



Lessons Learned & Success Stories – December 2019 to February 2020

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

Due to increased laboratory space requirements and limited Biosafety Level (BSL)-2 space availability, staff are now sharing a common BSL-2 suite; specifically, staff are now using a room within a suite previously dedicated as an animal use area. During an initial suite orientation, staff were instructed to don shoe covers upon entry and dispose when exiting the suite. Staff instituted the use of an additional shoe cover upon entry to their specific room for signature control, and there was confusion amongst staff as to whether the trash bag for the shoe covers in the hallway should be perceived medical waste or autoclave trash because they had seen both in a short time. The Health and Safety Department was consulted and determined that staff should remove the outer shoe cover in their room for disposal in the autoclaved trash, and the inner shoe cover should be disposed of in the hallway as perceived medical waste. Not fully understanding this logic, staff clarified that shoe covers were only necessary when street shoes were worn in the suite. Staff will always be in dedicated lab shoes upon entry for work in their area, thus eliminating the need for shoe covers upon entry to the suite. The resolution of this situation illuminates the criticality of effective communication and signage, especially when changes in workspace are involved. In addition, the stakeholders (in this case, the Laboratory Space Managers (LSMs)) need to be consulted to get all information when making these changes. This is a success because though it took a long time to get the correct staff talking; staff continued to ask questions until a full understanding was achieved. This resulted in a simple solution and eliminated the potential safety risk of wearing two sets of shoe covers and juggling removal at different times. Don’t just accept the concept of “NBACC Hard.” Ask questions and ensure complete understanding; it may lead to a simple resolution or safer work practices.

LESSONS LEARNED

1. It is always prudent to be aware of changes happening around you. Take a moment to consider what those changes mean to you and how those changes impact your “routine” job activities. A change in a group acquiring a new lab space had them questioning why they were doing something and that questioning led to changes into entry procedures for the space. A near miss this month involving work in a decontaminated lab led to procedural changes to locking out sinks/drains when rooms are in a decontaminated state.
2. Our due diligence is a cornerstone of our safety culture. Often, we find ourselves in situations where a routine mindset assumes control of our actions and thoughts. With any spill, outside of primary containment, ensure you are holding your breath, leaving the area, and contacting Health and Safety via the Command Center. Safety first! Though we may think that staying on scene is the right thing to do, vacate and verify proper procedures eliminating any chance of exposure. Ensure a hazard free work zone at all times!

3. As we ramp up work in containment, it is important to be mindful of the extra time and care we must exercise while working in personal protective equipment (PPE). As we have become busier in the containment suites, we have had a number of spills that could be prevented by slowing down and being cognizant of the additional hazards our PPE creates. For example, suit cuffs or lab coat sleeves add an extra hazard as they are large and can easily drag small items such as tubes or pens out of the Biosafety Cabinet (BSC). Dexterity is compromised with the addition of double or triple gloves, and we have had incidences where an item is been knocked out of the BSC, refrigerator/freezer or incubator, and not noticed until we are cleaning up or inventorying our items. A good work practice is to verify that all items are accounted for before exiting the workspace, as it is critical to keep a clean and clutter free working environment.

EVENT SUMMARIES

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

- 11/13/2019 - A staff member was placing a bottle under a laboratory sink when they scraped their left knuckle on the metal lip beneath the sink.
- 11/25/2019 - A staff member was switching out a gas cylinder when they scraped one of their fingers on a plastic tag that was attached to the tank.
- 01/07/2020 - A staff member working in the vivarium ruptured a blister on their right hand when they were removing a pair of gloves.
- 01/13/2020 - A staff member working on server equipment in an interstitial space scraped their right hand on a computer housing shell.

NEAR MISS SUMMARIES

1. **SPILL SUMMARY:** 11/07/2019. A staff member working in a BSL-3 laboratory was placing a brand new box of pipette tips in the BSC when they spilled the tips and a few rolled out of the cabinet. At the time of the spill, there was an active robot-run taking place in the BSC with a Risk Group (RG) 3 agent. The staff member followed spill procedure; they left the room and remained outside of the room for 30 minutes before returning to clean up the tips. The CMA ruled no potential exposure.
2. **PROCEDURAL FAILURE SUMMARY:** 11/13/2019. A staff member working in a decontaminated BSL-4 laboratory was sanitizing caging when they opened and closed a sink drain in order to drain the water they used. The sink and floor drains remain closed during deconned or “cold” modes because they are tied to the BSL-4 wastewater lines and they are considered a barrier to containment. The two staff members that were present in the room were wearing standard PPE for cleaning cages; however, respiratory protection was not required for the task. The liquid present in the sink when the drain was opened filled the trap and ensured a barrier to the rest of the piping, but the wastewater only contained a detergent that is not considered effective for inactivating agent. The room is primarily used as a “flip” room to move items in and out of containment and there had been no agent work in the room for several years. The CMA ruled no potential exposure. Health and Safety is working with the LSM to ensure that sinks and drains are clearly marked “out of service” and possibly locked out when a room is in “cold” mode. Additionally, Health and Safety is working with staff to evaluate and define processes that are permitted in the laboratory when it is in a “cold” state.
3. **PROCEDURAL FAILURE SUMMARY:** 11/19/2019. Staff members working in the BSC of a BSL-3 laboratory bumped the disinfectant reservoir of a robot and spilled approximately 1mL of disinfectant onto the floor of the BSC. The reservoir was used to disinfect pipette tips that had been used with a RG 3 agent. At the time of the spill, the full contact time had not elapsed. The staff members called

the Command Center and, after speaking to Health and Safety, cleaned the spill and resumed their work. The CMA ruled no potential exposure.

4. **PPE FAILURE SUMMARY:** 11/24/2019. A staff member that had been working in the BSL-4 entered the chemical shower in order to leave the suite. When they reached down to connect to air, their hose detached from their Dover suit. The staff member was able to retrieve the hose and loosely attach it to their suit during the chemical shower cycle. Upon exiting the shower, they reported the incident to the control room operator, and the Command Center was notified. The staff member had not had any issues with their suit while they were working in the suite, and the suit had only been in use for one week. Upon speaking to a member of Health and Safety, the staff member placed the suit out of service and used an alternative suit to enter the suite later that day. The CMA ruled no potential exposure. The suit was evaluated by staff, and it was determined that the location and the plastic material of the connect port on this style of Dover BSL-4 suit contributed to the hose becoming detached. After discussions with staff, Health and Safety will no longer order this style of Dover suit. Instead, Health and Safety will order Dover suits with integrated booties, which have brass connection ports that are located on the opposite side of the suit. For the suits currently in use, Health and Safety has informed the users of these suits of the potential for hose detachment and has asked that hose checks be incorporated into their usual pre-use suit checks. Any suit found to have a loose hose will be marked out of service and evaluated. Finally, a staff member will now enter the suit room each week to check the hoses on these suits and retighten any hoses that are found to be loose.
5. **SPILL SUMMARY:** 12/03/2019. A staff member working with a robot in the BSC of a BSL-4 laboratory was attempting to pour one of the robot's decontamination reservoirs into the main decontamination receptacle when roughly 1mL of MicroChem Plus and a RG 4 agent spilled onto the robot. At the time of the spill, the plates containing the RG 4 agent had already been removed from the BSC, but the decontamination reservoir had not reached the full contact time. The staff member cleaned up the spill and called the control room operator to request Health and Safety in order to report the spill. The CMA ruled no potential exposure.
6. **SPILL SUMMARY:** 12/11/2019. A staff member working in the buffer corridor was retrieving waste from an autoclave when they noticed water on the floor in front of the autoclave. The staff member immediately reported the leak to Health and Safety. Although the autoclave had successfully completed its cycle, the liquid was cleaned by Health and Safety using pig mats soaked with bleach for a 30 minutes contact time, followed by mopping. Upon further inspection of the autoclave, it was determined that the liquid was residual condensate from inside of the chamber due to a 'liquid cycle' load that was run the previous day and allowed to sit overnight. When the autoclave was opened, the sterilized water that was sitting in the bottom of the chamber spilled out of the door and on to the mechanical space floor. The spill was not noticed until it leaked out of the mechanical space to the hallway floor. The CMA ruled no potential exposure.
7. **SPILL SUMMARY:** 12/13/2019. A staff member working in the BSC of a BSL-3 laboratory bumped a reservoir containing media and a RG 2 agent, causing the solution to spill onto the floor of the BSC. The spill was contained entirely within the BSC. The staff member called the Command Center and, after speaking to Health and Safety, cleaned the spill and resumed their work. The CMA ruled no potential exposure.
8. **SPILL SUMMARY:** 12/13/2019. A staff member working in a BSL-3 laboratory with another staff member was transporting a bag of waste across the room when they noticed a few drops of liquid leak from the waste bag onto the floor. The bag contained plates that had been loaded with a RG1 agent and had not been decontaminated prior to being placed in the waste container. Upon noticing the spill, one of the employees immediately held their breath and left the room while the other staff member began to spray the area of the spill with a disinfectant. Once the remaining staff member

left the room, they called the Command Center and, upon speaking the Health and Safety, waited 30 minutes before reentering the room and cleaning the spill. The CMA ruled no potential exposure. Health and Safety is working with the laboratory group to modify their disposal method to minimize the risk of leaks. Additionally, the staff member was reminded of the appropriate spill response, which is to hold their breath and leave the area when they discover a spill outside of containment.

9. **PPE FAILURE SUMMARY:** 01/06/2020. A staff member that had been working in the BSL-4 was exiting through the chemical shower when they discovered a pin-sized hole in the right shoulder of their Sperian suit (#298). After exiting the shower to the suit room, the staff member called the control room and reported the hole to Health and Safety. The suit was repaired and returned to service. The CMA ruled no potential exposure.
10. **SPILL SUMMARY:** 01/10/2020. A staff member working in the BSC of a BSL-4 laboratory was starting their post-work decontamination of the BSC when a tube caught on their sleeve and fell outside of the BSC onto the floor. The tube contained extracted viral RNA from an animal exposed to RG 4 agent. The outside of the tube had been wiped down with MicroChem Plus prior to falling out of the BSC, but it had not completed its full decontamination time. After noticing the tube fall, the staff member picked it up and returned it to the BSC. They then contacted the control room operator, who informed Health and Safety. The staff member confirmed that the tube remained intact and that none of the contents leaked. They also confirmed that there were no issues with their suit at the time of the spill and that the area where the tube landed was cleaned with MicroChem Plus. The CMA ruled no potential exposure.
11. **PROCEDURAL FAILURE SUMMARY:** 01/13/2020. Staff members noticed that after an autoclave cycle, there was an autoclave load probe laying in the bottom of an autoclave pan, with a melted, hardened substance surrounding the probe. The autoclave technician was contacted, and determined that a polyethylene carboy had been used to hold the load the probe instead of the usual polypropylene carboy, which would have been able to withstand the temperature during the cycle. After reviewing the autoclave cycle printout, the technician deduced that the carboy melted around the probe and into the bottom of the autoclave pan during the heat up time of a RG 4 biomass waste cycle on 01/09/2020, one day before the staff members noticed the probe issue. Though the autoclave completed the 4 hour “kill cycle” as per the initial biomass validation plan, the pre-cycle ‘heat-up’ time was not fully met because the probe indicated that the critical temperature needed to initiate that “kill cycle” was reached 3-4 hours prematurely, due to the melted carboy surrounding the probe, and because the melted carboy facilitated the probe reaching the necessary temperature, the autoclave did not alarm or give any errors and therefore registered the cycle as successful.

After realizing the discrepancy, staff contacted a member of Health and Safety, who began to investigate the location of the biomass waste. The Health and Safety member discovered that the waste material had been removed from the autoclave on the day that the cycle completed its run. Per Standard Operating Procedures (SOPs), a staff member confirmed that there were no leaks from the biomass waste containers which had been bagged, placed into leak-proof boxes and then bagged again prior to autoclaving. Upon confirmation of the same, staff then placed the waste into a larger, leak-proof wheeled container, which was then taken to the loading dock for transport to an off-site incinerator. The waste was then transported to the incinerator site where it was handled mechanically and incinerated the same day. A meeting was called between the Leadership Team, technicians, CMAs, Health and Safety and other staff members to review and evaluate the details of the incident and any potential risk to NBACC staff and others. After reviewing published inactivation guidance from the CDC and conducting a mock autoclave run using an equivalent biomass, it was determined that the shortened autoclave cycle met the criteria for inactivation of the agent. During the investigation of this incident, it was also discovered that the polypropylene carboy normally used for autoclaving was misplaced and not available for staff prepping the autoclave. When those staff

members requested a replacement carboy, they were inadvertently provided with an identical-looking polyethylene carboy, which had a much lower melting point than the original. As an improvement, all polyethylene carboys and pans have been removed from containment. Additional corrective actions include updated autoclave training for staff, signage for autoclaves detailing run times and temperatures, improvements to SOPs regarding the storage and autoclaving of biomass waste, and an ongoing project between Health and Safety and the autoclave technicians to establish validated autoclave cycles in an effort to remove probes from all NBACC autoclaves. The CMA ruled no potential exposure.

12. **SPILL SUMMARY:** 01/14/2020. Two staff members working in a BSL-3 laboratory were retrieving a box from a freezer when they accidentally knocked another box to the floor causing the box to shatter and scatter its tubes all over the laboratory. The tubes contained a RG 3 agent. Both staff members held their breath, left the room, posted a sign on the door of the laboratory and contacted the Command Center. Upon speaking to Health and Safety and waiting the required 30 minutes, the staff members reentered the room, decontaminated the floor and the tubes and returned them to the freezer. The CMA ruled no potential exposure.
13. **PPE FAILURE SUMMARY:** 01/15/2020. A staff member working in the BSL-4 was prepping for a Vaporous Hydrogen Peroxide (VHP) decon when they tore their outer glove on the outside of a cage, which had been surface decontaminated before the glove tear. The staff member followed proper glove tear protocol and exited the suite through the chemical shower. Upon reaching the suit room, the staff member informed the control room operator and confirmed with Health and Safety that their inner glove and skin remained intact. The CMA ruled no potential exposure.
14. **SPILL SUMMARY:** 01/15/2020. A staff member working in a BSL-3 laboratory was reviewing samples from monthly environmental surveillance when they noticed that two samples were positive for a RG 3 agent. One of the positive samples was located inside the BSC of a BSL-3 laboratory while the other positive sample was found on a computer mouse in a different BSL-3 laboratory. Both laboratories are used for different procedures in a project involving that agent. Upon noticing the positive samples, the staff member immediately contact the Biosafety Officer (BSO), who initiated a 'Stop Work' on the project and notified the Responsible Official and CMA. A plan was developed to decontaminate the laboratories and resample all of the original sites as well as additional sites determined by the BSO. The BSO also met with the Principal Investigator (PI), Associate Laboratory Director and associated project staff to discuss potential improvements to processes and SOPs to prevent reoccurrence. During the meeting, staff reviewed the principles of aseptic technique and were reminded that when decontaminating surfaces, the item must remain wet during the required decon time. The CMA reviewed the list of staff members that accessed both rooms that contained positive sites and confirmed that the staff that entered the suite were either vaccinated against the agent, in respiratory protection, or both, and all followed the occupational health guidelines of not entering containment with skin imperfections. The CMA ruled that there was a low potential for exposure, and staff members were asked to perform skin evaluations and monitor their temperatures for a 10-day period and to report any issues to the CMA. At the end of the 10 days, the CMA confirmed there were no fevers or skin issues.
15. **SPILL SUMMARY:** 01/30/2030. A staff member working in the BSC of a BSL-4 laboratory was unscrewing the lid of a conical tube when they dropped the lid and it fell out of the BSC and onto the floor. The staff member immediately decontaminated their hands, exited the BSC, placed the cap back inside the BSC, sprayed the floor with MicroChem Plus and reported the incident to the control room operator. After speaking with Health and Safety, the staff member confirmed that the cap had not come in contact with agent, but work with a RG 4 agent had taken place in the BSC when the spill occurred. The CMA ruled no potential exposure.

OTHER OCCURENCES

1. **PROCEDURAL FAILURE SUMMARY:** 12/05/2019. A staff member working in the BSC of a BSL-2 laboratory was aspirating non-infectious media off of a 96-well plate when they noticed that the MicroChem Plus in the aspirator collection bottles had expired a few days earlier. The staff member immediately contacted Health and Safety, and it was determined that because the liquid being aspirated into the bottles was non-infectious and the other material inside of the bottle had sat for a time that was greater than the required decontamination time for MicroChem Plus, the substance could be disposed of without additional treatment. Once the aspirator bottles had been emptied, fresh MicroChem Plus was placed in the bottles, and they were labeled with a new expiration date.
2. **SPILL SUMMARY:** 12/10/2019. A staff member working in a BSL-4 cabinet laboratory was taking apart a midget impinger when it slipped out of their hands, fell to the floor of the passbox they were working in, and broke. At the time of the spill the staff member's right glove had a small amount of bleach on it, which may have contributed to the impinger slipping from their hand. The staff member was not working with agent at the time of the spill. After calling the Command Center and discussing the incident with Health and Safety, the staff member had a sharps container passed to them and proceeded to clean up the broken glass with a pair of tweezers.
3. **SPILL SUMMARY:** 01/09/2020. A staff member working in the BSC of a BSL-4 laboratory was removing the cap from a decontaminated flask when the cap slipped from their hand and bounced out of the BSC.
4. **PPE FAILURE SUMMARY:** 01/31/2020. A staff member working with a RG 3 agent in the BSC of a BSL-3 laboratory noticed a tear in one of their outer gloves. The employee removed their outer gloves, exited the BSC and called the Command Center to request Health and Safety. After confirming that their inner gloves remained intact, they donned new sets of gloves and continued their work.

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.