Environmental Health & Safety

Projects & Renovations in Laboratories
Types of Hazards Found in the Laboratory

Table of Contents

Introduction:

In recent years there has been an increase in request for laboratory renovations across the University of Delaware's campus. Within a laboratory renovation, there are three types of environmental and health hazards that need to be addressed: (1) infectious, (2) chemical, and (3) asbestos. Specialized/trained contractors are required to handle/mitigate all three types of these hazards present. EHS representatives serve as the point of contact for these specialized contractors. In this document, you will find a breakdown of what to expect if these hazards are found in the scope of the laboratory renovation project that you are assigned.

	What to look for in the laboratory?	What to look for in the scope of work?	Who to contact in EHS?
Type of Hazard			
Infectious	**BioSafety Cabinet**	**BioSafety Cabinet removal or relocation**	**Primary -** BioSafety Specialist **Secondary -** BioSafety Officer
Chemical	**Fume hood, Chemical cabinets, chemicals present, sink traps, etc.**	**Fume hood removal, ductwork removal, chemicals to be relocated, decommissioning a laboratory space, etc.**	**Primary -** Assistant Chemical Hygiene Officer **Secondary -** Chemical Hygiene Officer
Asbestos	**Fumehood, countertops, floor tiles, chalkboards, etc.**	**Fumehood removal, ductwork removal, decommissioning a laboratory space, etc.**	OHS Specialist

Table 1: Hazards and EHS Contact Quick Guide

Types of Hazards that require specialized handling:

1. **BioSafety/ Infectious Safety**
    a. *BioSafety Cabinet (BSC) Decontamination/Recertification Process*
        1. Before a unit is to be moved, the users/lab should contact EHS BioSafety Specialist so we can schedule accordingly with B&V to have the BSC decontaminated.
            i. Lab users should remove any items from within the Biosafety cabinet before decontamination is performed.
        2. B&V uses a vaporized hydrogen peroxide (VHP) method to decontaminate each unit. Allow approximately 2 weeks for scheduling, and the VHP process takes approximately 2 hours (lab must be vacant during the VHP process)
            i. Labs/Departments are ultimately responsible for the cost of decontamination/move/recertification. B&V expects payment via PO/credit card. This cost can also be factored in as part of the project renovation budget.
        3. Once decontamination is complete, the unit can be moved by the UD movers to a new location.
        4. When the BSC is in the new permanent location, EHS will schedule B&V to come back and perform a certification process to ensure that the unit is operating correctly. This certification process takes no more than 1-2 hours.
            i. Copies of all reports from B&V should be sent to EHS.

2. **Chemical Safety**
    a. *Laboratory Decontamination:*
        i. The University currently has 4 approved chemical decontamination vendors to complete the decontamination process: (1) Heritage, (2) Triumvirate, (3) Eldredge, and (4) ESI (County)
            1. Fume Hood Decontamination
                a. Preparing the Fume hood for decontamination:
                    i. The fume hood should be empty of all hazardous compounds and materials. This should be done by the users/lab workers.
                    ii. The utilities connected must be shut off/disconnected before work can begin (gas lines, water, etc.).

b. The decontamination process includes HEPA vacuuming the dust/debris and then wiping down the interior/exterior of the fume hood and the cabinets under the fume hood with a mild detergent.
    i. Once decontaminated a decontamination notice will be attached to the fume hood. The fume hood can be handled by the UD movers/facilities/general contractor.
c. The decontamination process can also include:
    i. Removing the back baffles/panels
    Note: It can be challenging to put some fume back together.
    ii. Cutting out the ductwork above the fume hood. (The Building Ventilation Shutdown Protocol must be followed)
        1. HVAC personnel/contractors must be available during the shutdown to appropriately cap the exhaust lines.

2. Laboratory Decontamination
    a. Includes the wiping down of countertops and mopping of the floors with a mild detergent.
    b. This can also include by request the cabinet drawers (interior/exterior).
3. Sink Trap Removals
    a. They are required to be removed and then bagged/drummed for delivery to the Materials Management Facility (MMF). They are treated as mercury-containing hazardous waste since older lab users may have poured mercury down the drain and it collects in the trap.

b. Laboratory Moves/Chemical Relocation

i. The University currently has 3 approved chemical safety vendors to complete the laboratory moves/chemical relocation process: (1) Heritage, (2) Triumvirate, and (3) Eldredge
    1. Things to be moved/considered:
        a. Chemical Compounds:
            i. This includes liquid and solid compounds along with oils, DI water, solutions, etc.
        b. Gas Cylinders
            i. Large/Small Cylinders:

1. The gas vendor (Examples: Keen, Praxair) can be contacted to relocate the gas cylinders.
2. Any cylinders left over can be moved by the chemical safety vendor.

ii. Lecture bottles:

1. Moved by the chemical safety vendor.

c. Refrigerators/Freezers

i. Refrigerators:

1. Two Options:
   a. Unpacked into coolers with dry ice and the empty fridge is moved and the chemical safety vendor will unpack the coolers once it is relocated.
   b. The lab users and/or chemical safety vendor pack the fridge with bubble wrap. Then the chemical safety vendor transports the fridge. The lab users and/or chemical safety vendor unpack the bubble wrap.

ii. Freezers:

1. The lab users and/or chemical safety vendor pack the freezer. Then the chemical safety vendor transports the freezer. The lab users and/or chemical safety vendor unpack the bubble wrap.

Note: Any chemical waste produced will be disposed of at the MMF through UD's Chemical Waste Disposal Program with our current Hazardous Waste Transporter.
Examples: Sink Traps, Contaminated PPE/rags, etc.
Lead Time for scheduling: 2 weeks

3. Asbestos

Asbestos Intro

All projects initiated at UD need to have an asbestos inspection prior to the start of work. All Asbestos-containing materials (ACM) must be identified (location and quantity) throughout the work area. If the ACM will be affected or disturbed by planned work, it must be removed by a licensed asbestos abatement contractor.

Asbestos is a fibrous mineral that naturally occurs in many places throughout the world. There are no asbestos mines currently in production in the US but many other countries still mine and produce the mineral. It was used for its many beneficial properties such as fire resistance, water resistance, acid resistance, non-electrical conductivity, and its strength as a binder. It was used in all types of construction throughout the years such as residential, commercial, industrial, and shipbuilding.

Asbestos gained notoriety due to the development of diseases such as asbestosis, lung cancer, and mesothelioma in workers who had high levels of unprotected exposure to the mineral over their work careers.

The EPA banned certain types of ACM in the 1970's such as fireproofing, pipe insulation, boiler insulation, and hot water tank insulation. Many other types of asbestos were never banned and could still be present in materials.

Types of ACM commonly encountered throughout campus: Floor tile, linoleum sheet flooring, floor mastic, cove mold mastic, roofing, roof cement, joint compound/spackle, plaster, caulking, window glazing, pipe insulation, boiler insulation, Hot water tank insulation, steam pipe coatings, chilled water lines, ceiling tiles, fire door insulation, chalkboard glue, mirror glue, fume hood liners, acid cabinet liners, lab table tops. This is not a complete list.

Asbestos inspection & abatement process

a. Contact EHS as early as possible regarding projects that potentially impact ACM. EHS will assist PPD with arranging of surveys, interpreting scope/sample results/ disseminating information, and arranging contractors.
    i. Discuss the scope of work, research previous sample records, and determine if inspection is necessary.

b. Schedule survey (lead time of 1 day to 2 weeks depending on the size of the project).
    i. EHS can perform small surveys but most work will be performed by 3rd party environmental consultant.
c. Perform survey (most surveys take 1 day to 1 week)
    i. Asbestos inspectors walk work area and inventory all suspect materials/take thumb size pieces of materials (except roof cores).
        1. For roof sampling will need the assistance of roofing shop to patch holes.
        2. Unless given permission all sampling is non-destructive. Inspectors typically will not demo wall systems to access inaccessible materials
d. Receive asbestos inspection report (usually 3 to 10 days after inspection).
    i. Discuss inspection report with design team/project manager/construction manager. Determine what ACM materials are affected and what will need to be removed.
    ii. Discuss the tentative schedule and sequencing of the project.
e. Hire contractors to perform abatement work and schedule job.
    i. Abatement contractor removes the ACM
    ii. Environmental consultant monitors job and performs air sampling during abatement.
f. Prior to abatement work:
    i. Move items out of work area
    ii. Turn off HVAC to work area
    iii. Address any issues with smoke detectors and sprinkler heads. They are typically covered before work begins.
    iiii. Notify nearby occupants that abatement will be occurring.
g. Perform abatement
    i. Depending on the size of the job can last anywhere from 1 day for very small projects or upwards of 3-4+ months for large projects.
    ii. Floor mastic removal is performed with low-odor chemical Strippers and buffers. Or can use a shot blaster.
    iii. Pipe insulation usually removed via glove bags
    iiii. Contractors only remove as much roofing per day that can be re-applied by roofing contractor to assure area is waterproof.
    v. Final air clearance samples must pass below EPA standard to re-occupy work area.
    vi. Tear down work area containment and vacate the site.

Building Ventilation Shutdown Protocol:

Any work that is to be done on laboratory exhaust/supply ductwork requires a building ventilation shutdown. This work can include exhaust duct decontamination, exhaust duct removal, fume hood removal, etc. These shutdowns usually occur over the weekend. The following is a stepwise approach of what to expect/what to prepare for when there is an ventilation (exhaust and/or supply) shutdown.

1. A date will be decided upon by the appropriate parties (i.e. PPD, EHS, Department managers, Department Chairs, Contractors etc.)
2. A building outage request must be submitted two weeks in advance to facilities.
3. UDPD must be notified of the shut down on the day of the event.
4. Building Managers must notify all occupants to cease hazardous chemical reactions.
5. Building Closure Signs will be hung by either the building manager or EHS notifying UD personnel of the shutdown by at least the Thursday before the shutdown.
6. EHS will need to be notified at least two weeks in advance (the earlier the better) to ensure that there is staff available for the weekend work:
    a. EHS (two members) walk the building at the time of the shutdown with the appropriate gas detection instrumentation.
    b. EHS (two members) walk the building again at the end of the work/shift after the exhaust system is turned back on.
7. The system will be shut down and all parties working on the system will follow UD's lock out tag out procedure to ensure that the system is safely shutdown.
8. The following departments from facilities may require staff on hand for the duration of the shutdown and restart of the system:
    a. BAS shop
    b. Electronics shop
    c. HVAC shop

Replacing Laboratory Ventilation Ductwork Protocol:

There are two approved options when installing a new section of laboratory ventilation (exhaust/supply) ductwork:

Option One: The building ventilation shutdown protocol must be followed and all of the work must be completed during the shutdown.

Option Two: The building ventilation shutdown protocol must be followed to allow for a positive seal blast gate or vapor-proof sealed blast gate to be installed in the exhaust line of the ductwork. EHS must approve the blast gate that is intended to be used. A

damper is not an approved closure device for this process. The ventilation system can be turned back on and the remainder of the work can be completed with the blast gate in place. Once the ductwork installation is complete the blast gate blade will be removed by the contractor and sealed appropriately.

NOTE: If all means of exhaust are removed creating a positive pressure differential in the room all associated lab work must be halted. Exceptions can be made by EHS upon review on a case by case basis.