

# Lessons Learned & Success Stories – September to December 2020

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The NBACC Mishaps, Lessons Learned and Success Stories Summary serves to reinforce a strong culture of safety and accountability by promoting consistent reporting of mishaps, establishing strong lines of communication with the safety department, supporting a learning environment by allowing others to learn from reported events, and tangibly demonstrating NBACC Leadership’s commitment to safety, accident prevention, and continuous improvement.

## **SUCCESS STORY**

1. During an Institutional Animal Care and Use Committee (IACUC) inspection of the Biosafety Level-4 (BSL-4), it was noted that MicroChem labels are frequently washed off the spray bottles and buckets, leaving them “unlabeled”. Several members of the Comparative Medicine group put their creative spirit to work and created pre-populated laminate labels. Each label provides a blank line for the date when the MicroChem was prepared and the initials of the preparer. The labels are affixed to the bucket or bottle with a Velcro dot and can be removed, erased, or modified, and placed on a new preparation of MicroChem the next day. This forward thinking creates an easier method to address the ongoing issue of labels coming off buckets and bottles when wet.

## **LESSONS LEARNED**

1. The cornerstone of conducting trustworthy research is generating data that is consistent and reliable. Poorly maintained laboratory equipment can not only affect research integrity but also lab productivity. Additionally, pieces of equipment not routinely cleaned and/or serviced are more likely to require unexpected repairs or premature replacement, both of which can be extremely costly in terms of time and expense. By including maintenance schedules in equipment-specific Standard Operating Procedures (SOPs), training staff on the use AND maintenance of equipment, and developing a cleaning schedule for frequently used instruments, we can ensure equipment remains operational and safe for staff.
2. As Coronavirus cases surge, we remain alert, personally and professionally, and our daily lives can be both mentally and physically exhausting. It is imperative that we do not allow pandemic fatigue to alter our vigilance in the laboratories. This is the time to take a step back and review our basic safety and security protocols and allow ourselves to regain focus on all of the small details that come together to make up our strong safety culture at the NBACC. Proper use of everyday safety equipment, such as biological safety cabinets, can greatly reduce the risk of accidental spills in the lab. Ensuring all materials are, at a minimum, four inches inside from the sash, that all contaminated operations are as far to the rear of the work surface as possible, moving arms and hands slowly, and avoiding side-to-side sweeping motions are just a few of the recommended guidelines to maximize effectiveness of the Biological Safety Cabinet (BSC).
3. We should know the SOP for Lab spills. It is that simple. Spills are a part of life. They can occur at any time, whether spilling coffee in an administrative area, leaky pipes in the interstitial spaces, or a

biological spill in the laboratory. All spills have their own unique hazards and it is important for staff to understand how to recognize a spill and how to respond to spills. A key point to remember, not all spills are liquids. A spill in the laboratory may involve, but is not limited to, tape falling out of the BSC, solid waste falling out of the trash, or any unknown source of liquid. Spill prevention is key to your safety and the safety of others around you. Please be mindful of the various types of spills that can occur in your work areas.

4. Signs are a part of all of our daily lives. From driving on the road, going into your favorite carryout with a "Face mask required for entry" posted on the door, to entering containment. It's easy to get caught up in doing what we perceive to be mundane, because we do it so often, but we must remember to stay vigilant at all times. Getting too comfortable could cause you to miss something important. Slow down, process, and don't just go through the motions. Be observant, diligent, and intentional with everything you do to protect yourselves and peers from potentially harmful situations.

### **EVENT SUMMARIES**

**FIRST AID SUMMARIES:** In all of the following incidents, personnel reported to the Competent Medical Authority (CMA), first aid was applied as necessary, and laboratory restrictions were placed, if needed.

- 09/04/2020 - A staff member was opening an overhead bin when they cut their finger on the side of the bin at a pinch point.
- 09/16/2020 - A staff member cut their finger while cutting out a cardboard template.
- 10/08/2020 - A staff member was defrosting a -20°C freezer when a large chunk of ice fell off the side of the freezer and scraped their gloved hand, causing an abrasion.
- 10/19/2020 - A staff member was removing an old soap dispenser when they scraped their hand against the plastic edge of the dispenser.
- 11/02/2020 - A staff member was soldering a fitting to a pipe when they briefly brushed the inside of their arm against the hot fitting and sustained a burn.
- 11/19/2020 - A staff member was removing a bag of reagents from a refrigerator when the door slid shut on their right, middle finger and caused a small cut.

### **NEAR MISS SUMMARIES**

1. **SPILL SUMMARY:** 08/13/2020 - Two staff members entered the BSL-4 to certify the walk-in BSC enclosure. During the process, the sash of the BSC was lifted and the technician's equipment was placed near the HEPA filters. There was an issue with the mechanism that holds the sash in place, so the technician requested permission to open the door of the cabinet in order to reach the space. After speaking with Health and Safety, the staff members were permitted to open the cabinet door. Upon opening it, they discovered 10-12 pipette tips, 2 tip box lids, pieces of paper and a paper towel on the floor of the cabinet. The staff members were connected to air at the time of the discovery and treated the items as a spill, decontaminating them, allowing for the full contact time and discarding them. The staff members confirmed that the cabinet had not been used within the past 24 hours. Given the number of items and the fact that the doors of the cabinet are rarely opened, there was no way to tell when the items fell and which agents had been worked with at that time. The staff members were able to successfully certify the cabinet, and upon exiting, confirmed that there were no breaches to their suits. There is a gap between the platform of the BSC and the door of the BSC, which leaves a space large enough for items to fall between. Health and Safety spoke to the Lab Space Manager (LSM) of the space about regularly scheduling routine cleaning of the floor below the platform. The CMA ruled no potential exposure.

2. **SPILL SUMMARY:** 09/04/2020 - A staff member working in a BSL-4 laboratory was preparing the BSC for the next step in their work when they knocked an unused tube out of the BSC. The staff member was able to catch the tube between their suit and the BSC before it fell to the floor. Though the tube was empty, the staff member had been working with a Risk Group (RG) 4 agent in the BSC. After speaking to a member of Health and Safety, the staff member confirmed that there were no spills during their work and that their suit and gloves remained intact. The CMA ruled no potential exposure.
3. **SPILL SUMMARY:** 09/22/2020 - A staff member was working in the BSC of a BSL-4 laboratory when they lost control of a tube cap and it fell outside of the BSC. The staff member, who was performing extractions of a RG4 agent, picked up the cap and decontaminated the floor with MicroChem. The staff member called the Control Room, and upon speaking with Health and Safety, confirmed that there were no breaches in their BSL-4 suit or gloves. The CMA ruled no potential exposure.
4. **SPILL SUMMARY:** 10/01/2020 - A staff member working in a BSL-3 laboratory was performing an ELISA and using a plate washer outside of the BSC when ~ 5 µL of liquid containing a RG2 agent spilled onto an absorbent diaper on the lab counter. The staff member did not immediately leave the room but continued the plate washing step, placed the plates back into the BSC, and then left the room to call Health and Safety. The staff member was reminded of proper spill procedure and the expectation that staff are to hold their breath and leave the room during spills. The CMA ruled no potential exposure.
5. **PROCEDURAL FAILURE SUMMARY:** 10/06/2020 - A staff member working in a BSL-4 laboratory contacted Health and Safety to report that they had entered the suite and conducted work without realizing that their BSL-4 suit was not fully zipped. The staff member had been working in the BSC with a RG4 agent when they noticed that part of their scrub top was stuck at the bottom of the suit's zipper and was partially sticking out. Upon noticing their scrub top, the staff member stuck the exposed part of the scrub top into the suit and zipped the suit shut. There were no spills reported from the room, the BSC was functioning properly and the employee was hooked up to air while working in the BSC. After reporting the incident to a member of Health and Safety, the staff member was reminded to slow down and do a thorough check of their Personal Protective Equipment (PPE) prior to entering any containment suite. The CMA ruled no potential exposure.
6. **SPILL SUMMARY:** 10/22/2020 - Two staff members working in the BSC of a BSL-2 laboratory were removing tape from a stack of agar plates inoculated with a RG2 agent when one of the plates fell out of the BSC and landed on the floor. Neither staff member held their breath or left the lab but instead called the Command Center to request assistance from a Health and Safety member. The Health and Safety member immediately asked both staff members to leave the lab and to call back. After discussing the incident, the staff members were permitted to re-enter the laboratory and decontaminate the area of the floor where the plate landed. The CMA ruled no potential exposure.
7. **SPILL SUMMARY:** 10/27/2020 - A staff member working in a BSL-2 laboratory was handling a stack of plates containing a RG2 human cell line on the benchtop when their hand bumped the top plate and spilled the contents of the plate onto the floor. The staff member contacted the Command Center and, after speaking with Health and Safety, was instructed to clean up the spill. However, the staff member did not leave the room prior to calling the Command Center. The CMA ruled no potential exposure.
8. **PPE FAILURE SUMMARY:** 10/31/2020 - A staff member working in a BSL-3 laboratory was cleaning up the BSC after completing their work when they noticed a tear in their inner glove. The staff member

had been working with a RG3 agent and had already discarded their outer gloves when they noticed the tear. After contacting the Command Center and speaking to a member of Health and Safety, the staff member was discouraged from attempting to retrieve the discarded gloves but instead to evaluate their hands for any cuts or scrapes. Upon confirming that their skin remained intact, the CMA ruled no potential exposure.

9. **PPE FAILURE SUMMARY:** 11/04/2020 - An escorted staff member was assisting with inventory in the BSL-4 suite when they noticed a tear in their right glove. Due to the placement and size of the tear, the escort determined that it was better to exit the suite and use the chemical shower to dunk the staff member's glove. Both staff members entered the chemical shower to leave the suite and during the shower, the staff member dunked their glove into the bin in the shower. Once in the suit room, the staff member reported the incident to the control room operator and performed a leak test of their inner glove. After speaking to a member of Health and Safety and confirming that their inner glove was intact, the staff member was allowed to be escorted back into the suite to continue their work. The CMA ruled no potential exposure.
10. **FACILITY PROCESS FAILURE SUMMARY:** 11/16/2020 - A staff member in a BSL-3 laboratory was reviewing plates from routine environmental sampling swabs taken the previous day when they noticed a small colony had grown on a sample taken from the women's containment-side shower drain. Upon noticing the positive samples, the staff member immediately contacted the Biosafety Officer (BSO). Given the size of the colony, the sample could not be ruled out as the RG2 agent the group had used in one of the laboratories in the suite earlier that week. The plate was placed back into an incubator to monitor for more growth and the shower and dirty-side change room were bleached by a member of Health and Safety. The following day, the staff member reported that the colony had grown larger. The colony sample was then prepped, extracted, and passed to another group for sequencing. The following week, the sample was confirmed to be the RG2 agent. The laboratories in the suite were decontaminated and the original site was resampled, as well as additional sites determined by the BSO. Additionally, the BSO met with the Principal Investigator, Associate Laboratory Director and associated project staff to discuss potential improvements to processes and SOPs to prevent reoccurrence. Based on the information provided and the route of infection for the agent, the CMA ruled no potential exposure.
11. **PROCEDURAL FAILURE SUMMARY:** 11/27/2020 - A staff member noticed that the sign of an ABSL-3 laboratory had the incorrect Powered Air-Purifying Respirator (PAPR) requirement written on it. The door sign stated that a PAPR providing an Assigned Protection Factor (APF) of 25 or greater was required for entry, however the risk assessment associated with the project stated that a minimum APF of 1000 was required for entry. Upon further investigation, it was discovered that the room signage had been updated to reflect the new phase of the project, but the change in required PAPR APF was not communicated, and therefore, not included on the new sign. All staff that entered the room with the incorrect PPE were notified. The CMA ruled no potential exposure based on the fact that there were no PAPR failures during any of the room entries, an APF of 25 is acceptable for the agent that was used, there were no aerosol generating activities performed, and none of the animal models developed respiratory symptoms.

#### **OTHER OCCURENCES:**

**REPORTED EVENTS:** In all the following, personnel reported the events to Health and Safety, and the events were tracked for trending purposes:

- A staff member was decontaminating their PAPR when the nozzle to the Bleach-Rite bottle popped off, causing them to drop the bottle and spill about 100 mL onto the floor.
- A staff member working in the BSC was pipetting agent into a cryovial when 100  $\mu$ L spilled down the side of the tube and onto the tube rack.
- A staff member spilled 100 mL of inactivated liquid waste on the floor by the sink while draining a decon pan in the sink. The staff member used a strainer while emptying the pan, but the placement of the strainer caused liquid to roll down the bottom of the pan and onto the floor.
- A staff member's PAPR shut off while they were working in the BSC. No agent was present. The PAPR unit was evaluated by Health and Safety and will be discarded once it is decontaminated.
- A staff member briefly lifted their PAPR hood over their face upon exiting a laboratory, but before entering the PAPR staging area. They reapplied their hood as soon as they recognized their mistake.
- A staff member noticed that a plate washer waste collection bottle had a leak. The only content of the waste bottle was diluted bleach. The staff member replaced the bottle.
- Two staff member's PAPR batteries died while they were working in the BSC. Due to the frequency of battery issues, the PAPR batteries were evaluated and replaced.
- A staff member, working in the BSC, briefly stopped work to step out of the laboratory, and upon their return, failed to don a lab coat before resuming their work. After noticing their mistake, the staff member immediately contacted Health and Safety and confirmed that there had been no spills during their work.
- A staff member preparing to load samples into an incubator noticed a glove tear of unknown origin on the left thumb of their outer gloves. After performing a leak test, the staff member confirmed that their inner gloves were intact.
- A staff member working in a BSL-2 laboratory was removing a bottle of Trizol LS from the plastic bag and the absorbent pads it was wrapped in when the bottle slipped from their hands and fell to the floor. The bottle remained intact but the cap shattered and Trizol LS began to spill on the floor. The staff member righted the bottle, held their breath, removed their gloves and shoe covers and exited the room. The staff member contacted the command center, and after speaking to a member of Health and Safety, they retrieved the 'Do Not Enter' sign from the hallway spill kit and posted it on the door. Upon arriving to the laboratory, Health and Safety and Facilities Management Operations (FMO) donned respirators and cleaned up the broken cap and Trizol. Access to the laboratory was restricted until the following morning to ensure an adequate number of air changes before re-entry.
- A staff member was working in the BSC of a BSL-3 laboratory prepping samples, which needed to sit for two hours before being processed. At the end of the incubation time, another group of staff members processed the samples in the BSC and moved them into another room. There was a miscommunication between the two groups of staff members and neither group conducted a post-decontamination of the BSC. The BSC remained dirty until another staff member discovered it the next morning despite the 'BSC Daily Use Log' being filled out completely by the staff member that prepped the samples. A member of Health and Safety discussed the purpose of the 'BSC Daily Use Log' with the initial staff member and reviewed the proper way to fill it out.
- A staff member ran a large sharps container on a 'utensils' (dry) autoclave cycle instead of the appropriate 'liquid' cycle. All sharps containers and any solids, including plastics that may turn to liquid during sterilization, are to be run on a liquid cycle.
- A staff member failed to remove their jewelry before entering a containment suite. The jewelry was bleached out of the suite.

- An escorted visitor failed to remove a watch before crossing the line of containment. The watch was bleached out of the suite.
- A staff member started a liquid cycle in the autoclave but failed to use the autoclave load probe. The autoclave did not go into alarm and completed the cycle. When the autoclave was opened, a staff member noticed that the probe had not been used and contacted Health and Safety. The bags were intact and did not contain agent. After consulting with Health and Safety, the waste was re-run on a liquid cycle with the load probe.
- Two staff member's PAPR batteries died while they were standing in the hallway and PAPR staging area of a suite, respectively. Both batteries were placed 'out of service', and replacement batteries were put in the suite by a member of Health and Safety.
- A staff member was setting up a clean BSC prior to starting work for the day when an empty tube fell out of the BSC.
- A staff member was retrieving samples of a RG1 agent from a centrifuge when they noticed that the o-ring had broken during centrifugation. All employees in the room immediately held their breath and exited the room to call Health and Safety. After speaking to safety and confirming that the tubes had remained intact, the rotor was removed from the centrifuge and placed 'out of service' pending replacement of the o-ring.
- A staff member running a liquid autoclave cycle from the BSL-4 suite placed the load probe in the large carboy normally designated for biomass cycles instead of the smaller pan used for regular liquid cycles, resulting in a heat timeout alarm. The staff member was unaware that there were different carboys used for different cycles since the writing had worn off of the large carboy. The cycle was re-run on the animal cycle and the large carboy was labeled with a sticker.
- A staff member was retrieving a bottle of media from the refrigerator when they noticed a ring of wetness underneath it. It was determined that the liquid was media leaking from a small crack in the bottle. The media was transferred to another container and the leak was cleaned by the staff member.
- A staff member was transferring a freshly made solution of 10% bleach across the room when a small amount (~100 mL) splashed out of the top of the container. It was determined that the cap to the container was not fully sealed. The spill was wiped up by the staff member.
- A staff member reported that the Class II BSC was in alarm in a BSL-3 laboratory. No work was planned in that room.
- A staff member was assisting a subcontractor and evaluating a new space to perform hot work operations when they discovered that previous hot work had been performed under unsuitable circumstances. The previous hot work bench was set up ~10 years ago and approved by Health and Safety, but over time the space evolved to include more staff members and items in close proximity of the work space. Additionally, staff discovered that the type of hot work taking place at the bench was slightly different than the work the bench was originally designed to support and therefore not adequate. Both Health and Safety and FMO decided that the best solution was to move the hot work bench to an interstitial space where it is able to support a variety of hot work operations, where the foot traffic is reduced, and there are minimal items stored nearby.

**Note:** It should be assumed that staff are wearing a PAPR (minimum APF 25) in events taking place in the BSL-3 laboratories unless otherwise stated.

### **Document Definitions:**

**Event Summaries** – Any OSHA recordable mishap or first aid injury or illness.

**Near Miss Summaries** – Any mishap that requires a potential exposure ruling from the Competent Medical Authority (CMA) or represented a CDC Form 3 submission.

**Other Occurrences** – Mishaps that do not fit into the other two categories.

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