ERM QUARTERLY
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INTERNATIONAL SOS (ISOS)

Traveling internationally carries certain inherent risks that we are all exposed to and need to manage. Have you ever thought during a trip overseas, "What should I do if I get ill and require medical care"? Or, "What happens if I get into a car accident?"

To manage these and many other types of international travel risks, International SOS (ISOS) is now available to all members of the CMU community traveling internationally on university business at no additional cost to travelers or departments. ISOS is the world's leading medical and travel security services company that provides 24/7 access to doctors, security experts and assistance coordinators.

Examples of services include, but is not limited to, health, security, or travel advice and consultations, confidential emotional support, emergency evacuation and repatriation, referral of local providers for services such as ground transportation, medical facilities, vetted accommodations and emergency assistance. ISOS can be contacted by phone, email or by using the ISOS Assistance app (available on Apple, Android and Windows platforms).

When booking travel, travelers are highly encouraged to do so via CMU's preferred travel agency provider, Collegiate Travel Planners (CTP). After registering travel with CTP, ISOS will automatically receive your travel itinerary.

For more information, please visit ERM's Travel Risk Management Program webpage. ◆

ERM SUPPORTS COMMENCEMENT

Enterprise Risk Management (ERM) worked in close partnership with University Events and University Police in preparing for and delivering this year's Commencement ceremonies.

ERM is responsible for emergency preparedness and response planning for this memorable annual tradition. This includes, but is not limited to, continuous weather monitoring, emergency evacuation procedures and other support.

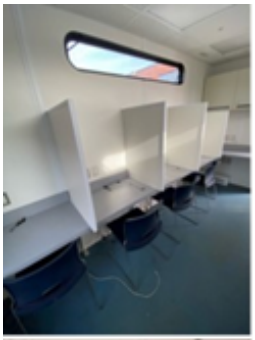
This year's commencement was unique, in that graduates from the classes of 2020, 2021 and 2022 took part in the ceremonies at Gesling Stadium. Prior to and during the ceremonies, trained volunteers from the CMUSafe Ambassador Program along with ERM staff assisted guests and graduates with directions and safety measures. ERM along with members of the Emergency Preparedness and Response Team managed an Emergency Operations Center (EOC) on campus to monitor the events, weather conditions and serve as a hub of communications between University Police, University Events and University leadership.

Enterprise Risk Management congratulates the classes of 2020, 2021 and 2022! ◆

View from inside the mobile command vehicle

View from inside Emergency Operations Center (EOC)

MOBILE COMMAND VEHICLE



In 2020, Carnegie Mellon University Police, Facilities Management and Campus Services and Enterprise Risk Management established the first university mobile command vehicle. A bus that transported CMU students as part of the CMU Shuttle and Escort Service for years was repurposed. Passenger seats were replaced with desks and computers to serve as a mobile link to the Emergency Operations Center (EOC) and establish an on-site command center.

The vehicle, used during large events and emergencies, is being upgraded to a new vehicle procured by ERM and University Police this past April.

The purpose of the mobile command vehicle is to be dispatched to locations on/around campus to establish incident command, coordinate assets and provide support during a variety of situations. While designed for crisis management, the primary function is to support communications between on scene operations and those working offsite to provide support. By doing so, the mobile command vehicle will serve the campus community during emergencies or large events, enabling quick and effective communications. ◆

MINORS IN LABORATORY, SHOP, RESEARCH AND OTHER PROGRAMS

This summer marks the return to in-person educational outreach programs including, Pre-College, Gelfand Outreach, STEM Programs and other events involving minors.

Environmental Health and Safety (EHS) strongly supports educational opportunities for minors and is committed to fostering a safe environment by preventing minors' exposure to hazards that may be present in university laboratories, such as hazardous materials, physical hazards and other inherent risks. EHS would like to remind program coordinators, instructors and volunteers of the importance for safety.

EHS has developed a Minors in Laboratory, Shop, Research, Teaching and Other Programs guideline that describes the requirements to allow minors to participate in laboratory activities and identifies when minors may work, conduct research or participate in programs in hazardous areas.

In addition, all programs, activities and courses involving minors must register with the Office of Human Resources before beginning interactions with minors and comply with the University Policy on the Protection of Children in Carnegie Mellon University Programs, Activities and Facilities.

Employees or volunteers who have direct contact with minors (i.e., the care, supervision, guidance or control of children, or routine interaction with children) must obtain Child Protection Clearances prior to interacting with any minors. These clearances must be renewed every 60 months (five years).

For questions about university policy requirements and Pennsylvania requirements for working with minors, please contact: childpro@andrew.cmu.edu or call: 412-268-3291.

For more information regarding the EHS guideline, please contact: safety@andrew.cmu.edu. ◆

VACUUM PUMP SAFETY

On August 14, 2020, a vacuum pump located inside of a chemical fume hood storage cabinet exploded at the University of Pennsylvania Chemistry Department. The vacuum pump explosion created a fire but caused no injuries.

A Chemistry graduate student was preparing to evaporate ethyl acetate and hexane using a Buchi Rotavapor (R-200) connected to a Savant VP100 rotary-vane roughing pump when the incident occurred.

Earlier that day, the student used the rotavap to evaporate some diethyl ether. After evaporation was complete, he failed to empty the solvent trap prior to leaving. Later that day, he disposed of the diethyl ether from the solvent trap and refilled the condenser with more dry ice and isopropanol to set up evaporation of a mixture of ethyl acetate and hexane.

The student engaged the switch to turn on the vacuum pump. The vacuum pump was located in a designated pump cabinet in the base of the fume hood, and power to the cabinet was controlled by a toggle switch on the face of the fume hood. The vacuum monitor on the rotary evaporator indicated that the pump was not supplying vacuum, so he turned off the power switch. He then opened the cabinet to check the pump. He did not observe any obvious damage, closed the door to the enclosure and attempted to start the pump again. When he engaged the switch a second time, the vacuum pump exploded, bursting the cabinet doors open. The vacuum pump was on fire, producing orange flames and black smoke. The fire alarm was activated, and the fire department extinguished the fire using water.

Fortunately, the student was not standing in front of the cabinet when the explosion occurred and, as a result, was uninjured. Even though he was wearing a flame resistant lab coat, there is a good chance that he would have been injured or maybe worse if he would have been standing directly in front of the cabinet door.

Although the exact cause of the explosion is unknown, the only explosive substance present was chemical vapor. Based on the investigation, the most likely direct cause of the explosion was the ignition of an explosive concentration of diethyl ether vapor expelled from the pump exhaust. Diethyl ether, which was evaporated using the system earlier in the day, may have been pulled into the vacuum pump and then exhausted into the cabinet. The introduction of fresh air into the enclosure (when the student opened the cabinet door to check in the pump) may have altered the fuel-air mixture inside the cabinet to a level within the flammable range of the chemical, which then ignited from the second spark (switching the pump on the second time).

How could the vapor have made it into the pump in the first place? After the first evaporation, the student did not empty any diethyl ether from the solvent trap. In addition, the dry ice condenser had warmed to room temperature by the time he returned, providing an opportunity for diethyl ether to continue evaporating into the system. When he returned, he disposed of some diethyl ether out of the solvent trap before using the rotovap again, but he was unsure if the volume was less than he had evaporated earlier, indicating that the ether my not have been adequately captured.

Vacuum pumps located in a cabinet must be vented through tubing connected to the lab exhaust either through a port in the back of the cabinet or through a hole in the bench top into the hood. In the lab where the incident occurred, this tubing was not present. That means that any solvent that was pulled

into the hot pump would have been exhausted right into the cabinet.

In addition, the rotovap manual recommends a Buchi brand diaphragm pump, but the pump connected to the rotovap operated at a speed 3.75 times faster than the recommended pump, and was not appropriate for solvents used in rotovap. So, not only was the pump over-powered for the application (according to the manual), but also should not have been used with diethyl ether, because its boiling point is very low, and warming it up causes its evaporation at atmospheric pressure.

Having at least two cold traps between the evaporator and the pump is considered best practice. In the lab where the incident occurred, only one room temperature liquid trap was present between the dry ice and isopropanol condenser.

To control the vacuum, Buchi recommends that an electronic vacuum controller is used to dial in and hold the precise vacuum setting for optimum evaporation. On the rotovap in the lab, the student used a manual valve, which is less precise.

Even though the cause of the explosion isn't 100% known, the pump was not vented properly, the pump was over-powered for the application, only one cold trap was present and the vacuum was not well controlled. To prevent a similar incident from happening in your space, follow these best practices if you are working with vacuum pumps:

- Empty the condenser trap immediately after evaporation is complete to eliminate the possibility that solvent will evaporate as the condenser warms to room temperature.
- Properly vent all vacuum exhaust and include sufficient condensing capacity prior to the pump. Connect the exhaust ports of pumps stored in vacuum pump cabinets directly to the vent port inside the cabinet. The pump may not vent into the cabinet interior. Contact safety@andrew.cmu.edu if you have any questions about your vacuum pump set-up.
- Any rotary evaporator systems that are using rotary vane pumps should be reviewed to determine whether the vacuum pressure is appropriate to the application and is well controlled. A less powerful vacuum pump with more precise vacuum control, such as a diaphragm pump, is more appropriate for rotary evaporation of low boiling solvents. For guidance on selecting the best vacuum pump for your application, see Labconco's "How to Select the Right Vacuum Pump" and "Lab Manager Magazine's Independent Guide to Purchasing a Vacuum Pump."
- Select the right pressure and temperature when condensing solvent vapor in rotary evaporation. Refer to the operator's manual for use and optimal settings.
- Use a second cold trap between the pump and the experiment to minimize the amount of volatile chemicals reaching the pump. This will also help to protect the pump from damage caused by degradation and contamination of the pump oil.
- Keep detailed records of all pump maintenance including routine maintenance and vendor-provided services.

Although this incident was a near miss, Kimi Brown, Sr. Lab Safety Specialist/Chemical Hygiene Officer, University of Pennsylvania stated during a webinar she presented for CSHEMA, "It is our responsibility to share our stories so they don't become someone else's tragedy."

If you have any questions or concerns regarding vacuum pump safety, email safety@andrew.cmu.edu. ◆

Image of the vacuum pump after the explosion from the University of Pennsylvania's EHRS website

Image of the vacuum pump cabinet after the explosion from the University of Pennsylvania's EHRS website

EHS PROVIDED TRAINING DURING TAKE OUR CHILDREN TO WORK DAY

On April 28, the EHS Fire Safety Team provided Fire Safety Training to participants during Take Our Children to Work Day. The Fire Safety Team provided instruction on E.D.I.T.H (Exit Drills In The Home), Stop Drop and Roll and how to use a fire extinguisher utilizing the P.A.S.S. (Pull, Aim, Squeeze, Sweep) technique. Each participant went through the steps of extinguishing a simulated fire using the Bullseye digital fire extinguisher simulator. The participants were highly engaged, asked questions, shared stories of their experiences and were excited to go home and relay what they had learned at "work" with their families. Evan Orowetz, EHS Fire Safety Specialist, reflecting upon the event said, "It was great to see how engaged each of the children were in the training. They enjoyed battling each other to see how quickly they could put out the fire! Our best time of the day…8 seconds".

For more information regarding the services provided by the Fire Safety Team, please see the Fire Safety website. ◆

Evan Orowetz instructing a child on the use of the fire extinguisher simulator

SUMMER 2022 FIRE EVACUATION DRILLS

In an effort to demonstrate fire safety awareness and preparedness in compliance with local fire codes, EHS has prepared a fire and evacuation drill schedule for the academic and administrative buildings. The following schedule identifies the proposed day and timeframe of the drill as well as where the drills will be conducted.

WEDNESDAY, 7/6, 09:00 – 12:00
Hamburg Hall
Smith Hall
CIC
Doherty Hall
Hamerschlag Hall
Scott Hall
FMS Building
Wean Hall

THURSDAY, 7/7, 09:00 – 12:00
Margaret Morrison Carnegie Hall
Porter Hall/Baker Hall
ANSYS Hall
Roberts Hall
CFA
Hunt Library
Posner/ Posner Center
HOA

FRIDAY, 7/8, 09:00 – 12:00
Gates Hillman
Newell Simon Hall
Purnell / Miller Gallery
Cyert Hall
Cohon University Center
Alumni House
East Campus Garage

MONDAY, 7/11, 09:00 – 12:00
INI Building
SEI
UTDC
Whitfield Hall
4721 Fifth Avenue - MARCOM
GATF
TCS
III
4618 – 4620 Henry St. Project Olympus

TUESDAY, 7/12, 09:00 – 12:00
205 S. Craig
300 S. Craig
311 S. Craig
407 S. Craig
417 S. Craig
Mellon Institute – Start here @ 09:00
Tepper Building

WEDNESDAY, 7/13, 09:00 – 12:00
6555 Penn Avenue
NREC
PTC
Mill 19
477 Melwood Avenue
Warner Hall – Start here @ 09:00

The Fire Safety Team asks for your full cooperation during the evacuation drills. During the evacuation drill in your area, you will hear a siren/horn and/or voice command announcement. Please follow instructions and proceed to the nearest exit.

Once outside of the building, remain with your group until the all-clear is given to return to the building. Do not leave campus until the drill has been completed. The expected duration will be 15-20 minutes.

If you have questions about proper procedures for your area, please contact safety@andrew.cmu.edu. ◆

TARTAN TESTING

Tartan Testing will remain open throughout the summer months. Tartan Testing is available for all asymptomatic community members who have not had a positive COVID-19 diagnosis within the last 90 days. Facial coverings are required for all individuals who visit Tartan Testing.

The test takes less than 15 minutes and same-day appointments are often available.

Tartan Testing Hours

Monday: 6 a.m. to 4 p.m.

Tuesday through Thursday: 8 a.m. to 4 p.m.

Testing is available Monday through Thursday by appointment only. You must arrive within 15 minutes of your scheduled appointment. If you miss your scheduled appointment, you may not be able to get tested if you walk-in at a different time. Individuals with appointments will be prioritized.

If you have questions or concerns about the Tartan Testing program, please email drbc@andrew.cmu.edu. ◆

TRAINING UPDATE

EHS is now offering BioRAFT/ChemTracker classroom training on a monthly basis. This training, intended for Principal Investigators, Laboratory Managers, Safety Coordinators, Laboratory Workers and Department Administrators, provides an overview of the system and its purpose, and explains how to effectively use its modules such as safety training, ChemTracker, inspections, radioisotope management, etc. You can schedule this training through BioRAFT. ◆

BIORAFT
Enterprise Laboratory Safety Software

CHEMTRACKER

STAFF SPOTLIGHT

Cole Bukowski is the latest addition to the Environmental Health and Safety Team. Cole joined the Workplace and Construction Safety Team on March 9th as the new Workplace Safety Specialist. Cole comes to the university from UPMC, where he worked as a Safety Specialist across many of their different hospital facilities. Cole holds his bachelor's degree in Safety Management from Slippery Rock University. Please join us in welcoming Cole to the Carnegie Mellon University community. ◆

ERM WOULD LIKE TO HEAR FROM YOU!

We encourage all members of the Carnegie Mellon University community to submit safety improvement ideas that enhance your personal safety on campus or the safety of the greater community. Your participation will help raise safety awareness in our community! Please submit your safety concerns and ideas to safety@andrew.cmu.edu.

In addition, if you have any suggestions for the next newsletter, please submit your ideas to Mary Sickles at msickles@andrew.cmu.edu. ◆

SEE SOMETHING? SAY SOMETHING!

Help ensure the safety and well-being of the CMU community by calling:
University Police: 412-268-2323
Ethics Hotline: 1-877-700-7050 ◆

CMU SAFE
See Something.
Say Something.