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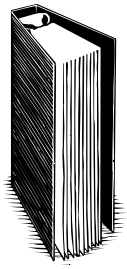
STANDARD OPERATING PROCEDURES - DOES YOUR LAB HAVE THEM?



Cal-OSHA's Laboratory Safety Standard covers all employees engaged in the use of hazardous chemicals. It requires that employers (i.e., UCSF) develop and implement a "Chemical Hygiene Plan". UCSF's plan is embodied in the Chemical Safety Manual, which has just recently been updated and is available on the EH&S website. Changes are numerous, so please familiarize yourself with the plan.

Another requirement of the Laboratory Safety Standard is that "Standard Operating Procedures relevant to Health and Safety considerations be followed when laboratory work involves the use of hazardous chemicals." What does this mean at a practical level, and what constitutes an acceptable Standard Operating Procedure (SOP)?

SOPs should be prepared by each laboratory for each routinely performed laboratory task. SOPs describe each step of the procedure in the order in which it is performed, and should include any health and safety information needed to perform the procedure.

SOPs are often written in a manner and at a level of detail that is appropriate for someone who has performed the procedure many, many times, and is simply documenting which procedure was used. Usually, writing the SOPs is the responsibility of the laboratory supervisor.

A better approach for writing the SOP is for the aboratory supervisor and a relatively inexperienced laboratory worker to work through each step of the procedure, writing down the details that the inexperienced worker needs. The SOP can then be considered a training tool and a safety aid for both new and experienced workers.

From a health and safety perspective, what should the SOP include? It should recognize the hazards associated with each chemical, and ways to protect the worker. As an example, it might include a statement such as:

Caution
The chemical (identify by name) used in the next step is highly corrosive, and should be handled only when wearing gloves and safety goggles. If exposed through skin contact, immediately flush the area with water for 15 minutes.

Another example:

Caution
Chemical is extremely volatile and flammable. It is also irritating to eyes and lungs. Use material only in a fume hood.

This information can be obtained from the chemical's bottle label or Material Safety Data Sheet (MSDS). Summarizing that information directly in the SOP is usually a more effective way to deal with the hazard than by a step in the SOP that says "read the label and MSDS before starting".

Other hazards, such as potential for electrical shock or risk of disease transmission, can be incorporated into the SOP in the same manner. For example:

Caution
The human tissues used in this study may contain HBV, HIV or other bloodborne pathogen. Follow all standard precautions...

The SOP should also include the proper steps for cleanup and disposal. What waste container do the chemical wastes go to? Are there serious chemical incompatibilities that should be noted? Is the biological material autoclaved or processed as medical "red bag" waste?

Once written, each SOP should be tested by performing the procedure exactly as written. Unclear steps and errors should be corrected before the SOP is put into general use. It is a good idea to review the written procedure, at least annually to make certain it is still valid, and is being followed. New employees should be instructed to follow the procedure carefully. This has merit scientifically, as well as from a health and safety perspective.

SOPs written in this manner will meet the regulatory requirement and will go a long way toward ensuring safe laboratory operations. Some good examples of SOPS which address health and safety concerns can be found at the UC San Diego EH&S web site:http://www-ehs.ucsd.edu/sop.htm. Contact your DSA for more information.

When you have finished reading this newsletter, please pass it along to others in your lab or office.

SAFETY ALERT!

There have been two recent laboratory fires at UCSF, each caused by a faulty water bath. Damage to equipment and laboratory benches was moderate in each fire. In one case, the water bath itself was seriously damaged. A temperature controller sitting on one side and a small centrifuge sitting on the other were heavily scorched. Cardboard boxes of supplies stored on the shelves above the bath were scorched, and the plastic tape which sealed them was melted. Plastic tubing running from a CO^2 cylinder to an incubator melted (result: no CO^2 to incubator!).

Heat generating equipment in too close proximity to one another, view 1

Heat generating equipment in too close proximity to one another, view 2

In the other fire, the water bath itself was damaged, but can be repaired. Other damage was limited to a small burned area under the water bath, and soot on the shelves above.

In the first case, the water bath was old, had not been used recently. The bath had been filled at the end of the day, and turned on, so it would be temperature-stable in the morning. When lab personnel arrived in the morning, the bath was dry, and the surrounding area badly charred. This suggests that either the thermostat was not operating properly (causing the heater to continue heating) or the bath itself leaked.

Damage to waterbath after fire

In the second case, the fire appeared to be in an electrical component of the bath, since flames were coming from the electrical cord when the fire was discovered. The bath was normally run continually, but was dry when the fire was discovered. The bath did not have either an overtemperature shutoff or a low-liquid-level shutoff.

EH&S recommends you examine all older electrical equipment for frayed cords or other signs of damage. Whenever possible, turn off equipment at night and on weekends.

Also, when buying new water baths or heating circulators, look for features such as an overtemperature shutoff and a low-liquid shutoff. Thermally-protected pumps which will not burn out, even when jammed are available, and provide a greater level of fire prevention. Models having audible and visual alarms associated with the shutoffs are available.

As general safety practices, check the liquid level in circulating water baths frequently. Many models depend on a feedback from the liquid-immersed thermometer for thermostatic control. Some moderate-temperature circulating water baths use the circulating liquid to cool the pump.

The melted lid fell onto the floor and destroyed tile

Keep the lid on the bath to minimize evaporation. Turn the unit off when it is not in use, as newer models warm and reach stable temperature quite rapidly (45-60 minutes).

Smoke damage to combustibles stored above waterbath

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USE OF TOXINS IN RESEARCH

The use of toxins in research at UCSF is not unusual. Approval to use toxins is obtained from the UCSF Biosafety Committee (BSC) through the Biological Use Authorization (BUA) process.

Toxins are noxious or poisonous substances of biological origin, produced by microorganisms or higher species and existing as either an integral component of the cell(s) or excreted to the extracellular environment. Examples include botulinum toxin produced by the bacterium *Clostridium botulinum*, aflatoxin produced by the fungus *Aspergillus flavus*, ricin produced by the castor bean plant, and tetrodotoxin produced by the globe puffer fish.

The use of toxic chemicals that are not toxins does not, per se, require a BUA but in many cases, the conditions of use of such a chemical ultimately dictate the need for Biosafety Committee approval. For example, a study using methylphenyltetrahydropyridine (MPTP), a neurotoxic chemical that causes an irreversible Parkinsonian condition in humans, required a BUA because the agent was being administered to rhesus monkeys (an Old World primate) and the study generated biohazardous waste, not because MPTP was being used.

A great majority of the studies approved by the Biosafety Committee involve the use of infectious agents, either as such or as vectors for recombinant DNA work, and there are well-defined levels of containment appropriate to each agent to guide the Committee. However, the standard reference points of Risk Groups and Biosafety Levels apply only to microorganisms. Consideration of applications to use toxins requires a very different set of criteria. With toxins, the Committee must consider, among other things, the toxicity of the toxin; the quantities being used in the whole experiment, being handled in each procedural step, and being stored at UCSF; routes and rates of uptake and the potential for exposure; and, if animals are involved, the possibility of excretion and consequent risk to animal handlers. The Committee, the Biosafety Officer and the ACF Veterinarians work with the Principal Investigator to ensure the safest possible handling scenarios for all involved.

A potential complicating factor in toxin use is the possible need for campus registration with the CDC's Select Agent Tracking program. This program requires institutions using toxins or infectious agents on the list of Select Agents to register, currently at considerable expense, with the CDC before the agent or toxin can be transferred to or from UCSF. The list includes several common toxins, such as botulinum toxin, tetrodotoxin and ricin, all of which are or have been used at UCSF. As a research institution, we are exempt from registration for all forms with LD50s (by mouse intraperitoneal route) greater than 100 nanograms per kilogram. Many of these toxins have chemical forms with toxicities above the exempt level. Tetrodotoxin, for example, has several forms, only one of which falls below the exemption level; therefore, use of any other form of tetrodotoxin is exempt. You'll know the toxin you order is exempt if you actually receive it; if it doesn't meet exemption requirements, the supplier cannot ship it to you without first receiving a copy of your Form EA-101, the proof of registration in the Select Agents program. To date, UCSF has not registered in the Select Agents Program because no toxin requiring registration is being used.

If you are considering using toxins in your research, contact the Biosafety Officer (476-2097) early in your planning process. Registration in the Select Agent Program, if required, will take time and your BUA must be approved by the BSC before you order the toxin and begin your research. Your BUA application should provide plenty of procedural detail and a copy of the Material Safety Data Sheet of your toxin. If the research does not require a BUA, contact your DSA for safety advice on employee protection. This information will help the BSC best serve you and the campus community by assisting you in determining the safest possible method for handling the toxin.

TAKING SAFETY HOME

At EH&S we focus on workplace safety, but most of our information is equally applicable outside the workplace.

Handling hazardous chemicals at home could be hazardous to your health. We use flammable materials, oxidizers, acids, bases, organic solvents, toxic chemicals, and even some carcinogens. Obviously, charcoal lighter fluids are flammable, as are mineral spirits, propane, natural gas, alcohols. Chlorine-containing bleach and peroxide-containing bleach are both oxidizers. Acids include ceramic tile cleaners, and cleaners to remove water residues; these may contain sulfamic acid, phosphoric acid or hydrochloric acid. Oven cleaners often contain sodium hydroxide, a strong base. Window cleaners may contain ammonia and alcohols. Pesticides are usually toxic. Methylene chloride, the active material in paint strippers is considered carcinogenic. Older homes may contain lead-based paints or asbestos insulating materials.

What's the best way to work safely with these hazardous chemicals? The same way we do at work! Read container labels carefully; if you want more information, you can request a Material Safety Data Sheet from the manufacturer. Follow the instructions on the label for gloves, eye protection, etc. and read the first aid precautions - protect yourself & your family.

The same compatibility and storage principles apply at home, too. It's not a good idea to store large amounts of flammable materials in your home. The flammables you store should be kept in a cool place, away from sparks and flames. We've all been told not to store acids and bleach together and not to mix them - the reaction will generate free chlorine, which is toxic. Store hazardous chemicals where they won't fall and break in an earthquake and store them so they're inaccessible to small children & pets.

Disposal of some of these hazardous chemicals is becoming an issue at

(Continued on Pg 4, See Safety)

Environmental Health and Safety #717
50 Medical Center Way
San Francisco, California 94143

In This Issue:

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

TOASTER / MICROWAVE FIRES

During fiscal 1997/1998 UCSF had thirty-two fires - seventeen involved improper use of toasters or microwave ovens.

- Two fires resulted from staff turning on a toaster and leaving it unattended; the burning toast activated the smoke detector.
- Fourteen fires resulted from staff placing food in a microwave, setting the oven for a period longer than necessary to heat the food and leaving it unattended; the burnt food activated the smoke detector.
- One fire resulted from employee placing a thick bagel in a narrow toaster slot and leaving it unattended. The bagel interfered with the automatic shut off mechanism and the smoke from the burning bagel activated the smoke detector.

The San Francisco Fire Department, Physical Plant Engineering, and Building Management responded to all seventeen fires; fires could have been avoided had employees:

- thought before using a heating device.
- operated the toaster or microwave oven properly.
- set the timer for an appropriate length of time.
- stayed with the appliance while the food heated.

All fires must be reported to the Office of the State Fire Marshal (OSFM), no matter how small. When these fires were reported to Chief Paul Ditzen, he stated should the misuse of small appliances continue the OSFM would ban their use at the University.

(Safety, continued) home. Motor oils, paints, pesticides, and certain other chemicals should never be dumped into the storm sewer. Most cities have a "household hazardous chemicals disposal program" for you to take these materials to a designated site for proper disposal. If in doubt about chemical disposal, call your household hazardous waste program, usually listed in the phone book under city or county government.

Chemicals are just one area where you can take safety home, others are electrical safety, and the ergonomics of lifting, pulling, and sitting at a computer workstation. Fire safety measures apply at home, so do the bloodborne pathogens principles - treat all blood, blood products, and other potentially infectious materials as if they are indeed infectious. Play safe!

The Campus Safety Fair, presented by EH&S, will take place Tuesday December 8, 1998 9:00 a.m. - 3:00 p.m. in the Millberry Union Conference Center