Environmental Health & Safety

Safety Matters Winter 2009 Newsletter

Make Some Room

Do you need more storage space in your laboratory? Take a look around and see if your laboratory is filled with:

- chemicals that are no longer of use (beyond the expiration date)
- chemicals and samples that cannot be identified (faded labels, no labels)
- chemicals that appear as though they have not been used in years

If you answered YES to any of the questions, then it's time to get rid of these 'inherently waste-like' chemicals, which are subject to EPA's hazardous waste regulations. EH&S invites you to make some room and unload your unwanted chemicals for safe, no-cost disposal. Simply schedule (854-8749 @ Morningside or 305-6780 @ CUMC) a visit with EH&S staff who will help coordinate your clean out. For "cleanouts" no Hazardous Waste Labels or Chemical Pickup Request Forms are required, so take advantage of this simple solution to your chemical storage issues.

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Update: Chemical Recycling

Even before "going green" was in vogue, EH&S was thinking green. In 2001, we partnered with the Departments of Pathology and Dermatopathology at CUMC to begin an on-site recycling program for used xylene and ethanol, which are returned for use over and over again. Many years and thousands of gallons later (they recycle in excess of 3,000 gallons annually), the program is running strong and providing green and financial benefits. Visit these links to read more:http://www.columbia.edu/cu/environment/news/hichack/index.html and http://www.cumc.columbia.edu/news/in-vivo/Vol1_Iss3_feb11_02/around-and-about.html
In 2008, EH&S's continued pursuit of environmental Sustainability resulted in a partnership with several labs in the Department of Chemistry to initiate recycling of acetone for reuse within the

laboratories generates approximately 800 gallons of waste acetone each year and in the first 4 months of operation, 210 gallons were recycled and returned. EH&S estimates the program will recycle approximately 600 gallons of acetone per year (or 75% of all waste acetone generated by Chemistry labs) with a projected annual savings of $7,400 in purchase and disposal costs.

EH&S would like to expand the acetone recycling program by encouraging more laboratories to join the “go green” movement. In addition, we will be evaluating opportunities to recycle other commonly used solvents in research. If you have ideas for reuse or recycling, please forward suggestions to EH&S envsafety@columbia.edu or to the Stewardship Office environment@columbia.edu

Polystyrene Boxes Recycling @ CUMC

Polystyrene foam boxes are used often in shipments of temperature-sensitive materials; their lightweight and insulating properties make them ideal for this purpose. Producing these boxes is highly resource-intensive however, and their plastic ingredients have an indefinite half-life in landfills (or oceans, or rivers).

To help limit the production and subsequent disposal of these boxes, EH&S, in cooperation with CUMC Facilities, is pleased to announce a recycling program for Polystyrene/Styrofoam shipper boxes. Bring clean, empty foam boxes (not the cardboard outer box), **with the supplier’s return label attached**, to any of the following locations:

CUMC Facilities Department personnel will arrange for the boxes to be returned for re-use.

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EH&S launches new website

In October 2008, EH&S unveiled a new look to the website. The target date for completion is March 1, 2009. The content reflects the expansion of programs to address a wider range of health and safety areas and the ever-widening role of environmental compliance in University operations. Search options have been enhanced and the site allows users from all campuses (Morningside, CUMC, LDEO, & Nevis) to easily identify EH&S personnel responsible for specific programs.
Please check our site at http://ehs.columbia.edu.

ChemTracker System audit results

During the summer of 2008 EH&S audited the ChemTracker System (CTS) in all Morningside laboratories. The audit found 30,264 containers of the total of 30,947 in the system. This translates to an identification rate of 97.8%, a significant improvement compared to last year’s audit.

Thank you very much for your assistance in improving our chemical management system.

Clarifying the University's "No Drain Disposal" Policy

As a member of the Columbia University research community, you should be familiar with the University's "No Drain Disposal" policy for laboratory chemicals. Sometimes EH&S is asked for clarification and because the regulations behind this policy statement are numerous and convoluted, we will (use this article to) clarify the "No Drain Disposal" policy.

Let's begin with the regulatory basis of the policy and how the laws define "hazardous waste." The US EPA and NY State DEC define hazardous waste as anything that can pose a substantial or potential hazard to human health or the environment when improperly managed. EPA and DEC go on to say that chemical wastes that have the characteristic of ignitability, corrosivity, reactivity, or toxicity are hazardous wastes, as are any chemicals that appear on specific lists (e.g., F-list, P-list, U-list) created by the agencies.

In addition to the broad net cast by EPA and DEC, the New York City Department of Environmental Protection (DEP), the agency that regulates the City's sewage treatment plants and thus the laboratory drains that feed them, forbids flammable liquids and toxic substances from entering the public sewers. Again, flammable liquids and toxic substances cover a wide array of laboratory chemicals. Municipalities in Rockland and Westchester Counties have similar prohibitions on substances entering the sewers.
When considering the combined requirements and restrictions of EPA, DEC and DEP, little wiggle room exists for the drain disposal of chemicals. And even where some room exists, Columbia has chosen to take a conservative approach to chemical waste collection and requires the collection of ALL laboratory chemical waste because attempting to debate the definition of hazardous, toxic, etc with the regulators is futile.

So once we have determined what is subject to the hazardous waste regulations, we can turn to the University's "5Ls of Hazardous Waste Management," 5 basic principles of chemical waste collection and management (http://www.ehs.columbia.edu/5L.html). The "5Ls" were developed by EH&S as a translation of the complex Federal, State, and local hazardous waste regulations into concise, easy to follow steps for ensuring compliance. In accordance with hazardous waste regulations and the "5Ls," all hazardous chemical waste must be collected and properly disposed of. The overwhelming majority of Columbia's laboratory chemicals meet the criteria for collection as hazardous waste, prohibiting drain disposal as an option. In support of the University's No Drain Disposal policy, here are some classic examples of chemicals EH&S is frequently questioned about:

Ethanol: an ignitable/flammable chemical that meets the ignitability characteristic of hazardous waste as defined by EPA/DEC. As a flammable liquid, it is also forbidden from entering the public sewer (even with copious amount of water). It is clear and unequivocal that ethanol must be collected for hazardous waste disposal.

Acetone: see Ethanol

Methanol: see Ethanol

Chromerge: a sulfuric acid (corrosive) and chromium trioxide (toxic) solution used for cleaning laboratory glassware. This mixture is a corrosive, toxic hazardous waste and a pretty nasty actor all around. EH&S always recommends laboratories try alternative glass cleaner products (e.g., Alconox or NoChromix).

Dyes and Stains: the exact contents of dyes and stains will determine whether they can be drain disposed. For example, Coomassie Blue and "Destain," which contain methanol and acetic acid, would both be considered hazardous wastes and prohibited from drain disposal. EH&S prefers all dyes and stains be collected for hazardous waste disposal.

There are two very important issues related to drain disposal and hazardous waste collection that must also be mentioned. The EPA, DEC and DEP generally DO NOT recognize quantities or volume limits in their definitions, which means even small
quantities of chemical waste must be collected for proper disposal. Also, the evaporation, intentional dilution or neutralization of a hazardous chemical waste for the purpose of avoiding collection of that chemical as a hazardous waste is illegal.

Please contact EH&S with questions about the University's "No Drain Disposal" policy.

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The Tip of the Hazardous Iceberg

Many laboratory operations involve the need for accurate transfer of micro liter quantities of liquids. When filling wells on a plate for an assay, or loading a gel for electrophoresis, micropipetters are the tool most commonly called upon for these jobs. With the use of micropipetters however, comes the use of micropipette tips and the need to properly dispose of them. Furthermore, these tips are often generated in large numbers, particularly with the use of multi-channel pipetters.

Over time EH&S has received accident reports resulting from the improper disposal of these tips. When discarded in large numbers and weighed down in a red bag or regular trash bag, the micropipette tips are quite capable of tearing through the bags and causing scratch or needle stick-type injuries. These injuries can cause great anxiety to the injured and are easily preventable. The safest outlet for micropipette tip disposal is in the regulated medical waste sharps containers. These containers, which are also used for more traditional sharps such as needles, scalpels, razor blades, and contaminated glassware, provide puncture-proof containment for the micropipette tips.

Tips can be collected in bench-top beakers or other puncture-proof containers before being discarded into the sharps containers. If used for the transfer of chemical materials such as ethidium bromide, phenol or chloroform, the tips can be temporarily stored in a puncture-proof container in the lab's chemical fume hood to mitigate odors. Since there will be an insufficient volume of liquid leftover in the tip (negating the need for the tips to be collected as hazardous waste), these tips should be discarded in sharps containers and disposed of as regulated medical waste.

Solvent Fire Destroys Laboratories

On what seemed like an uneventful evening, graduate students in an upstate chemistry lab were engaged in routine activities. Some were working at the bench while others were unloading a shipment of hexane into a solvent cabinet. A student placed the last of 12, one-gallon bottles into the cabinet, when the shelf broke. The bottle shattered, cut the student's arm and contaminated their clothing. Co-workers quickly attended to the injured student, but were overwhelmed by the strong solvent vapors. A nearby open flame ignited the vapors, causing a violent explosion. **Twenty fire trucks were deployed to fight the fire that**

destroyed the lab and those surrounding it (photo below; Chemical & Engineering News, May 2005.).Fortunately no one was hurt**.**

Lessons Learned:
While this incident occurred at another college, because the presence of flammable and hazardous materials defines most laboratory spaces, never consider any lab activities 'routine'. To safely store hazardous materials:

- Properly segregate and place in secondary containment for storage in cabinets.
- Be aware of the maximum weight a shelf can hold; and remember some liquids are heavier than water, for example, sulfuric acid (depending on the concentration) may be as much as 84% more dense.
- When possible, store higher hazard materials below eye/face level.
- Always wear personal protective equipment (PPE) including gloves, a lab coat and safety glasses when handling hazardous materials. These protective barriers may buy a few extra seconds preventing skin contact and serious injury.
- Follow the applicable rules regarding chemical storage.

In the event of any spill:
Turn off any ignition sources to prevent a fire or explosion. In case of a manageable spill, know the location of spill kits and initiate clean up **only** if you are knowledgeable to do so and the clean up will not put you at risk. When in doubt, **get out**.
For a large or unmanageable spill, evacuate the laboratory and contact EH&S immediately. The NYC Fire Department (FDNY) recently enacted more stringent rules for chemical storage; see our web site for information about this and our safety training sessions.

Be Proactive-Be Prepared: Our web site, http://www.ehs.columbia.edu/chemspill.html describes response scenarios for laboratory spills-take a quick look now. This might be a page you want to print out and keep handy. Call EH&S (854-8749 @Morningside or 305-6780 @ CUMC) with questions about chemical segregation and storage.

The NYC Fire Department requires at least one holder of a Certificate of Fitness for supervision of laboratories (C-14) to be present **anytime** a laboratory is in operation, including nights and weekends. EH&S provides training and testing at both the Morningside and Medical Center campuses.

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Select Agent Toxins

You may be aware of the Select Agents Rule as a component of the Department of Homeland Security's program to oversee the use of high-risk microorganisms in research and other settings. Fewer people know that the same legislation also covers one dozen toxins, some of which are fairly common in academic settings, including tetrodotoxin and conotoxins. But unlike microorganisms, the requirements for the toxins are only applicable for possession above specified quantity limits. For a list of toxins and their respective quantity limits see http://www.cdc.gov/od/sap/sap/toxinamt.htm. Possession above these levels require a background check and an extensive registration process. If your laboratory uses any of the Select Agent Toxins, be sure that quantities are kept well below the specified limits. Contact EH&S with any questions.

Building	Location	Hours
Hammer Health Sciences Building	Receiving Department / Loading Dock	8am – 12pm; 1pm – 4pm
Black Building / P&S Building	Receiving Department / Loading Dock	8am – 12pm; 1pm – 4pm
Russ Berrie Building	Receiving Department / Loading Dock	8am – 12pm; 1pm – 4pm

Recognition of Outstanding Achievement

Regular readers of our Newsletter know that there is no lack of rules, regulations, policies to follow. However, none of these would be effective without the active support of non-EH&S members of the Columbia community. One such person is Cathy Troutman of the Lamont-Doherty (LDEO) Safety and Security Office. She was recently awarded the Lamont Service Award for her dedication and hard work in supporting LDEO's safety program. This award is given each year to a member of the administrative or support staff who has demonstrated:

- Extraordinary effort;
- Exceptional work quality;
- Capacity to anticipate and solve issues before they are problems;
- Willingness to go "above and beyond" the call of duty, often without being asked; and
- High degree of reliability and trust by supervisors, research staff, peers, and customers.

During her 9 years of service, Cathy has increasingly taken on additional responsibilities in a number of critical areas, continuously displaying a high standard of performance.
Congratulations Cathy!

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Food Irradiation: Is It Safe?

Food is irradiated to destroy insects, fungi or bacteria that cause spoilage or spread disease. (Remember though that irradiated food should not be a substitute for good food preparation hygiene.) The process has been used for many years on food for the armed forces, in some hospitals, and on all imported dried spices.
While exposing food to high radiation will not make it radioactive, some scientists believe that radiation can lower the nutritional value or produce harmful free radicals in the food.
Further research must be conducted in this field to assure the safety of irradiated food (changing the name would be beneficial). Irradiated food is sold in many supermarkets around the country and can be recognized by the logo in the attached photograph.

Biosafety Cabinet Survey: Working Safely, Preventing Contamination

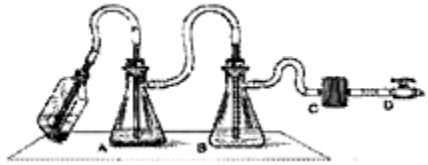
EH&S recently completed its semi-annual survey of biological safety cabinets (tissue culture hoods). During such visits we focus on these related safety and contamination control items.

- **Certification Date** - Laboratories must have their cabinets certified annually. This procedure tests the integrity of a cabinet's HEPA filters and determines if the airflow rate and directionality are

within an established 'acceptable' range. Some researchers may be inclined to delay or forego certification because they "do not use anything infectious." Even when this is the case, it is critical to remember that biosafety cabinets not only prevent personal exposure (to infectious materials) but they also, when used properly, reduce the chances of contamination of critical, perhaps unique, specimens.

- **Vacuum Line Filters and Disinfectant Traps** - Aspiration of cell culture flasks creates aerosols that can be drawn into vacuum systems posing a hazard to maintenance staff; installation of an in-line filter, C, reduces the hazard. The drawing at right illustrates the appropriate flask and filter set up. Collection flasks should be placed inside the cabinet (yes, this is feasible if storage of unnecessary material in the cabinet is eliminated and the workspace is efficiently set up). Placing a collection flask on the floor results in drawing infectious material outside the confines of the cabinet and creates the possibility of breakage and contamination should someone knock it over.

For more on the safe and effective use of biological safety cabinets, see:
http://ehs.columbia.edu/bs.html



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Emergency Preparedness

An important component of research safety is preparedness in the event of an accident to minimize its impact and enable the resumption of normal activities as soon as possible. Think of how many articles you've seen in Safety Matters concerning spill kits, emergency contacts, and fire extinguisher use, to name a few preparedness topics. This concept does not stop at the laboratory door. Living in the New York City area, we are subject to both natural (snowstorms, hurricanes) and man-made (fires, blackouts) occurrences that will force us to confront the question: ARE YOU PREPARED?
An informative starting point is the New York City Department of Health and Mental Hygiene's web site, http://www.nyc.gov/html/oem/html/ready/household_guide.shtml
Beginning with how-to essentials (go-bags, disaster plans, emergency supplies), the guide goes into specific response situations related to the natural and man made crises that we may face. Take a quick look and remember that it is too late to prepare when it is time to act.

Is There any Way to Top an HPLC?

High Performance (Pressure) Liquid Chromatography uses effluents with varying polarities as carriers for organic compounds in samples being analyzed. The resulting effluents are typically a mixture of water and some common solvents: acetone, acetonitrile, methanol, and/or hexane. These ignitable effluents are considered hazardous wastes and must be managed in accordance with the "5 L's of Hazardous Waste Management" (see previous article), even while the effluent container is still connected to the HPLC. This means the container must bear a label, identifying the specific solvents and the lid must be kept securely closed.

Since HPLC effluent is directly deposited into the waste container via attached tubing, there are a few

methods to ensure that the lid is tightly sealed (leak-proof if overturned). One option is to purchase a waste disposal container from the HPLC manufacturer or other laboratory equipment supplier. These containers are made specifically to address the "closed container" requirements of the hazardous waste regulations; the tubing ports are built directly into the container cap to allow for a tight connection. Alternatively, rubber stoppers built to similar specifications can be purchased. One of the least expensive options is to drill one or more holes, depending on the HPLC set-up, into the cap of the effluent container. EH&S recommends a small bead of silicone to seal the penetration after the tubing is inserted through the cap to ensure a good seal. Whichever option you choose, the caps can then remain attached to the equipment and the waste container can be closed with a spare, solid cap while awaiting disposal by EH&S.

If you need help setting up your HPLC effluent container (or any other laboratory equipment with effluent tubing) to ensure it will pass EPA muster, or if you simply need some help drilling holes in your container caps, please contact EH&S.

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Additional Appreciation-Environment-al Audit

Working with an independent consultant, EH&S recently completed its all-campus triennial audit of the University's Hazardous Waste Programs. We are pleased to report that CU ranked in the highest echelon of compliance for similar institutions. EH&S thanks the members of the University with whom we and the auditors interacted, particularly laboratory staff and campus Facilities groups. In addition to facilitating the process, they are largely responsible for the overwhelmingly positive audit results.

Morningside Lab Equipment Disposal

Environmental Health and Safety (EH&S) and Facilities Operations have teamed up at the Morningside campus to provide open drop-off hours at the Grove on Wednesdays from 10 AM to 2 PM. During this time and at no cost, personnel may bring down "cleared" laboratory equipment and furniture to the dumpsters for disposal. All lab equipment must first be **cleared** by EH&S **before** disposal or handling by anyone outside the lab. For more information about the equipment clearance process, visit http://ehs.columbia.edu/LabEquipClearance.html.