



## SAFETY/PROTECTION GUIDELINES FOR WORK WITH BIOLOGICAL TOXINS

This document is intended as a guide to assist in determining safety/protection requirements for University staff working with Biological Toxins (BT). The document outlines minimum requirements for safe BT work; however, a risk assessment might indicate the need for more stringent requirements. A risk assessment ***must be*** conducted for all BT work.

### 1. Introduction

- a. Biological toxins (BT) are products of plants, animals, microorganisms (including, but not limited to, bacteria, viruses, fungi, or protozoa), or infectious substances, or recombinant or synthesized molecules
- b. BTs are serious laboratory hazards that are highly toxic in minute quantities
- c. BT routes of exposure are primarily inhalation ingestion, and absorption (such as ocular, percutaneous, and injection). Skin absorption is also a potential hazard with some BTs.
- d. BTs do not pose a vapor hazard, and do not have short-term exposure limits, ceiling limits or time-weighted average concentrations. They are different from well-characterized chemical toxins and the unknown aspect of their properties must be considered in any risk assessment.
- e. Batches of BTs from the same source can vary widely in activity/toxicity
- f. Risk assessment is key to developing and implementing an effective BT safety strategy
- g. A 'zero level' toxin exposure philosophy will be the goal.

### 2. General Practices

- a. All work with BTs must be done in a Biosafety Cabinet (BSC) that is certified annually, except where prior approval from the biosafety officer is obtained for working outside of a BSC based on a comprehensive risk assessment done by the PI.
- b. Approvals will not be granted for future for toxin work outside of a BSC unless a detailed risk assessment makes a convincing case that the risk will be mitigated through the use of alternative safety procedures when manipulating the toxin. This assessment will include, at a minimum, the amount of toxin to be used, the probability of aerosol generation, the route of exposure, and the toxin LD50.
- c. When conducting high risk operations/procedures with BTs work must be conducted in a BSC and a respirator must be worn. High risk procedures include:
  - i. Working with BT powders
  - ii. Manipulating BTs in ways that intentionally generate dust or aerosols (Table 1)
- d. SOPs must be prepared and approved by the Institutional Biosafety Committee (IBC) for toxin work
- e. Follow approved IBC protocol/SOPs for toxin work
- f. Comply with Select Agent rules as necessary

3. **For assistance:** Contact the Biosafety Officer (BSO) or other DEHS Biosafety Specialist at 612 626 6002 for assistance with risk assessment and/or if you have trouble questions with regard to meeting these guidelines.

**Table 1: Requirements for high risk biological toxin work**

Operation/procedures	Safety/Protection Requirements						
	Two trained individuals	Spills procedures	Respirator <sup>1</sup>	Engineering controls <sup>1</sup>	Gloves	Eye protection	Lab coat/disposable gown
Work with powdered toxins	+	+	Fitted N95 or better with an APF <sup>2</sup> ≥10	Class II or Class III BSC	+	+	+
Toxin manipulated to <b>intentionally generate dust/aerosols</b>	+	+	Fitted N95 or better with APF <sup>2</sup> ≥10	Class II or Class III BSC	+	+	+
Work with powdered toxins or toxin manipulated to <b>intentionally generate dust/aerosols</b> while using volatile materials	+	+	Fitted N95 or better with APF <sup>2</sup> ≥10	Ducted Class II or Class III BSC	+	+	+

<sup>1</sup>Any respirator usage by U of M community members, either required or voluntary, **shall** be pre-approved by the Department of Occupational Health and Safety (<http://www.ohs.umn.edu/rpp/respirator/home.html>). U of M community members **shall** only wear the specific respirator-type(s) for which they were pre-approved.

<sup>2</sup>APF =Assigned Protection Factor.