The Laboratory Safety Institute
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SPEAKING OF SAFETY

Making health, safety and the environment an integral and important part of education, work, and life

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CANNABIS LAB EXPLOSION KILLS TWO

A Wake-Up Call for a Fast-Growing Industry

Two workers died in a chemical explosion at a cannabis lab in Italy on May 7, raising questions about maintaining high safety standards within a rapidly expanding industry.

Samuel Cuffaro, 19, and Elisabetta D'Innocenti, 52, have become the latest additions to labsafety.org's Memorial Wall, a webpage that tracks lab-related deaths worldwide.

Although the exact cause of the explosion in Italy is still unknown, the lab was using pentane, and authorities are investigating how, where, and how much of the flammable chemical was being stored prior to the explosion, according to *Italy24 News*.

The inherent risks in cannabis labs are well known. Commercially extracting substances such as tetrahydrocannabinol (THC) or its non-psychoactive cousin, cannabidiol (CBD) from the plant requires the use of either highly toxic and flammable solvents or liquid carbon dioxide, a cryogen.

Of course, all labs have hazardous chemicals and associated risks, even the ones that only handle mint and tomatoes. (See "No Chemicals? Think Again" on page 9.) In most labs, such risks are minimized by proper training, hazard analysis and controls.

While the legal cannabis industry has worked hard to earn a reputation for high standards of quality and safety, doing so hasn't been easy in an industry that is speeding like a runaway train, as seen in the following examples:

- In October 2020, two workers were hospitalized following an explosion at a New Mexico cannabis manufacturing facility. Five years before that, New Mexico's Occupational Safety and Health Bureau had fined a medical marijuana dispensary $13,500 after a hash-oil explosion so powerful that it separated the roof from the wall and sent two employees to the hospital.

- In 2018, Cal/OSHA issued a $50,470 fine to Future2 Labs after a worker was badly burned in a propane explosion.

- In 2016, felony charges and an $8.9 million civil lawsuit were brought against the owner of a legal marijuana lab in Oregon after two people received severe burns in an explosion.

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You are welcome to reproduce all or part of the newsletter. Please share it with your students and colleagues. We appreciate hearing how these materials are used.

Some of the back issues are now available online for free. We are working on adding more. Copies of all back issues (over 90) are available and can be purchased as a complete set in three-ring binders or electronically. Contact connor@labsafety.org for more information.

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Volunteers

Would you like to help LSI? Become a volunteer!

LSI Updates

LSI now has virtual lab inspections, safety program evaluations, document reviews, plus courses and seminars—all virtual.

Tuition vouchers are now available to allow participants with busy lives to reserve a class now and defer attendance to when it's most convenient.

Alie Schreck

After completing her MBA at Assumption University, LSI intern Alie Schreck has graciously accepted LSI's offer for a continuous position. Her marketing and social media expertise is already having a noticeable effect in advancing our mission.

HOW NOT TO BE A LAB SAFETY COP

Those who make a career in safety have two basic choices:

1. Be a transformational leader who builds organizational culture in which health, safety and the environment are an integral and important part of life for everyone.

2. Be that person with a clipboard, always on the prowl for violators — a "safety cop."

That's not an official title, of course, but it is a role in which many safety professionals unfortunately find themselves. It's the safety career to be most avoided. Here's why.

Those who choose this option sooner or later discover that their career has become an exhausting and pointless game of whack-a-mole — the more safety issues they find, the more crop up.

Just Google it. With a little searching, almost anyone can easily find dozens of photos of people not wearing PPE in the lab when they clearly should be, proudly displayed in high resolution on public-facing college and university websites.

The fact that there are so many violations to be found is great for job security, but let's be honest: spotting incidents of noncompliance is not the most fulfilling use of your life. Worse, it causes others to perceive you as merely an enforcer, and once that perception sets in, your job actually gets harder. Sure, they may throw on a pair of goggles whenever you're in the room, but you will succeed in producing only perfunctory compliance at best. So how does one avoid the career of a safety cop?

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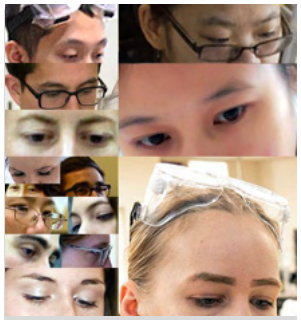

A collage of eye protection noncompliance in the lab taken from the websites of college and university science departments

Safe Science — Be Protected

By Dr. Ken Roy, NSTA & NSELA
safety compliance consultant
Email: Royk@glastonburyus.org

SAFETY INCIDENTS: UNPLANNED SECURITY INCIDENTS: PLANNED!

Generally, safety involves anticipating incidents that are unplanned. That is, safety accidents do not intentionally happen. On the other hand, security involves anticipating incidents which someone actually *planned!* Security incidents happen intentionally by individuals acting in a terrorist manner.

Since the April 20, 1999 Columbine High School shooting, security has been addressed in many school districts across the United States. Still, in recent years, some school districts have fallen victim to terrorism.

This article provides some strategies to make science laboratories and the schools in which they are located not only safer but also more secure from terrorist threats. This is of special importance, given that hazardous materials and other dangerous artifacts or chemicals found in science laboratories can be the focus of terrorists. Even with the top priority of addressing the current COVID-19 pandemic, laboratory security should not be off the radar.

Helping Make the Lab Safer

To help raise levels of awareness relative to safety and security, consider the following areas of focus:

- **Entrances, Exits, Stairways and Hallways** All means of egress should be clear and unobstructed to allow for safe evacuation if necessary. Proper signage should be posted as appropriate.
- **Laboratory Access** All access doors to laboratories should be posted as "laboratories." All doors should remain closed and locked when unattended. Only certified science teachers should have access to laboratories when hazardous materials or equipment are present. Only certified science teachers, administrators, facilities maintainers and custodians should have keys to laboratories, storerooms and preparation rooms. Never allow students entry or opportunities to work in a lab without appropriate adult supervision.
- **Safety Equipment Operation** All showers and eye wash equipment must be inspected and in operational order in areas housing or using hazardous materials. A minimum of monthly inspections should be required. Also, weekly flushing protocols must be followed for 1–3 minutes.
- **Personal Protective Equipment** Indirectly vented chemical splash goggles, safety glasses with side shields, nitrile or vinyl gloves, non-latex aprons, etc., should be easily accessed and in good condition. They also need to be sanitized after each use.
- **Fire Suppression Equipment** Appropriately rated fire extinguishers (ABC type and D type where combustible metals are present) should be available in the laboratories, storerooms and preparation rooms. The extinguishers should be appropriately inspected

and located for easy access. All science employees should annually be trained in the use of the extinguishers, providing this is permitted by Board of Education policy.

- **Pressurized Gas** All pressurized gas cylinders must be placed in an upright position and properly secured. Appropriate signage and cylinders per square footage must be adhered to. Small flammable gas cylinders must be stored in flammable liquid cabinets. No other flammables are to be stored in that same cabinet.

- **Electrical Energy** All circuits in science laboratories, preparation and storerooms should have ground fault circuit interrupter protection (GFCI), in addition to easily accessible master shutoff switches with appropriate signage.

- **Gas Energy** All laboratories, preparation and storerooms should have master gas shutoffs with appropriate signage.

- **Water** Master water shutoff valves should be easily accessible with appropriate signage.

- **Fume Hoods** Fume or exhaust hoods should have periodic inspections for appropriate operation, such as face velocity. The hood's stage should not be used as a storage area for hazardous chemicals, lab ware or any other items. The NFPA requires an annual inspection of fume hoods by certified technicians.

- **Hazardous Chemical Storage** All hazardous chemicals should be properly labeled, dated and stored in a secured location. The areas housing hazardous chemicals should have restricted access and a high level of security.

- **Laboratory Hygiene** No drinking, eating, smoking, etc., should be permitted in the laboratory, save exceptions approved by the chemical hygiene officer.

- **Appliances** All appliances such as refrigerators, microwaves, ovens, etc., should be appropriately labeled for intended use, for example "food for human consumption only" or "hazardous chemicals."

- **Ventilation** Laboratory and preparation rooms should have negative pressure relative to corridors. According to NFPA standards, ventilation must be continuous and ongoing. It also should not be recycled to other parts of the facility.

- **Housekeeping** Appropriate housekeeping must be secured to reduce or eliminate trip or fall hazards, provide adequate clearance from sprinkler systems (18 inches), provide access to emergency equipment, have an unobstructed means of egress, etc.

- **Emergency Lighting** Emergency lighting should be available to assist evacuation in power outages as appropriate. The lighting should be inspected periodically to ensure operation.

- **Evacuation Plans** Evacuation plans should be posted in appropriate sites, in addition to emergency numbers. All laboratories, preparation rooms and storerooms should have communication access in cases of emergency.

Making Labs More Secure

The school building facility must also have security needs addressed. This is the first line of defense. The following recommended procedures will not guarantee a 100% secure workplace. However, they will raise everyone's level of awareness and help the building become more secure, both physically and psychologically.

- **Designated Reception Area** The building should have a designated entrance and receptionist area to control access. All remaining entrance doors should be locked.

- **Visitors** Once signed in, visitors should be escorted to designated work areas by employees.

- **Employees** All employees should wear photo identification.

- **Strangers** Employees should challenge any unaccompanied stranger(s) in the workplace.

- **Mail** Employees should be trained and be provided with personal protective equipment (e.g., vinyl gloves) to sort mail. Protocols should be in place to deal with suspicious items.

- **Lockdown/Evacuation Procedures** Employers should develop both lockdown and evacuation procedures for employees and students. Appropriate drills should be exercised. Administrators need to check with their local fire marshal or the authority of local jurisdiction for mandatory drill procedures.

OSHA requires emergency preparedness plans for employees in 29 CFR Part 1910.30 and 29 CFR Part 1910.165. These standards mandate that employers provide emergency action plans and fire prevention plans. They are only an example of proactive preparation. Readers should consult their own government's standards or regulations.

More Resources

- OSHA.gov
- EPA.gov
- schoolsafety.gov
- schoolsafety.gov/covid-19-resources-schools

CANNABIS LABS — CONTINUED

All totaled, at least a 10 serious fires or explosions have occurred in the last five years at legal cannabis labs in the U.S.

New Companies Growing Like...

"Oh, my God, it's like a free-for-all out here," said Michael Segura, owner of New Mexico-based processing company Nebula Hemp, quoted in the *Albuquerque Journal*. "Every time I turn around there's a new company."

CBD-infused beer, chocolates, coffee, deodorant, gummies, seltzer, toothpaste, even pet treats have flooded the world market. Companies everywhere are rushing to be the first to introduce the next big product or processing innovation. In total, the global legal cannabis market is currently valued at $28 billion and is expected to expand by about 14% each year through 2028, according to market analysis by Grand View Research.

In the U.S. last November, every single marijuana-related ballot measure put to voters passed, and there are currently only 13 states that have not legalized either medical or recreational marijuana use.

In a fast-moving industry with so many opportunities knocking at the door, the temptation to cut corners on safety is real. In addition, misconceptions about OSHA being hands-off due to the illicit status of cannabis at the federal level has led to confusion among employers.

The NFPA website offers free information on the unique safety issues of cannabis labs.

A dizzying variety of CBD-infused products have flooded the market.

While OSHA has not issued any cannabis-specific guidance, all employers are required to provide a workplace free of recognized hazards, regardless of the industry or occupation. Any employee of a cannabis facility can contact OSHA with a workplace concern. In California, licensed cannabis businesses are specifically required to provide a 30-hour OSHA safety course to one supervisor and one employee.

OSHA compliance aside, there is a clear imperative for cannabis labs to prioritize worker safety. Besides protecting the health and life of its employees and preventing tragedies like the one in Italy, it is in the industry's own self-interest to do so. The manifesto on the Cannabis Trade Federation website says: "Given the history of illegality of cannabis and the challenging landscape the industry faces now with differing state and federal laws, it is critical that our members operate with a high degree of integrity and advance the industry's reputation with legislators, media, community influentials, and the public at large."

To keep the momentum the industry now enjoys, it is important to maintain a commitment to safety that promotes public trust.

Conflict of interest statement: *The Laboratory Safety Institute has provided safety consultation services to cannabis industry organizations, including the California Cannabis Industry Organization and the National Cannabis Industry Organization. These organizations were not consulted in preparing this article.*

What Do You Know About OTOTOXINS?

By Howard Spencer

It is widely recognized that noise exposure can cause hearing loss, but many are not aware that many common workplace chemicals can also cause hearing loss, tinnitus, deafness and vertigo.

Ototoxins are chemicals or medications that either cause hearing loss independently or work synergistically with hazardous noise to damage the inner ear. Ototoxins can present a hidden danger because safety data sheets often do not contain warnings about potential hearing loss.

It was not until the 1970s until the ototoxicity of several industrial chemicals, including solvents, was recognized. Even if noise and chemicals are at or below the permissible exposure limit, exposure to both can do more damage than a higher exposure to just noise or chemicals alone. Some chemicals show ototoxic effects at high airborne concentration but may not be ototoxic in the concentrations observed in typical workplaces.

The route of entry can be by inhalation, skin absorption and ingestion. Those which can be absorbed through the skin are considered particularly hazardous because of the increased exposure risk. Since the exposure effects for ototoxic chemicals alone are not generally known, audiometric monitoring is necessary to determine if the chemical is potentially also affecting the hearing of exposed workers. The OSHA standard 29 CFR Part 1910.95 provides guidance for hearing conservation.

Ototoxic chemicals can be found in substances such as paints, thinners, degreasers, glues and engine exhaust. Once they have entered the body, ototoxins travel through the blood stream and can result in damage to the auditory nerves or the cochlea in the inner ear.

Although it can be difficult to find published guidance on ototoxins, *Army Public Health Command: in FACT SHEET 51-002-0713* says this: "If there are dermal exposures to: toluene, xylene, n-hexane, organic tin, carbon disulfide, mercury, organic lead, hydrogen cyanide, diesel fuel, kerosene fuel, jet fuel, organophosphate pesticides and IF such exposures are known to have systemic dose equivalent to 50% or more of the OEL, (Occupational Exposure Limit) annual audiograms are recommended." Audiometric tests are powerful tools that show hearing impairments, such as threshold shifts. However, they do not differentiate between noise and ototoxic causes.

Some experts further recommend that the 8-hour equivalent continuous noise level of workers exposed to any ototoxins be reduced to 80 dB(A) or below.

Exposure to both noise and ototoxins increases the likelihood of hearing damage, but most OEL's have not yet been revised to take this into consideration. This combination often results in hearing loss that can be temporary or permanent, depending on the level of noise, the dose of the chemical, and the duration of the exposure.

Substitution, isolation and local ventilation are some controls which should be applied to prevent or reduce harmful exposure, with personal protective equipment (PPE) appropriate to the chemical. Workers should also be given information on ototoxic chemicals.

A study sponsored by CPWR, (Center for Construction Research and Training) published in 2018 examined work history, health behavior, and hearing test results from more than 19,000 former construction workers to identify factors contributing to hearing loss. The researchers found that exposure to **organic solvents** along with exposure to **loud noise** on the job and **smoking *each*** increased a worker's risk of hearing loss by 15-20%.

In conclusion: hearing loss prevention programs should take chemical exposures into account when monitoring hazards, assessing hearing and controlling the combined exposures.

About the Author: Howard Spencer is a Senior Safety Consultant at Connor Strong. He is active with the American Association of Safety Professionals (ASSP). He has written dozens of articles in his series "Howard Talks Tech." He has worked with LSI to inspect pharmaceutical research and consumer product testing labs. Contact Howard at safetyguy328@aol.com.

Lab Safety Guideline #6:

PROVIDE INCENTIVES FOR GOOD SAFETY PERFORMANCE

Everyone likes to receive a reward for good performance. It can be a merit raise, it can be good grades, it can be a promotion, or it can be praise from a superior. Good performance deserves to be recognized and rewarded. Safety performance is no different. When it's done right, it should be recognized.

For students, grades and praise are great incentives. One way to recognize students' safety efforts is to include a section on safety performance on the report sheet that students receive for each experiment.

For staff members it becomes more difficult. Academic institutions do not usually give merit raises. (Pay for endurance is more the rule!) Even so, if you do staff evaluations, make safety one of the written criteria. Let staff members with good safety performance get recognized, appreciated, and generally treated in a way that others would want to behave similarly.

Make sure the folks who get promoted are good safety performers. Otherwise, you're giving a very mixed signal. See if you can get the dean, department head, or president to put on a special cookout for everyone if the school can set a special record of days without a disabling injury to anyone. Post the goal and keep visible track of your progress.

Encourage faculty members to include "safety performance" in the section of their course syllabus that describes the grading criteria for the laboratory portion of the course.

—Jim Kaufman

THE POWER OF FEEDBACK

Since the days of Ignaz Semmelweis in the 1800s, physicians have known that handwashing reduces hospital infection rates. Despite this, healthcare personnel historically have low rates of handwashing compliance. A variety of creative experiments aimed at behavior change achieved mixed results until a breakthrough study in 2011 by Dr. Donna Armellino et al. She measured effects on handwashing after placing surveillance cameras above sinks used by healthcare personnel in a New York hospital intensive care unit. At first, compliance remained at a dismal 6.5%, even though staff were informed about the cameras and why they were being used. But when the totaled results from the camera observations were displayed on a simple digital "scoreboard" for all staff to see (left), handwashing compliance shot up to 81.6% in the first 4 months, and then climbed to 87.9% in the 17 months of the study. The takeaway? Keep score! Feedback is a great motivator. *Source: Clinical Infectious Disease, January 1, 2012.*

CS = Current Shift; WR = Weekly Rate; MR = Monthly Rate; OHCP= Other healthcare professionals; Phys= Attending physicians

Laboratory Safety Guidelines was written while I worked for the Dow Chemical Company, in an attempt to share with schools, colleges and universities what I was learning about lab safety.

Since then, Dow (1986), Fisher Science Education (1989), Carolina Biological Supply Company (1994), Fisher Safety (2012), Workrite (2017), SCAT-Europe (2019) have produced co-branded editions of the guidelines in various poster formats. The guidelines have been translated into 21 languages, and it's even available in Braille!

In each issue of *Speaking of Safety,* we will publish one or two of the revised and expanded guidelines. The entire collection of revised and expanded guidelines is available in a 50-page booklet on our website.

NO CHEMICALS? Think Again

By Danny Sanchez, P.Eng., PMP

Situation: An environmental emissions monitoring lab is being planned that will only be used for the calibration of analytical equipment. No sample testing is performed in this lab, with only non-flammable compressed gases being used for instrument calibration. This lab design does not need to account for hazardous chemicals, right? Wrong.

It's never safe to assume that hazardous chemicals will not be present in a laboratory. Highly flammable compounds and strong acids may be the most familiar hazardous chemicals, but other chemicals are not risk-free.

The compressed gases used for calibration in this lab were mixtures mainly based on nitrogen and carbon dioxide. Such blends are, in fact, capable of suffocating the lab staff by displacement of breathable oxygen in case of an accidental release.

Therefore, lab design would need to include ventilation, indoor gas monitoring for oxygen, indoor air purging, segregation of incompatible gases, physical restraints of bottles, security, lifting aids, safety barriers, signage, etc.

As this example illustrates, the lab design process can begin with some preconceived notions that may lead to a poor design and unsafe conditions. Here are two other scenarios that show how a systemic hazard and risk analysis could prevent falling into this trap.

Situation: A minerals testing lab is being planned with an external storage space housing several intermediate bulk containers with a solution of 25% sodium hydroxide. At first glance, it seems extensive chemical controls will be unnecessary since the containers will be fully sealed and besides, the totes are very well-made, making it almost impossible for them to fail.

What this fails to account for, of course, is Murphy's Law (anything that can go wrong will go wrong). The containers *can* break under the right circumstances — a forklift could puncture them. Also, the area still needs to be classified as a chemical storage room according to applicable building codes.

Therefore, proposed controls would include ventilation, spill prevention and containment, indoor gas monitoring, fire protection, safety shower, security, lifting aids, safety barriers, signage, etc.

Situation: An oil-lubricated vacuum pump is connected to a gas chromatograph exhaust point. Initially, it was determined that the safety data sheet (SDS) does not classify the pump oil as hazardous, so there is no need for it to be included in the chemical inventory.

However, although the product itself is not deemed hazardous according to the SDS, the SDS does contain various hazard disclaimers related to the oil mist that is normally produced during the pump operation. Also, any hazardous compounds generated by the gas chromatograph analysis might be exhausted directly or dissolved into the oil and then released as part of the oil mist.

Therefore, proposed controls would include ventilation, mist filters, pump exhaust vented to outside, sound dampening, vibration controls, spill containment, heat gains provisions, eyewash station, and electrical grounding, among others

Bottom line, lab designers and engineers are expected to account for abnormal conditions that might develop outside of normal operating conditions. Even the simple presence of water flowing through a condenser in a lab may pose numerous safety risks in case of a leak.

The laboratory design must be based on an exhaustive assessment of all hazards involved in every activity and complemented with a comprehensive risk analysis. This investigation will certainly reveal any mitigating factor such as insignificant quantities, small likelihood of occurrence, and negligible consequences. However, each of these elements must be carefully assessed and documented before dismissing the lab design implications of a particular chemical. In other words, due diligence.

About the Author: Danny Sanchez, P.Eng., PMP, 20+ years of experience working in laboratories. Danny is the lead consulting engineer for Bureau Veritas' Laboratory Design & Construction Services, in charge of a multi-disciplinary team with 90+ years of combined experience dedicated to designing and project managing new laboratory constructions and renovations.

Member of the technical committees:
- Laboratories Using Chemicals (LAB-AAA / NFPA 45)
- ASHRAE TC 9.10 Laboratory Systems
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With the recent economic downturn, we truly depend on your support for our future survival. To learn more about how you can help, contact Jim Kaufman at jim@LabSafety.org.

CONTINUED: SAFETY COP

Principles, Not Rules

Rules are important. Where would any safety program be without rules? That being said, if someone asks you a question about safety, "29CFR1910.132" is probably not the best answer to give them. In other words, the reason eye protection is important is because I care about you and I want you to be able to read books to your grandchildren, not because of a citation I memorized in safety cop academy. When others see you as a human who cares, they will be more inclined to listen.

Everyone in the lab needs to understand that the reason safety rules exist is not because safety professionals love finding violations. It's not because they're intent on finding a way to make things take longer and cost more money. It's because they know that when someone tried it the that way, they got hurt.

Be a Windsock

Bottom line, no matter what your current job is, envision your role as more of a windsock rather than an enforcer. A windsock doesn't tell anyone how to behave. It just tells them which way the wind is blowing and how strong it is. Use LSI's collection of over 5,000 lab accidents and the 600 fatalities on the labsafety.org Memorial Wall to make the point. Then allow others to make the choice.

"POOR JUDGMENT" WITH LIQUID NITROGEN IN HIGH SCHOOL LAB

"Mr. Brodersen displayed extremely poor judgment when he doused a student with a dangerous chemical during a science demonstration," Attorney Robert Berlin said in a written statement. Perhaps "written understatement" is a more appropriate term.

In 2018, Garry Brodersen, a suburban Chicago high school teacher, asked for volunteers for a classroom chemistry demonstration. One boy came forward and agreed to lie on his back and have liquid nitrogen poured on his chest. Keep reading — it gets worse.

A cell phone video of the event shows that while a small amount of liquid nitrogen was placed on the student's chest, a much larger amount of the freezing substance was poured, apparently accidentally, onto the boy's groin area. He was later treated for freeze burns to his groin and hand.

Brodersen resigned from his position and voluntarily surrendered his teaching certificate in June 2018, according to the *Chicago Tribune*. On March 9, 2021, Broderson, 66, was convicted of reckless conduct and endangering the health or life of a child. The student has since fully recovered from his injuries.

ICASE Triennial World Conference

The International Council of Associations for Science Education (ICASE) will hold its next triennial world conference in 2022. For more information, visit the ICASE web site, www.icaseonline.net.

ICASE
International Council of Associations for Science Education

Science educators from schools and higher education, lab technicians, lab managers, and scientists will be making presentations and discussing laboratory safety issues.

LSI is organizing a symposium on safety in science education and will offer a professional development course on safety in science education. We are looking for sponsors to make it free for science/STEM teachers.

For more information about the ICASE-LSI symposium at the India conference or to express interest in contributing a paper please email jim@labsafety.org.

Candidates are now being sought for the position of president elect.

THE LABORATORY SAFETY INSTITUTE

Courses in North America (2021)

The Laboratory Safety Institute
40 Years | 1978-2018

Register today! LabSafety.org

More information: 508-647-1900

To ensure safety during the pandemic, until further notice, all courses will be held virtually, not on location.

2-DAY SHORT COURSE	
Early Bird (60 days prior)	$895
Individual	$995
Members 15% off ($845.75)	
Group of 2-4	$850
Group of 5-9	$825
K-12 Teacher / Grad Student	$349

Classes are 8:30 a.m. to 4:30 p.m. ET each day. Dates and locations are subject to change or cancellation. Before making final arrangements, contact LSI to confirm. Discounts cannot be combined. For groups 10 or more, contact LSI.

* 24-HOUR BOOT CAMP	
Early Bird (60 days prior)	$1150
Individual	$1250
Members 15% off ($1062.50)	
Group of 2-4	$1130
Group of 5-9	$1105
K-12 Teacher / Grad Student	$449

ONLINE COURSES (Anytime, Anywhere)

Includes online tests and completion certificate

How To Be a More Effective CHO	$600
Introduction (12 topics)	$600
Extended (18 topics)	$995
Comprehensive (23 topics)	$1250

Q & A and COFFEE ($10 Webinars)

Enjoy a cup of coffee and a lab safety chat with us in our Boston classroom. Or, if you prefer, you can video conference from the comfort of your home or office. (But you'll have to provide your own coffee.)

January 8
March 12
May 21
July 9
October 8
December 3

ONE DAY COURSES

Early Bird	$550
Individual	$600
Member	$510
Groups of 2-4	$525
Groups of 5-9	$505
K-12 Teacher / Grad Student	$249 (Courses in Natick $149)
Feb. 17, Apr. 20, Jun. 2, Oct. 27, Dec. 1	**Biosafety in the Laboratory**
Jan. 21, Mar. 16, May 4, Sep. 28, Oct. 28, Nov. 30	**Complying with MA's New OSHA Regulations**
Feb. 18, Oct. 26	**Developing a More Effective Lab Safety Program**
Jan. 7, Feb. 4, Mar. 4, Apr. 8, May 20, Jun. 17, Aug. 26, Sep. 16, Oct. 14, Nov. 18, Dec. 16	**How To Be a More Effective CHO**
Jan. 20, Mar. 17, May 5, Sep. 29, Nov. 11	**Safety in the Laboratory**
Jan. 19, Feb. 16, Mar. 18, Apr. 22, May 6, Jun. 1, Sept. 30, Nov. 9, Dec. 2	**Safety in Secondary Schools Science Labs**
Apr. 21, Nov. 10	**Safety is Elementary**

ONE HOUR WEBINARS

$99 per connection. No limit on attendees. $10 for each certificate of attendance. 1:00 p.m. Eastern.

Jan. 29	**Chemical Handling and Storage**
Feb. 12	**Legal Aspects of Safety**
Mar. 26	**Leadership in Safety**
Apr. 23	**Complying with OSHA Lab Standard**
May 7	**Chemical Handling and Storage**
Jun. 18	**Compressed Gases**
Jul. 23	**How to Convince Others**
Aug. 27	**Electrical Safety**
Sept. 10	**Chemical Handling & Storage**
Oct. 22	**Chemical Labeling & GHS**
Nov. 12	**Lab Ventilation & Fume Hoods**
Dec. 17	**Eye & Face Protection**

Don't see what you need? Customize a course for your organization.