Lessons Learned & Success Stories – January to March 2024

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. Understanding the appropriate response to hazards, such as spills, smoke, and chemical smells, is critical to keeping us all safe in the workplace. At the NBACC, it is common to work in multiple spaces on the same day that each have slightly different emergency response procedures. While review of the standard operating procedures (SOPs) is required annually, staff is encouraged to review the relevant SOP(s) after each near miss or incident to identify if there are any gaps or clarifications that could improve the procedure. If a gap is identified or a process change could improve the procedure, please reach out to the process owner, Health and Safety, or your supervisor to address the concern.
2. There is always the potential for a spill or process failure to occur. However, it's important to recognize that reporting such incidents is integral to fostering a robust safety culture within our organization. Every individual contributing to NBACC’s mission plays a crucial role in upholding the highest standards in their work. If you ever find yourself in doubt, take a moment to revisit the procedures or SOPs before continuing with your work. Embrace a proactive approach to incident reporting and near misses, as this serves as the cornerstone for implementing meaningful process enhancements.
3. A key principle for the safe conduct of research is the idea that a healthy respect should be maintained for what can go wrong. This means that we need to remain vigilant and avoid complacency since even routine tasks have potential to result in serious injuries or operational upsets. Good examples include always being aware of your surroundings, your PPE, and understanding the procedures you will perform. Never allow time pressure to be a setup for potential mistakes; instead, openly acknowledge when there is a time crunch and have heightened attention to your safety. Doing so will allow you to see the details like noticing a glove tear, an expired chemical, or recognizing a potential SOP deviation before it happens.

# EVENT SUMMARIES:

1. **FIRST AID SUMMARY (CUTS)**: 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.
* 12/11/2023; A staff member was repairing a BSL-4 suit in the suit room when they scraped their thumb knuckle on the zipper. The staff member washed their hands, exited the suit room, and reported to the CMAs.
* 01/08/2024; A staff member was working in an interstitial space when they scraped their arm on a metal support.
* 01/26/2024; A staff member was wiping down stall dividers in a restroom when they cut their finger on one of the mounting brackets.
* 02/01/2024; A staff member was working in an interstitial space when they scraped their finger on a metal rail used for installing a firewall.
* 02/06/2024; A staff member was carrying several items including a plenum in their hands as they traversed through a heavy hallway door when they dropped the plenum on their foot.
* 02/09/2024; A staff member was unloading an autoclave after a cycle when a bag containing a chair-back fell onto their foot.
* 02/20/2024; A staff member working in a BSL-0 laboratory was unplugging a computer when they hit their head on the monitor.

# NEAR MISS SUMMARIES:

1. **SPILL SUMMARY:** 12/04/2023; A staff member reading environmental sampling plates from an ABSL-3 laboratory noted a single suspect colony from a drain cover swab that was collected in the room. The following day, the colony was confirmed to be a Risk Group (RG) 3 agent. At the time of sampling, the laboratory was supporting project work involving the agent, however, there were no other suspected or confirmed colonies from neighboring laboratories or corridors found. The room was bleached immediately following the environmental sampling and bleached again after agent confirmation. Following a second round of environmental sampling, no suspect colonies were observed. During the investigation, Health and Safety confirmed that there had been no reported PPE issues for staff entering the laboratory and that all staff had been required to wear PAPRs (APF 1000), double gloves, shoe covers and lab coats or Tyvek suits when entering the room. The CMA ruled no potential exposure, and a CDC Form 3 was filed.
2. **SPILL SUMMARY:** 12/08/2023; A staff member was removing items from a refrigerator in a BSL-0 laboratory when an open container of ampoules was knocked off a refrigerator shelf and onto the floor. Upon hitting the floor, one of the glass ampoules containing a hydrochloric acid solution broke and spilled its contents. The staff member did not immediately leave the room and called the Command Center to request a callback from Health and Safety. During their discussion with a Health and Safety member, the staff member was instructed to leave the room and called them back to continue the report. There were no biological agents involved in the incident. After waiting 30 minutes, the Chemical Hygiene Officer (CHO) entered the laboratory, neutralized the acid, collected the residue, and disposed of the broken glass. The laboratory was mopped and once the remaining ampoules were confirmed to be intact, the staff member double bagged them and returned them to the refrigerator. Following the incident, the staff member was reminded of proper spill response and the importance of leaving the laboratory immediately following a spill.
3. **SPILL SUMMARY:** 12/11/2023; A staff member working in a Class II Type A2 BSC of a BSL-3 laboratory was disinfecting RG 3 liquid waste with MicroChem Plus™ when they bumped the waste container and spilled roughly 100 mls of liquid onto the surface of the BSC. At the time of the spill, the waste had completed approximately 2-3 minutes of the required 15 minutes contact time. The staff member held their breath, exited the room, and called the Command Center to request a callback from Health and Safety. During their discussion with Health and Safety, the staff member confirmed that the spill was limited to inside the BSC and that both the BSC and their respiratory protection were functioning properly. The staff member was permitted to re-enter the room, clean the BSC, and resume their work.
4. **SPILL SUMMARY:** 12/13/2023; Staff members working in an interstitial space were closing a valve in anticipation of performing maintenance on the EDS operating vent skid when they noted that a leak started to occur as they closed the valve. The staff members were not wearing PPE at the time of the leak, which they described as drips of liquid that totaled less than 1 ml. Though NBACC procedures require agent decontamination prior to being introduced into the plumbing system, the valve was upstream of HEPA/hydrophobic filters and located on the “dirty” side of the vent. The three staff members held their breath and immediately exited the interstitial area. Once outside of the interstitial space, the staff members called the Command Center and requested to speak to Health and Safety. After speaking to the Health and Safety member, signage was placed outside of the interstitial space and the staff members waited 30 minutes before re-entering the space wearing PAPRs (APF 1000), Tyvek suits, double gloves, and disposable booties. The area of the leak was covered with toweling and bleached for the 10 minutes contact time. Next, the staff members replaced the leaking valve. A bleach bucket was placed under the valve to catch any additional condensate inside the pipe once the valve was removed. The outside of the valve was liberally sprayed with bleach and removed, placing it immediately into the bucket of bleach. No additional liquid was observed inside the pipe and no additional dripping occurred. Bleach was then sprayed inside the open piping. Surfaces remained wet with bleach for a minimum of 10 minutes before the replacement valve was installed. The CMA ruled no potential exposure, and a Form 3 was filed.
5. **LAB PROCESS FAILURE SUMMARY:** 01/04/2024; A staff member working in the BSC of a BSL-3 laboratory was pipetting a RG 3 agent using 200 μL pipette tips when they accidentally struck their hand with the tip. Following the contact, the staff member checked their outer and inner gloves and noticed that both were torn. They immediately scrubbed their hands with soap and water and then called the Command Center to request Health and Safety. While speaking to a member of Health and Safety, the staff member visually inspected their hand for a breach and performed an alcohol test and confirmed that their skin was intact. After consulting with the CMA, the staff member was permitted to continue their work and was asked to report to the Occupational Health Clinic once they left containment. Upon exiting the suite, the staff member’s hand was evaluated by the CMA, who confirmed no sign of injury or broken skin and ruled no potential exposure.
6. **SPILL SUMMARY:** 01/11/2024; A staff member was working in a BSC of a BSL-3 laboratory and placing 96-well plates containing a RG 3 agent into a decontamination pan of Micro-Chem Plus™, when the liquid in the pan became agitated and a drop of less than 1 mL exited the BSC and landed on the front of their closed lab coat. The staff member immediately discarded their outer gloves to exit the BSC, removed and discarded their lab coat and began to inspect the grate of the BSC, the floor and their scrubs for additional liquid. Once they confirmed that the spill had been limited to their lab coat, the staff member called the Command Center and requested a callback from Health and Safety. During their conversation with the member of Health and Safety, the staff member noted that they were still inside the laboratory where the spill occurred. The staff member was asked to exit the room and call the Health and Safety member back. During the follow-up conversation, the staff member was reminded to place signage on the laboratory door and to remain out of the room for 30 minutes. The staff member later returned to the lab and cleaned the BSC sash, chair, and floor under the BSC with 5% Micro-Chem Plus as a precaution before restarting their work. The CMA ruled no potential exposure. A Form 3 was filed with the CDC.
7. **LAB PROCESS FAILURE SUMMARY:** 01/13/2024; A staff member processing samples was finishing up their work and returning a sample transport carrier to a fridge when they noticed streaks of a dried substance on the outside of the container. The staff member placed the container in a resealable plastic bag, placed the bag in the BSC and called the Command Center to notify Health and Safety. During their discussion with a member of Health and Safety, the staff member was asked to swab and plate the dried substance before thoroughly bleaching the container. The CMA was then contacted by the member of Health and Safety, and they ruled no potential exposure. The following day, the plates were checked, and three of the four plates had no growth. The fourth plate contained a single bacterial colony, and the staff member placed it back into the incubator for a Subject Matter Expert (SME) to evaluate and rule on the colony. The SME observed the colony and ruled that it was phenotypically consistent with the RG 2 agent used in the study. The following day the plate was transferred to NBFAC for confirmatory testing and the results confirmed that the colony was the same RG 2 agent used in the study. A Form 3 was filed with the CDC. Following the incident, the group reviewed their processes with Health and Safety and language was added to their SOPs requiring the manual wipe down of items with disinfectant when removing them from a downdraft table instead of spraying them, which is anticipated to further reduce the likelihood of a similar event in the future.
8. **LAB PROCESS FAILURE SUMMARY:** 01/13/2024; A staff member on a vaccination waiver handled conical tubes and a bag containing samples of a RG 2 agent despite their waiver restricting them from “direct work” with that agent. During an incident investigation for another event, the staff member confirmed with members of Health and Safety and the CMAs that they had handled the items but that they were not aware that those tasks constituted “direct work.” The CMAs ruled no potential exposure. Health and Safety is working with the Leadership Team and changes to the vaccination waiver process are forthcoming.
9. **LAB PROCESS FAILURE SUMMARY:** 01/22/2024; BSAT was transferred between BSL-3 suites without following the proper procedures. Though the container was not labeled, the inner bag containing the samples was labeled as BSAT. After physical transfer, an email was sent to the receiving lab with the BSAT working stock form attached. The samples were processed in the second laboratory and upon receiving the results and the working stock form, the group immediately realized their mistake. The Principal Investigator (PI) contacted a member of Health and Safety and was advised to report the incident via email to the Responsible Official (RO). Following the incident, the group implemented a number of changes to their processes which include ensuring that staff receiving samples are aware of any BSAT present and updating container labels that state contents include BSAT material and list BSAT transport requirements.
10. **LAB PROCESS FAILURE SUMMARY:** 01/24/2024; A staff member opened an airlock to retrieve items from a BSL-3 containment suite before the 15-minute air wash was complete. The staff member opened the airlock door without looking through the window to confirm that the timer was at zero. Once the staff member realized that the timer had not completed the countdown and had 5 minutes remaining, they immediately closed the door and called the Command Center to report the incident to Health and Safety. The staff member admitted that they were distracted with their conversation before opening the airlock door. The CMA ruled no potential exposure.
11. **LAB PROCESS FAILURE SUMMARY:** 02/05/2024; A staff member was beginning their work in a BSL-2 laboratory, when they noticed that the bleach in the room was expired. The staff member then remembered that they had used the expired bleach during their toxin work several days prior. They reported the incident to Health and Safety via email and followed-up with an in-person chat. During the investigation, Health and Safety recovered the bottle of expired bleach, tested it, and confirmed that a 1:10 dilution contained at least 5,000 ppm of free chlorine needed to inactivate the toxin. The bottle of expired bleach was discarded. The staff member was reminded to always check expiration dates prior to use and was commended for remembering this bleach bottle was used several days prior. By notifying Health and Safety, additional testing could be performed to confirm the activity of the bleach prior to disposal of an expired disinfectant.
12. **LAB PROCESS FAILURE SUMMARY:** 02/22/2024; Staff members conducted two official Biological Select Agents and Toxins (BSAT) inventories using a Principal Investigator’s (PI) designee as a witness and did not have a disinterested witness present as is required by the SOP. The use of a disinterested witness is required when completing an official BSAT inventory. While PI designees may act as witnesses for internal inventories and transfers, individuals on projects headed by the PI whose BSAT is being inventoried cannot be considered disinterested witnesses. The inventories were completed before the Responsible Official (RO) was made aware of the issue. A CAPA was initiated, and the root cause of the incident continues to be under investigation.

# 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 preparing to empty an autoclave following a completed cycle when they noticed that a bag that was placed inside of a large sharps container had breached the top of the sharps container, spilled some of its contents into the autoclave pan and slightly melted to the top of the autoclave’s interior. The staff member called the Command Center and requested to speak to Health and Safety. Members of Health and Safety reported to the autoclave, donned PPE, re-bagged the waste for disposal and cleaned the interior of the autoclave once it was cool and safe to do so. During the incident investigation, it was determined that the bag inside the sharps container was sealed, and the buildup of pressure caused the items to be expelled during the autoclave cycle. Staff were reminded to leave their resealable bags slightly open to allow gas exchange and prevent similar incidents in the future.
	* A staff member working in the BSC of a BSL-3 laboratory was untaping a sleeve of plates containing a RG 2 agent when they experienced an outer glove tear. The staff member tested their inner glove and confirmed that it remained intact.
	* A staff member was deconning the BSC of a BSL-3 laboratory following their work with a RG 3 agent when they noticed an outer glove tear. They discarded their outer gloves and exited the BSC. A leak test was performed on their inner gloves and the staff member confirmed that they remained intact.
	* A guard reported an after-hours water leak in an industrial space. The cause of the leak was due to a malfunctioning water gauge. Members of FMO cleaned the water.
	* A staff member reported that the PAPR of a escorted laboratorian went into alarm and stopped working during a BSL-3 suite inspection. The escorted laboratorian held their breath, returned to the PAPR staging area with their escort and donned a new PAPR. The defective unit was marked out of service.
	* A staff member reported that they accidentally wore their stainless-steel watch across the change room line of containment. The watch never entered the containment suite. The staff member deconned their watch out of the change room upon exiting the suite.
	* A staff member was deconning a BSC prior to initiating work when they experienced a glove tear. The staff member was also wearing a waterproof bandage at the time but confirmed that it remained intact. The staff member washed their hands and donned a new pair of gloves. There was no agent present at the time of the glove tear.
	* A staff member reported that a microfuge tube failed during a spin. The tube contained extracted plant DNA, beads and a buffer solution. During the spin, the bottom of the tube fractured and spilled the contents inside the microfuge. While discussing the incident with a member of Health and Safety, the staff member noted that all of the other tubes in the microfuge remained intact and they believed that the contributing factor was a defective tube. The microfuge and benchtop were cleaned with bleach.

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.

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.