SAFETY UPDATE NEWSLETTER

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

OFFICE OF ENVIRONMENTAL HEALTH AND SAFETY

OCTOBER /NOVEMBER/DECEMBER 2007 VOLUME 07, NUMBER 4

EMERGENCY RESPONSE LESSONS LEARNED – FLAMMABLE CABINET FIRE LABORATORY

On September 19th 2007, the Office of Environmental Health and Safety (OEH&S) Emergency Response Team (ERT) was summoned to investigate an odor complaint in the Medical Sciences Building. Capital Programs and Facilities Management initially responded and informed OEH&S that it was clear a fire had occurred within a flammable cabinet days, or perhaps weeks prior. The flammable cabinet was located in S-1343. Upon arrival, the ERT responder observed that the door to the room with construction and warning signs such as “Danger”, “Keep Out, Authorized Personnel Only.”

The ERT responder noted considerable evidence that a fire or explosion had occurred. The interior, exterior, and contents of the flammable cabinet were covered with a brown, filmy chemical residue.

Many of the chemicals stored in the cabinet (xylene, toluene, butanol, acetone, and cyclohexane) were overturned or otherwise disturbed. The walls of the cabinet were charred and paint had bubbled on the interior surfaces. Heavy duty plastic bins had melted and a metal ethanol container had collapsed upon itself.

Melted Bins and a Collapsed Container

The fire appeared most intense where the charred remains of an unknown substance were observed. The charred substance was subsequently identified as the highly flammable material known as nitrocellulose (cellulose nitrate, flash paper, or guncotton). Nitrocellulose is used for tissue preservation, media embedding, and in Western Blots to immobilize DNA and proteins. If kept moist in a bath of isopropanol, nitrocellulose will not catch fire. Once nitrocellulose reaches <12.5% moisture, it may spontaneously combust (with a blast force of 6,300 feet/second). The quantity of nitrocellulose in the flammable cabinet was unknown.

The ERT responder and Campus Fire Marshal had determined that the isopropanol containing the nitrocellulose had evaporated over years of storage

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NEW CAL/OSHA FUME HOOD REQUIREMENTS

Chemical fume hoods are the principal safety devices in UCSF laboratories for preventing exposures to potentially hazardous materials. New requirements under the Cal/OSHA fume hood regulation will go into effect on January 1, 2008 and will change how researchers monitor their fume hoods.

OEH&S, has applied for a variance requesting a compliance extension date of June 2008.

THE NEW CAL-OSHA REGULATION WILL REQUIRE THE FOLLOWING:

1) Laboratory fume hoods must be equipped with a quantitative monitoring device which provides the user with a means to detect changes in the air flow. This new device will enable the user to assess whether or not the fume hood is operating properly and within the required safety parameters

2) Fume hood users must be trained in the proper use of the fume hood and the new monitoring device. To comply with Cal/OSHA’s fume hood user qualification requirement, fume hood operator training will be available on Research On-line in the near future. This will be required training for all laboratory researchers at UCSF. Your DSA will inform you when the training course is available.

UCSF’S STEPS TOWARD COMPLIANCE:

UCSF has approximately 900 chemical fume hoods in its medical and research facilities. OEH&S has conducted a fume hood inventory

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(Gas Cylinders continued)

crete-block walls. To prevent such a dangerous situation, there are several general procedures to follow regarding safe storage and handling:

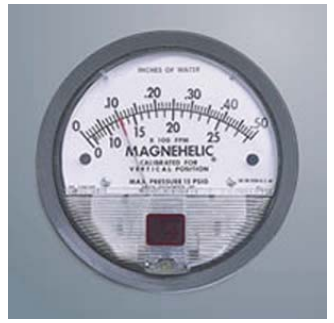
- Store cylinders in a specifically designated well-ventilated area. Do not store empty cylinders with full cylinders. The area must protect the cylinders from being struck by another object and must be located away from heat and ignition sources. Additionally, the area must be at least 20 feet away from highly combustible materials. Cylinders containing oxidizers must be stored at least 20 feet away from flammable gases.
- Cylinders must not be dropped or allowed to fall. Chain and rack them in an upright position during use and storage. At UCSF, cylinders must be double strapped to the wall if not securely held in racks that prevent falling. When moving large cylinders, a properly designed cart with straps must be used.
- When moving a cylinder, even for a short distance, all the valves must be closed, the regulator removed, and the valve cap installed.
- Never use the valve cap to lift a cylinder. If you are using a crane or some other lifting device to move a cylinder, use a cradle or boat designed for that purpose. Never use a sling or a magnet to move a cylinder.
- Never permit cylinders to contact live electrical equipment or grounding cables.
- Cylinders must be protected from the sun's direct rays, especially in high-temperature climates.
- All systems must be leak tested at every connection after set-up and after changing cylinders.
- Before the gas is used, install the proper pressure-reducing regulator on the valve. After installation, verify that the regulator is working, all gauges are operational, and that all connections are tight. When the gas is ready for use, open the valve slowly with your hands. Never use a wrench or other tool. If you cannot open it with your hands, do not use it.
- All users of toxic compressed gases must have their room ventilation checked for negative pressure and their chemical fume hood(s) checked for performance prior to commencement of work. Consult with OEH&S to determine if air monitoring and/or gas sensor installation is necessary.
- Cylinder users must develop, in consultation with OEH&S, written operational and emergency procedures for toxic and flammable gases in their laboratory. No attempt shall ever be made to transfer gases from one cylinder to another, to refill cylinders, or to mix gases in a cylinder.

Following these procedures will help prevent accidents. Remember, your safety depends on you when using compressed gas cylinders.

(Fume Hoods continued)

and found that approximately 200 of these fume hoods require installation of new quantitative airflow monitoring devices. The other 700 fume hoods either have a digital air flow monitoring device with an audible/visual alarm, a Magnehelic pressure gauge, or a Dwyer inclined manometer. These are all acceptable under the new Cal/OSHA fume hood regulation.

Digital Air Flow Monitor with Audible/Visual Alarm



Magnehelic Pressure Gauge

In an effort to comply with the regulation, OEH&S has partnered with Facilities Management to purchase and install incline manometers for the 200 fume hoods without air flow monitoring equipment. If your laboratory has a fume hood without an air flow monitoring device, expect an installation to occur in your laboratory within the next few months. If your fume hood currently has NO monitoring device, place a Kimwipe somewhere at the face of the fume hood to indicate inward air flow until the new device can be installed.

For more information, contact your DSA , or refer to Title 8, California Code of Regulations, section 5154.1 http:www.dir.ca.gov/title8/5154_1.html

Inclined Manometer

Laboratory Closure and Clearance

When a Principal Investigator (PI) vacates a laboratory space due to retirement or relocation, OEH&S must verify that the space is clear of radioactive, biological, and chemical materials, and controlled substances. Since custodial, facilities maintenance personnel and contractors will enter the space after you leave, it is essential that OEH&S verifies that all hazards have been removed. Researchers must notify their Department Safety Advisors (DSA) several months in advance of an anticipated move or laboratory closure to ensure an efficient process. Please note that moves within the contiguous buildings of HSE, HSW, Medical Sciences, UC Hall and Clinical Sciences do not require outside movers. Laboratory clearance policy, however still applies.

Hazardous Chemicals

• When transferring chemicals to another UCSF campus, a licensed hazardous materials transporter authorized by OEH&S must be contracted. If the move is being coordinated by Capital Programs and Facilities Management (CPFM), transport of all hazardous materials will be arranged for you. Prior to moving chemicals, verify that adequate chemical storage space exists at the new location.

• Unopened chemicals that are no longer wanted can be listed on the chemical exchange program located on the OEH&S website. Costs associated with chemical disposal prior to the move will be included in the moving costs.

• Remove chemical residues from furniture and equipment. Use detergent and water to clean lab benches and accessible areas within fume hoods.

• If your lab utilized ethidium bromide (EtBr), check for residual EtBr contamination with a UV light. You can remove EtBr contamination with household vinegar followed by a wipe down with soap and water.

• OEH&S must test fume hoods for perchloric acid residue where perchloric acid was used. Contact your DSA.for assistance if needed.

Radioactive Materials

• When transferring radioisotopes to another UCSF campus, you must use a licensed hazardous materials transporter authorized by OEH&S. If you have a CPFM moving coordinator, he or she will arrange transport of radioisotopes for you.

• When transferring radioisotopes to another PI, completion of a radioactive materials (RAM) transfer form is required. Notify your DSA in advance of any transfers so he or she can verify that the PI is authorized to receive the material.

• If you have a liquid scintillation counter (LSC) that requires storage to surplus, it may contain a radioactive sealed source that must be removed prior to storage. The company that services the LSC will remove the sealed source and recycle it, however, since the sealed sources are part of your laboratory's radioactive inventory, OEH&S must document that this event occurred.

After all radioactive waste and inventory has been removed from the laboratory, check for contamination. Perform wipe tests and meter surveys at all use locations and on all appropriate items within the locations. Storage areas must also be wipe tested or surveyed. File your final wipe tests in your RUA logbook and show them to your DSA. Document contamination, decontamination, and re-wiping as per standard radiation safety procedures. If your laboratory has been assigned a moving coordinator from CPFM, you will have the option of using a contractor to conduct the clearance surveys.

• If you plan on closing the laboratory and retiring the RUA, your DSA will collect all records for archiving, including the RUA logbook.

Biological Materials

• Remove all biological materials from the laboratory.

• Check all drawers, shelves, cabinets and bench tops for sharps and dispose appropriately.

• If your laboratory has select agents, decontaminate or destroy all select agents in your inventory. Contact your DSA to ensure completion of the appropriate documentation.

• Clean and decontaminate all areas and equipment where biological materials were used or stored with 10% bleach solution followed by a wipe down with soap and water.

• Contact TSS or other authorized vendor to decontaminate biosafety cabinets prior to relocating or transferring to surplus storage.

• Defrost freezers and refrigerators prior to relocating or transferring to surplus storage. Collect the frost melt and decontaminate with 10% bleach solution. Decontaminate freezers and refrigerators with bleach solution followed by a wipe down with soap and water.

• Biological samples may be transported to new locations *in situ* in freezers. CPFM's moving coordinator can arrange this for you.

Controlled Substance Authorization (CSA) Clearance

• If you have a CSA and are planning to move to another UCSF campus, contact the UCSF controlled substance officer a minimum of eight weeks in advance. Failure to give advance notice may result in a delay of authorization for controlled substances at your new location.

• Only authorized users may physically transport the controlled substances to the new locations.

• For a laboratory closure, properly dispose of all controlled substances from your laboratory and submit an online inventory indicating zero quantity for all controlled substances.

Final OEH&S Closure

Subsequent to removing all hazardous materials, schedule an appointment with your DSA to verify that the laboratory is free of hazards. Bring the RUA logbook, if applicable. At that time, the DSA will ensure that all hazard identification signs and labels are defaced or removed. The DSA will inform your department that the vacated laboratory space is formally cleared. If you are moving to another location, complete a Universal Use Authorization Modification Request Form and add or delete locations appropriately.

Safe Use of Compressed Gas Cylvinders

Compressed gases present several hazards. Labels on the cylinder and the Material Safety Data Sheet (MSDS) supplied with the gas give important information regarding the hazardous properties of the gas such as toxicity, flammability, or oxidizing potential. In addition to the gas specific hazards, the cylinders themselves pose hazards simply because they contain gas under pressure.

Regardless of the properties of the gas, any gas under pressure can explode if the cylinder is improperly stored or handled. Making a balloon fly around by suddenly releasing the air is amusing, but a flying cylinder is not so funny. The principle is the same for both a balloon and a compressed gas cylinder. Improperly releasing the gas from a compressed gas cylinder is extremely dangerous. Cylinders are not balloons--they are hard and heavy. A sudden release of the gas can cause a cylinder to become a missile-like projectile, destroying everything in its path and have been known to penetrate con-

(Continued on page 4, see Gas Cylvinders)

(Lessons Learned continued)

and eventually created a hazardous environment within the cabinet. They surmised that the fire's ignition was so intense and so rapid that it depleted the oxygen in the cabinet thus preventing the ignition of the other flammable materials and averting a major incendiary disaster in the Medical Science Building.

Nitrocellulose Charred Remains

•A flammable cabinet, when up to code and used properly, will prevent a calamity as indicated by this occurrence.

• Laboratory workers must be familiar with the chemical characteristics of all compounds they use/store.

• Dispose of expired and unused chemicals.

• Ensure incompatible chemicals are stored separately.

• Ensure all chemicals are labeled properly.

• Notify OEH&S as soon as possible when planning relocation or renovations. Abandonment of hazardous chemicals is a serious regulatory violation.

• Do not allow contractors access to areas containing hazardous materials before receiving written clearance from OEH&S.

For more information on clearance procedures and chemical storage, contact your DSA. See also the article in this issue entitled, "*Laboratory Closure and Clearance.*"

PLEASE HAVE ALL PERSONNEL IN YOUR LAB INITIAL HERE AS EVIDENCE OF CONTINUING EDUCATION & KEEP THIS NEWSLETTER IN YOUR LOGBOOK.