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SafetyMatters

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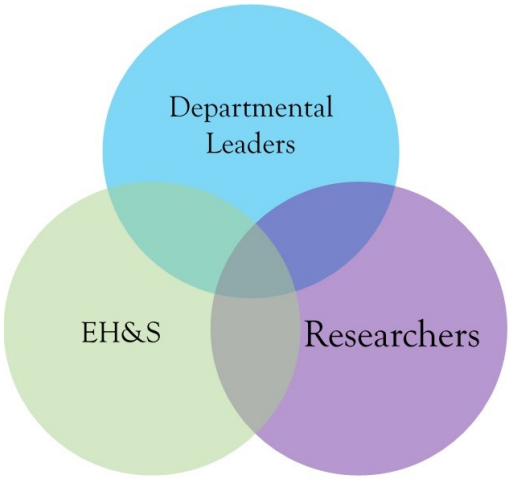
Soon Again to be Printed on Recycled Paper

Starting a Laboratory Safety Team at Columbia University

by Sandra Keyser, Senior Safety Advisor

Active support and participation from all levels of the research community is imperative to the development of a strong and sustainable safety culture at any institution. To help develop a culture of safe practices in academic laboratories and to address a crucial need in safety education, laboratory safety teams (LSTs), led by graduate students and postdoctoral researchers, have been launched at a number of universities, including the University of Minnesota, Johns Hopkins University, Northwestern University, Ohio State University, University of Connecticut, and Yale University.



Though implementation differs, the approximately 16 LSTs across the nation share similar values: a prioritization of a safety culture that minimizes the chances for accidents and near misses, empowers researchers at all levels to discuss safety concerns, and a reliance on open communication.

Common activities for LSTs include conducting peer laboratory walkthroughs and discussions, writing and presenting "Safety Moments", establishing a reporting mechanism for near-misses, delivering training for teaching assistants and the development of other supplemental educational resources. Due to the extent of hazards associated with their research, LSTs are typically associated with institutions' chemistry and chemical engineering departments in conjunction with related high-hazard groups or departments.

To maintain long-term success, LSTs work in collaboration with their respective departments, their principal investigators, EH&S, and sometimes deans or vice presidents of research. Some have formed industrial partnerships (e.g., Dow Chemical Company with the University of Minnesota and ExxonMobil with Texas A&M) to provide the LST representatives with a safety perspective from outside academia, involving seminar talks, on-site visits to the companies' facilities, training, and recruitment. Networking, development of marketable and transferrable skills, and professional development are further advantages to industrial partnerships with LSTs.

Beyond the development of a safer research community, LSTs offer numerous added benefits: enhanced familiarity with broader safety concerns, professional development (whether pursuing an academic or industrial position), and soft skills like leadership, communication, and teamwork.

In the coming months, EH&S is interested in supporting and championing a researcher-led LST at Columbia University to promote a robust safety culture. If you are passionate about safety and improving Columbia's research programs at a grassroots level or would appreciate having more information, please reach out to labsafety@columbia.edu. Additional resources can also be found through *ACS Chemical Health & Safety* and *Journal of Chemical Education*.

When working in the laboratory: eating, drinking or applying cosmetics is prohibited.

Proper work attire (e.g., long pants, closed toe shoes) and PPE (e.g., laboratory coat, gloves and eye protection) must be worn when working in the laboratory.

Remember to periodically flush your laboratory cup sinks and floor drains with water to prevent odors from migrating into your laboratory.

For Lab Fire Safety Prevention tips, check out FDN(wh)Y Me https://research.columbia.edu/content/fdnwhy-me

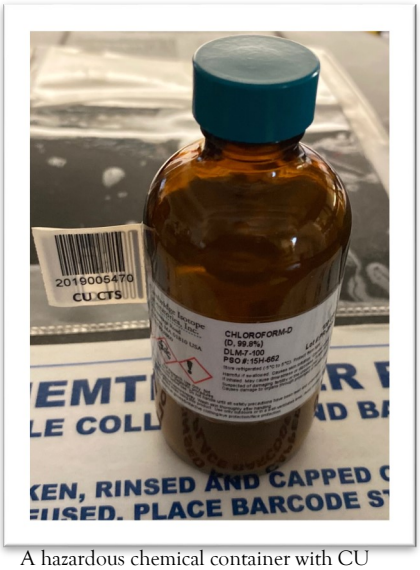
Remember!
Mask UP!
Maintain physical distance (at least 6') requirements!
Wash your hands often!

ChemTracker: Chemical Inventory Reconciliation during COVID-19

by Phylicia Obame, Senior Systems Analyst

To support ongoing chemical inventory reconciliation for research laboratories, Environmental Health and Safety (EH&S) has taken several measures of precaution to ensure the safety of our community while staying compliant during COVID-19. Columbia University has an obligation to meet regulatory requirements by maintaining an accurate chemical inventory. With central receiving systems for chemical deliveries at the Morningside Campus and the Jerome L. Greene Science Center at Manhattanville, chemical receiving and reconciliation is managed by EH&S and performed by Synovos representatives, who specialize in on-site chemical management services. Synovos has been a trusted partner of EH&S since 2006 bar-coding all chemicals upon delivery and receipt while also maintaining accurate chemical inventories through reconciliation and empty bottle handling.

Despite the disruptions caused by the pandemic, chemical inventories are still being updated for both emergency response and regulatory purposes. These inventories are free to access for laboratory personnel, and researchers are encouraged to use the ChemTracker inventory program, a web-based software created by Stanford University and acquired by BioRAFT in 2018. More information about how to access and use ChemTracker can be found EH&S' ChemTracker page: https://research.columbia.edu/chemical-tracking-system-chemtracker.



A hazardous chemical container with CU ChemTracker RFID tag.
Photo: Phylicia Obame

Since research ramp-up began on June 22, 2020 EH&S has been scheduling chemical inventory visits with each laboratory, with different options available for their reconciliation audits. Most researchers have chosen the option to have their inventory updated outside of their regular work shifts. Synovos representatives can start at 8:00am and conduct the reconciliation using Radio Frequency Identification (RFID) technology. RFID mobile readers can scan multiple RFID tags simultaneously, offering significant increases in speed and efficiency. Still in the program's first phase of ramp up, Synovos is only visiting laboratories whose inventory already contains exclusively RFID-tagged bottles, which allows the reconciliation to be performed as a contact-free process and at a faster pace; instead of several weeks of manual counting, an inventory scan now takes approximately 30 minutes to complete.

Additional precautions include the buddy system. Two Synovos staff "auditors" generally conduct inventory scans and maintain physical distancing for the duration of the audit to ensure a safe process. The team is provided with appropriate Personal Protective Equipment (PPE) which includes a laboratory coat, eye protection, gloves and face covering. A face shield can be provided to laboratory staff if there is unavoidable close contact that must take place. As the COVID-19 pandemic continues to evolve, EH&S is committed to prioritizing the safety and wellbeing of our community. EH&S anticipates ramping up further in spring, 2021 to include chemical inventory reconciliation efforts in laboratories where conversion to the new RFID tags is necessary. If you are interested in getting your laboratory on the schedule for a chemical inventory update, or have questions about how to access and use ChemTracker, please reach out at chemtracker@columbia.edu.

Bunsen Burnout

by Cody Cameron, Biological Safety Officer

Once lit, the wick of a candle will eventually burn out; the flame of a typical Bunsen burner, however, will remain lit until manually extinguished. While the open flame of a Bunsen burner can be useful in maintaining a microbe free environment on an open bench, a number of hazards arise when it is confined to a Biosafety Cabinet (BSC). For instance, if the flame of the Bunsen burner is extinguished while the gas supply valve remains open, flammable gas would accumulate uninhibited inside of the cabinet, creating a possible fire or explosion hazard. Standard biosafety cabinet models such as Type A2 BSCs recirculate around 70% of the HEPA filtered air inside. As a result, the flammable gas could potentially reach concentrations suitable for combustion and pose a serious risk to personnel occupying the immediate and adjacent areas. BSCs are not intrinsically safe, which means, the motor, ultraviolet lamp, or outlets may create an ignition source for accumulating volatile gases. Nuaire, a prominent cabinet manufacturer published a technical bulletin on the use of natural gas Bunsen burners within a Biological Safety Cabinet stating, "use at your own risk." The installation of the gas line alone voids manufacturer warranties and entities such as the NIH/CDC, WHO, and NSF openly discourage the practice.

In addition to fire hazards, Bunsen burners may also pose a biosafety risk if used improperly. Although the intended use of the flame is typically to sterilize instruments and aid in maintaining a sterile work area, the heat of a Bunsen burner flame can create turbulence disrupting the laminar HEPA filtered air flow inside of a biosafety cabinet. This disruption of the laminar air stream can potentially expose the user to aerosols generated beneath the flame. Thus, counterintuitively, the very practice meant to maintain sterility can endanger the user. The heat from the flame can also damage the HEPA filter media, compromising the efficacy of the filter, which could potentially lead to contamination.

The CDC and NIH have addressed the use of Bunsen burners when working inside of a BSC in *Biosafety in Microbiological and Biomedical Laboratories (BMBL)* 6th edition. The BMBL suggests that open flames are not necessary for use in the "near microbe-free environment of a biological safety cabinet." If absolutely necessary, touch activated micro burners equipped with a pilot light are recommended by the CDC/NIH. Touch activated micro burners offer portability without the use of a gas line. Other models allow pedal-controlled flame attenuation, and some even use passive infrared motion sensor circuits for auto ignition and extinguish when idle.

The innate risks associated with Bunsen burners in BSCs are well characterized by manufacturers and public health authorities. For more resources regarding effective and safe use of heat sources inside of the Biosafety Cabinet, please contact the biosafety office at biosafety@columbia.edu.

Fire Safety Minute

Cold weather is now upon us in NYC and your office or laboratory may become cold or drafty. Space heaters are allowed under University policy and can be useful during the colder months. According to both the Morningside and Medical Centers campus Fire Safety, the rules are the same. Space heaters must be approved by campus Fire Safety officers. Fire Safety at Morningside can be reached at firesafety@columbia.edu. At CUIMC, call (212) 305 HELP (4357), option 3 and request a heating assessment. This is to assess the space and ensure proper placement to reduce any risk of fire and in some cases to recommend certain heaters. Once approved, there are several strict rules that must be followed to ensure fire and life safety:

- Space heaters can never be placed under desks or in enclosed areas
- Space heaters must be plugged directly into a wall outlet and may not be used with extension cords
- When in use the space heater must be located three feet from any combustibles
- Open-element space heaters are forbidden, such as fan-forced, quartz, ceramic or any other that has exposed heating elements
- Only oil-filled radiator heaters with Underwriters Laboratories (UL) rating may be used in University owned buildings

Certificate of Fitness Process

by Natasha Shockness, Administrative Assistant

The Fire Department of the City of New York (FDNY) requires that all non-production (i.e., research) laboratories be under the supervision of a qualified C-14 Certificate of Fitness holder, at all times that the laboratory is in operation.

This includes nights, weekends and holidays, and also means that if only a single person is in the laboratory, that individual must themselves be a C-14 holder. While most laboratories are typically staffed during "normal" times, the limited occupancy and reduced density limitations due to COVID-19 may add to the challenge of ensuring proper C-14 coverage. EH&S has collaborated with the FDNY to make obtaining a C-14 card easier for laboratory personnel by offering online training and application processing.

Natasha processing new C-14 cards. *Photo: Pam Shively*

Due to COVID-19, in-person training has been postponed, however, EH&S still offers the training course online in RASCAL (TC5451). Once an individual has taken the training and passed the subsequent test, the next step is to submit all required paperwork to fire-life@columbia.edu. The required forms and documents are the A20 Application, Employee Affirmation, Employee Statement and a copy of the applicant's degree or transcript and a passport photo. Upon receipt, EH&S will review the documents and submit to the FDNY.

C-14 ID cards are typically delivered to the EH&S office 2-4 weeks from the time paperwork is received. Once received, they are scanned, uploaded into the LION system and card owners are informed that their card has arrived. A similar process also occurs for all C-14 card renewal requests that come though the fire-life@columbia.edu email. After receiving their card, all cardholders must make a copy to be kept in the laboratory, and must keep their C-14 cards with them at all times while conducting research.

Researchers who receive their cards directly from the FDNY Headquarters, must email a copy of the card to EH&S to be uploaded in LION.

Please note that not every applicant qualifies to be certified through Columbia. For the list of qualifications and more information regarding the complete process visit: https://research.columbia.edu/certificate-fitness-information.

This Week in Virology

For readers of *SafetyMatters* who may not be familiar with Columbia University virologist Professor Vincent Racaniello's podcast, "This Week in Virology (TWiV)", it was recently noted as one of Columbia's top ten podcasts and is well worth a listen! https://magazine.columbia.edu/article/11-columbia-podcasts-keep-you-know?utm_source=43567601_467834246&utm_medium=email&utm_campaign=1673945040

Professor Racaniello's guest on the November 13, 2020 episode of TWiV was EH&S' own Dr. Kathleen Crowley who explains the role of Environmental Health & Safety departments. You can watch the show on YouTube or listen at TWiV 681: Crowley, Coats, and Cross-Reactive Antibodies.

Meet the EH&S Staff

"Meet the EH&S Staff" is a new addition to the Safety Matters Newsletter. This feature will introduce members of Team EH&S to the Columbia Community, highlighting their background, hobbies and interests. Get to know Team EH&S by checking back each quarter for new profiles. And next time a team member is in your laboratory, feel free to strike up a conversation about something new you've learned about them!

Cody Cameron hails from Carlsbad, California, the birthplace of skateboarding. As a Biosafety Officer, he is nearing his three-year anniversary at EH&S. Prior to coming to Columbia, he began his career at the Harvard Stem Cell Institute. While at Harvard Cody spoke often with the Biosafety Office and admired their professionalism and knowledge of the institution and research. As a researcher, Cody observed the need for safety professionals in keeping himself and those around him safe. It was this relationship which inspired Cody to become a Biosafety Officer when the opportunity at Columbia University materialized.

Photo: Jon Paul Aponte

His love and empathy for animals is obvious as he dreams of living on Aoshima Island in the Ehime Prefecture in Japan, where there are significantly more cats than people! Cody also loves creating portrait art; his current project is a portrait of Cissy Spacek as Carrie from the movie adaptation of Stephen King's novel. He is also interested in learning more about astrology and in his spare time, he loves to cook vegetarian dishes and listen to music to unwind after work.

The philosopher, Lucius Annaeus Seneca, has been an inspirational influence for Cody. If he could make one change in the world it would be social stratification. Cody's altruistic beliefs motivate him, this is obvious to everyone fortunate enough to work with him. Cody identifies with the crow as he considers himself and the bird as both problem solvers. The best professional advice he has been given in his career is, "trust your intuition".

Photo: Jon Paul Aponte

Laszlo Virag loves his adopted city New York because of the diversity and cultural life. However, he has not forgotten his beloved hometown of Brasov, Romania. He especially appreciates the continued preservation of its medieval architecture including the wall and towers that fortified the city.

Laszlo began his career in science in Bucharest the capital city of Romania as a high school teacher in chemistry and physics. He joined Columbia University in 1993 as a technician in the Department of Anesthesiology, where he worked in increasingly senior roles investigating the neurotoxicity of drugs of abuse and the correlation between administration of anesthetics (and sedatives) and Alzheimer's disease. In January 2016 Laszlo became a member of Team EH&S where he has applied knowledge and experience to advancing the safety of the entire Columbia University community. He currently holds the position of Senior Health Physicist. Laszlo believes the best piece of professional advice he ever received was to never stop improving your performance. He has committed himself to following this advice in work and life.

After a long day at work, Laszlo likes to wind down with a walk. He also enjoys reading, traveling, listening to classical music and watching his favorite soccer team, Bayern Munich. In addition to these pastimes, he is always striving to gain more knowledge, particularly in the areas of astronomy and astrophysics.

When asked what animal he most identifies with, he responded with the canine breed, Boxer. He considers the Boxer to be intelligent, loyal, friendly and confident as well as devoted; all characteristics which he strives to portray in his daily life. He also feels his adaptability, problem solving skills and drive to overcome a challenge have served him well in his role in the area of environmental health and safety. Laszlo's favorite quote, "Gaudeo discere ut doccam" (translated: I enjoy learning to be able to teach others), reflects his enjoyment in sharing his knowledge with others. If Laszlo could change one thing in this world, he would like to make hate among people disappear. We all join him in this wish.

Columbia University EH&S Wins ABSA International Award

#23 EXPERIENCES IN CONDUCTING FEDERAL SELECT AGENT PROGRAM DRILLS AND EXERCISES

Christopher Aston, Aderemi Dosunmu, Christopher M. Pitoscia, Kathleen A. Crowley
Columbia University Environmental Health and Safety, NYC, New York, United States

Abstract:
Facilities authorized by the Federal Select Agent Program (FSAP) to possess select agents are required to perform drills or exercises at least annually to test biosafety, biosecurity and incident response plans. Columbia University has over ten years experience in performing tabletop exercises, drills and reporting of actual response events to fulfil FSAP expectations. We have engaged internal stakeholders such as Public Safety and Facilities Operations and external partners such as the FBI and Fire Department. We have appreciated the value in identifying exercise goals, establishing ground rules, recording video of in-person drills, having evaluators ask the right questions, performing a hot wash, and writing a meaningful after action report using Homeland Security (HSEEP) guidelines. Exercises have included plausible scenarios related to misdirected and leaking select agent packages, non-inactivated and mislabeled specimens mistakenly leaving the BSL-3 lab, biosafety cabinet, centrifuge and autoclave failures, person down, and insider threat, as well as having participants create scenarios ("choose your own adventure"). We will share our experiences to guide others who are looking to establish or maintain a successful drills and exercise program.

Identify your exercise goals:
- Improve preparedness efforts
- Improve incident response abilities
- Clarify roles
- Build relationships with partners
- Identify any shortcomings in the:
  - ✓ BSL-3 Biosafety Plan
  - ✓ Security Plan
  - ✓ Incident Response Plan

Identify the type of exercise:
For full engagement, think small – generate scenarios that could realistically happen (not plane crashes or multi-agency responses)
- Drill – Practical simulation of actual event
- Table top exercise – discussion based
- Hybrid drill (videoed) and table top - Useful in areas where space is tight or there are access restrictions
- Actual Incidents – We used Hurricane Sandy response for our 2012 exercise

Ideas for crafting scenarios:
- Actual events – e.g. non-inactivated select agents leaving CDC lab
- Internal audit findings – e.g. incomplete records
- Experiences at other institutions - Networking with other ROs and Biosafety Officers
- Asking the investigators what they think their vulnerabilities are
- Adding multiple contributing factors to a scenario to create a perfect storm
- Guidance document from FSAP

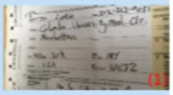
Establish ground rules:
- Confidentiality
- Varying viewpoints, even disagreements, are expected
- Exercises are intended to be an open, low stress environment
- Don't fight the scenario - Maintain realistic expectations of what the scenario entails

Types of select agent exercise scenarios – 2011 to 2020:
- Misdirected package containing select agent (1)
- Leaky select agent-containing package received at lab
- Non-inactivated specimen leaves BSL-3 lab in mislabeled tube resulting in worker illness (2)
- Autoclave used to decontaminate select agents fails QC and requires lengthy repairs (3)
- Centrifuge fails, contaminates room and a fire starts
- Insider threat - Stolen select agent
- Person down in BSL-3 lab (4)

Keep your participants engaged:
- Split players into two teams – e.g. Jr. and Sr.
- Appoint evaluators and note takers
- Involve external participants (e.g. FBI, local first responders)
- Provide floor plans for those unfamiliar with the lab layout
- Provide actual lab forms for participants to complete
- Use BSL-3 shutdowns as an opportunity to do in-person drills
- Choose your own adventure – One team of participants craft the scenario, the next team adds a complication, the third team formulates a response (5)

Memorialize key lessons learned while still fresh ("hot wash")
- Can be during the drill ("time out") or immediately post; use your evaluators to weigh in

Write a meaningful after action report:
- Commend positive behaviors
- Identify corrective actions (SOP revisions, training needs, resource needs)
- Distribute to all applicable stakeholders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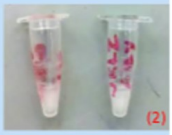
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Take home message:
It's a challenge to keep stakeholders engaged in fulfilling a regulatory requirement, especially in a Select Agent Program facility which has storage-only status. We have done this by continuously changing the format of our drills and exercises, providing realistic scenarios, and giving everyone a job to do. Our most engaging and effective exercises were a hybrid drill and table top (videoed drill in the BSL-3 lab critiqued by others) and a "Choose your own adventure" team-based tabletop exercise.

Dr. Aderemi Dosunmu

Team EH&S was distinguished with an American Biological Safety Association International Award at the organization's Annual Conference for a poster submitted by Dr. Christopher Aston, Dr. Kathleen Crowley, Dr. Aderemi Dosunmu and Christopher Pitoscia. Submission to the conference's virtual poster session included the poster and a short video, narrated by Dr. Aston, highlighting the University's experience managing an important requirement of the federal Select Agent program. Congratulations, Team EH&S!

[Columbia's Winning 2020 ABSA Poster]

Dr. Christopher Aston

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Please share questions or comments with us at newsfeedback@columbia.edu