Lessons Learned & Success Stories – December 2018 to February 2019 Report

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 STORIES:

1. An employee noticed that a BSL-3 airlock timer was not functioning and was stuck at the 15 minute mark. They had items in the airlock that needed to be retrieved. Rather than just open the door without verifying the time was up (since the timer appeared to be broken), they asked the Responsible Official (RO) how they could determine when the inner airlock door was last opened. The employee was directed to a staff member who was able to run a report to see when the last time the inner door was opened, and could verify that 15 minutes had indeed expired. While they were checking the report, the RO contacted Environmental Operations (EO) to see if there were any extra timers, and a new one was placed in the affected airlock. It was also determined that a bad batch of batteries was to blame, and that other timers may be similarly affected. EO will be replacing the batteries with new ones.
2. Last August, a laboratory staff member working in BSL-3 noticed a tear in the biohazard bag they were going to use for waste. Upon further investigation, all bags of this type tore very easily. This employee not only reported the incident to Health & Safety, but sent photographs of the torn bags and set all remaining bags of this type within the laboratory suite aside. With this information, members of Health and Safety noticed an overall increase in bag tears after a change in how the manufacturer packages these bags. In a series of Safety Flashes, they were able to tell laboratory staff to take extra precautions when separating bags at the perforation, which was the likely cause of the tears. With the source of the problem identified, they were also able to look for alternate manufacturers who package bags in a way that lowers the risk of bag tears. Reporting incidences like glove tears and bag tears can seem useless and even a bit silly. But without this knowledge, trends such as the increase in bag tears could not be identified. Thanks to all laboratory staff who reported these tears and who report all incidences no matter how minor. A special thanks to the staff member who took the time to investigate the cause of a bag tear.
3. While working in the BSL-4, an individual was transferring infected 96 well plates into an incubator when they knocked one out, causing the entire contents of the plate to spill on the floor, the individual's lower legs, boots, and the tray that the incubator sits on. The individual decontaminated and examined their PPE, notified Health and Safety and decontaminated the affected area appropriately.

   The project lead was off site at the time of the incident, but when they returned and checked their email, they noted the near miss paperwork in a series of communications. At that point, they were unsure as to whether anyone had notified the Institutional Biosafety Committee (IBC) Chair of the recombinant nature of the cell line used in that assay. Spills of any recombinant materials must be reported to the IBC. The project lead spoke with the individual involved about the incident, notified the IBC chair and notified the Principle Investigator (PI).

Spill aside; there were a number of positives that came out of this incident:

- The individual involved in the incident followed proper spill protocol and notification.
- The project lead, upon learning of the incident, recalled their obligation to notify the IBC of the spill.
- The IBC was able to exercise their spill policy, something they had not had to handle in the past, which brought up several issues that can now be addressed prior to a more concerning spill. A meeting with Leadership Team members was called to discuss options.
- The Health and Safety Office noted that their Near Miss Form to document spills was lacking a checkbox for recombinant material, which is now in the process of being remedied.

This is a success story on many levels, but it began with the individual who had the presence of mind to remember their IBC reporting obligation.

LESSONS LEARNED:

1. Now that we have been in Purified Air Purifying Respirators (PAPRs) full time for many months, it is easy to move through our checks by muscle memory. Although muscle memory makes it easier, it is still important to slow down, do the proper safety checks for airflow and check the hoses for breaches. Each time the motor has been shut down it requires a new airflow check. If PAPR batteries are hard to click into place, make sure that you feel it click into place before wearing it. If your battery/motor seems to stop working, hold your breath, leave the area and if it still isn't working after trouble shooting, place the battery out of service and let Safety know that you had to place it out of service.
2. In the event of an injury, staff should try to leave containment as quickly and safely as possible. If, at the time of your injury, you enlist another staff member to communicate the event to Health and Safety (via the Command Center), it is still your responsibility to ensure that Health and Safety has been informed of the incident either before or during your visit with the Component Medical Authority (CMA).
3. As you will see, this past month the majority of near misses were spills. Always report spills of any kind to Safety, including liquids coming from an autoclave. It is a best practice to use absorbent pads in the Biosafety Cabinet (BSC) when handling liquids to prevent spread of spills on the BSC floor. Note that per the BMBL 5th edition, applying cosmetics is not permitted in BSL-2, 3, and 4 laboratories. Lastly, be aware of changes to normal operations and adjust your attention level and work speed accordingly.

EVENT SUMMARIES:

1. **FIRST AID SUMMARY**: 12/05/2018; A staff member scraped their thumb while disposing of cardboard in a BSL-3 hallway. The employee immediately washed their hands and had another staff member call the Command Center, while they showered out and reported to the CMA. The CMA applied first aid and the staff member confirmed that Health and Safety had been notified. The staff member was allowed to return to work but required a waterproof bandage for work in containment.

2. **FIRST AID SUMMARY**: 12/19/2018; A staff member was retrieving their cellphone from their locker in the lobby when they scraped their hand on the inside of the locker. The employee grabbed a paper towel from the nearest restroom, applied pressure to their injury and reported to the CMA. The CMA applied first aid and the staff member was allowed to return to work with modifications.

3. **FIRST AID SUMMARY**: 01/15/2019; A staff member working in a non-containment hallway was preparing to unload an autoclave when they punctured their finger on a small piece of metal

protruding from the autoclave cart. The employee immediately washed their hands and reported to the CMA. The CMA applied first aid and the staff member was allowed to return to work with modifications. The metal piece was filed down.

NEAR MISS SUMMARIES:

4. **PPE FAILURE SUMMARY:** 11/05/2018; A staff member working in a BSL-3 laboratory was removing their outer gloves to exit the BSC when they noticed that one of their inner gloves had a tear. After further inspection, the staff member confirmed that their outer gloves remained intact. The CMA ruled no potential exposure.

5. **SPILL SUMMARY**: 11/05/2018; A staff member working in a BSL-3 laboratory was counting plates of a RG3 agent when they tore one of their outer gloves. The staff member removed their outer gloves, tested their inner gloves and confirmed that they remained intact. The CMA ruled no potential exposure.

6. **PPE FAILURE SUMMARY**: 11/14/2018; A staff member working in a BSL-4 cabinet laboratory reported a tear in one of the gloves of a Class III BSC. The staff members did not notice the tear when they checked the gloves prior to beginning their work but after moving equipment around in the BSC, one of the staff members discovered the breach. Upon discovery of the tear, the staff member removed their inner gloves, confirmed that they were intact, and washed their hands. The staff member called the Command Center and, after speaking with Health and Safety, performed an emergency glove change. There was no agent work taking place in the BSC when the tear was discovered. The Class III was operating normally and maintained negative pressure. The CMA ruled no potential exposure.

7. **EQUIPMENT FAILURE SUMMARY**: 11/16/2018: Staff members working in the BSC of a BSL-2 laboratory reported a glove tear. The staff member was wearing one pair of gloves while culturing cells. The staff member removed their gloves, washed their hands and called the Command Center. There were no spills or imperfections in the staff member's hands and the BSC was operating normally. The CMA ruled no potential exposure.

8. **SPILL SUMMARY**: 11/20/2018; A staff member working in a BSL-3 laboratory reported that while working in the BSC, they shifted in their chair and their PAPR unit shut off. The staff member held their breath, removed their gloves and outer gown, left the room and headed to the PAPR staging area to call the Command Center. After speaking with a member of Health and Safety, the staff member admitted that they were unsure if the battery had been completely engaged with the PAPR motor, which could have contributed to the loss of power when the employee shifted in their chair. During their troubleshooting, the employee confirmed that the battery was not drained and was still holding a charge. The CMA ruled no potential exposure. Health and Safety would like to remind staff to listen for an audible "click" when attaching batteries to PAPR motor units.

9. **PPE FAILURE SUMMARY:** 11/30/2018; A staff member working in a BSL-3 laboratory reported a broken midget impinger inside of the Class III BSC. The impinger, which is used to collect aerosolized particles into a liquid medium, had been exposed to a RG3 agent and had not been decontaminated prior to the break. After speaking with Health and Safety, the impinger was carefully decontaminated and placed into a sharps container. The Class III was functioning properly at the time of the incident and there were no glove tears reported. The CMA ruled no potential exposure.

10. **EQUIPMENT FAILURE SUMMARY:** 12/03/2018; A staff member working in a BSL-3 laboratory reported that the airflow of their AirMate PAPR may have dropped below 6 cfm (the required flow rate for PAPRs). The employee had been micro-titrating and growing up stocks of a RG2 agent. There were no reported spills or issues with the BSC during their work. Upon exiting to the change room, the employee retested their PAPR and discovered that the airflow had dropped below 6 cfm. The PAPR was marked 'Out of Service' and the CMA ruled no potential exposure.

11. **PPE FAILURE SUMMARY**: 12/05/2018; A staff member working in a BSL-2 laboratory was wearing a single pair of gloves when they reached inside the BSC and picked up a tube of a RG2 agent. After realizing their mistake, the employee removed their hands from the BSC, tested the gloves and confirmed that they remained intact. After calling the Command Center and speaking to Health and Safety, the staff member donned two pairs of gloves and continued their work. The CMA ruled no potential exposure.

12. **PPE FAILURE SUMMARY**: 12/06/2018; A staff member working in the BSC of a BSL-3 laboratory was completing their work with a RG3 agent when they removed their outer gloves and discovered a small hole in one of their inner gloves. The staff member tested their outer gloves, confirmed that they had remained intact and called the Command Center. The CMA ruled no potential exposure

13. **PPE FAILURE SUMMARY**: 12/10/2018; A staff member that had been working in the BSL-4 was exiting through the chemical shower, when they discovered a small hole in their right glove. After exiting to the suit room, the staff member tested their inner gloves, confirmed that they were intact and called the control room. The CMA ruled no potential exposure.

14. **SPILL SUMMARY**: 01/07/2019; A staff member working in the BSC of a BSL-3 laboratory was troubleshooting a clog in the plate washer, when a small amount of washing solution dripped from the manifold and onto the surface of the BSC. The liquid was cleaned up using an absorbent pad and the area was treated with Micro-Chem. The CMA ruled no potential exposure.

15. **PROCEDURAL FAILURE SUMMARY:** 01/08/2019; A staff member working in a BSL-3 laboratory reported that while waiting to begin their lab work, they picked up a bottle of clear nail polish, which is used to seal coverslips onto microscope slides, and began to paint some of their nails. A coworker noticed them and immediately had them remove the polish with acetone. Instead of calling the Command Center, the employee showered out of the suite and reported directly to a member of Health and Safety, who escorted them to the CMA. The bottle of polish was recently opened and after reviewing the usage of the polish and confirming that there were no breaches to the employee's skin, the CMA ruled no potential exposure.

16. **SPILL SUMMARY**: 01/09/2019; A staff member working in the BSC in a BSL-3 laboratory reported that, after aspirating a syringe containing a dilution of a RG2 agent into a conical tube, a small drip of the solution fell onto the conical tube rack. The drip was immediately treated with Micro-Chem and cleaned up according to proper spill cleanup procedure. The CMA ruled no potential exposure.

17. **PPE FAILURE SUMMARY**: 01/11/2019; A staff member that had been working in the BSL-4 was exiting through the chemical shower, when they discovered a small hole in the left shoulder of their Sperian suit (#247). 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 unable to be repaired so it was retired. The CMA ruled no potential exposure.

18. **SPILL SUMMARY**: 01/15/2019; A staff member working in the BSC in a BSL-4 laboratory reported a spill of a dilution containing a RG4 agent. The employee was pipetting when less than 5mls of the dilution spilled onto a diaper pad inside the BSC. The spill remained contained inside the BSC. The diaper pad was immediately treated with Micro-Chem and discarded after the appropriate contact time. The surface of the BSC was also cleaned with Micro-Chem. At the time of the spill both staff members in the room were connected to air and they reported no issues with their suits. The CMA ruled no potential exposure.

19. **SPILL SUMMARY**: 01/15/2019; A staff member working in a BSL-4 laboratory was transferring 96-well plates that had been infected with a RG4 agent into an incubator when they knocked one out, causing the entire contents of the plate to spill on the floor, the individual's lower legs, boots, and the tray that the incubator sits on. The staff member began to clean the spill using Micro-Chem while the control room operator called for Health and Safety. Health and Safety instructed the staff member to remain hooked up to air but to stop cleaning, dunk their gloves in Micro-Chem and inspect both their gloves and their suit for any compromises. After confirming that their PPE was intact, the staff member resumed cleaning up the spill. The CMA ruled no potential exposure. Upon further investigation, it was determined that the lack of readily available incubators contributed to this spill. A number of incubators in the suite were 'out of service' requiring rarely needed replacement parts that were not routinely kept in-house. When two more incubators were discovered to be 'out of spec', staff members were left with only two functional incubators to support their project work. Without an adequate number of incubators, the two functional units were overcrowded and plates were arranged in a manner that allowed greater numbers but presented difficulty when staff attempted to retrieve the plates. After this incident was reported, facilities was able to pull needed parts from incubators that were in storage and repair and recalibrate additional units in the suite. Additionally, extra incubator parts will now be kept in-house and the project lead will ensure that adequate equipment remains available to support project needs.

20. **SPILL SUMMARY**: 01/16/2019: A staff member working in a BSL-4 laboratory removed a T300 flask from an incubator and, upon examining it under the microscope, noticed a drop of liquid on their gloves. The staff member remained hooked to air, bagged the flask, decontaminated their gloves and called the control room. Health and Safety instructed the staff member to place the flask inside the BSC and examine for cracks but the flask appeared intact. The staff member observed liquid in the secondary container that had been holding a number of flasks in the incubator, though none of the flasks appeared to be leaking. Additionally, there was no liquid found in the incubator. The staff members placed all flasks in individual Ziploc bags and still did not observe any leaks from the flasks. The CMA ruled no potential exposure. After discussion with the staff member, it is possible that the leaking flask had been decontaminated and discarded prior to the discovery of the leak. Health and Safety would like to remind staff to always inspect flasks for cracks prior to use and ensure that vented flasks are tightly closed prior to placing in incubators.

21. **SPILL SUMMARY**: 01/16/2019; A staff member working in the BSC of a BSL-3 laboratory was taking apart a pipette when the plunger button/rod fell out of the BSC and onto the floor. There was no agent present at the time of the spill. The staff member immediately held their breath, left the room and called the Command Center. The component of the pipette was not expected to be contaminated so the staff member was permitted to re-enter the room, return the plunger apparatus to the BSC and decontaminated the area of the floor where it landed. The CMA ruled no potential exposure.

22. **SPILL SUMMARY**: 01/23/2019; A staff member working in the BSC in a BSL-3 laboratory was attempting to aspirate air bubbles out of a syringe containing a dilution of RG2 agent, when the plunger became stuck. The staff member applied pressure and caused the contents of the syringe to eject upwards onto the upper surface of the BSC. The staff member immediately decontaminated the BSC and cleaned the spill. The spill remained entirely within the BSC. The CMA ruled no potential exposure.

23. **SPILL SUMMARY**: 01/31/2019; A staff member working in a BSL-4 laboratory was removing 96 well plates containing a RG4 agent from an incubator, when they attempted to readjust a plate and tipped it over. The contents of the plate spilled onto the floor and the incubator. The staff member notified the control room and after speaking with Health and Safety, decontaminated the floor, incubator and their suit with Micro-Chem. The staff member reported no issues with their suit and remained hooked to air at the time of the incident. The CMA ruled no potential exposure.

24. **SPILL SUMMARY**: 01/31/2019; A staff member working in the BSC in a BSL-3 laboratory was attempting to decontaminate a solution containing a RG3 agent by adding it to bleach when an exothermic reaction occurred and the solution began to bubble. The bubbling caused a small amount of the solution to spill onto the surface of the BSC. The staff member immediately called the Command Center and, after speaking with Health and Safety, cleaned up the spill. The work instruction describing the decontamination of this type of solution has been revised by the Chemical Hygiene Office to minimize the reaction.

25. **SPILL SUMMARY**: 01/31/2019; A staff member working in a non-containment hallway entered the chemical room and discovered a spill of unknown liquid on the floor. They immediately held their breath, called the Command Center and reported the incident to Health and Safety. When members of Health and Safety inspected the area, they discovered that there was also a spill of liquid inside a nearby BSL-3 airlock. Based on observations of the area, it appeared that the spill originated from the neighboring autoclave, which was currently in the middle of a cycle. The corridor area was cordoned off and members of Facilities were called to evaluate the autoclave for leaks both inside and outside of containment. After the examination of the autoclave and speaking with staff members, it was determined that the liquid in the chemical room and airlock was the result of an unreported condensation spill earlier in the day. Prior to starting the autoclave run, a staff member opened the autoclave on the containment side and water from the (clean) autoclave chamber spilled out of the autoclave and on the floor. The staff member did not call the Command Center to report the spill, but instead cleaned the water, loaded the autoclave and started the cycle. A member of Health and Safety spoke with the staff member and reminded them the importance of spill recognition and reporting. The CMA ruled no potential exposure.

26. **PROCEDURAL FAILURE SUMMARY:** 01/23/19, A staff member in a BSL-3 corridor exited a PAPR staging area without donning their required PAPR. The staff member immediately recognized their mistake, returned to the staging area, notified Health and Safety and donned their PAPR. The CMA ruled no potential exposure.

OTHER OCCURENCES

27. **PROCEDURAL FAILURE SUMMARY:** 11/13/2018; A staff member reported that an autoclave load probe was damaged when it was incorrectly placed through the bars of the autoclave rack. The load probe is normally draped over the top bar of the autoclave rack but the staff member that loaded the autoclave was unable to place the probe in the correct position. The load probe was replaced, the staff member was retrained and the orientation of the autoclave racks were changed to make

placing the probe easier. Health and Safety and Facilities are currently investigating the possibility of reprogramming the autoclaves to eliminate the use of load probes.

28. **PROCEDURAL FAILURE SUMMARY:** 11/28/2018; A staff member reported entering a BSL-3 suite corridor without donning a VersaFlo PAPR unit. The staff member spent a few seconds in the suite before realizing their error and returning to the PAPR staging area. A member of Health and Safety reminded the staff member of the proper procedure for entering containment.

29. **PROCEDURAL FAILURE SUMMARY:** 12/04/18; An escorted staff member reported that they failed to remove their watch before entering the BSL-4 suit room. Upon realizing their mistake, the staff member removed their watch and called the Command Center. Health and Safety would like to remind escorts to be vigilant with escorted personnel entering containment.

30. **PROCEDURAL FAILURE SUMMARY:** 12/04/18; A staff member was transporting a liquid nitrogen tank from the loading dock when the wheels of the canister caught the edge of the lift gate and caused the tank to tip over. The staff member immediately informed nearby staff of the incident and the area was cordoned off while another staff member called the Command Center. After consultation with Health and Safety and the tank manufacturer, it was determined that the tank was safe to upright and members of Facilities righted the tank. Moving forward, staff members that are transporting items across the loading dock must stay outside of the yellow markings surrounding the dock's lift gates.

31. **PROCEDURAL FAILURE SUMMARY:** 01/22/19; A staff member entered the BSL-4 control room and discovered that the oxygen (O2) sensor for one of the BSL-4 laboratories was in alarm. The O2 sensor usually alarms when the Liquid Nitrogen (LN2) tanks are filling. Staff members inside the BSL-4 were informed by Health and Safety that they were not permitted to enter the laboratory until the O2 sensor stopped alarming. After an hour, the sensor continued to alarm and facilities was notified. Facilities confirmed with EO that the tanks in the interstitial areas were not providing the room more than the usual amount of LN2. Facilities then checked the manifold system and control board. After the control board was reset, the tank appeared to stop filing and the alarm ceased. A member of facilities later entered the suite and recalibrated the alarm to ensure the O2 sensor was operating correctly. Infrastructure Operations is currently in the process of purchasing new upgraded control boards. While there is not enough information to state that the control boards were at fault for the alarm, a failed board and stuck valve could lead to an overfilled LN2 tank.

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.

This work is funded under Contract No. HSHQDC-15-C-00064 awarded by the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) to The National Biodefense Analysis and Countermeasures Center (NBACC), a Department of Homeland Security federal laboratory (DHS) sponsored by the DHS Science and Technology Directorate and operated by the Battelle National Biodefense Institute. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the

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