SAND2012-0267C

Emergency and Incident Planning & Response

Module 11

Learning Objectives

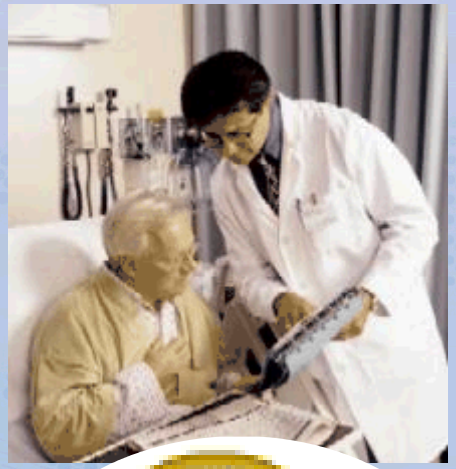
- Define and recognize incidents and emergencies
- Understand how best to respond to emergencies and incidents
- Describe selected response procedures and train using these procedures

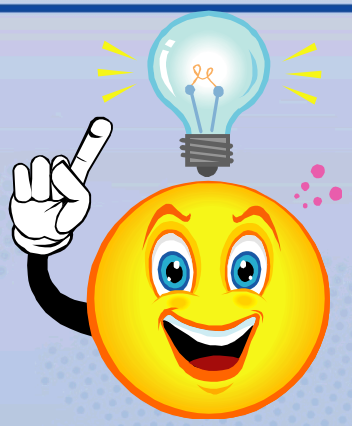
Group Activity #1

Definitions

- Define incident and emergency
- Compare definitions within your group
- Share with the class

The Incident Cycle





Awareness

Investigate

Communicate

ACTION

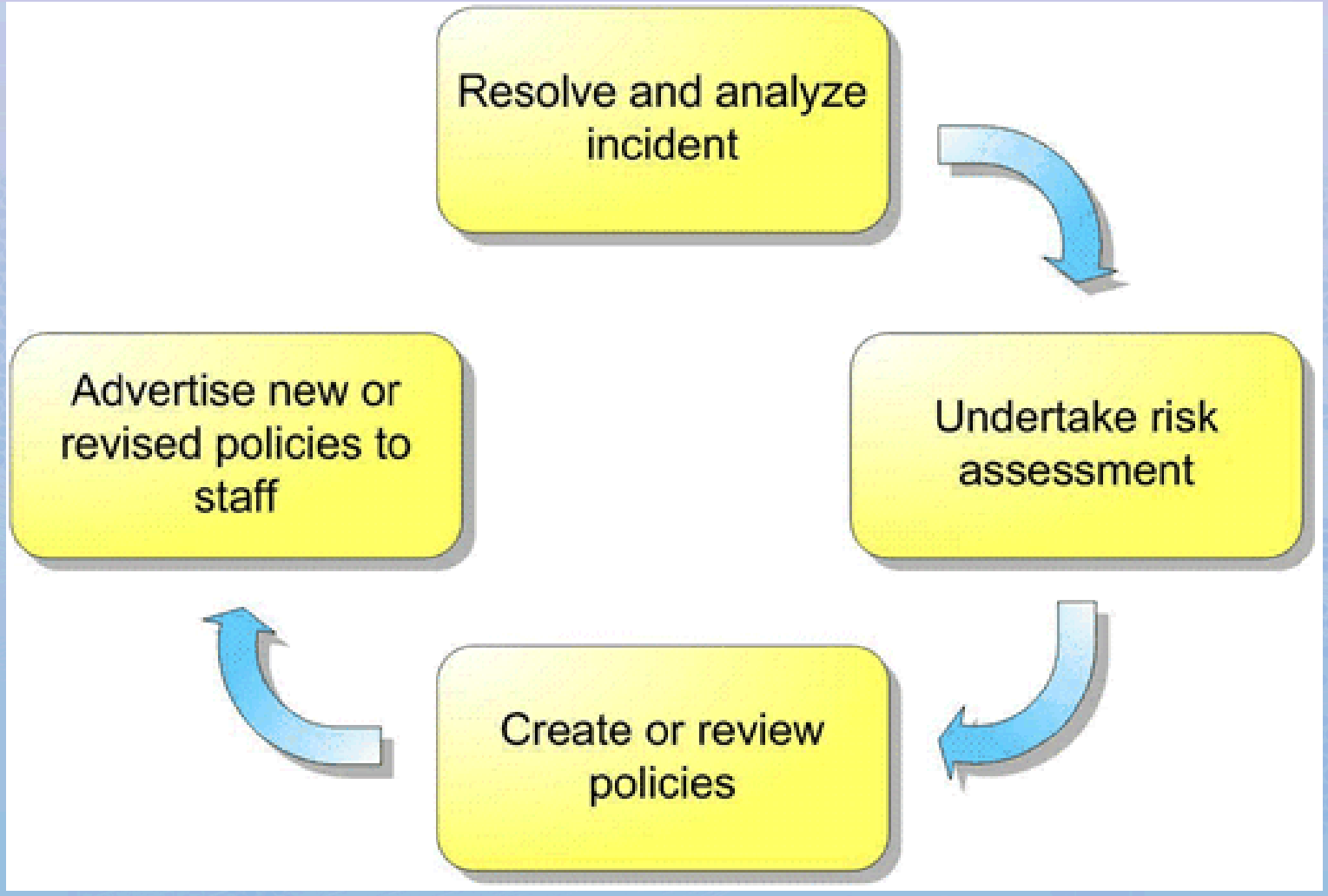
4

Definitions

- **Incident**
  - An event that's likely to have adverse consequences

- **Emergency**
  - Unanticipated circumstances resulting in need for immediate action

Resolution and Corrective Action Cycle



Group Activity #3

- In your group, take 10 minutes to list things that can go wrong in a Bio-laboratory. Use ***post-it notes*** (1 per post-it-note) to write down your answers and put on your flip chart.

Not All Incidents Are Necessarily Emergencies

Group Activity #4

Incidents Are Not Necessarily Emergencies

- **Which of the incidents on your list are emergencies?**

Incidents Are Not Necessarily Emergencies

Incidents	Emergencies	Notes

Break #1

EXAMPLES OF EMERGENCIES AND INCIDENTS

- Natural Disasters
- Lab Emergencies
- Lab Incidents

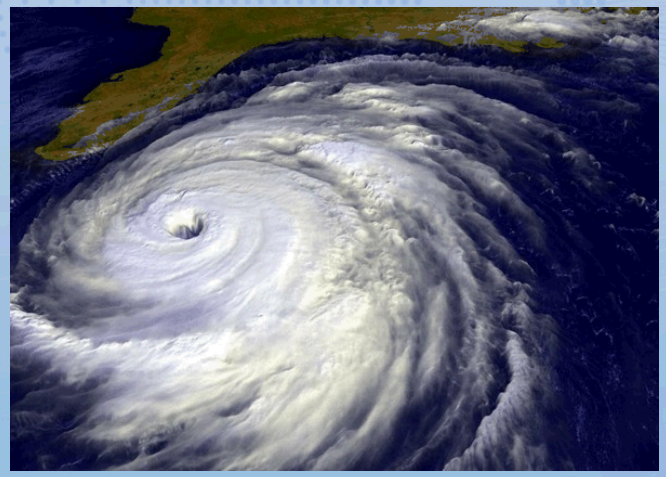
CVW10

Slide 12

CVW10 LouAnn,
How should we deal with this section?
Cecelia V. Williams, 12/14/2011

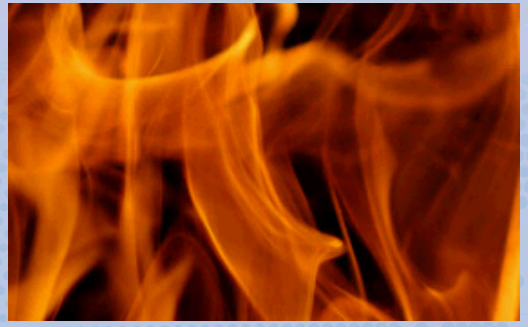
Natural Disaster: Emergency?

- Least probable incident
- Contingency plans should be in place
- Warn emergency services of potential hazards
  - Pre-planning
  - Drills and exercises
  - Facility tours
- A trained laboratory worker should accompany emergency personnel.
- Infectious materials should be collected in leak-proof boxes or strong disposable bags
- Examples:
  - Earthquakes
  - Tornadoes
  - Hurricanes
  - Tsunamis
  - Floods



Fire

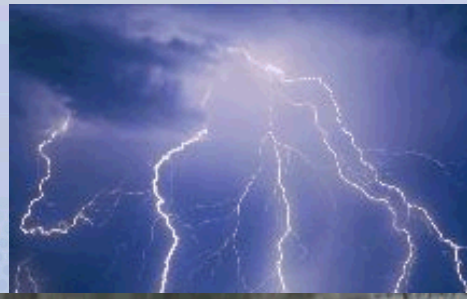
- Evacuation planning
- Fire safety and evacuation training
- Fire extinguisher location and training
- Emergency exit doors from BSL3 lab and facility
- What if workers need to shower out?
- Emergency service provider access
- Pre-planning
  - Training
  - Drills
  - Exercises



Power Outage

If time permits:

- Switch equipment to backup power if available and if not done automatically
  - Facility backup power
  - Emergency generator
    - Test frequently
    - 24 hour capability
- Turn off equipment not on back-up power



In June 2007, an hour-long power outage at CDC's new BSL-4 lab in Atlanta, caused by failure of a backup generator to turn on automatically, raised serious questions about the safety of the agents inside the facility.

Medical Emergency

- **Exposures, Injuries, or Illnesses**
  - Decontamination
  - Emergency service provider access
  - Pre-planning
    - Training
    - Exercises
    - Drills
  - Example scenarios
    - BSL3-Ag lab in Iowa that worked with *Brucella* species
    - Man's leg was broken as a result of being kicked by a horse.
    - What now?

Incident: Spill

What could happen?

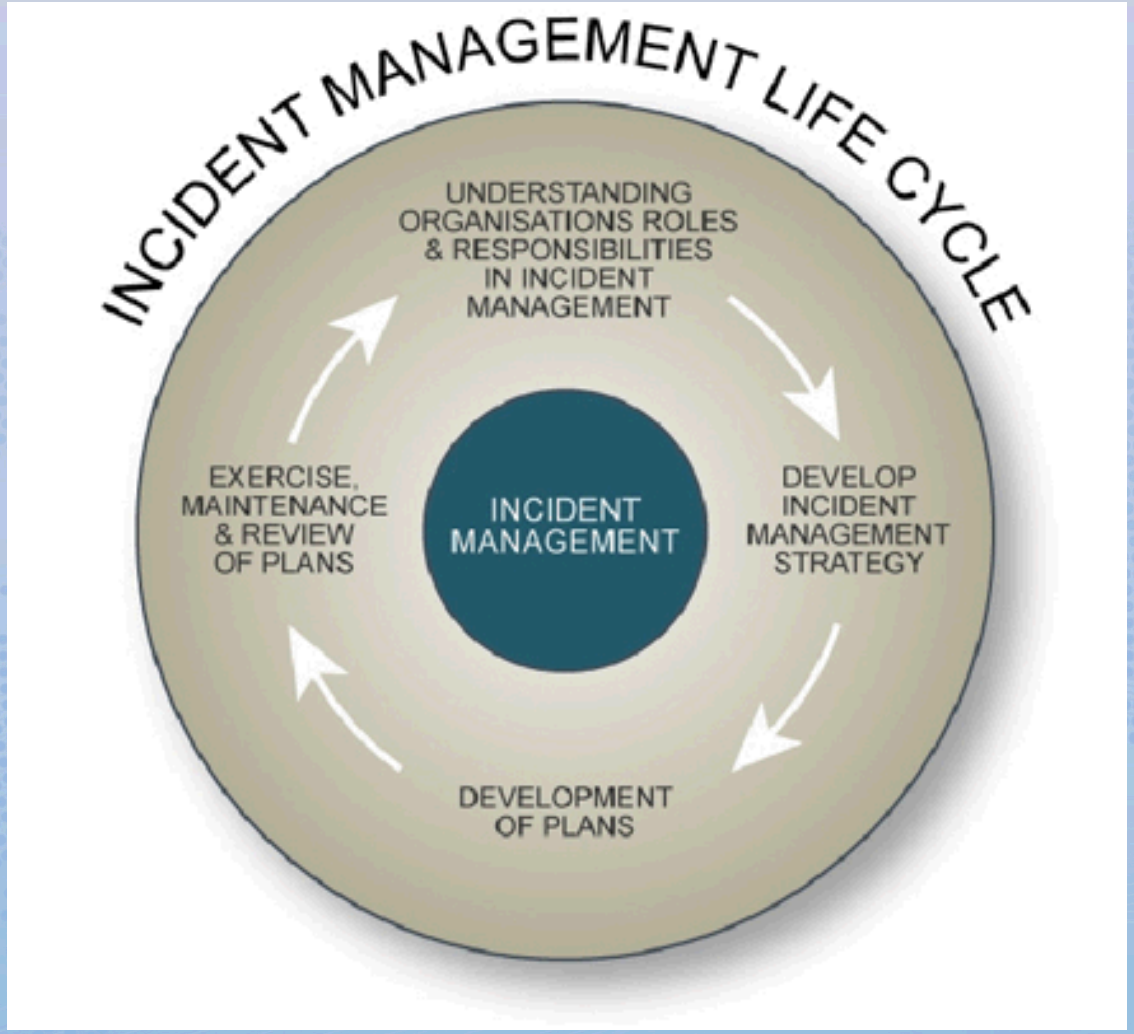
- **Recognize, Avoid, and Alert**
- **Isolate:** Cover with an absorbent material soaked with proper disinfectant
- **(Exit the area if spill is large)**
- **Notify**
  - Biosafety officer
  - Lab Manager
  - Hazmat if necessary
- **Mitigate**
  - Don proper PPE
  - Clean spill with proper procedure
  - Decontamination if necessary
- **Review the incident**
  - Root Cause Analysis

Unauthorized Entry

- **Preplan** to implement measures prior to incident
  - Facility personnel must be able **to recognize** unauthorized individuals
- **Train** personnel on appropriate response
  - If **non-threatening**: approach person, ask if they need assistance directions?
  - If **threatening**, avoid, and call security
- If evacuation is appropriate and there is time
  - Isolate the area first
  - Don't leave experiments on the bench if time is not a factor
  - Lock doors, freezer, etc
- **Notify appropriate personnel**
  - Security and Police/Fire
  - Lab manager and Biosecurity Officer
  - Other agencies as needed, Community? Media?

Do **Not** Make the Situation Worse

Incident Management Life Cycle



Why Incident Management?

- Structured process developed in advance to mitigate incidents/emergencies
- Tool to minimize the incidents
  - Preplanning
  - Anticipate incidents
  - Implement preventive measures
- Enhance ability to respond to incidents
  - Know what to do
  - Minimize panic
- Attempt to minimize loss or injury
- Enhance ability to recover from incidents

Group Activity #5

- **Take 10 minuets to answer the following question:**
  - **What needs to considered when drafting an Incident Response Plan?**
- Use ***post-it notes*** (1 per post-it-note) to write down your answers and put on your flip chart.
- **Report to Class**

Incident Response Considerations

Considerations	Whose is Responsible?

Incident Response Plan

- **Policies and procedures for managing all incidents**
  - "What and How" of managing an incident
- **Based on facility needs and applicable regulations**
- **Foundation of procedures for protection of**
  - Employees
  - Facility
  - Community

Group Activity #6

- **Take 20 minutes to outline the Stages in Responding to a Bio-Laboratory Incident.**

- Use ***post-it notes*** (1 per post-it-note) to write down your answers and put on your flip chart

- **Report to Class**

Stages in Responding to a Bio-Laboratory Incident

Stages to Responding to a Bio-Laboratory Incident	Whose is Involved?

Incident Awareness

Incident Awareness *= recognition of an incident + appropriate response*

Incident Awareness:

- Must be developed and understood so that it becomes a part of the facility culture
- Requires a “real” commitment
- Requires up-and-down communication flow

It’s everyone’s responsibility!

Break 2

Incident Education and Awareness Programs

Establish initial entry classes, refresher education, and awareness events and programs

- The subject matter may cover a wide variety of topics
- Should be tailored to match the potential threats, change of work scope, and procedural updates

Preventing and Dealing with Incident

Prevention –Mitigation - Use engineering controls, safety equipment and PPE to minimize impact if an accident occurs (e.g. – biosafety cabinets, eye protection)

Respond – First responsibility is to protect life and health, then to decontaminate

Report - Internal reporting: accidents involving risk group 3 and 4 agents have additional reporting requirements

Monitor - Monitor the health of those affected as well as other personnel who are potentially at risk if the same accident was to recur; monitor the potential spread of the agent

Investigate – Conduct a root cause analysis of why and how the accident occurred (include lab manager, biosafety, and personnel involved in the incident

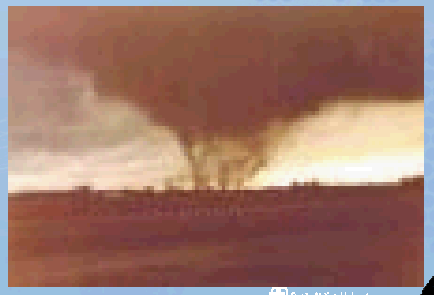
Prevent reoccurrence - Review risk assessments and SOPs to minimize the possible of reoccurrence of this type and/or similar incidents

Communicate – Report findings to management, appropriate regulatory body, and lab personnel

Risk Mitigation[3]

- **Mitigation**
  - Actions and control measures that are put into place to reduce or eliminate the risks
- **Example of Mitigation:**

  Severe weather scenario
  - No way to alter *probability*
  - Can alter *magnitude of the effect* by controls
    - Structures designed to withstand winds and with consideration of possible flooding
    - Back-up power
    - "Stand-down" procedures during threat
    - Pre-planned responses
    - Multiple-layer response team



Slide 31

3 LouAnn,
Is there some reason that we are not using a biological example?
Cecelia
Cecelia Williams, 11/29/2011

Coordinate with Local Responders

- **Identify potential responders**
  - Fire, police, hazardous materials team, bomb squad, local terrorism response coordinators, emergency medical services, hospitals, infectious disease physicians, local public health agencies

- **Memorandum of Agreement with potential responders as needed**
  - Understand the hazards
  - Response times
  - Understand internal response at facility
  - Points of contact
  - Agreement to review plan periodically

Coordinate with Local Responders Continued

- **Awareness training**
  - Roles/responsibilities/expectations
  - Building maps and access protocols
  - Fire alarm and monitoring systems
  - Hazardous materials awareness (chemical, radiological, biological)
  - Emergency procedures
  - Facility tours
- **Yearly Review and update training** as necessary
  - Ensure plan is adequate
  - Incorporate changes to reflect current status of facility

Communicating with the Public and Media

- **Be Prepared! One Focal Point!**
- **Be Accurate, Credible, and Timely**
- Spe**ak Clearly and with Compassion**

Example of an Incident Response : Building Evacuation

- Shut down equipment,
  - **if time allow**
  - Have an established protocol
- Take personal belongings
  - Only if close by
- Close doors
- Avoid elevators in fire emergencies and any situation that will affect the elevator operation
- Exit lab, proceed to nearest exit, leave the building (evacuation plan)

Example: Building Evacuation Continued

- **Assemble** at predetermined location
- **Accountability**
  - Make sure everyone leaves facility
- **Someone must be in charge**
  - Police/Fire
  - Biosafety/biosecurity officer
- **Wait until "All Clear" to enter the facility**
  - Who determines "All clear"?
  - Who is the facility liaison to receive the "all clear"?
  - How is "all clear" communicated to personnel?

Group Activity #7

Incident and Response Identification

Based on your own lab

- List relevant incidents that you have experienced or could realistically happen
- List responses
- List results

Group assignment: incident and response identification

Incident	Response	Result

Group Activity #8

Response Measures

Based on a specific lab incident (Activity #4)

- Document the response
- Document corrective actions

Group assignment: Response Measures

Incident	Response	Corrective action

Lunch

Group Activity #10: Safety Equipment in a Bioscience Laboratory

In your group, take 10 minutes to list Safety Equipment in a Bio-laboratory. Use ***post-it notes*** (1 per post-it-note) to write down your answers and put on your flip chart.

Safety Equipment in a Bioscience Laboratory

- Spill Kits: biological, chemical, & universal
- Safety Cabinets: Flammable, Corrosive
- Eye Wash, Safety Shower
- Fire Extinguisher
- Fire Blanket
- First Aid Kit

Group Activity #9: Safety Equipment in a Bioscience Laboratory

- In your group, take 10 minutes to:
  - Identify the functions of the equipment
  - Describe the equipment (i.e. what are the components of a biological spill kit)
  - Describe how the equipment is used
  - Any other important information?
- Use ***post-it notes*** or your flip chart
- Report to class

Universal Spill Kit

- **Used for a chemical spill**
- **5 gallon kit includes**
  - 5 gallon pail
  - 4-48 x 3-in. socks
  - 12-12 x 12 x 3/16-in. sheets
  - poly disposal bags
  - hazardous label
  - 1 pair of nitrile gloves

Chemical Spill Kit

- **Includes**
  - Green Z (solidifies aqueous spills),
  - Red Z (solidifies blood/body fluids),
  - Acid Lock (neutralizes/solidifies acids),
  - Alky (neutralizes/solidifies caustics and alkalines)
  - Petro Lock (solidifies organic and petroleum based spills).
  - Acid resistant nitrile gloves
  - Pick-up scoop with scraper
  - Waste bags
  - Hazardous/non-hazardous labels

Biological Spill Kits

- Commercially available
- Do it yourself
  - Small disposable broom with dustpan, tongs or forceps
  - Biohazard waste bags
  - Disinfectant agent suitable for the agents in the lab
  - Paper towels or other absorbent material
  - Dike material or spill pillows for large spills
  - Spill control and cleanup procedures
  - Sharps container
  - Warning signs
  - Storage container

Flammable Cabinet

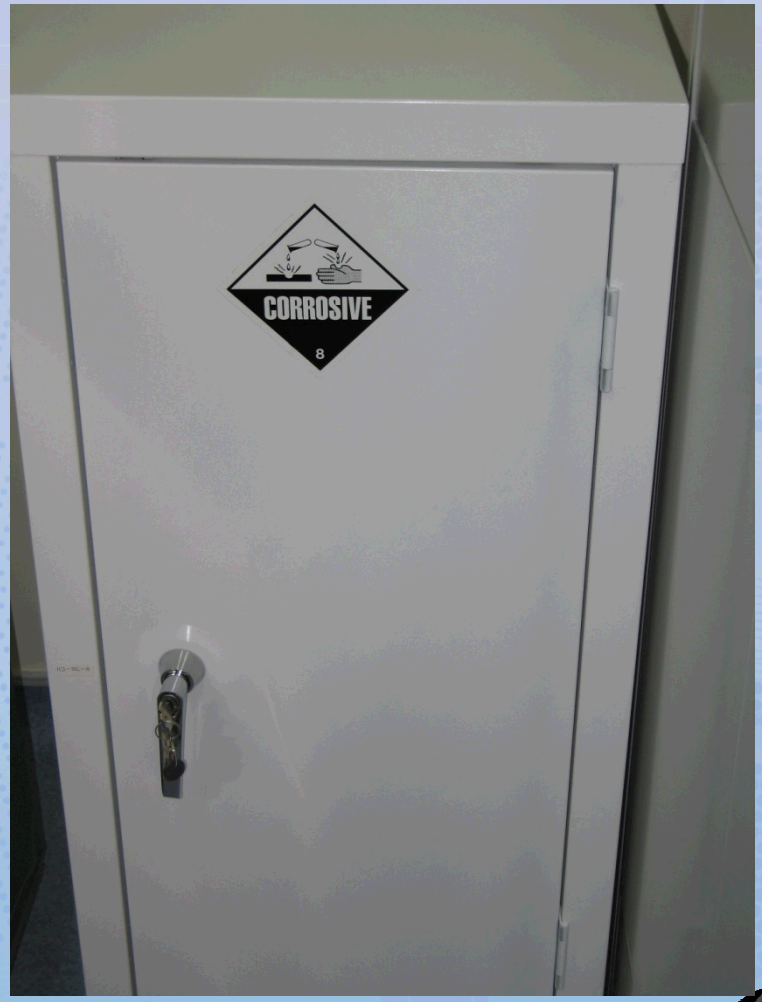
- Flammable liquids in containers 500 mL or larger shall be stored in NFPA-approved flammable cabinets.
- The total volume of flammable liquids stored outside of an NFPA-approved storage cabinet shall not exceed 1 gal (3.8 L).
- Corrosive materials and oxidizers shall not be stored inside flammable storage cabinets.
- Do not store combustible materials, such as cardboard boxes and paper near flammable liquid storage cabinets
- Must be grounded

Corrosive Cabinet

- **Corrosive Cabinet**

The following chemical classes should always be kept separated from one other:

- **Corrosive Materials** should be stored separately from:
  - Oxidizers
  - Poisons
  - Flammable Liquids and Solids
- **Oxidizers** should be stored separately from:
  - Corrosive materials
  - Flammable and combustible liquids
  - Poisons
- **Poisonous Liquids and Solids** should be stored separately from:
  - Corrosives
  - Oxidizers
- **Organic Peroxides** should be stored separately from all other chemicals.



Eye Wash & Safety Shower

- **Eye Wash Station**
  - *A designated location where personnel can seek immediate fluid for washing of the eyes*
  - Eyewash stations should be checked monthly to ensure eye wash solution has not expired
  - Contact lenses are not permitted in the laboratory.
- **To use the Eye Wash Station**
  - Flush the eyes for **at least 15 minutes.**
  - After thorough washing, notify laboratory director and seek medical care
- **Safety Shower**

Fire Extinguisher

- The fire extinguisher gauge should be checked at least monthly.
- Needle in full position

Report use of fire extinguishers to the Safety Office

Fire Extinguisher

- **Use**
  - Small contained fires
    - Class A, B and C
  - All fires must be reported to the director.
- **Operation: PASS**
  - **P**ull the pin to release the handle.
  - **A**im the nozzle at the base of the fire
  - **S**queeze the handle to activate the extinguisher
  - Using a **S**weeping motionMove the nozzle from side to side in a

Fire Blanket

- **Fire Blanket**
  - The fire blanket container should be placed at a point of greatest potential hazard.
  - If a person's clothes catch on fire while in the laboratory, locate the fire blanket.
  - Remove the fire blanket from the container and wrap the individual in the blanket and smother the fire until it is out.
  - After using the fire blanket, re-roll tightly and replace in container.

First Aid Kit

- The First Aid Kit should only be used for minor injuries.
- First Aid Kits should be located within or close to the laboratory.
- The location and phone number of emergency services should be clearly posted.
- A designated person should be responsible for monitoring and maintaining the first aid kit.

Incident Response

- **General Incident**
  - Notify security
- **Biological Incident**
  - Biological spill exercises should be performed yearly
- **Emergency Incident**

General Incident Procedures

- Safety equipment should be properly maintained and ready for use at any time.
- Provide training on safety equipment for laboratory personnel
- Keep the area in front and around the safety equipment free from obstruction.
- Practice drills improve performance during actual incidents
- Report any accidents or fires to the laboratory director

Break 3

Emergency Procedures

- Assembly point - a designated spot where employees will gather after an emergency has occurred

- At the assembly point, Security will coordinate:
  - Evacuation activities
  - Headcount procedures
  - Seal off the affected area(s)
  - Contact emergency services

Emergency Procedures: Security Incident\Emergency

- Earthquakes
- Fire
- Flooding
- Security Incident
- Bomb Threats
- Explosion

Group Activity #11: Emergency Procedures

- In your group,
  - Select one of the Incidents/emergencies
  - Outline procedures to respond to the emergency
  - Use your flip chart
- Report to the class

Emergency Procedures: Earthquakes

- If you are outside

- If you are inside a building

- After the earthquake:

Emergency Procedures: Fire

- If you discover fire or see smoke:

Emergency Procedures: Fire

- **If you hear a fire alarm:**

Emergency Procedures: Flooding

- **When flooding occurs**:

Emergency Procedures: Security Incident

- What should you do?

Emergency Procedures: Bomb Threats

- During normal business hours:

- During non-business hours

Emergency Procedures: Bomb explosion

- **Should a Bomb Explosion**

Emergency Procedures: Earthquakes

- **If you are outside**
  - Stay outside
  - Move quickly to an open area
- **If you are inside a building**
  - Stay inside
  - Do not evacuate or go outside
- **After the earthquake**:
  - Check for injuries, give or seek first aid
  - Alert emergency responders
  - Assist any disabled persons
  - With the biosafety representative, clean up any infectious spills, once area is safe

Emergency Procedures: Fire

- If you discover fire or see smoke:
  - Secure infectious materials if it can be accomplished safely (e.g., in refrigerators, BSC)
  - Alert others to the emergency
  - Activate the fire alarm as you exit the building

- From a safe location, report the fire to the Safety Office and other authorities

- Do not reenter the building until instructed to do so

Emergency Procedures: Fire

- **If you hear a fire alarm:**
  - Proceed to the nearest exit
  - Evacuate the building using stairwells and corridors
  - Do not use the elevator
  - Do not open any doors until you have felt the door handle and upper door for heat
  - If you encounter excessive smoke, get as low as possible and crawl to the nearest exit
  - Once outside, move to the designated assembly point

Emergency Procedures: Flooding

- **When flooding occurs**:
  - Secure infectious materials
  - Move paper and electronic records to higher ground
  - Evacuate areas that are endangered
  - Proceed to assembly point
  - Stay out of effected area
  - Do not return to building until instructed to do so

Emergency Procedures: Security Incident

- The natural tendency of people in a security incident is to get out of harm's way as soon as possible. This is not recommended because:
  - You could be killed or captured by roving intruders.
  - You could be wounded or killed by responding security force personnel who mistake you for an intruder.

Emergency Procedures: Bomb Threats

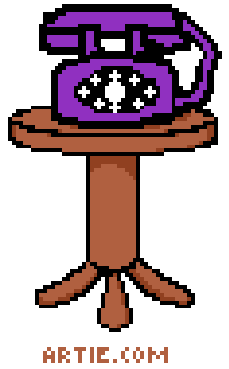
- **During normal business hours:**
  - Complete the bomb-threat checklist form to the extent possible while taking the telephone call
  - Immediately contact security after the telephone call or as soon as possible
- Security will contact and coordinate with law enforcement
- Security will make recommendations to Senior Laboratory Management
- Prior to evacuation-
  - Check work area for items or packages that are not normal
  - Do not touch, remove or manipulate any suspicious item or package; notify security
  - Secure all infectious biological materials
- **During non-business hours**
  - Complete the bomb-threat checklist form to the extent possible while taking the telephone call
  - Immediately contact security after the telephone call or as soon as possible

Bomb Threat

BOMB THREAT CHECKLIST FORM

Remember to remain calm and courteous. Listen carefully. Do not interrupt the caller. Try to keep the caller on the line and talking as long as possible.

Your name:	Date	Phone	Time Call Received
Exact Words of Caller:			



Questions to Ask:

When is the bomb going to explode?	
Where is the bomb right now?	
What kind of bomb is it?	
What does it look like?	
Why did you place the bomb?	
Where are you calling from?	

Origin of call: ☐ Local ☐ Long Distance ☐ Booth ☐ Internal
Description of Caller's Voice: ☐ Male ☐ Female ☐ Young ☐ Old
Characteristics: ☐ Loud ☐ Soft ☐ High pitched ☐ Deep ☐ Raspy ☐ Pleasant ☐ Intoxicated ☐ Other: _____ Speech
Pattern: ☐ Fast ☐ Slow ☐ Distinct ☐ Distorted ☐ Stutter ☐ Nasal ☐ Slurred ☐ Other _____
Manner ☐ Calm ☐ Angry ☐ Rational ☐ Irrational ☐ Emotional ☐ Righteous ☐ Laughing ☐ Other: _____
Accent: ☐ Local ☐ Not local ☐ Foreign ☐ Regional ☐ Other: _____
Use of Certain Words or Phrases:_____
If the voice seemed familiar, who did it sound like?

Emergency Procedures: Bomb explosion

- **Should a Bomb Explosion occur-**
  - Fire alarms will activate
  - Prior to proceeding to the assembly area, ensure that the area is safe
  - Secure infectious materials (e.g., close sash of BSC) if it is safe to do so.
  - Proceed to the assembly point or other safe location

Emergency Procedures: Summary

- In case of a **flood, fire, bomb threat, or bomb explosion**:

  → evacuate the building

- In case of an **earthquake**:

  → take shelter

- Report **all emergencies** to the Security Office

Break 4

Decontamination

- **Procedures depend on whether the incident is:**
  - Non life-threatening: simple incident
  - Life-threatening incident becomes an emergency
  - Both situations may occur during one event.

Decontamination Procedures: Incident

- **Non life-threatening**
  - Store or control infectious material
  - If necessary, remove contaminated clothing following proper doffing procedure to avoid spreading contamination
  - Wash hands with soap and water to remove contamination
  - Exit lab using routine exit procedure
    - Avoid tracking contaminant out of the laboratory
  - Seek immediate medical attention, as needed
  - Notify biosafety officer/lab manager
  - Fill out incident report
  - Post-exposure follow up
  - Evaluate incident:
    - Identify root cause
    - Correct potential issues with procedure that resulted in incident
    - Identify additional training requirements

Incident Procedures: Decontamination (cont.)

- **Additional considerations immediately after incident**
  - Area decontamination may be needed
  - Post-exposure treatment for contaminated individuals
  - Follow up for assisting individuals, including responding agency personnel
  - Review incident to identify any potential issues with incident and response
- **Time is of the essence!**
  - Identify/practice proper evacuation procedures before incidents occur
  - Safety of individuals is the priority

Decontamination: Emergency Procedures

Life-threatening

- Call for assistance **immediately** (fire department, medical assistance, biosafety officer)
- If possible move injured person out of the contaminated area and quickly remove contaminated clothing
    - Removes ~80% of contaminant
- Wash hands with soap and water or rinse to remove gross any contamination
- Remove the injured person from the lab as quickly as possible
  - Initiate necessary emergency medical treatment
    - Cardiopulmonary resuscitation (CPR)
  - Notify responding agency of potential contaminant

Conclusions

Key considerations for thinking about incidents	Covering

Lesson Wrap-Up

- In your groups, discuss what you learned (10 minutes)
- Write down each item you discuss on an index card (**one item per card**)
- You have **10 minutes** – try to identify as many items as you can!

Key Messages

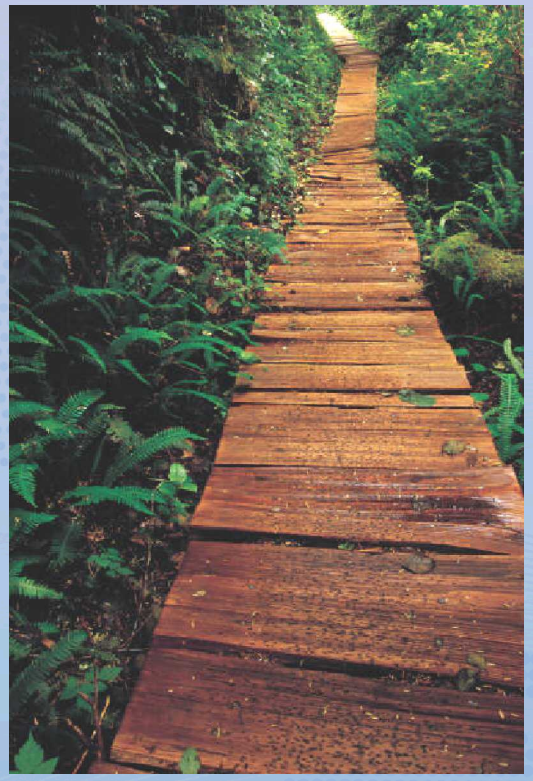
- Defining an incident
- Incidents are not necessarily emergencies
- Key concepts of recognizing incidents
- Key concepts of responding to an incident
- The number of incidents should be limited
- The effects of incidents should be mitigated
- The information from this lesson may be useful in a variety of laboratory settings and procedures

Resources

- CEN Workshop Agreement 15793:2008.
- CEN Workshop Agreement pr55:2011 – Guidance on CWA 15793:2008
- WHO, *Laboratory Biosafety Manual*, 3rd Edition, 2004.
- WHO, *Biorisk Management: Laboratory Biosecurity Guidance*, WHO, 2006.

Individual Reflection and Evaluation

- Based on this lesson, complete the **learning contract** in your workbook.
  - Write down 3 – 5 specific steps you plan to take when you return to your institution
  - When you are finished, complete the **lesson evaluation**



Reflection – Learning contract

- How will I use the information I learned during the lesson in my work?
- What do I still need to learn?
- How can I acquire this knowledge or skill?
- How will I know that I've succeeded?

Workbook Table

Question	Answers
How will I use the information I learned during the lesson in my work?	
What do I still need to learn?	
How can I acquire this knowledge or skill?	
How will I know that I've succeeded?	

Evaluation

- How would you rate this lesson overall?
  - Excellent, Very Good, Good, Fair, Poor
- Did this lesson meet your learning expectations?
  - Know: 5 4 3 2 1
  - Feel: 5 4 3 2 1
  - Be able to Do: 5 4 3 2 1
- Module ratings – How would you rate these modules (5 = Excellent, 1 = Poor, circle answers)
  - Class Activity 1 1 2 3 4 5
  - Class Activity 2 1 2 3 4 5
  - Class Activity 3 1 2 3 4 5
  - Incident management concept 1 2 3 4 5
  - Class Activity 4 1 2 3 4 5
  - Examples and stages in a response 1 2 3 4 5
  - Class Activity 5 1 2 3 4 5
  - Equipment and procedures 1 2 3 4 5
  - Class Activity 6 1 2 3 4 5
  - Conclusions and key considerations 1 2 3 4 5
- How would you rate the performance of the instructors (s)?
  - Poor Adequate Good Very Good Excellent
- The group activities were useful exercises.
  - 5 (Strongly Agree) 4 (Agree) 3 (neutral) 2 (Disagree) 1 (Strongly Disagree)
- Would you recommend this lesson to other laboratory leaders?
  - Strongly recommend recommend maybe do not recommend
- Please use the comment space below to provide us with any additional thoughts, feedback, or suggestions for t[illegible] lesson.

Good Luck!