

Danger Zone – Work in the Higher Ed Science Lab

Need for Development of Protocols
To maximize safety and minimize risk in Higher Ed Science Labs

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Overview

- Work in a Higher Ed Science Lab often involves coming into contact with materials that present potential health & safety and environmental concerns
 - Incidents and near-misses happen from a health & safety perspective
 - There is often a need for better understanding of the rules governing waste management in the lab setting and better coordination to ensure regulatory compliance

Overview

- Objectives of the Webinar
 - Provide a summary of the legal framework of both the health & safety issues and waste management
 - Suggest best practices designed to maximize safety and minimize risk from both a personal protection and a regulatory compliance perspective

Health & Safety Legal Framework

- OSHA Requirements
 - Occupational Exposure to Hazardous Chemicals in Laboratories (29 CFR 1910.1450)
 - Chemical Hygiene Plan
 - Chemical Hygiene Officer
 - Hazard Communication (29 CFR 1910.1200)
 - Bloodborne Pathogens (29 CFR 1910.1030)
 - Personal Protective Equipment (PPE) (29 CFR 1910.132)

Health & Safety Legal Framework

- Eye and Face Protection (29 CFR 1910.133)
- Respiratory Protection (29 CFR 1910.134)
- Hand Protection (29 CFR 1910.138)
- Control of Hazardous Energy (Lockout/Tagout) (29 CFR 1910.147)

Health & Safety Legal Framework

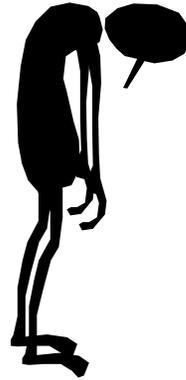
- OSHA – covers private sector workplaces
- https://www.osha.gov/Publications/all_about_OSHA.pdf
- New York Public Employee and Safety and Health (PESH) Act
 - Public Employees State Plan covers public sector workplaces in the state, including state, county, town, and village governments, as well as public authorities, school districts, and paid and volunteer fire departments
 - August 16, 2006 Federal Register – OSHA approval of NYS plan with variations noted

Health & Safety Framework

- Health & Safety Legal Obligations
 - OSHA – Chemical Hygiene Plan
 - Protects employees but not students
 - Common Law Liability – Negligence
 - Determining the required level of instruction for the students who work in the lab

Environmental Health & Safety (EHS) Management

Difficult task?



Top 5 Areas of Health & Safety Concern in the Higher Ed Science Lab

- Safety Culture
- Hazard and Risk Assessments
- Standard Operating Procedures
- Near Miss and Incident Reporting
- Chemical Management

Creating a Safe Lab Environment

- **Safety Culture**

- Safety shouldn't just be a priority as priorities can change.
- Institutions should work on making safety a part of their core values and culture.
- As educators, there's an obligation to incorporate health and safety into the curriculum.

- Web Resource

– <https://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety.html>



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Creating a Safe Lab Environment

- **Safety Culture – Quick Questions**

- How are Principal Investigators (PIs) and laboratory management engaged in EHS?
- How “visible” is EHS in the reporting structure and on campus?
- What EHS committees exist and how well do they function?
- Are instructors incorporating EHS into the curriculum?



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Creating a Safe Lab Environment

- **Hazard Determination/Risk Assessment**

- PIs cannot leave safety solely to the EHS staff because fixed safety protocols may not be comprehensive enough to protect the large variety of work being performed.
- PIs and laboratory supervisors must have the knowledge or ready access to those with the knowledge to conduct hazard assessments.
- Web Resource
 - <https://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety.html>

Creating a Safe Lab Environment

- **Standard Operating Procedures (SOPs)**

- A set of written instructions outlining how to safely perform a given task or set of tasks.
 - How good does the Chemical Hygiene Plan look?
 - How well is it implemented?
- In academic laboratory incidents, a lack of SOPs and/or individuals not following existing SOPs is a common occurrence.
- Incorporate the hazard/risk assessment into the SOP writing process.
 - Need overarching SOPs to guide common tasks
 - Need lab specific SOPs to guide unique tasks

Creating a Safe Lab Environment

- **PPE Assessments (1910.132)**
 - One of the Top 5 OSHA citations in academic labs.
 - Must be lab/task specific, written and certified by competent individual.
 - OSHA can issue citations per individual.
- Web Resource
 - https://www.osha.gov/dte/library/ppe_assessment/ppe_assessment.html

Creating a Safe Lab Environment

- **Near Miss and Incident Reporting**
 - If you aren't reporting and evaluating the near misses, you can't prevent the incidents. It is important to create a culture where employees are encouraged to report near misses.
 - Important to have a system to determine root causes of incidents so that corrective and preventive actions can be taken.
- Web Resource
 - <http://www.nsc.org/WorkplaceTrainingDocuments/Near-Miss-Reporting-Systems.pdf>

Creating a Lab Safe Environment

• Chemical Procurement and Inventorying

- A detailed purchasing policy can help better control what chemicals are being purchased and brought into laboratories.
 - The policy should cover chemicals synthesized in the lab and those brought in by collaborators.
 - The policy is an opportunity to introduce a review, authorization and control process

Creating a Lab Safe Environment

• Chemical Procurement and Inventorying

- Benefits of a controlled/central purchasing system include increased volume buying power; increased compliance; opportunity for chemical adoption programming and reduced waste.
- Having an up-to-date chemical inventory is important to help manage safety, security, emergency planning and waste disposal (eliminate unneeded, expired chemicals).

Top 5 Suggestions to Minimize Health & Safety Risk in the Higher Ed Science Lab

- Review ACS “Guidelines for Chemical Laboratory Safety in Academic Institutions”
- Work on positive EHS engagement on campus
- Complete risk assessments in laboratories
- Implement and harness the data from a robust near miss/incident reporting system
- Review existing and/or implement new procurement policies

Waste Management in the Higher Ed Science Lab

- Hazardous Waste Management Regulatory Program
 - Federal and state legal obligations to
 - Characterize waste materials
 - Properly store them prior to off-site disposal

Waste Management in the Higher Ed Science Lab

- EPA Enforcement Initiative (December 1999)
 - <https://archive.epa.gov/region02/capp/web/html/index-4.html>
 - Urged the colleges/universities to review compliance programs, and if necessary, take advantage of EPA's Audit Policy
- EPA Guidance
 - Go to RCRA Online and type into the Full Text Search box - Hazardous Waste Generated in Laboratories (EPA Memo dated August 16, 2002)



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Identify and Characterize Solid Wastes

- The hazardous waste regulations apply to materials that are “solid wastes.”
- A solid waste is a “discarded material” that is “abandoned,” “recycled” or “inherently waste-like.”
- A “solid waste” can be a:
 - Solid
 - Liquid; or
 - Containerized gas.



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Identify and Characterize Solid Wastes

- To be a hazardous waste, the solid waste must:
 - exhibit a characteristic of hazardous waste or
 - appear on one of the lists of hazardous wastes in the regulations.

Hazardous Waste Characteristics and Listings

- Hazardous waste characteristics are:
 - Ignitability (A liquid having a flash point of less than 60°C (140°F).)
 - Corrosivity (Acids or bases (pH ≤ 2 or ≥ 12.5) or a liquid capable of corroding steel at a specific rate)
 - Reactivity; and
 - Toxicity.
- If a solid waste exhibits one or more of these characteristics, it is regulated as a hazardous waste for as long as it exhibits the characteristic.

Hazardous Waste Characteristics and Listings

- F-listed:
 - List that identifies wastes from common manufacturing and industrial processes (e.g. solvents used to clean machines).
 - Known as “non-specific source wastes”
- U-listed:
 - List that includes specific commercial chemical products identified as toxic wastes that are discarded or intended to be discarded
 - Consists of products having the generic names listed, off-specification species, container residues, and spill residues
- Among the listed wastes are what are known as **acute hazardous wastes**.
- In NYS, listed wastes include PCB wastes (“B” List)

Temporary Storage in the Lab

- A generator may accumulate as much as 55 gallons of hazardous waste or one quart of acutely hazardous waste (threshold amounts) in containers at or near any point of generation where wastes initially accumulate which is under the control of the operator of the process generating the waste, provided the generator:
 - complies with 6 NYCRR section 373-3.9(b-d)(container requirements); and
 - marks the containers with the words "hazardous waste" and with other words that identify the contents of the containers.

Satellite Accumulation Areas

- The area where the waste materials are being temporarily stored in the laboratory is known as a satellite accumulation area (SAA).
 - A facility can have multiple SAAs, but hazardous waste cannot be moved from one SAA to another.
 - The regulations do not limit the number of hazardous wastes or the number of containers that can be placed in an SAA.
 - Regulations limit only the total volume of waste – 55 gallons of hazardous waste or one quart of acute hazardous waste.

Satellite Accumulation Areas

- A single SAA may have multiple points of generation.
 - Movement or consolidation of hazardous waste within an SAA is permissible, as long as it remains “at or near” the “point of generation” and “under the control of the operator generating the waste.”
 - EPA in its guidance advises that it is not possible for the agency to delineate for all situations what constitutes a single SAA versus what constitutes separate SAAs.

Satellite Accumulation Areas

- Satellite accumulation containers should not be marked with a date, unless the amount of hazardous waste in the area has exceeded a threshold amount
 - The generator must mark the container holding the excess accumulation of hazardous waste with the date the excess amount began accumulating.
- Monitor the total waste in the SAA:
 - Must move waste in excess of the threshold amount to the centralized hazardous waste storage area
 - Before you exceed a threshold amount, notify the EHS Department that waste needs to be picked up and moved to the centralized hazardous waste management area or taken off-site for disposal

Satellite Accumulation Areas

- If the quantity of hazardous waste in multiple smaller containers equals or exceeds a threshold amount, you have up to 3 days to move the excess to the centralized hazardous waste storage area
 - As long as the amount of hazardous waste in excess of the threshold amount is removed to the centralized hazardous waste storage area during that 3-day period, the remaining hazardous waste and any new hazardous waste added can be managed under the satellite accumulation rules.
 - No requirement that full containers must be removed within 3 days of being filled
 - If the excess is not removed within 3 days, the SAA becomes a hazardous waste storage area.

Container Requirements for Waste Stored in Satellite Accumulation Areas

- The containers must be kept at or near the point where waste was generated and be under the control of the operator whose activities generated the waste.
- The containers must be in good condition and not in danger of leaking.
 - if it begins to leak, the hazardous waste must be transferred from this container to a container that is in good condition or manage the waste in some other way that complies with the requirements of Subpart 373-3.

Container Requirements for Waste Stored in Satellite Accumulation Areas

- The type of container must be compatible with the hazardous waste stored.
- The containers must be properly labelled with the words “Hazardous Waste” and with a description of the waste.
- The containers must be kept closed except when adding or removing waste.
- Containers holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the containers or cause them to leak.

Satellite Accumulation Areas

- EPA Guidance on SAA Management
 - Go to RCRA Online and type in **Satellite Accumulation Areas** in the Full Text Search box.
 - Look for the EPA Memo dated 3/17/2004 entitled “Frequently Asked Questions about Satellite Accumulation Areas.”

Top 5 Areas of Waste Management Concern in the Higher Ed Science Lab

- Failure to identify the point in time when a material is considered to be a waste
 - Indefinite storage of working materials
- Failure to characterize a waste as hazardous
- Failure to place a waste material in an SAA
- Failure to maintain properly the containers in the SAA
- Failure to move the waste to a centralized hazardous waste storage area when a threshold amount is exceeded

Alternative EPA Rule for Academic Laboratory Wastes

- Academic Laboratories Rule (Subpart K)
 - <https://www.epa.gov/sites/production/files/2014-12/documents/labs-brochure.pdf>
 - December 1, 2008, 73 FR 72912
 - Voluntary participation; those entities not participating remain subject to the pre-existing generator standards

Alternative EPA Rule

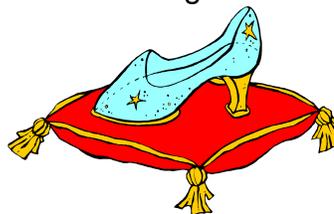
- Advantages:
 - Hazardous waste determinations to be made by trained professionals, rather than students
 - Hazardous waste needs to be removed from the laboratory every six months
 - Provides the institution the flexibility to decide when and where on-site hazardous waste determinations are made
 - Provides incentives for removing old and expired chemicals in the laboratories
 - Requires development of a Laboratory Management Plan that should specify best waste management practices

NYS State Regulatory Program for Academic Laboratories

- EPA Rule on Academic Laboratories
 - Not effective in NYS
 - See <https://www.epa.gov/hwgenerators/where-managing-hazardous-waste-academic-laboratories-rule-effect>
- NYS proposed Academic Laboratories Rule
 - Part of FedReg 5 – under review
 - <http://www.dec.ny.gov/regulations/100424.html>

Top 5 Suggestions to Maximize Safety and Minimize Risk with Waste Management

- Create and maintain a site-specific waste management program that:
 - Establishes a clear chain of command
 - Coordinates compliance efforts within the institution
 - Has a system of accountability that encourages feedback
- One size does not fit all



Top 5 Suggestions to Maximize Safety and Minimize Risk with Waste Management

- Monitor (and to the extent possible, minimize) the types and quantities of virgin lab materials that would be characterized as hazardous at the moment they are considered to be solid waste
 - Explore the advantages of a centralized purchasing system

Top 5 Suggestions to Maximize Safety and Minimize Risk with Waste Management

- Include a waste management component in student lab training
- Require that any research grant application include a component for waste management
- Audit compliance with any laboratory-related plan that is intended to ensure legal compliance and/or maintenance of best management practices

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Questions?



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