



# Lessons Learned & Success Stories – April to June 2022

---

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.

## **LESSONS LEARNED:**

1. Standard Operating Procedures (SOPs) are meant to be a written set of instructions that document daily operations and procedures followed by NBACC staff. Failure to comply with SOPs may contribute to potential safety hazards and experimental deviation and/or error. Careful review of SOPs is a critical role of every employee. When we follow SOPs, we are engaged in making the SOP the best it can be, and it helps each of us to perform at a high level of quality and consistency.
2. Accountability and security go hand in hand with our daily NBACC responsibilities. As an integral part of our safety culture, the need for accountability permeates every facet of working at NBACC. For example, badging in and out of our building, lab spaces and change rooms is vital to both our safety culture and our security culture; these actions help alleviate any risks and/or liabilities that may lead to our guard force or emergency responders having to search and locate an employee during a time of crisis. When staff correctly badge in and out of areas, we further minimize our risk as well as that of our responders during an emergency. The strength of our safety and security cultures are dependent on staff doing the right thing. Remember, what you do every day, in every instance, influences the actions and safety of others.
3. Unfortunately, we are still dealing with COVID and all the obstacles that go along with a global pandemic. Here at NBACC, we are following current CDC guidelines for testing and quarantine, which were last updated on 1/20/2022. You are considered fully vaccinated if you have received 2 doses of either Pfizer or Moderna or a single dose of J&J, along with at least 1 booster, regardless of when that booster was received. As a reminder to staff, if you are sick, stay home even if you test negative for COVID, as testing is not 100% accurate.

## **SUCCESS STORIES**

1. One of our guard staff noticed that a staff member had badged out of the main entrance of the building only to re-enter with a subcontractor through the loading dock shortly afterwards. The guard recognized that this staff member would not come up on the accountability list during a building evacuation as they had not badged back in through the front entrance. The guard immediately reached out to a member of Health and Safety to report the oversight, and the Safety member was able to contact the employee and have them badge back into the building per

standard procedure. A sign of a positive safety culture is when staff feel ownership over their safety and that of their colleagues. While the guard recognized that, from a security aspect, the person was accounted for, they took it a step further and considered the safety implications of that staff member not showing up on an accountability list during an emergency.

2. Ranging in weight from 50 lbs. up to ½ ton, moving HVAC motors is a significant safety risk and involves immense planning and coordination between members of the Facility Maintenance Operations (FMO) group. With that in mind, two members of FMO recently developed a plan to streamline both how the motors are stored and how they are transported to mitigate some of these hazards. Previously, the motors were stored in a confined area on shelves, which required the use of numerous pieces of equipment to maneuver and lift the units. The two staff members determined that placing each motor on individual pallets and storing the pallets in another section of the building would reduce the time it took to move the equipment but also reduce the risk of injury to fellow group members. Since implementing their plan, the movement of HVAC motors in the building requires fewer motor manipulations and less time to complete. By utilizing a CAN-DO attitude and placing safety at the forefront of their daily activities, these two staff members demonstrated great dedication to ensuring safe and efficient operations for both the FMO group and NBACC, as a whole.

#### **EVENT SUMMARIES:**

1. **FIRST AID SUMMARY (CUTS):** 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.
  - 03/02/2022; A staff member was carrying supplies through a doorway when the door closed sooner than expected and came down on their left hand causing a small cut.
  - 03/07/2022; A staff member was removing their Personal Protective Equipment (PPE) after completing their work in the vivarium when they noticed a small wound on their right hand. The staff member could not recall injuring themselves and noted that their gloves had remained intact the entire duration of their work.
  - 04/01/2022; A staff member that was working in the vivarium was removing a nut with a wrench when their left hand slipped, and they scraped it on a metal pipe.
  - 04/25/2022; A staff member developed a fever, weakness, and joint pain after receiving a recommended immunization.
  - 05/04/2022; A staff member working in a Biosafety Level (BSL)-2 laboratory was doffing a disposable lab coat when they scraped their left knuckle on an electrical junction box. After being evaluated by a member of Health and Safety, the edges of the junction box were filed down.
  - 05/16/2022; A staff member was retrieving an item from a drawer in a BSL-2 laboratory when they cut their right ring finger on a sharp piece of metal inside of the drawer.
  - 05/23/2022; An asymptomatic staff member tested positive for COVID-19 within five days of being in close contact with another staff member who tested positive. Full contact tracing per CDC guidance was conducted by the CMA, and all affected staff members were informed and asked to monitor any symptoms. The positive staff member was placed on home isolation, and their workstation was disinfected.

## NEAR MISS SUMMARIES:

- 1. SPILL SUMMARY:** 03/01/2022; Two members of FMO were preparing a portable downdraft table for decontamination via vaporized hydrogen peroxide in the Animal Biosafety Level (ABSL)-3. After flooding the table with bleach in order to pull the HEPA filters, they discovered multiple drops of dried blood throughout the interior portion of the table. They immediately called the Command Center and reported their findings to Health and Safety. Health and Safety spoke with Comparative Medicine (Comp Med) staff and confirmed that the most recent work with the downdraft table ended 5 months prior. Since the completion of the project, the table was powered off; however, any staff member that entered the room would have been wearing appropriate PPE including a Powered Air Purifying Respirator (PAPR) with a minimum APF of 1000. The CMA ruled no potential exposure. During the investigation of the event, it was acknowledged that the portable downdraft tables are not designed in a manner that would prevent fluids from dripping on prefilters, since they do not include a collection tray between the top grate and the internal HEPA housing. While there is a cover over the HEPA filter, two prefilters remain exposed to potential spills. Comp Med and Health and Safety are working together to implement multiple process improvements and design changes to make the downdraft tables safer to use. New downdraft tables have been ordered that allow for easier cleaning of internal spaces, and FMO is creating a cover/tray that will prevent fluids from dripping onto the prefilters during operations without interfering with airflow of the table. Comp Med will now lay pads soaked in appropriate disinfectant on top of the HEPA and prefilter housing prior to starting work. Before shutting the unit off after use, staff will clean the top and bottom of the grates and check the pads for any evidence of spills. Once the interior and exterior have been disinfected and cleaned, the tables will then be powered off.
- 2. SPILL SUMMARY:** 03/03/2022; Two staff members, including a member of Health and Safety, were investigating new controls on a downdraft table in the ABSL-2 when they noticed a spot of dried blood on the internal surface of the table, which was last used three months prior for a project. The blood was cleaned by the staff members. The CMA ruled no potential exposure. Note that this incident was discovered prior to the implementation of process improvements listed in the 03/01/2022 Spill Summary which will prevent future recurrence.
- 3. SPILL SUMMARY:** 03/03/2022; A staff member working in a biosafety cabinet (BSC) in a BSL-3 laboratory was performing serial dilutions of a toxin when they noticed that one of the pipette tips did not have the same volume of liquid as the other tips. Thinking that the tip had a poor seal with the pipette, the staff member tried to adjust the tip when it spilled its contents onto the surface of the BSC. The staff member immediately dispensed the remaining liquid into the wells of the plate and bleached the surface of the BSC. After further inspection of the tip, the staff member discovered that the top of the tip that seals with the pipette was deformed, which prevented it from attaching correctly. Once the BSC had been decontaminated, the staff member replaced their gloves and continued working.
- 4. PROCESS FAILURE SUMMARY:** 03/29/2022; A staff member submitted an escorted laboratorian form (ELF) renewal for BSL-2, BSL-3, and BSL-4 spaces to support a laboratory inspection happening the following week. The ELF received all appropriate signatures, and an ELF card was created. However, upon closer inspection of the form, it was noted that the staff member would require a vaccination waiver before access could be provided to certain areas. The newly created ELF card was discarded the same day, and the vaccination waiver process began. On the day of the inspection, the staff member requested access to the areas not requiring the vaccination waiver to avoid

rescheduling the inspection. A new ELF form, which had the waiver-required rooms removed, was generated and circulated for approvals. A new ELF card was created in anticipation of the ELF form approval but was not yet issued to the staff member. Shortly before the staff member was to enter the suite for their inspection, they were informed that their waiver had been approved. The staff member recalled that their original ELF form was fully signed, so they retrieved their ELF card that had not yet been issued to them off a staff member's desk and entered containment. Health and Safety and Quality are working together to determine appropriate corrective actions for this incident. As a reminder, when scheduling tasks, staff should allow adequate time for forms to be reviewed, signed, and approved. Staff should also ensure that documents requiring their signature are accurate and complete before being approved. The health and safety of NBACC is dependent on adherence to the processes we have in place.

5. **SPILL SUMMARY:** 04/14/2022; A staff member working in a BSL-2 laboratory called Health and Safety to report a spill of <1mL from a high-performance liquid chromatography (HPLC) instrument which was fully contained within a chemical fume hood (CFH). Upon noticing the spill, the staff member initiated an emergency stop and exited the room to contact Health and Safety. The staff member was permitted to re-enter the room to clean up the spill and decontaminate the CFH. While toxin had previously been loaded into the HPLC, the toxin would have passed the sample loop and been loaded onto the column at that point in the run. Given the size of the spill and the time at which it was noticed, it is believed that this spill contained solvent only. Upon further review, it was determined that the spill originated from a leak in the plastic fittings between the sample injection port and the sample loop. The staff member had conducted leak checks during instrument start-up at the beginning of the day, and no leaks were identified. It was noted that the pressure during the run was slightly elevated, but well within normal limits. The staff member further troubleshooted and discovered that the guard column became clogged during the run which would have contributed to the elevated pressure. After the guard column was replaced and checks were done to ensure all fittings were properly connected, the employee continued their work with the HPLC. The staff member is working with Health and Safety to draft a Memorandum for the Record (MFR) to be permitted to clean and regenerate an unclogged column when the pressure reaches a specific level.
6. **SPILL SUMMARY:** 04/25/2022; A staff member working in a BSL-2 laboratory was centrifuging a conical tube containing a non-infectious sample along with a separate 'balance' tube filled with water. When the spin was complete, the staff member waited two minutes per the SOP, opened the centrifuge, and discovered that the balance tube had shattered inside the centrifuge. The staff member noticed the water and broken plastic in the centrifuge but also noted that the sample tube had remained closed and intact despite being warped. Upon further investigation, it was determined that the staff member had spun the tubes at 15,000 RPM (revolutions per minute) but the SOP they were following called for 15,000 xg (relative centrifugal force), meaning the tubes were spun much faster than necessary. After speaking to Health and Safety, the staff member cleaned up the spill and continued their work.
7. **LAB PROCESS ERROR SUMMARY:** 05/19/2022; A staff member was working in a BSL-3 laboratory when a fire alarm was activated in the building. When the staff member exited the laboratory and entered the suite hallway, they noticed that the marquee was not displaying a message. They then proceeded to the airlock and began reading the instructions for an After-Hours Emergency Evacuation, despite the fact that the alarm had been activated during normal working hours. This is considered a near miss due to the fact that this employee was unsure of the proper procedure. Had they not received additional information from a colleague in the suite, they may have crashed out incorrectly.

## OTHER OCCURENCES:

1. **REPORTED EVENTS:** In all of the following, personnel reported the events to Health and Safety, and they were tracked for trending purposes.
  - A staff member was exiting a BSL-3 laboratory when the door hit their PAPR causing the PAPR filter and filter cover to pop off the motor. They immediately reconnected the pieces onto the PAPR, which continued functioning, washed their hands, and exited to the PAPR staging area to call Health and Safety.
  - A staff member reported a glove tear while tying a lab coat in a BSL-3 suite.
  - A staff member was unboxing and testing new pipettes at their desk when one pipette expelled an unknown liquid on the staff member's hands and desk. The staff member immediately washed their hands and cleaned their desk. They then re-boxed the pipette, placed the box in a Ziploc bag, and contacted a member of Health and Safety. While it was assumed that the liquid was water from quality testing, both the staff member and the Health and Safety member contacted the company for confirmation. The company was able to confirm that the pipette had been previously tested with distilled water by their technical team. The pipette was returned to the company, and a replacement was provided.
  - A staff member entering a BSL-2 lab discovered a large volume of water under a BSC and other items. The staff member reported the spill to Health and Safety. FMO responded and found that the faucet vacuum breaker was leaking onto the floor. One of the faucet's foot activators was stuck in the 'on' position, and the faucet had been running for hours.
  - A staff member working in a BSL-3 laboratory reported that their PAPR gave a low battery alarm and shut off while being worn. The staff member held their breath, exited the room, and called Health and Safety. After troubleshooting, the battery was placed 'out-of-service' and was eventually replaced by Health and Safety.
  - A staff member spilled < 1mL of glycerol onto the bench top in a BSL-2 laboratory. The staff member called Health and Safety and cleaned the spill.
  - A staff member working in a BSL-3 laboratory tore their glove when it became caught on the handle of the incubator they were opening. The staff member discarded the gloves, washed their hands, and donned a new pair of gloves.
  - A security guard reported that a staff member badged out of the building and then re-entered with a subcontractor through a loading dock. After speaking to Health and Safety, the staff member re-badged back into the building.
  - A staff member was getting ready to exit a BSL-3 suite after completing their work when they noticed that they failed to remove their necklace prior to entering the suite. The necklace was decontaminated out of the suite with bleach.
  - A staff member working in a BSL-3 laboratory was decontaminating a BSC prior to beginning their work when they noticed a hole in their single layer of gloves. The employee immediately discarded their gloves, washed their hands, and called Health and Safety. The staff member believes they tore their glove when they were decontaminating a closed sharps container. The employee noted no skin imperfections and stated that the BSC had been previously decontaminated following its last use a few days prior.
  - Staff members were conducting drills in a decontaminated BSL-4 space when they noticed a significant water leak coming from the back of the wet examination table. Since the area is in a decontamination mode, the table's drain had been plugged. Water had filled the entire table and was spilling from the back onto the floor. One staff member notified FMO.

Another staff member located the valves for the water and shut off the water to the table. Approximately 10-15 gallons of water leaked onto the floor. Staff contained the leak with pig pads until FMO arrived and cleaned the rest of the space with a wet vacuum. It is believed that a staff member may have inadvertently bumped into the water valve.

- A staff member in a BSL-3 laboratory reported that a Class II BSC would intermittently trigger an airflow alert alarm when they entered the room. Despite not using the BSC, the staff member noticed that it would alarm for a few seconds, then switch its status to 'ok' and then alarm again. The BSC was placed out of service, and the cause of the alarm is being investigated.

**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), represented a CDC Form 3 submission, or a potentially serious accident or incident that could have resulted in personal injury, illness, death, and damage to property or the environment, but did not occur due to one or more factors.

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

**Success Story** - A successful process improvement or response to an event that went above or beyond normal operations, where an injury was prevented, or the improvement had a positive effect on a program, project, or activity.

This work was funded under Agreement No. HSHQDC-15-C-00064 awarded to Battelle National Biodefense Institute by the Department of Homeland Security (DHS) Science and Technology (S&T) Directorate for the management and operation of the National Biodefense Analysis and Countermeasures Center (NBACC), a Federally Funded Research and Development Center. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of DHS or the U.S. Government. The DHS does not endorse any products or commercial services mentioned in this presentation. In no event shall the DHS, BNBI or NBACC have any responsibility or liability for any use, misuse, inability to use, or reliance upon the information contained herein. In addition, no warranty of fitness for a particular purpose, merchantability, accuracy or adequacy is provided regarding the contents of this document.

All research was conducted in compliance with the Animal Welfare Act and other federal statutes and regulations relating to animals and experiments involving animals and adheres to principles stated in the Guide for the Care and Use of Laboratory Animals, and approved by both the NBACC Institutional Animal Care and Use Committee and, when applicable, the DHS Compliance and Assurance Program Office. The facility where this research was conducted is fully accredited by AAALAC International and maintains a Public Health Service (PHS) Humane Care and Use of Laboratory Animals (Policy) assurance.