SafetyMatters

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Who's in Charge Here?
A Brief History and Overview of Radiation Regulations

By Peter Caracappa, Chief Radiation Safety Officer

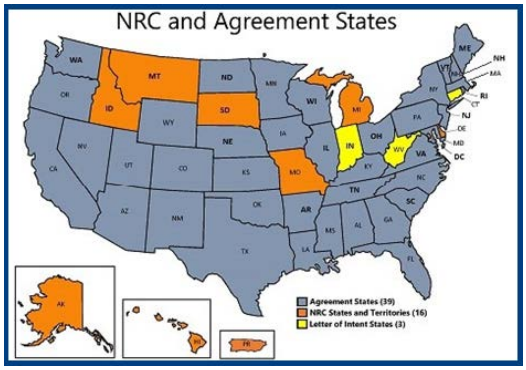
The use of radiation and radioactive material is a highly regulated activity. Not only that, but it often seems that radiation is treated separately from the other hazards that we encounter in the laboratory. Much of the reason for this traces back to the history of the establishment of these regulations. Many of the regulations we are subject to around hazardous materials were born out of the environmental movement of the 1970s, but the control of radioactive material is rooted in the aftermath of the Manhattan Project and the creation of the atomic bomb. In those early years, radioactive material was tightly controlled, secretive, and largely in government hands.

In 1953, then US President (and former Columbia University President) Dwight D. Eisenhower addressed the United Nations in what became known as the "Atoms for Peace" speech, outlining a vision of the use of nuclear technology for peaceful civilian purposes, focused on the establishment of commercial nuclear power, but also promoting its use in medicine, industry, and research. The following year, Congress gave responsibility for bringing this vision to reality to the Atomic Energy Commission. Part of its mission was to ensure the safety of those working with radioactive materials associated with the nuclear fuel cycle and any that were created as a byproduct of the nuclear fission reaction (known as "byproduct material"). These responsibilities later became part of the Nuclear Regulatory Commission, or NRC, of today.

However, while the NRC was given responsibility for those materials noted, their authority did not extend to regulating the use of radiation producing equipment (such as x-ray machines) or to other naturally occurring radioactive materials. Those responsibilities remained with state and local authorities, which led to some degree of overlap and duplication of effort when it came to radiation protection.

To address this, the NRC has established the "Agreement State Program" in which the NRC transfers most responsibility for the regulation of radioactive material to the State (the NRC retains authority over nuclear reactors, certain special nuclear materials, and the use of radioactive material in federal lands or facilities), while the State agrees to maintain its regulations to be at least as restrictive as the NRC's. This would give users in the state the simplicity of a single set of regulations and one department of regulators to deal with. In 1959, Kentucky became the first agreement state. As of today, 39 states are part of the Agreement State Program.

New York went on to become an agreement state in 1962. But they may have missed the "simplicity" part of the purpose! New York decided that commercial and industrial facilities within the state would be regulated by the New York State Department of Labor, and that academic and medical facilities would be overseen by the New York State Department of Health. Furthermore, those facilities that fell under the jurisdiction of the Department of Health that were within New York City would instead be regulated by the New York City Department of Health. Each of these departments have similar (but far from identical) regulations (we refer to them as "Code Rule 38", "Part 16", and "Article 175" respectively).



At Columbia University, with its reach and complexity, we are regulated in different aspects by all three of these bodies, with three sets of regulations (and regulators) to keep track of (and we still have some limited aspects that fall directly under the NRC – so it is really four sets of regulations!). Luckily, the university has an excellent radiation safety team that provides its expertise in applying best practices for the safe use of radiation and ensuring that we remain in compliance with whichever jurisdiction we fall under.

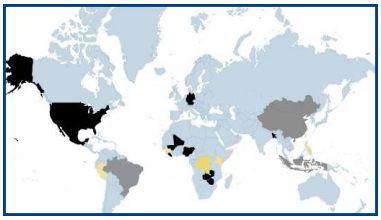
So, if someone asks who regulates radiation use at Columbia, you have your answer: pretty much everyone!

Image credit for this article: https://www.nrc.gov/reading-rm/doc-collections/maps/agreement-states.html

Filling the GAPP in International Public Health

By Samira Joussef Pina, Biosafety Officer

In the wake of the unprecedented challenges posed by the COVID-19 pandemic, the imperative for global collaboration in preventing and mitigating infectious disease outbreaks has become increasingly evident. The Global Alliance for Preventing Pandemics (GAPP) program at the Center for Infection and Immunity (CII) within the Columbia University Mailman School of Public Health is spearheading interdisciplinary research, education, and advocacy initiatives to meet these challenges.



Beginning in June 2022, GAPP has trained multiple cohorts of international researchers from Zambia, Malia, Mexico, Zimbabwe, and other countries, in support of its mission.

GAPP marked a significant milestone by forging a research collaboration agreement with the US Centers for Disease Control and Prevention (CDC) and partners in Zambia. This landmark agreement provided GAPP with the institutional recognition and legitimacy required to conduct its operations across Zambia. Leveraging this newfound agreement, GAPP swiftly launched a series of comprehensive training programs and research initiatives, beginning with the training of its first cohort of Malian scientists at Columbia, in collaboration with the US National Institute of Allergy and Infectious Diseases (NIAID) Division of Clinical Research. The team's groundbreaking investigations into the origins of febrile illnesses of unknown origin uncovered many diseases, including unexpected cases of measles and the Lassa Fever virus.

Subsequently, GAPP has continued to expand its global reach, training a cohort of Zambian scientists at Columbia University in September 2022. Notably, the team, led by Ms. Doreen Shempela, Director of Laboratory Services at the Churches Health Association of Zambia, and Dr. Lavel Moonga, Genomics Director at the University of Zambia School of Veterinary Medicine, focused their efforts on analyzing samples from rodents to identify and characterize the viruses present in populated areas in the eastern part of Zambia. GAPP's groundbreaking findings are scheduled to be presented at the upcoming International Conference of Public Health in Lusaka, slated for November 2023 under the auspices of the Africa CDC.

Additionally, GAPP's comprehensive training programs extended to scientists from Mexico as part of the LaRed clinical research consortium along with a second cohort of Zambian scientists. These initiatives show GAPP's commitment to fostering global collaborations in infectious disease research.

Furthermore, GAPP has solidified its role as a hub for international collaboration and exchange of ideas. The program's efforts have included the training of undergraduate students and faculty from the United States Air Force Academy aiming to demonstrate the efficacy of the VirCapSeq technology in identifying viruses in wastewater. Additionally, GAPP played a crucial role in training scientists from diverse regions, including Nigeria and Bangladesh, emphasizing the program's global reach in building a community of experts dedicated to combating infectious diseases.

Central to its mission, GAPP has emphasized the importance of creating a robust network of partners in alignment with the World Health Organization's International Health Regulations to facilitate affordable and rapid diagnosis, surveillance, and infectious disease discovery. The program remains committed to creating a secure and accessible data-sharing system that serves as the foundation for evidence-based public health policy decisions and the development of immunological drugs and vaccines.

EH&S and the biosafety team have a long-standing partnership with CII and now with the GAPP program to ensure safety and compliance. This is particularly important for pathogen discovery and surveillance, where the handling of potentially hazardous biological materials demands adherence to biosafety measures to mitigate the risks associated with their activities. The biosafety Team oversees the establishment of standardized protocols for the safe handling, storage, and transportation of their biological samples, and performs risk assessments for the implementation of engineering and administrative controls, as well as the adoption of appropriate personal protective equipment (PPE) to prevent accidental exposure to potentially harmful agents. Finally, EH&S ensures adherence to proper waste management protocols, including the safe disposal of hazardous materials, which is crucial to prevent any unintended environmental contamination and comply with local and federal regulations.

Undoubtedly, GAPP's efforts represent a significant step forward in the global battle against infectious diseases, laying the groundwork for a more resilient and prepared global health community. As the program continues to expand its reach and deepen its collaborative efforts, it remains dedicated to building a sustainable infrastructure for microbial discovery, surveillance, and response, while nurturing a new generation of public health leaders equipped to tackle the challenges of the future. EH&S will continue to be there in support.

Photo/image credits for this article: https://www.publichealth.columbia.edu/research/centers/center-infection-immunity and J. Kenneth Wickiser, PhD, Administrative Director LinkedIn

Training Compliance

Make sure to check your RASCAL transcript to ensure you are current in all required courses.

Training Finder

Not sure what courses you are required to take for Research Compliance? Use the QR code to find out!

EH&S would like to announce a shift in the release of our publication FDN(wh)Y Me. Fear not! Why? Because this reduced production schedule has allowed for the piloting of a new program – See one, Do one, Teach one! This new session will serve as a companion piece to FDN(wh)Y Me. Occurring four times a quarter, these interactive, small group sessions will be hosted by one of our Safety Advisors, alongside a subject matter expert. These sessions will take place the first Thursday of every month at 2:00 pm beginning in January 2024. We are excited to pilot this new program and hope to see you there!

What is a C-14 Permit and How Do I Get One?

By Pam Shively, Associate Manager, Safety Training Programs

New York City Fire Department (FDNY) regulations require at least one C-14 Certificate of Fitness holder to be present while a laboratory is operating including weekends, evenings, and holidays. Laboratory personnel may obtain a C-14 through Columbia University EH&S. Columbia University EH&S offers C-14 training for all applicants, whether the applicant is self-certifying or taking the test at FDNY headquarters at Metrotech Center in Brooklyn.

There are multiple pathways for Columbia University researchers to obtain a C-14. Based on the highest degree earned, a researcher may be able to self-certify. For those who qualify for this option, the requirements include completing TC5451: Certificate of Fitness (C-14) Holder Training for Supervising Non-Production Chemical Laboratories and submitting the appropriate documentation to fire-life@columbia.edu. Applicants who do not meet the self-certification requirements must take the test in Brooklyn. EH&S will apply for these applicants upon completion of TC5451: Certificate of Fitness (C-14) Holder Training for Supervising Non-Production Chemical Laboratories and submission of the proper paperwork to fire-life@columbia.edu. All claimed laboratory experience must be post baccalaureate. EH&S also applies for researchers who need to renew a current C-14 permit. Those researchers need to submit a Renewal Form to fire-life@columbia.edu. An applicant must be compliant with Laboratory Safety, Chemical Hygiene, and Hazardous Waste Management Training (Initial Training: TC4951 or Refresher Training: TC0950) for EH&S to apply for the C-14 permit or renewal. The good news, EH&S will pay for the permit!

It is important for the applicant to properly complete all paperwork for FDNY to accept the application. EH&S provides a guide to assist the applicant with proper completion. Once the paperwork is accepted, EH&S will apply for the permit. An applicant who needs to take a test in Brooklyn will receive an email from FDNY confirming acceptance and informing the applicant of the testing procedures. Once the test is passed and a permit is issued, the new permit holder needs to send a copy of the permit to EH&S to enter the information in Laboratory Information Online Network, or LION. Self-certifying applicants and renewal permits will have the C-14 permit delivered to EH&S. The permit information will be entered into LION and the permit holder will be notified to pick up the permit at the EH&S office. The LION will send reminders to permit holders when a permit is expiring and needs to be renewed.

EH&S encourages all researchers who are eligible for a C-14 permit to apply through fire-life@columbia.edu. The table below indicates if an applicant may self-certify or must take the test at the Metrotech Center in Brooklyn. Please visit our Certificate of Fitness page for more information.

Self-Certification	Test in Brooklyn
Doctor of Medicine (MD) or Dental Surgery (DDS) or Doctor of Veterinary Medicine (DVM)	Bachelor degree in Chemistry, Biology, Biochemistry, Environmental or Health Sciences, Medical Technology and Chemical, Environmental, Mechanical or Biomedical Engineering, or related field
Master or Doctoral degree in Chemistry, Biology, Biochemistry, Environmental or Health Sciences, Medical Technology and Chemical, Environmental, Mechanical or Biomedical Engineering, or related field	Associate of Science or Associate of Applied Sciences degree in Chemistry, Biology, Biochemistry, Environmental or Health Sciences, Medical Technology and Chemical, Environmental, Mechanical or Biomedical Engineering, or related field
Bachelor degree in Chemistry, Biology, Biochemistry, Environmental or Health Sciences, Medical Technology and Chemical, Environmental, Mechanical or Biomedical Engineering, or related field and **TWO years of post-baccalaureate experience** in the operation of chemical laboratories. **Any experience gained before receiving the degree will not be accepted.**	60 credits with minimum of 21 credits in applicable science or engineering courses

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Meet the EH&S Staff

David Skorodinsky

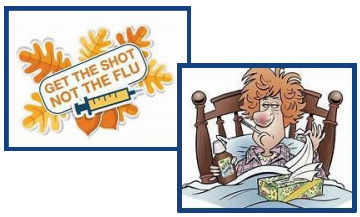
Systems Analyst II

David Skorodinsky grew up in Sheepshead Bay, Brooklyn, a town named after the Sheepshead fish whose teeth resemble those of a sheep. He joined Columbia University EH&S in 2021, and his skills and contributions earned him a promotion to Systems Analyst II in June of 2022.

David enjoys the challenge of automating EH&S reports to save time and energy, as each project is unique, which pushes him to learn and think about solutions. He is motivated by learning new things and solving problems. This makes him feel like a valuable and positive asset to the team, which is something David need not worry about as his projects regularly amaze! David believes a cat most closely matches his personality, as he can use anything to keep him busy and values having his own space. This type of personality fits him well as he likes to self-reflect and identify areas where he can improve. His work experience began as a high school intern at the Prospect Park Zoo. However, his first paying job was as a Store Associate at Home Depot. Both positions suited him, as they offered time to think and his own space. Always keen to try something new, he would like to visit somewhere in Greenland or the Congo where Google maps has never been and find his own way.

David is not a sports fan, as he would rather spend his time watching the news and developing his food palate. He enjoys picking out flavors in food and drinks, and although he does not claim to be an expert, he has come a long way. When he is not working and needs to relax, David enjoys a cup of hot tea, watching TV, playing on his phone, and finding new things to laugh at with his girlfriend!

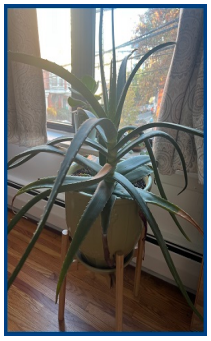
He would like to learn more about finance, specifically regulations for small businesses. He lives by the best piece of professional advice he has ever received, "Learn something new." As an exceedingly kind and thoughtful person, David would like people to be more open-minded and understanding to one another. "Doubt kills more dreams than failure ever will" is a quote which inspires him. David is not afraid to try something and fail as he knows failure will bring him closer to a successful solution.



Congratulations to Sofia Ioannidou on achieving the Diplomate, American Board of Medical Physicists (DABMP) Certification.

Sarah Aloe

Safety Advisor II



Sarah Aloe has been with Columbia University Environmental Health and Safety for two years and is currently a Safety Advisor II. Her professional work ethic and knowledge make her a star at EH&S. She is always available to assist her teammates and help with projects and is a role model for new hires in the department. Along with her full-time position, she is also working on her master's degree in Toxicology at the Mailman School of Public Health.

Her kindness and personality show through every day. Sarah brings a smile wherever she goes. She enjoys the simpler things in life; nice long walks, knitting, ceramics, learning new things, and helping others. Sarah believes an octopus most closely resembles her personality as they are both curious and resourceful. Her resourcefulness and ability to do multiple things at once resemble the octopus with several arms to accomplish many tasks. Her ability to take issues in stride and deal with them is another of her amazing characteristics. When she is not working or studying, she likes to try new restaurants.

Montreal is a city Sarah would like to live in one day. She sees the city as charming and loves the colder weather. She wants to learn more about plant biology and horticulture and someday grow her own garden. Her favorite quote by Kurt Vonnegut fits her easy lifestyle, "So it goes." This quote reminds her to not dwell on the past but look to the future. As a young professional, Sarah has a bright future to look toward.

Cold Weather Safety Tips

When you are outside, frostbite and hypothermia are possible so you need to protect yourself.

1. Wear layers of loose-fitting, lightweight, warm clothing.
2. Wear a hat. Try to stay dry and out of the wind.
3. Cover your mouth to protect your lungs from extreme cold.
4. Mittens, snug at the wrist, are better than gloves.

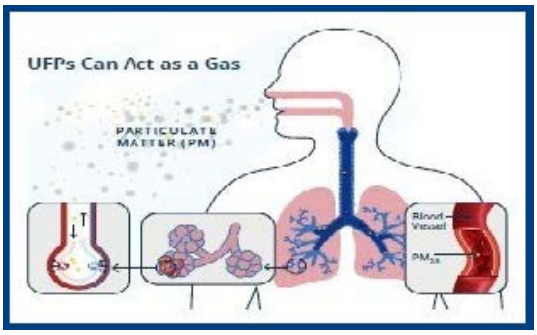
https://www.weather.gov/media/aly/PSAs/ExtremeCold.pdf

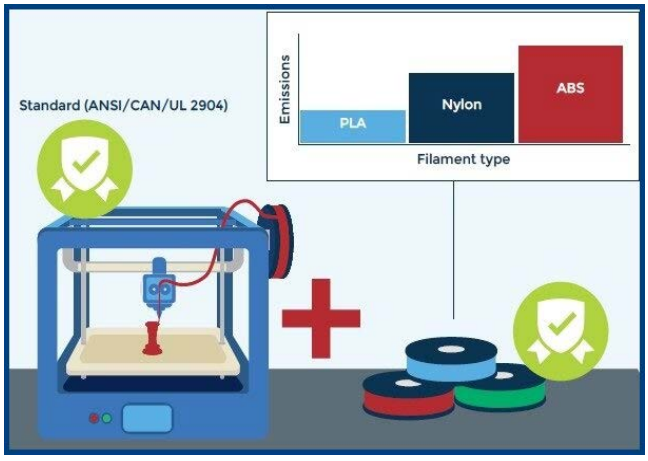
Unmasking the Hidden Hazards of 3D Printers

By Offira Gabby, Senior Project Manager, Safety and Strategic Programs

In recent years, the use of 3D printing has risen rapidly, transforming industries, and enabling researchers to bring their creative visions to life. 3D printing has become an indispensable tool for prototyping and therefore has become widely used in research. The affordability, compact design, and ease of use of 3D printer equipment has facilitated its widespread use. Unfortunately, scientific studies evaluating the impact of 3D printing on indoor air quality have not been able to keep up with the demand, and as a result, regulations and formal guidance on safe practices are limited. According to a recent Campus Safety, Health, and Environmental Management Association (CSHEMA) survey among university campuses, 80% of 3D-printer use is found in Academic Shops/Makerspaces; however, up to 20% of 3D printers in higher education are located in residence halls and dormitory units.

Recent studies have demonstrated that when 3D printer filament or resin materials are heated, melted, or cured, airborne ultrafine particle emissions (UFPs) as well as volatile organic compounds (VOCs) are emitted. UFPs can penetrate deep into the lungs and cause respiratory symptoms, while some of the identified VOC compounds include known irritants and carcinogens. Common VOCs emitted during 3D printing include styrene, which is found in many resins, and toluene, present in some filament materials. The hazards of 3D printers can differ based on the technology used, among a wide range of other variables. The most common 3D printer technique in university research settings includes material extrusion printing, whereby a heated material (filament) is dispensed through a nozzle to construct an object, layer by layer.





Based on the results of a multi-year research initiative conducted by Georgia Tech and Chemical Insights (an Institute of Underwriters Laboratories), some general recommendations to reduce exposure hazards were released in 2023. EH&S has also established guidelines for the purchasing and safe use of 3D printers based on exposure assessments conducted over the last several years.

Purchasing: Consider purchasing 3D printers and supplies that have been that meet ANSI/CAN/UL 2904 standards and have been certified to have reduced emissions. Only purchase and use filaments compatible with the printer and recommended by the manufacturer. According to research as well as assessments conducted by Columbia EH&S, polylactic acid (PLA) has been shown to have lower UFP emissions compared to other filament types. If purchasing a 3D printer with a P-card, an EH&S 3D-Printer Form must be completed and approved by EH&S. Please reach out to occusafety@columbia.edu for a copy of the Form.

Location & Ventilation: When installing a 3D printer in any space, considerations including ventilation and access should be assessed. Avoid installing a printer in high traffic areas where air can be dispersed and consider installation in a room with local exhaust, a snorkel extractor, or a fume hood. Local exhaust in the room has proven to be an effective means of lowering emissions. 3D printers should not be installed near return air vents.

Operation: Several operational strategies can mitigate emissions. The most obvious of which is to always operate 3D printers within an enclosure and to limit observation and hovering while in use. Research has also found a correlation between higher operating temperatures of the nozzle and base plate and higher emissions. Programming temperatures to the lowest recommended setting can mitigate emissions. EH&S exposure assessments have found that waiting at least 10-15 minutes to open the door after running the printer resulted in lower UFP exposures. The longer wait time will continue to reduce potential exposure.

Housekeeping: UFPs and VOCs are likely present, even if not immediately visible. Regular cleaning of the 3D printer and surrounding area is important. Clean areas with a disposable wet cloth and/or a HEPA vacuum to collect particulate matter and to prevent dispersal of particles.

Understanding the potential risks and implementing safety measures is crucial to ensure a healthy and safe working environment. If your laboratory or shop space is interested in an exposure assessment or advice on where to best situate a printer, please reach out to occusafety@columbia.edu or labsafety@columbia.edu.

Picture/image credit for this article: 3D Printer Safety: A Guide for Institutions of Higher Education to Support Indoor Air Quality & Human Health, Underwriters Laboratories, Inc., 2021.

Keep it Clear - Eyewash, Overhead Emergency Showers, and Fire Extinguishers

By Hadler da Silva, Senior Safety Advisor

Accidents, exposures, and emergencies can occur at any time in the lab. Having the right tools necessary to keep one safe in an emergency is not the only thing needed but knowing where they are and that they are unobstructed are the others. Emergency equipment like the fire extinguishers, emergency eyewash, and emergency showers are key tools in the laboratory for preventing an accident from becoming even more severe. Every second counts in an emergency and ensuring that the laboratory has all the seconds they can get takes preventative work. Items should never be stored in front, under, or on top of these devices (below are examples of obstructions).

Fires can spread rapidly, causing extensive property damage. When fire extinguishers are kept unobstructed, they can be used promptly to contain small fires before they escalate. Swift response and minimal property damage can be the difference between a minor incident and a catastrophic loss. Moreover, using the right extinguisher correctly can prevent further damage by ensuring that the fire is put out efficiently.

In the laboratories dealing with hazardous chemicals, emergency showers and eyewash stations are vital for addressing chemical exposure incidents. Obstructing access to these safety features can result in serious chemical burns or eye injuries. Immediate decontamination is crucial to minimize harm in such cases. Ensuring unobstructed access to these facilities is essential for providing effective first aid and preventing long-term injuries. If the laboratory sees any of these devices obstructed, fix it as soon as possible and educate others on the importance of keeping it unobstructed.

Alongside this, FDNY regulations and standards require fire extinguishers, emergency showers, and eyewash stations to be easily accessible and unobstructed. Failing to comply with these regulations can result in violations being administered. Fire extinguishers, emergency showers, and eyewash stations require regular maintenance and inspections to ensure they function correctly. Keeping these safety devices unobstructed makes it easier to access them for routine inspections, servicing, and recharging.

Researchers should become familiar with the locations of each of them and ensure that they are always kept clear and ready to use! The importance of keeping fire extinguishers, emergency showers, and eyewash stations unobstructed cannot be overstated. Easy access to these safety devices can save lives, prevent property damage, and ensure legal compliance. Additionally, maintaining unobstructed access to safety equipment reduces panic during emergencies, supports a quick and cost-effective response, and enables proper equipment maintenance. Safety should be prioritized and personnel should work together to keep these essential tools accessible and ready for use. By doing so, we can create safer workplaces and reduce the potential for accidents, injuries, and costly emergencies.

Photo credits for this article: Examples of obstructed emergency equipment.

Obstructed emergency shower or eyewash stations | Finance, Procurement and Planning. (n.d.). www.ualberta.ca. Retrieved October 19, 2023 from https://www.ualberta.ca/finance-procurement-planning/insurance/loss-prevention/eyewash.html

Team, Q. (2018, October 16). #130 – When and Where Should Fire Extinguishers Be Installed? A Practical Guide for Building Owners. QRFS - Thoughts on Fire Blog. https://blog.qrfs.com/130-when-and-where-should-fire-extinguishers-be-installed-a-practical-guide-for-building-owners/

EH&S New Team Members

Katie Bolger - Director of Research Safety Programs
Hadeline Hanonik - Safety Advisor
Carolina Paredes Nova - Radiation Safety Program Coordinator
David Raharijao - Data Analyst

EH&S Fun Facts

How many researchers took RASCAL Safety courses in 1992? In 2022?
Answer: In 1992, 4 and in 2022, 24,994 researchers (624,750% increase)!

Editorial Staff: Kathleen Crowley, Chris Pitoscia, Pam Shively, Sonia Torres
Please share questions or comments with us at **newsfeedback@columbia.edu**