VOLUME 4, ISSUE 2 COLUMBIA UNIVERSITY EH&S Spring 2010

Safety Matters

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Environmental Health & Safety and CUMC's Radiation Safety Office Join Forces by Kathleen Crowley and Christopher Pettinato

As announced on January 7th, 2010, the operations of the CUMC Radiation Safety Office (RSO) and Environmental Health & Safety (EH&S) were integrated to form one department responsible for providing comprehensive health and safety services to the University community. Under the leadership of Kathleen Crowley, who has lead EH&S for 10 years and successfully merged the Morningside and CUMC EH&S department in 2005, the University community now has consistency in the application of University policies and governmental regulations and better coordination of our radiation safety programs and the delivery of services to investigators.

"Our Vision, remains clear", says Crowley: We provide expert guidance and timely service to the University Community through our commitment to health and safety. Employing best practices and collaboration, and by building long term relationships, we promote a productive and safety conscious work environment.

"Without question, the University and medical center community will benefit from this integration. We have already begun to evaluate the service models for each of our core programs and will begin implementing improvements in the delivery of services as we move to assimilate the best practices of the two departments,"

George Hamawy, who has been the Radiation Safety Officer for Morningside, Lamont-Doherty and Nevis Laboratories for the past 15 years, now serves as the University's Chief Radiation Safety Officer and will play a key role in ensuring we maintain the highest standards for radiation safety services. Additionally, Chris Pettinato, Executive Director, will help manage EH&S operations throughout the integration and beyond.

While it is uncertain if there will be yet another department name change in EH&S' future, what is certain is regardless of the name, our commitment to health & safety remains constant.
The CUMC Radiation Safety Office URL is http://ehs.columbia.edu/RadiationSafetyMC.html.

Liquid Nitrogen — What's That Hissing Sound? by Neil Mansky

The liquid-to-gas conversion rate in a commercial liquid nitrogen (LN) tank is about 2.3% per day. Bulk-volume liquid nitrogen tanks are designed to function with little or no internal pressure. To dissipate this pressure all containers have a pressure relief valve to allow for the slow release of vaporized nitrogen. Hearing a slight hiss from a LN tank's pressure relief valve is normal and no attempts should be made to stopper or plug the opening, as this could dangerously pressurize the tank. If you believe your tank does have a leak problem, contact the vendor immediately. **Contrary to popular belief, storage of LN in cold rooms will not slow down the liquid-to-gas conversion.** LN cylinders **must always** be stored in well ventilated areas. And while the accumulation of ice on some of the lines is normal, users must also ensure that such frosting does not obstruct any vent lines.

Consolidating Waste – programs that is for Radiation and Chemical disposal *by Christopher Pettinato*

The ChemTracker system (CTS) Random audit finished in March, 2010. audit results will Be distributed to PIs shortly

With the integration of the EH&S and RSO departments, of prime importance is restructuring of the radioactive waste management programs. Under the new structure, Lauren Kelly, who has been proficiently managing the chemical waste program for the past 4 years with EH&S, has been promoted to Manager, Hazardous Materials Program (Congratulations Lauren!). Under Lauren's direction, the chemical and radioactive waste management programs will be merged to ensure the delivery of a comprehensive service and educational program to the University community. The changes will focus on enhancing the laboratory's experience in managing these wastes by ensuring EH&S's usual proactive approach is consistently applied. Some specific changes that are in process include an on-line radioactive waste pick-up request form so labs do not need to hand deliver requests to the RSO, more effective waste labels to help the labs meet compliance requirements and help EH&S make better and more cost efficient waste disposal decisions, and improved training and guidance information regarding waste handling and segregation. We encourage your suggestions on improving these services, so please feel free to call Lauren (305-6780) or email her (lk2292@columbia.edu) your suggestions.

Someone's Always Watching: Will You Be Ready? *by Paul Rubock*

For Lab Fire Safety Prevention tips, check out: FDN(wh)Y Me @ http://ehs.columbia.edu/FDNYMe.html

A paranoid fantasy. No, rather a reflection of the reality that numerous governmental entities have a regulatory voice in our health and safety operations, particularly as they pertain to research laboratories. With increasing frequency, agencies'' compliance checks are conducted through on-site inspections, usually unannounced. Inspectors invariably focus on various forms of documentation to assess health and safety compliance. Two notable recent examples: Recently the New York City Department of Environmental Conservation (DEC) came to the CUMC campus and asked for chemical inventories in the Facilities Operations department and from several laboratories. He also assessed the areas visited for proper storage and segregation of hazardous chemicals. In all cases, the appropriate documentation was provided and no findings resulted from the inspection. **Laboratories are reminded of the requirement to compile a hazardous chemical inventory and update it annually.** On the Morningside campus the system is largely automated by the ChemTracker system. At CUMC, laboratories must provide their inventories in the appropriate section of EH&S's Attachment 1, http://www.ehs.columbia.edu/a1.pdf and forward it to their lab's Safety Officer

The Federal Aviation Authority inspects shipping to determine compliance with regulations for the shipment of Dangerous Goods-anything capable of causing personal, environmental, or property damage as a result being improperly packaged and transported. The foundation of establishing compliance with shipping regulations is **training on Department of Transportation** (DOT) regulations-. EH&S provides shipping training for infectious materials and dry ice on RASCAL; anyone involved in preparing such shipments must be up to date on these triennial trainings. All shipments of sealed source radioactive materials must be done through the Radiation Safety Office whose personnel have received the required DOT training. For any and all shipping questions, contact EH&S. By the way, FAA penalties could be as high as $35,000 per individual violation, including errors made in filling out the documentation that accompanies Dangerous Goods shipments.

Keeping Chemical Storage Sites Safe by Neil Mansky

Labs understand the necessity to maximize their limited research space, especially those that have recently shrunk in size. Among the consequences of space constraints is the need to identify safe storage locations that provide adequate segregation of incompatible chemicals. Too often, to the detriment of safety, chemicals may be crammed under the sink, randomly stored together or left 'temporarily' in the fume hood*, increasing the risk of personal exposure from the reaction that may occur when incompatible chemicals come into contact.

The restrictions of limited lab space and chemical safety need not be in conflict. The revised FDNY fire code no longer requires separate cabinets or permanent barriers between incompatibles. Rather, these items can be stored on the same shelf or in the same cabinet if they are kept in separate secondary containers, such as plastic bins. EH&S has a limited supply of secondary containment bins, available by request, for labs that need to develop a segregation system.

When planning storage areas, segregate chemicals into the following classes: flammables, reactives (including water-reactives, pyrophorics, and flammable solids), oxidizers and organic peroxides, and corrosives (acids and alkalis). Extremely hazardous chemicals should by stored separate from as many other materials as possible. Store chemical containers in places where they are the least likely to fall or break (not on the floor, where they can be tripped-over or kicked, or under a sink, where they can be impacted by leaks) and always keep hazardous liquids below eye level to minimize the likelihood of exposures to the face and eyes. See the Segregation Chart on the EH&S website for more information: http://ehs.columbia.edu/chemSegChart.doc.

*Overcrowded fume hoods may result in an FDNY Violation Order. Failure to correct may lead to the assessment of fines and/or require a court appearance. The bargain you get on ordering in bulk will be more than negated by the adverse financial and safety consequences.

EH&S Website: http://ehs.columbia.edu

Are You Registered? by Christopher Pitoscia

A Canadian research scientist at the University of Saskatoon Cancer Centre recently had his laboratory shut down after a worker reported the lab for conducting unauthorized experiments. An investigation – the full story is from CBC News - revealed that the lab failed to obtain permits for work with an infectious material, *listeria*, and had also failed to properly register their experiments with the University's animal care committee. While the national requirements vary from the US to Canada, the incident serves as an important reminder that numerous activities involving biological materials, though seemingly commonplace and innocuous, require administrative notification. For example:

- All work with recombinant DNA must be registered with the University's Institutional Biosafety Committee (IBC) via RASCAL (https://www.rascal.columbia.edu). Log on to the RASCAL system and complete Appendix A.
- All animal experiments involving the use of hazardous materials, whether potentially infectious, human-derived, or chemical, must also be described in RASCAL appendices attached to your protocol.

Please contact EH&S with any questions regarding research notification and registration requirements.

Near-Miss in Unattended Water Bath *by Juliet Ogbonnaya*

Prior to the arrival of laboratory staff on a recent weekday morning, Public Safety responded to a smoke alarm at a CUMC laboratory. The smoke condition was caused when a rack of plastic test tubes melted after being left in a water bath overnight. The water bath was left plugged in, with the heat on and its lid off, allowing its contents to evaporate. Once the bath was dry, the plastic test tubes and rack were exposed to the direct heat of the bath. This and other recent incidents (see Oil Bath article, page 4) illustrate the importance of personally attending and supervising all experiments. EH&S strongly discourages the unattended use, in particular, of electrical equipment with heating elements. For additional information, please see EH&S' policy statement on the Unattended Operation of Laboratory Equipment - http://www.ehs.columbia.edu/UnattendedEquipment.html

Fire Extinguishers: If You Pull the Pin, Call It In! by Harry Oster and Brian Anderson

It has come to the attention of Fire Safety that sometimes fire extinguishers have been used to extinguish small fires and then placed back on their hook for re-use if another fire occurs. **Fire extinguishers are designed for a single use only.** Even if the pin is only pulled and the extinguisher is not discharged, report to EH&S office so the extinguisher can be replaced immediately.

Fire extinguishers are pressurized cylinders; any activation by squeezing the handle releases some. Subsequent squeezes will never be as effective in terms of dispersal force and quantity of extinguishing material released. Consider a bottle of soda: you open the bottle, drink a glass, and replace the cap. Is there any guarantee that if the bottle remains untouched for 6 months it will still be carbonated when opened again? Similarly, there is no guarantee that an extinguisher will work if it has been previously used.

All extinguishers are inspected monthly to confirm that they are sufficiently charged, that the locking pin apparatus is intact, or if there is any indication of previous use. In any of these instances, the extinguisher is placed out of service and replaced.

There are a few things you can monitor to make sure the fire extinguisher is ready if you need it:

- The path to the extinguisher is unobstructed; the extinguisher must never be used as a door stop.
- Pressure is at the recommended level; the gauge reads in the green zone.
- The pin and plastic tamper seal/retainer are intact.
- The nozzle/parts are clear and free of chemical contamination.
- The date on the service tag is not exceeded.
- Extinguishers should be wall mounted in a clear location and only removed for emergency purposes.

Please remember that Columbia University Policy requires that all fires, no matter how small, be reported immediately to:
Morningside Public Safety@ 212-854-5555 and Fire Safety@ 212-854-6670/ 6676
Medical Center Public Safety@ 212-305-8100 and Fire Safety @ 212-305-6780/8713

Oil Bath Incident by Juliet Ogbonnaya

Recently, a fire occurred in a chemical fume hood while a laboratory worker was heating an oil bath on a hot plate. Fortunately, no one was injured and the fire was quickly extinguished by personnel using the lab's fire extinguisher.

It was the researcher's first use of this particular hot plate and the oil bath. The oil bath was not labeled as to its contents and had been prepared previously by someone no longer employed by the laboratory. With the temperature at 150 °C, the laboratory worker stepped away from the equipment to attend to another operation. Shortly after, a noise was heard coming from the hood as the bath ignited; the mercury thermometer used to monitor the temperature of the bath broke, releasing mercury in the hood.

While EH&S provided clean-up assistance and conducted an investigation, the exact cause of fire could not be determined. Several recommendations for ensuring safe operation for this common procedure were provided:

- Label oil baths with the type of oil they contain and the safe working temperature of the oil. Oil heated to temperatures above its flash point will smoke and possibly ignite. Silicone oil is recommended for higher temperatures and is a safer substitute for other oils. Always refer to an MSDS for information on flashpoints.
- Oil baths must be mixed well to ensure that there are no "hot spots" on the heating elements. This can be achieved by placing the thermo-regulator close to the heater.
- **All** active laboratory operations must be monitored closely and never be left unattended. If multiple operations are taking place, equipment should be outfitted with an automatic shut-off (e.g., thermal sensing device) or the watchful eye of co-workers should be employed.
- Laboratory equipment must be periodically inspected/tested in accordance with manufacturer's recommendation or industry standards- Never use equipment that may not be functioning properly.

Mercury is a toxic metal. EH&S strongly encourages you to exchange your intact mercury thermometers for non-mercury thermometers at no cost. If you must use a mercury thermometer, you must outfit your laboratory with a mercury spill kit. Contact EH&S for details.

Getting Your FACS Straight by Christopher Pitoscia

Flow cytometry, particularly fluorescence-activated cell sorting, or FACS, is a laboratory technique that offers the ability to differentiate between homogeneously mixed cells based on various parameters or characteristics of interest, such as DNA content or protein expression. To accomplish this, FACS sorters suspend cells in a liquid and align them in a single-file stream by rapidly passing the liquid through a narrow opening in a vibrating mechanism. A beam of LASER light intersects with each cell in the stream as it passes through the opening, and the resulting light scatter is analyzed by complex optics. Based on the light scatter measurements, cells with the same characteristics are deflected into a designated collecting tube, thus sorting them into a pure sample for further analysis. Cell sorting by this mechanism has become practically ubiquitous in biomedical research laboratories, but it is not without safety concerns, especially when sorting unfixed human cells.

In 1997, the International Society for Analytical Cytology (ISAC) published a series of reports that remain the standard biosafety guidelines for the sorting of unfixed human cells. At a minimum, due to the potential for human tissue to harbor HIV, hepatitis C and other bloodborne infections, unfixed human cell specimens must always be treated as Biosafety Level 2 (BSL 2) materials- capable of transmitting infectious disease to healthy adult humans. See the CDC publication, *Biosafety in Microbiological and Biomedical Laboratories* www.cdc.gov/OD/OHS/biosfty/**bmbl5/BMBL_5**th_Edition.pdf

When sorting these samples, malfunctions of the cell sorting equipment in which the cell-liquid stream is deflected, or the stream-focusing nozzle becomes clogged, have the potential to create aerosols of the cell-liquid matrix that can spread potentially infectious materials considerable distances from the machine. The ISAC guidelines therefore recommend that sorters in which unfixed human cells will be processed be housed in a biosafety cabinet enclosure, and that sorting not be performed on the open bench. Furthermore, operators of sorters are directed to observe BSL-3 work practices when handling such materials. Additional training, testing, signage and access restrictions also apply to sorting activities involving unfixed human materials, and sorting operations involving lower-risk materials.

Simple Procedure Leads to a Painful Injury by Kevin McGhee

While many common procedures in a laboratory become simple to perform with experience, accidents can still occur while performing the most seemingly benign of tasks. Recently a lab worker was microwaving a small amount of agarose solution to prepare an electrophoresis gel. The researcher was quite experienced with the procedure, having performed it several hundred times by their own estimation, without incident. However, the worker, not anticipating that the neck of the bottle would be hot, attempted to retrieve it from the microwave by gripping it barehanded. Unfortunately, the neck of the bottle WAS hot, the worker reflexively dropped the bottle, and the superheated solution erupted from the container as it struck the lab bench, splashing onto the worker's face and eyes.

The consequences were fortunately limited to minor first degree burns and irritated eyes, but several lessons are apparent from this incident. An eye injury would have been easily avoided had appropriate eye protection been worn. Insulated gloves were also available but were not used, as the worker assumed that grabbing the container by its neck would be an adequate shortcut. Both of these oversights were largely a result of the assumption that such a common task, with a relatively benign substance, would not be hazardous, obviating the need for personal protective equipment. In fact, the physical hazard posed by the hot surface of the container and the superheated agarose solution remained, but was momentarily disregarded due to the seemingly routine nature of the procedure.

Microwaving and autoclaving present a potential for a superheated liquid to erupt upon initial handling of a bottle or flask. To avoid this, allow sufficient time for the material to cool before touching the container and gently tap the container at arm's length to ensure that any boil over does not contact your hand or arm.

Injuries can be quite common during everyday tasks, even for tasks as simple as cooking in one's own kitchen or driving home from work. Very often accidents occur when tasks become so familiar that they are routine, and able to be performed without requiring much active thought. Because laboratories can present serious hazards, even for the most routine of tasks, laboratory workers must always take special care to perform even the most routine of procedures with appropriate precautions.

Radiation Workers and Pregnancy by Thomas Cummings and Shira Abraham

If you work near radiation and are pregnant or may become pregnant, federal law protects you against job discrimination. With a few simple steps, you can also ensure that your unborn child is protected from occupational radiation exposure. If you become pregnant, you are entitled to voluntarily submit a *Declaration of Pregnancy* form to the Radiation Safety Office. This form is part of the *Radiation Protection Policy for Pregnant Workers* which must be posted in all laboratories that use radioactive materials. Once the *Declaration* is filed, a physicist from the Radiation Safety Office will meet with you to answer any questions you may have, and to determine whether your situation requires any reassignment of your job duties. In most cases, job re-assignment will not be necessary because the majority of workers receive exposures well below the ALARA (as low as reasonably achievable) limits. The *Declaration* is confidential, and the Radiation Safety Office will not discuss your pregnancy status with anyone without your consent.

Once a pregnancy has been declared, radiation dose to the fetus is tracked via a fetal badge monitor that is given to the worker in addition to a regular dosimetry badge. Since the radiation dose to the fetus is limited to 500 mrem for the duration of the pregnancy, radiation workers are urged to declare their pregnancy as early as possible. Once a worker declares their pregnancy, the Radiation Safety Office will monitor the dose to the fetus to ensure that for the remaining period of pregnancy, the exposure will be less than 50 mrem per month.

Principal Investigators must ensure that the *Radiation Protection Policy for Pregnant Workers* is posted in a prominent place in the laboratory. In discussing the issue with an employee, PI's should note the importance of extra fetal monitoring and emphasize that pregnant workers are protected by law against job discrimination. In the case where job re-assignment is necessary, the Radiation Safety Office will be available to discuss alternatives with the individual and the immediate supervisor. Remember: filing a *Declaration of Pregnancy* is the best policy for everyone – especially the fetus.

Aerosols Cans: They aren't just regular trash by Lauren Kelly

There is a consistent interpretation of environmental regulations that characterizes aerosol cans, whether the can is full, empty or somewhere in between, "hazardous waste" when disposed. Since many aerosols contain environmentally harmful contents for example a flammable propellant, or flammable or halogenated solvents) and/or are under pressure, all aerosol cans must be handled through the University's hazardous waste management program for disposal. Aerosol cans must NEVER be crushed or punctured, placed in the trash or red bag waste containers, or stored at high temperatures. Mismanagement of aerosol cans can result in serious injury and/or environmental contamination. To ensure safe handling and proper disposal, remove the spray nozzle or affix the can's original cap, and then place a hazardous waste label on either the individual can or collection container. Place the aerosol cans in a closeable container such as a 5-gallon pail provided by EH&S. Once full, submit a chemical waste pickup request, available at http://vesta.cumc.columbia.edu/ehs/wastepickup/.

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Do you have a suggestion for a future *Safety Matters* article? Do you have a comment on something you just read? Please share it with us at , newsfeedback@columbia.edu