

Sandia Biological Laboratory Guided Exercises

Laboratory biorisk Mitigation Exercises

Goal: This exercise will be used to orient students with the laboratory setting while highlighting laboratory biorisk mitigation strategies. It is intended for students who have very little or no experience with the work, equipment or agents associated with work conducted in the laboratory. The exercise builds upon basic knowledge of biosafety/biosecurity risk assessment.

At the end of this guided exercise, students will:

- Know:
 - Know what mitigation means
 - Know the importance of doing a thorough risk assessment prior to implementing/evaluating mitigation control measures
 - Understand the various categories of control measures used to reduce risk and their advantages and limitations. (i.e, elimination/substitution, engineering controls, administrative controls, practices, procedures, and PPE).
- Feel:
 - Prepared to learn more about specific kinds of mitigation
 - Confident in identifying appropriate mitigation measures
- Do:
 - Categorize various mitigation efforts into the hierarchy of controls
 - Practice suggesting mitigation measures based on a risk assessment

Instructors Notes:

This exercise will primarily be inquiry driven, meaning that the students will be prompted to ask questions throughout the laboratory exercise, which the instructors will answer. Two instructors will work with a group of 7-8 students per laboratory session.

The students will be given a mock scenario and risk assessment which they will use to suggest mitigation controls to minimize the risk in the laboratory. It is expected that not all of the students will be very familiar with the different mitigation options, so the instructors are encouraged to explain them as they work through the exercise.

A key point to demonstrate is how a risk assessment can support **appropriate** mitigation strategies. While each mitigation strategy is demonstrated the instructors will prompt the students to say why we would or wouldn't consider a certain mitigations strategy – and the answer should always be because either the risk assessment warrants it or it doesn't.

Materials:

1. Two tables with chairs and flip-charts set up outside the laboratory by the window. This will be used for initial group discussion about the definition of mitigation as well as selection of the mitigation measures.
2. One deck of mitigation measures cards from which the students can design a mitigation strategy.
3. 2-3 Flip-chart papers posted on the wall with each category of mitigation controls on them. This will be used by the students to create their risk mitigation strategy.
4. Example PPE from which the students can select the appropriate PPE for their scenario.
5. Glow Germ – UV light
6. Dry Ice and warm water
7. Sample SOPs rules

Reference – from CBR Course:

Rabies Virus Scenario and Risk Assessment

General Countermeasures: BSL2 facilities can be used for diagnostic purposes; BSL3 for any work involving the virus amplification. Minimum PPE should include a lab coat, double gloves, and safety glasses; a biosafety cabinet should be used for handling infectious materials. A face shield and heavy gloves should be worn when dissecting infected carcasses and handling brain matter. In the event of suspected infection, simultaneous postexposure vaccination (active and passive) must be applied within 24 hours after exposure to increase the chance of disease prevention. Bites and scratches should be washed immediately with soap, water, and disinfectants; human rabies serum or immunoglobulin should be inoculated on wounds promptly. If symptoms appear, the person will die. Numerous human and animal vaccines have been developed from whole virions, purified rabies proteins, and recombinant viral vaccines encoding rabies proteins; these are generally quite effective at inducing protective immunity. In the US, a licensed vaccine is administered to individuals (with no prior vaccination) in 5 doses over the course of a month. There are only 3 documented cases of individuals surviving in the absence of vaccination.

Time	Step: Description of Activity	Notes
5 min	1. Introductions. Review Goals, Objectives, Agenda	Verbally review the goals of the exercise as well as the objectives listed above - read
5 min	2. What is Biorisk Mitigation? Allow 2 minutes for the student groups develop a definition for biorisk mitigation and write it down on their flip charts. Students should be prepared to report their definition and rationale to the class.	Lead a 3-minute discussion by asking each group to report their definition /explain (write it on the flip chart) and continue around the room asking each group. Go over the answers. (Ans: controlling/reducing the risks of accidents like exposure to biologicals, faulty equipment, PPE, and behavioral practices etc).
5 min	3. Plenary discussion on the categories of mitigation controls and the hierarchy of controls.	Use flip charts pre-made to reference. Be sure to highlight to the students that often there is some overlap between the categories. The categories themselves can be used as a checklist of options for mitigation strategies.
5 min	4. Hand out the scenario and risk assessment to the groups. Have the students analyze the documents and discuss them in their groups (5 min).	
10 min	5. Have the groups identify ways that the risk could be reduced. The students will be prompted to use the mitigation cards on their desks to help them with their answers. Everyone will work together to generate a mitigation strategy for the laboratory that will encompass each of the categories of mitigation controls. Spend a little time discussing elimination and substitution with regard to the scenario, as this point cannot be displayed appropriately in the laboratory when we review examples of the other mitigation controls.	Each group will get half the deck of cards. Both groups and the instructor will work together as the mitigation strategies are named and placed under each category. The instructor will also, at this point be pointing out the correct names and examples of the risk mitigation that the students are suggesting. This will be a very interactive session. Also mention that the goal behind this exercise is to realize that there is a variety of mitigation control options to solve a particular problem.
10 min	6. Entry into the Lab. Biosecurity and access controls (engineering controls). Review different options for detection, notifications, alarms. Introduce double door entry.	Talk about layers of graded protection. The goal of laboratory physical security is to detect delay respond and how access controls are used. Highlight the unique challenges of keeping biological agents secure (hard to detect, replicate, etc) compared to other assets.
10 min	7. Anteroom (engineering control)– purpose and PPE (PPE) mitigation explanation. Review the selection of PPE available and	Draw the schematic for the anteroom and why it is used. The instructors will guide the students to appropriate choices based on

	have the students explore and pick out some PPE that they think might be useful to protect against the scenario pathogen.	their agent, scenario and risk assessment. Talk briefly about donning and doffing PPE (practice and procedure).
5 min	8. Move into the laboratory wearing PPE. Talk about how Glow Germ was spread in the laboratory and we will determine who had contact after the exercise.	Instructors should place the mitigation strategy up on the window of the laboratory and use the categories as a guide to move through each one.
10 min	9. Engineering Controls – walk through and explain the use of the BSC and how engineering has designed airflow to keep the pathogen safe from the people and the people safe from the pathogen. Introduce HEPA filters. Laboratory airflow.	Do dry ice demonstration. Talk about how correct practices and procedures still need to be in place for correct operation and to get the benefit of the engineering controls (demonstrate with blocking airflow).
10 min	10. Administrative Controls – Point out examples and show how they can be used to reduce risk. Examples include: Hazard warning signs and labels, emergency numbers/procedures, Rules. Vaccination program. No food or drink policies. Regulation about what types of equipment is used.	This category is a little more ambiguous compared to the others and may have some overlap, however, these people are in management and leadership roles and will have the most influence over this type of mitigation control – this point should be stressed.
10 min	11. Practices and Procedures – Review and/or demonstrate a procedure that was given in the scenario. Demonstrate without risk mitigation and then with proposed risk mitigation – pointing out the risks at each step.	Here the focus should be on the options for what types of material to use, how to use them, how to handle the agent, what to do if there is a spill, use of standard operating procedures (SOPs). Highlight SOPs as this is a critical component of risk mitigation that we have started to implement at their institutions – and how important it is!
5 min	12. PPE – wrap-up PPE exercise with an inspection for glow germ in the anteroom. Then have the students doff their PPE trying to not expose themselves. Inspect again for glow germ. If any was detected on their hands have them work into the hand washing exercise (if time allows).	Again emphasize SOPs for donning and doffing etc.
5 min	13. Review and Wrap-Up. The instructor will ask the students what they learned from the overall activity with regard to mitigation risks, engineering controls of equipment, implementing administrative controls (SOPs, rule/regs, training) as well as wearing PPE and proper way of doffing and pathogen contact in the laboratory.	Be sure to highlight any key points that the students are unsure about before wrapping up the exercise.
95 min total	Evaluation - Dismiss	Pass out Level 1 evaluations KFD for the students. After activity Instructors will fill out Level 2 evaluations.

