RECENT UW SAFETY-RELATED INCIDENTS

Explosion at MolES
On August 2, 2017, a graduate student discovered a chemical spill due to a waste bottle that had ruptured in a secondary containment bin. Approximately 3 liters of liquid had spilled, with about 75% of the spill contained by the containment bin, while the rest was located on the floor and the glass wall behind the bin. The upper portion of the ruptured bottle was in pieces. All occupants of the lab were immediately evacuated and the building coordinator was informed of the spill. The UW's Hazmat Spill Cleanup Contractor, the National Response Corporation (NRC), was called in and conducted the cleanup.

Temperatures in the lab had risen to 80-85 degrees F on this day due to a chiller failure in the building. The bottle that had ruptured was manufactured for chemical waste storage and disposal purposes, and had contained a mixture of organic solvents. The bottle was approximately 80% full with about 1.5" of headspace between the liquid level and the top of the bottle at the time of the rupture, and its cap was on tight. The elevated temperature is not believed to be a root cause of this incident, as the specific type of bottle in question is tested and designed to be able to handle significant temperature differentials. Waste bottles are routinely staged in that location when full and awaiting pickup, but that specific bottle had been sitting around for several weeks and no chemical collection request had been submitted for it. The waste bottle was also not properly labeled with a complete list of constituents stored inside.

Mercury Spill at Power Plant
On August 2, 2017, a truck arrived at the Power Plant to collect garbage from the collection container. As the driver was dumping the contents into the truck, he heard a loud noise and immediately smelled a strong chemical odor, which led him to discover aerosol cans, black buckets, metal cans, flowing liquids (white and purple), and a syringe inside the garbage container. The Driver immediately contacted his supervisor. He commented later that the chemical odor was so strong that it made him very dizzy. A large pool of elemental mercury was discovered later in the hopper of the vehicle. The universities spill contractor, NRC Environmental, was contacted to clean up the spill and decontaminate the garbage truck. It took NRC staff three days three days to complete this.

It was confirmed that the mercury, as well as the purple liquid, came from items thrown into the dumpster by staff at the Power Plant. A relatively new employee had been tasked with cleaning up an instrument shop, but did not complete proper training on safety practices and chemical management prior to this task. Some of what he disposed of included a black five-gallon bucket that a previous occupant had used to store elemental mercury from various devices, as well as a device that was used to test or calibrate flame scanners. The improper disposal and compaction of those items, as well as a five-gallon container of latex paint (of undetermined origin) is what caused the spill and the chemical smell. Mercury is easily spread and the spill area may not be easily identified. Health effects from mercury exposures can include central nervous system disorders, reproductive effects and kidney damage.

Chemical Incident at Kincaid Hall
On May 22, 2017, an employee in a research lab was preparing a solution of paraformaldehyde and dimethyl sulfoxide (DMSO) in the fume hood. The solution was in a Pyrex bottle closed with a screw cap screwed on tightly. The solution was heated to dissolve the paraformaldehyde and the bottle exploded when the researcher moved it from the hot plate to an ice bath. The hot vapor and liquid splashed his face and upper body, and got into his eyes. Paramedics were called to treat him and he was released to go UW Medical Center. Most of the material from the explosion was contained in the fume hood. The spilled solution and broken glass was cleaned up by lab staff and labeled as hazardous waste for disposal.

The protocol for this procedure cautions that appropriate personal protective equipment (PPE) (nitrile gloves, lab coat, and splash goggles) should be worn while preparing a paraformaldehyde solution. The researcher had been wearing his eyeglasses and a T-shirt, and was lacking proper eye protection and a lab coat. The protocol also calls for an erlenmeyer flask, not a bottle with a screw cap, to be used. The container failure is presumed to be structural from thermal shock rather than over pressurization due to the cap being on too tight. Always wear proper PPE and follow Standard Operating Protocols (SOP) for any experimental procedures.

Chemical Incident at Johnson Hall

On March 27, 2017, EH&S staff were alerted by Hall Health Clinic that an employee had checked in with a concern that he had been exposed to hydrogen cyanide (HCN) gas. The affected employee had been preparing aqueous solutions of sodium ferrocyanide the day before and had left them stirring on a hot plate/stirrer with the heat turned off and inside a fume hood with the sash approximately 60% open. The next morning, he detected an odor when he went into the lab. He turned off the stirrers, exited the room, and later returned to close the hood sashes and put up a sign that read “Keep out, HCN.” He began to feel dizzy and had tingles in his hands and feet. He then called his PI and contacted EH&S, who printed out the safety data sheet (SDS) for the chemical he was working with to give to a physician. He was sent to the ER and was released a couple of hours later.

After a thorough review of the room no source for an odor, no evidence of HCN, and no hazardous chemical spill were found. It was also verified that the fume hood was functioning within specifications. No injuries were reported, and the affected employee was released from hospital with the understanding that he had not been exposed to HCN. Always read the SDS for the chemical you are working with prior to starting your experiment, so that you understand what it is and how to handle it. If an incident occurs and you need medical assistance, take the SDS with you so that medical staff know how to approach the situation.

Chemical Exposure at Molecular Engineering

On December 22, 2016, a graduate student was filtering a solution of 10% phenylmethanesulfonyl fluoride (PMSF) in ethanol using a plastic, disposable syringe with an attached filter unit. During the procedure, the syringe demonstrated a reduced flow rate and increased resistance, causing him to pull harder. The syringe failed, resulting in splash of the material in his face. The student experienced minor skin and respiratory irritation, but was not in severe pain and could see normally. He does not appear to have suffered long term injuries. The incident did not require spill response, and no lab equipment was damaged beyond the syringe in use.

The student was lacking proper eye protection and a lab coat at the time of the incident. There was also no protocol established for using a syringe to filter PMSF in ethanol. Always wear proper PPE and follow Standard Operating Protocols (SOP) for any experimental procedures.

Explosion at More Hall

On November 29, 2016, a student was rinsing glassware as part of a silanization process with a mixture of toluene and dichlorodimethylsilane. Against usual lab procedure, the glassware was placed in an oven at 450’C before the solvent was allowed to fully evaporate. The student left the area and at some point later an explosion occurred within the oven. Damage to the oven was evident, but no one was injured as a result. Had the student been in the area at the time of the explosion, injuries from the force or emanating heat may have occurred.

Flammable liquid residues will ignite if heated to their autoignition temperature, even without a source of ignition. That is why the lab’s protocol called for the glassware to be completely dry before being put in the oven. It is important to always follow standard procedures, which are in place to prevent this type of incident.

Fire at Mary Gates Hall
On August 10, 2016, an occupant activated a fire alarm pull station after noticing smoke on the second floor. This was followed by waterflow alarms in the building. It was determined that the cause of the fire was a 9 volt rechargeable battery which had ignited. Heat from the battery ignited nearby combustibles and the heat generated was sufficient to activate a sprinkler head. Occupants were allowed to reenter the building to retrieve personal belongings, but access to the ground floor of the building was limited due to lingering odors and high carbon monoxide levels.

There were injuries, but property damage consisted of wetted carpeting, walls, floors, and ceilings; water and fire damage to most of the room contents; and smoke residue and odor through the rooms and surrounding areas. It is believed that an internal fault of the battery caused shorting which led to overheating and fire. There are no recommendations that might have prevented this incident.

Hand Injury at Cabrini Tower
On July 8, 2016, a clinic received a shipment of research media in a sealed container packed with dry ice. Upon opening the package, an employee noticed the container was bulging and placed it behind a Plexiglass shield in an unoccupied room. The employee put on safety glasses and thick gloves and attempted to loosen the lid to slowly release the pressure within the container. The container exploded and injured the employee's hand, resulting in partial amputation.

The container used for shipping the contents in dry ice did not have any ventilation holes, which are needed for dry ice packaging to prevent pressurization from off-gassing. Even though the employee who opened the package was wearing protective equipment, it still was not sufficient to protect them from the hazards of the inappropriate container used to ship the dry ice. If a bulging shipping container is received, 911 should be called to respond and no attempt to open the container should be made.

Burn Injury at MoleS-Hoffman Trailer
On July 6, 2016, a former lab member came in to clean glassware that had been sitting unwashed for six months. He had difficulty removing residue from a flask and added chloroform to it. He then heated the chloroform, unsealed, in an oil bath at 160'C. The flask exploded and splashed oil onto his hands, arms, and lab coat. He removed the lab coat and rinsed his arms under cold water. An ambulance was called and he was treated for thermal burns.

No major injuries resulted from this incident since it was conducted in a fume hood and the person was wearing a lab coat and goggles. However, people who are no longer employees should not be allowed to work in the lab and glassware should be cleaned in a timely manner and not left sitting around for months. Chloroform is not usually used as a cleaning agent and should not be heated up in an oil bath.

Explosion in Wilcox Hall
On May 9, 2016, a graduate student, working alone in a lab in Wilcox Hall, stored a solution of 70% nitric acid wash in the fume hood as waste. She tried to dissolve acetates using ethanol, hydrochloric acid, and water for an experiment. Unable to get the acetates to completely dissolve, she discarded the solution by pouring it into the nitric acid wash container in the fume hood. Nitric acid reacts violently with alcohols and organic materials, among many other compounds, and the student's actions resulted in an explosion in the fume hood. The explosion shattered the glass container of nitric acid wash as well as other containers in the fume hood. A visible white gas began forming from one of the containers, which the student chose to remove and set on the floor. Gas and odors spreading from the container prompted people to evacuate the area, pull the fire alarm, and call 911.

No injuries were reported from this incident, but it did result in evacuation of the entire building, road closure, vehicle inaccessibility to other buildings, as well as response from local news crews and over 51 emergency personnel. Proper handling, storage, and disposal of nitric acid are key to avoiding such incidents or worse in the future. Chemical reactions should never be removed from the fume hood.

Welding Eye Injury at Fluke Hall
On May 20, 2016, an employee was exposed to a welding flash in the lobby of Fluke Hall. The employee notified their supervisor and then was sent to the emergency room at UW Medical Center. The employee was treated and released but reported residual symptoms associated with the flash. Welding was occurring in the public corridor outside of the Fluke Hall first floor construction area in a space separated from the main lobby of the building. The welding was on materials located near the ceiling of the first floor. Shielding had been erected directly beneath the work area but not to the sides, allowing the welding to be visible through fixed glass from the Fluke Hall lobby.

The contractor had made an attempt to erect welding flash shielding around their work area. However, shielding was not complete and occupants located remotely from the immediate area of work had a clear view of the welding taking place. The fixed glass in the partitions and glass in the door should have provided some protection from ultraviolet light radiation exposure. However, clear glass would not prevent dazzle from the bright light.

Chemical Spill in Hitchcock
On February 2, 2016, a lab worker in Hitchcock Hall dropped a bottle containing about 250 ml of b-mercaptoethanol. The lab staff immediately tried to clean up the spill, absorbing most of the material with spill pads. The clean up debris was bagged and placed in a fume hood across the hall. Within 30 minutes, the smell was pervasive in the south end of the building. EH&S Environmental Programs (EP) was contacted, as well as UWPD and the UWEM SOC, so they would be aware of the issue. FOMS responded and custodial services was notified that they should not work in Hitchcock that evening. The odor was very strong on the 3rd floor and less so on the lower levels. Undergraduate labs scheduled for that evening were cancelled due to the odor. At least one occupant left complaining of a headache in the evening. About 6 floor tiles appeared to be damaged or the finish removed.

When health effects are associated with strong odors, EH&S advises reporting occupants to evacuate the building and call 911 if the odor is strong, especially if a gas odor is present. When recognizable or reoccurring odors are detected, such as exhaust or natural gas, occupants should refer to Facilities Services to inspect the problem. EH&S staff will respond and inspect if unknown or chemical odors occur or health concerns are associated with the odor.

Chemical Spill in Chemistry Building
On January 22, 2016, a custodial staff person noticed a liquid spill on the floor of a room in the Chemistry Building. They immediately left the room and contacted UWPD, who requested an SFD response. SFD responded with hazardous materials (haz mat) staff as there was no way to identify the spill materials. It was later discovered that a researcher was working late in the lab and spilled mineral oil while transferring it to a waste container. He went to get some sleep in another room of the building, leaving the spilled mineral oil to drip onto the floor, where it was discovered by custodial staff in the morning. There was a waste container with the same liquid dripping down its sides on the bench.

Lab staff should be reminded of proper spill response procedures and cautioned not to leave such situations for others to discover and possibly misinterpret. Although the material spilled constituted a very low hazard, leaving it without cleaning it up resulted in a large haz mat response, involving a number of Seattle Fire personnel and equipment, disrupting operations throughout the rest of the building and campus, as well as impacting traffic on Stevens Way. Building occupants should not sleep in the building. The Chemistry Building is not classified as a residential occupancy and does not have the required safety features to detect incipient fires and warn occupants with adequate sound pressure to ensure they promptly wake up.