

## **Biorisk Assessment Methodologies and Models**

### **Risk Assessment Activity**

For your case study, your group will be performing a biosafety and a biosecurity risk assessment. The case study will identify the biological agent(s) and planned procedures; you will be using the hypothetical facility as the basis for the assessment along with the provided agent details. You may use additional resources and your own expertise as well; document any additional assumptions that your group makes. The laboratory area in which all work will be conducted in may be adequate, inadequate, or overly restrictive based upon the risks identified in the assessment.

Please use the provided forms to conduct this risk assessment (these forms are only an example of one method for conducting a risk assessment but will provide you a better understanding of a quantitative assessment method).

#### Step 0:

Does the agent provided in your case study require a biosafety or a biosecurity risk assessment? If yes continue. (For all provided case studies, you should need to perform a risk assessment)

### **Biosafety Risk Assessment**

#### Step 1 – Assessment of the biological agent

Using the biological agent information provided, please complete the Likelihood of Infection and Consequences of Disease forms. First identify the ‘at risk’ population(s), if you have multiple populations of concern (e.g. humans and cattle), please fill out two separate forms, one for each population. Please calculate all the sub-scores and the overall consequence and likelihood of infection scores (calculators are available for your convenience). You can use your expert judgment to provide greater resolution of the scores, if desired. That is, for a criteria where an answer of Yes = 4 and an answer of No = 0, you can use your judgment to say, “It’s not really 0, but rather a 1”. However, all scores must be between 0 and 4 to allow for relative risk comparison.

Step 2 – Assessment of the laboratory hazards:

Using the information provided in your case study and the information provided in the hypothetical facility document, please fill out the Likelihood of Exposure for an Individual Performing In Vitro Work.

Please calculate all the sub-scores and the overall likelihood of exposure score for each route of exposure. You can use your expert judgment to provide greater resolution in the scoring if desired.

Step 3 – Determining the biosafety risk to an individual in the laboratory:

Using the Results sheet, calculate the overall likelihood of infection/exposure of the biological agent by multiplying the likelihood of infection score (for a human) completed in Step 1 with the likelihood of exposure score completed in Step 2 then take the square root (to normalize to a number between 0 and 4). The rationale for averaging some scores and multiplying others will be explained in lecture.

Copy the consequence of disease to a human host score on to the results worksheet.

Using the supplied chart, please graph the calculated likelihood score on one axis (Y-axis) and the calculated consequence score on the other axis (X-axis).

Step 4- Evaluation of the risk:

Identify the overall risk (very low, low, moderate, high, or very high). Can you explain why this risk is where it is? Is it due to the consequences or the likelihood or both? Does the risk assessment help you identify ways to reduce this risk? What is missing from this risk assessment?

**Please be prepared to present these results to the rest of the class.**

## **Biosecurity Risk Assessment**

### **Step 1a – Characterizing the biological agents:**

Looking at the biological agent criteria used early, are these criteria the same you would use if trying to assess the risk of this agent being targeted for malicious use? What additional criteria would you need? Are there criteria which you do not need? Please review both the criteria used in likelihood and those used to assess consequences. Once you have identified all the criteria you would use for assessing a biosecurity risk, please rank these criteria in order of importance.

### **Step 1b – Characterizing the threats:**

What factors would you use to evaluate the threat or the potential adversaries who may target your agent for theft? Where would you find this information? What other factors would you need to consider in conducting a biosecurity risk assessment? Review the potential adversaries below and identify which are of the greatest concern.

- The Band of Mercy was established in 1973. They are a radical extremist group sympathetic to the animal rights movement have been active in the area. The group appears to have two goals: 1) the liberation of captive animals and 2) the destruction of capital necessary to conduct such research. However, the Band of Mercy's website instructs its followers to "take all necessary precautions against harming any animal, human and non-human."
- In the past few years, anti-Genetically Modified Organism activists have become active in the area. Although they have not damaged property yet, similar groups in neighboring countries have targeted facilities that conduct research on genetically modified organisms (GMOs), particularly newly constructed biotechnology laboratories.
- Last year, one graduate student in chemistry was arrested on charges of manufacturing methamphetamine one of the laboratories.
- The following staff has access to the all the laboratory space: faculty, research technicians, graduate students, housekeeping, facility staff, and the biorisk officer.

### **Step 2 – Characterizing the facility:**

Using the provided information about the facility from the previous activity and the agent you were given, evaluate the likelihood the facility will be targeted and the potential of a successful theft.

### **Step 3 – Characterizing the risk:**

Please review the factors you have identified and the results of the biosafety risk assessment to conduct a qualitative assessment of the biosecurity risks of your agent in the defined facility. (Please categorize the biosecurity risk as high, moderate, or low).

**Please be prepared to present these results to the rest of the class.**