Guidelines on Laboratory/Work Activity Risk Assessment

According to the Biological Agents and Toxins Act[1], the Biosafety Committee appointed by the operator of a facility shall conduct risk assessments in relation to the activity proposed to be carried out, and devise measures to manage risks that may arise from the proposed activity.

The laboratory activity risk[2] assessment shall consist of the following elements:-

(1) Identification of risk assessment team(s) and their respective roles or job duties

(2) Register of key laboratory processes or experiments and a listing of work activities for each process with information on hazardous materials used and the location where the activity is performed

(3) The conduct of risk assessment for every listed work activity using a 3-step process
   (i) Hazard and threat identification
   (ii) Risk evaluation
   (iii) Risk control measures

(4) Risk control measures are derived from the hierarchy of control
   (i) Elimination
   (ii) Substitution
   (iii) Engineering controls
   (iv) Administrative controls
   (v) Personal protective equipment (PPE)

(5) An established 5 by 5 risk matrix, for risk evaluation, with descriptions of the five levels of severity and likelihood scores
   (i) Severity rating relates to how severe is the possible injury or ill-health
   (ii) Likelihood rating relates to the certainty that the hazard may cause injury or ill-health

Guidance shall be provided to describe different levels of severity and likelihood.

Table 1: Severity rating

Level	Severity	Description
1	Insignificant	Negligible injury
2	Minor	Injury or ill-health requiring first aid only
3	Moderate	Injury or ill-health requiring medical treatment; non-compliance resulting in fines or warning letter from authorities
4	Major	Serious injuries or life-threating diseases; acute poisoning; non-compliance resulting in loss of approval to operate (business interrupted) and fines or warning letter
5	Catastrophic	Death or fatal diseases; non-compliance resulting in loss of approval to operate and prosecution by authorities

[1] Section 39 of the Biological Agents and Toxins Act

[2] Should take into consideration safety, security and dual use risk

Table 2: Likelihood rating

Level	Likelihood	Description
1	Rare	Not expected to occur but still possible
2	Unlikely	Not likely to occur under normal circumstances
3	Possible	Possible or known to occur
4	Likely	Common occurrence
5	Most Likely	Continual or repeating experience

Table 3: Risk Evaluation Matrix

Risk Prioritisation Number (RPN)					
Likelihood (frequency)	**Severity (S)**				
	1 Insignificant	**2 Minor**	**3 Moderate**	**4 Major**	**5 Catastrophic**
1 Rare	**1**	**2**	**3**	**4**	**5**
2 Unlikely	**2**	**4**	**6**	**8**	**10**
3 Possible	**3**	**6**	**9**	**12**	**15**
4 Likely	**4**	**8**	**12**	**16**	**20**
5 Most Likely	**5**	**10**	**15**	**20**	**25**

Note: Risk prioritisation numbers (RPN) are deduced from risk scoring of severity and likelihood (severity x likelihood).

(6) Criteria for corrective actions shall be established based on RPN, for 3 risk levels; low (acceptable), medium (tolerable) and high (not acceptable).

Table 4: Recommended action for risk levels

Key to Risk Prioritisation (RPN) for implementation of actions				
Color	**RPN**		**Risk Acceptability**	**Recommended Action**
Green	< 5	Low Risk	Acceptable	To manage by routine procedures No additional risk control measures may be needed.
Amber	5 – 14	Medium Risk	Tolerable	Interim risk control measures, such as administrative controls or PPE, may be implemented while longer term measures are being established. A careful evaluation of the hazards and threat should be carried out to ensure that the risk level is reduced to as low as reasonably practicable (ALARP) within a defined period, for example 6 months
Red	≥ 15 overall score **or** Catastrophic score for Severity of Consequence	High Risk	Not acceptable	Work shall not start. There should not be any interim risk control measures. High risk level must be reduced to at least medium risk before work is allowed to start. Management review is required before work starts.

(7) Identification of person responsible to implement corrective action(s) and as part of continual improvement, risk levels (RPN) should be monitored regularly with efforts to reduce risks to as low as reasonably practicable.

(8) Completed work activity risk assessments must be approved by the Facility Operator or his designate and be reviewed

(i) once every two years, or;

(ii) upon occurrence of accidents, near misses, dangerous acts, or;

(iii) when there are changes in work processes or workplace condition / layout,

whichever is earlier.

Refer to sample template for work activity risk assessment for laboratory handling biological materials.