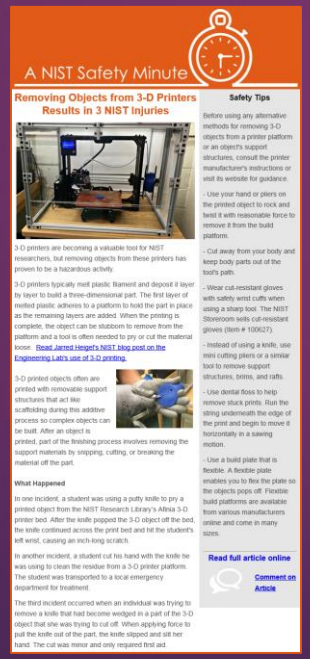
As before, you must swipe your badge before passing through the turnstiles. You can badge guests through, but you must be on the same side of the turnstile as your guests. Badge your guests through one at a time and then badge yourself through after the doors have closed behind your last guest.

CAUTION: Entering from the "DO NOT ENTER" side of a turnstile after someone has badged from the opposite side will cause the doors to close immediately. The turnstiles have sensors located on each end that trigger the doors to close when an unauthorized entry is detected.

Don't miss the NISTube video: https://tube.nist.gov/media/Changes+to+the+NIST+Security+Turnstiles/0_d3v7d5d3

For questions, comments, or suggestions, please contact the Office of Security at 301-975-2660.

Cutting Tools & 3D Printers


A NIST Safety Minute

Removing Objects from 3-D Printers Results in 3 NIST Injuries

3-D printers are becoming a valuable tool for NIST researchers, but removing objects from these printers has proven to be a hazardous activity.

3-D printers typically melt plastic filament and deposit it layer by layer to build a three-dimensional part. The first layer of melted plastic adheres to a platform to hold the part in place as the remaining layers are added. When the printing is complete, the object can be stubborn to remove from the platform and a tool is often needed to pry or cut the material loose. Read Jarred Heigel's NIST blog post on the Engineering Lab's use of 3-D printing.

3-D printed objects often are printed with removable support structures that act like scaffolding during this additive process so complex objects can be built. After an object is printed, part of the finishing process involves removing the support materials by snipping, cutting, or breaking the material off the part.

What Happened

In one incident, a student was using a putty knife to pry a printed object from the NIST Research Library's Afinia 3-D printer bed. After the knife popped the 3-D object off the bed, the knife continued across the print bed and hit the student's left wrist, causing an inch-long scratch.

In another incident, a student cut his hand with the knife he was using to clean the residue from a 3-D printer platform. The student was transported to a local emergency department for treatment.

The third incident occurred when an individual was trying to remove a knife that had become wedged in a part of the 3-D object that she was trying to cut off. When applying force to pull the knife out of the part, the knife slipped and slit her hand. The cut was minor and only required first aid.

Safety Tips

Before using any alternative methods for removing 3-D objects from a printer platform or an object's support structures, consult the printer manufacturer's instructions or visit its website for guidance.

- Use your hand or pliers on the printed object to rock and twist it with reasonable force to remove it from the build platform.
- Cut away from your body and keep body parts out of the tool's path.
- Wear cut-resistant gloves with safety wrist cuffs when using a sharp tool. The NIST Storeroom sells cut-resistant gloves (Item # 100627).
- Instead of using a knife, use mini cutting pliers or a similar tool to remove support structures, brims, and rafts.
- Use dental floss to help remove stuck prints. Run the string underneath the edge of the print and begin to move it horizontally in a sawing motion.
- Use a build plate that is flexible. A flexible plate enables you to flex the plate so the objects pops off. Flexible build platforms are available from various manufacturers online and come in many sizes.

Read full article online

Comment on Article

Slips on Ice & Snow


A NIST Safety Minute

What Happened

On a Wednesday last March, a large snowstorm hit the NIST-Boulder campus. During the day, the snow continued to fall and the site lost power multiple times. Freezing night temperatures turned wet and snowy surfaces to ice. The next morning, the site was still closed, but a facilities employee was called in to help power up systems that were down from Wednesday's power outages. Around 6 a.m., he left his building and began walking across the campus for a meeting to discuss the power outages. As he stepped off the sidewalk onto the pavement, his feet slid out from under him and he fell to the ground, striking his head on the pavement.

He believes he may have briefly lost consciousness. When he regained it, he says he couldn't move anything or feel anything, but began calling out for help. A worker in the nearby central-utility plant heard him and helped him inside a building until an ambulance arrived. He was taken to a local emergency room where he was diagnosed with a contusion on the front of his brain, produced by the hard strike to the back of his head. The head trauma caused him to lose control of his right leg, which required weeks of physical therapy to regain.

Lesson Learned

Incident investigators said the lesson learned from this incident is for NIST to provide all employees required to report to work when the site is closed due to inclement weather, with the same special heel-traction devices issued to those involved in snow clearance operations.

How to Prevent it From Happening to You

With 3 to 4 more months of winter ahead, it is important not to underestimate the dangers of snow and ice. While no snow- or ice-related incidents have been reported this winter season, each year, winter-related slips and falls seriously injure our fellow colleagues. These injuries have resulted in trips to the emergency room, surgery, physical therapy, and days away from work.

Even when surfaces do not look icy or slippery, it is possible that a thin sheet of transparent or "black ice" is covering your path and putting you at risk for a fall. At NIST, injuries have occurred from slips on ice patches hidden under a light dusting of snow.

To help avoid a winter slip and fall, keep these tips in mind:

- Take small steps and walk slowly and deliberately with your hands outside your pockets to maintain balance.
- Wear boots with good traction or slip-resistant footwear such as Yaktrass or Microspikes.
- Be extremely cautious when getting in and out of your vehicle and walking to and from your home or building. Most winter-related slips and falls occur when people are leaving their homes and getting out of their vehicles.
- Look out for slippery floors when entering buildings.

Take care and enjoy your holiday!

Thorough Hazard Reviews


A NIST Safety Minute

What Happened

A corrosion experiment was being performed in a pressure vessel containing supercritical carbon dioxide and nitric acid at 1,100 psi and 45 °C. On the fourth day of the experiment, the pressure vessel unexpectedly vented into the walk-in enclosure where it was housed, setting off an alarm (IRIS Case No. 16-IB-0041).

A researcher assumed it was an oxygen deficiency alarm, contacted the Boulder safety office, and then secured the area. Personnel from the safety office arrived with an oxygen meter, and it was determined that it was a nitrogen dioxide alarm sounding, not the oxygen monitor.

Why it Happened

New Gasket

Corroded Gasket

The vessel was originally designed for high-pressure and high-temperature corrosion experiments using carbon dioxide, but not nitric acid. The addition of nitric acid into the vessel had only begun recently.

The investigation found some of the pressure vessel's gaskets were made of copper, which reacts with nitric acid, a strong oxidizing agent that forms a poisonous gas (nitrogen dioxide) when exposed to copper and other compounds. In this incident, the nitric acid corroded the gaskets (see image on left) in the vessel to the point that they failed under pressure, allowing the vessel's contents to escape into the walk-in enclosure (pictured above).

The researchers were unaware of the copper gaskets in the vessel.

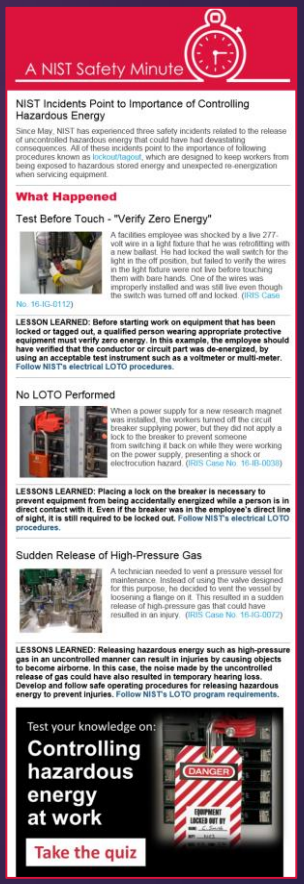
How to Prevent it from Happening to You

1. Hazard reviews need to dig deep into the details of a new operation. In this case, the vessel was not specifically assembled for use with nitric acid, which should have raised a red flag. The gaskets and other small components that came with the vessel were not specifically addressed in the hazard review.
2. Whenever the conditions of an experiment change, such as increasing the quantity of chemicals involved--or, in this case, adding a new corrosive agent to the test atmosphere that has unique incompatibilities with other chemicals and metals--the effect that the change may have on safety must be considered. A new hazard review must be performed.
3. Whenever a lab has more than one sensor or alarm, be sure you know each alarm's unique sound and which sensor it is connected to in the lab. If you cannot tell which alarm is sounding, take precautions against all hazards (oxygen deficiency, poisonous gas) that might possibly be present.
4. In this experiment, redundant engineering controls were designed in and were effective at controlling the potential hazard, but engineering controls should not be your first line of defense. It is a safer option to foresee potential hazards and mitigate any risk before an incident occurs. In this incident, the experimental designers should have been aware of the types of materials and components used in the pressure vessel, the incompatibilities of the chemicals being used in it, and the potential effect of nitric acid on copper (corrosion and formation of a poisonous gas).

Questions? Need Safety Assistance? Contact OSHE at x5375, Option #3

SAFETY.NIST.GOV

Following Lockout/Tagout


A NIST Safety Minute

NIST Incidents Point to Importance of Controlling Hazardous Energy

Since May, NIST has experienced three safety incidents related to the release of uncontrolled hazardous energy that could have had devastating consequences. All of these incidents point to the importance of following procedures known as lockout/tagout, which are designed to keep workers from being exposed to hazardous stored energy and unexpected re-energization when servicing equipment.

What Happened

Test Before Touch - "Verify Zero Energy"

A facilities employee was shocked by a live 277-volt wire in a light fixture that he was retrofitting with a new ballast. He had locked the wall switch for the light in the off position, but failed to verify the wires in the light fixture were not live before touching them with bare hands. One of the wires was improperly installed and was still live even though the switch was turned off and locked. (IRIS Case No. 16-IG-0112)

LESSON LEARNED: Before starting work on equipment that has been locked or tagged out, a qualified person wearing appropriate protective equipment must verify zero energy. In this example, the employee should have verified that the conductor or circuit part was de-energized, by using an acceptable test instrument such as a voltmeter or multi-meter. Follow NIST's electrical LOTO procedures.

No LOTO Performed

When a power supply for a new research magnet was installed, the workers turned off the circuit breaker supplying power, but they did not apply a lock to the breaker to prevent someone from switching it back on while they were working on the power supply, presenting a shock or electrocution hazard. (IRIS Case No. 16-IB-0038)

LESSONS LEARNED: Placing a lock on the breaker is necessary to prevent equipment from being accidentally energized while a person is in direct contact with it. Even if the breaker was in the employee's direct line of sight, it is still required to be locked out. Follow NIST's electrical LOTO procedures.

Sudden Release of High-Pressure Gas

A technician needed to vent a pressure vessel for maintenance. Instead of using the valve designed for this purpose, he decided to vent the vessel by loosening a flange on it. This resulted in a sudden release of high-pressure gas that could have resulted in an injury. (IRIS Case No. 16-IG-0072)

LESSONS LEARNED: Releasing hazardous energy such as high-pressure gas in an uncontrolled manner can result in injuries by causing objects to become airborne. In this case, the noise made by the uncontrolled release of gas could have also resulted in temporary hearing loss. Develop and follow safe operating procedures for releasing hazardous energy to prevent injuries. Follow NIST's LOTO program requirements.

Test your knowledge on:

Controlling hazardous energy at work

Take the quiz

DISCUSSION