SAND2012-6648P

Course:

Decontamination, Sterilization and Disinfection

Design Document

Sandia National Laboratories
International
BIOLOGICAL THREAT REDUCTION

BEP

CBEP
Cooperative Biological Engagement Program

Part I: Course Overview

Course Description

Overview

Decontamination and Disposal is designed to provide participants a general overview of the various decontamination methods (physical and chemical). It offers activities for students to learn about the properties of general chemical disinfectants (bleach, iodophors, quats, etc.). Participants should complete *Orientation to Biorisk Management; Risk Assessment* and *Risk Mitigation strategies* prior to taking this course. An SOP development course would also be helpful prior to taking this course.

Scope

This course will provide awareness of the general properties of chemical disinfectants, why waste needs to be segregated, risks and mitigation controls for waste disposal, autoclave safety, methods for validating waste treatment and decontamination procedures.

Learning Level
based on
Bloom's taxonomy

- ✓ knowledge
- ✓ comprehension
- ✓ application
- synthesis
- evaluation

Length of Course

4 hours

Course Objectives

At the end of this course, students will be able to:

Organizational Objectives

- Discuss the various decontamination methods used for surface and area decontamination.
- Discuss the differences between disinfection, decontamination, and sterilization.
- Explain how validation of the decontamination procedure is conducted and be able to interpret the results.
- Be able to describe the process to develop standard operating procedures and validation methods.

Instructional Objectives

- Define, give examples, and demonstrate proper (based on risk assessment) techniques to decontaminate work surfaces, equipment, and waste, per lab-specific SOPs;
- Define, give examples, and demonstrate proper (based on risk assessment) techniques to segregate and contain waste, per lab-specific SOPs.
- Identify hazards and limitations of decontamination methods;
- Understand how and autoclave works to sterilize a biological load;
- Explain how validation of the decontamination procedure is

conducted and be able to interpret the results;
- Describe disinfection, decontamination, and sterilization methods;

Personal Objectives

Know

- Know the various ways and definitions associated with disinfection, decontamination and sterilization. Know that all disinfectants have their limitations. Know safety rules for autoclave use

Feel

- Competent in selection and use of appropriate disinfection and decontamination procedures

Do

- Choose and appropriate disinfectant and write a simple SOP for its use. Use various validation methods to ensure appropriate disinfection or sterilization.

Key Messages

1. Disinfection and decontamination have similar meanings. Both are less rigorous than sterilization which is the complete removal of all life.
2. No disinfectant is ideal, they all have strengths and limitations. Understanding the strengths and limitations is key to their use.
3. There are a number of factors that determines how effective a particular disinfectant is.
4. Micro-organisms have various innate resistance to disinfectants
5. Autoclaves can be used to sterilize things through wet heat and the application of appropriate time, pressure and temperature.
6. Wet heat is much more effective than dry heat.
7. Validation is a process to ensure that the decontamination, disinfection or sterilization process used was complete and achieved its requirements

Evaluation Strategy

Level 1 (satisfaction):	Students will complete a satisfaction survey about their experience with the course
Level 2 (learning):	Students will complete a "learning contract" for the next steps needed to begin biorisk management implementation
Level 3 (behavior):	Desired behavior is for students to participate in additional learning opportunities on BRM – this behavior will be evaluated three to six months post-training and may encompass additional training courses

Level 4 (organizational change):	A repeat of the training needs assessment will be performed at least annually – this annual assessment can be compared to the baseline assessment to determine improvements in biorisk management performance

Student Description (for course design purposes)

Number of students	10 to 25; small groups of 5 people each
Biorisk Management Role	✓ Policy Makers ✓ Top Management ✓ Biorisk Management Advisors/Advocates ✓ Scientific/Lab Management ✓ Workforce
Audience Assumptions	(assumed range is indicated by shaded cells)

		Novice		Practi-tioner		Expert
Education	Scientific	1	2	3	4	5
	BRM*	1	2	3	4	5
Expertise	Scientific	1	2	3	4	5
	BRM	1	2	3	4	5
Competence	Scientific	1	2	3	4	5
	BRM	1	2	3	4	5
BRM = "biorisk management". See definitions for terms in Resources section						

Language of instruction; translation or interpretation anticipated	English (for design purposes)
Prerequisites	None
Pre- or post-work required for completion	None
Certificates or documents of completion	Certificates of completion will be provided
Preparation for future coursework	This course is a pre-requisite for all other courses in the biorisk management curriculum
Anticipated next steps	Students will participate in either the management & leadership, advice & advocacy, or skills & competency biorisk management tracks, as defined by the local training needs assessment and other SME recommendations.

Instructional Environment

Number of Instructors/Staff required	TBD depending on number of students – optimal ratio is 1 instructor per no more than 12 students
Instructor Qualification	Instructors must have completed BRM Curriculum Orientation, which includes this course, and be enrolled in the BRM training network.

Learning Environment

Media	Instructor-led
Exercises & Activities	
Experience (Activists)	Students will be asked to consider their experiences with their work in regard to safe and secure handling of biological agents and toxins
Reflection (Reflectors)	Students will be asked to reflect on those experiences to help develop a model for effective safe and secure handling of biological agents and toxins; students will be asked to reflect on the next steps for working towards biorisk management in their work
Models (Theorists)	Students will be introduced, through their own experiences and reflections, to management system models (Plan – Do – Check – Act) and to the biorisk management AMP (Assessment, Mitigation, Performance) model
Practice (Pragmatists)	Students will be given the opportunity to develop examples of the PDCA and AMP models, as well as describe next steps for applying these models in their facility.

On-Site Specifics

Location	TBD
Room organization	Clusters of tables to facilitate small group (no more than 5 students per group
Dress code and/or important cultural considerations	TBD

Instructional Materials

Equipment & Supplies	Instructor will need to print out the scenario from the notes section of slide 17 to handout to students. Also, each small group or participant should have access to a copy of the WHO Laboratory Biosafety Manual (or at least a copy of Chapter 14 of the manual)
Student	Student notes Glossary

Handouts	CWA 15793

Resources

Dependencies	WHO Biorisk Management course
Authorities	
References	CWA 15793 CEN WS 55, 53 WHO Laboratory Biosafety Manual Glossary of terms (in development)

Terms used in this document

- Knowledge
- Comprehension
- Application
- Synthesis
- Evaluation

- Novice – a person who is new to the circumstances, work, etc. in which s/he is placed; beginner
- Practitioner – a person engaged in the practice of a profession; a person who practices something specified
- Expert – a person who has special skill or knowledge in some particular field; specialist; authority; trained by practice
- Education – the act of acquiring particular knowledge or skills, as for a profession
- Expertise – the process of personally observing, encountering or undergoing something; knowledge or practical wisdom gained from what one has observed, encountered, or undergone
- Competence – Possession of a suitable or sufficient skill, knowledge, experience, etc. for some specified purpose; properly qualified

Part II: Course Outline/Schedule							
Day	**Segment time (min)**	**Time**	**Topic**	**Instructional Method**	**Slide#**	**KM #**	**T/F**
1	10	00:00	Welcome & Introductions				T
	20	00:10	Course Objectives – Instructor & Student Establish Ground Rules	Reflection, then plenary activity to address Know, Feel, Do – post-its			F
	15	00:30	Definitions	Instructor presentation	6-9	1	T
	10	00:45	The perfect disinfectant	Small group activity	10	2	F
	40	00:55	Chemical Disinfectants	Group activity/presentation	11	3	F
	10	01:35	BREAK				
	15	01:45	Efficacy Factors	Instructor presentation	13-16	3-4	T
	25	02:00	Select an appropriate disinfectant	Small group exercise	17	3/4	F
	10	02:25	Physical Disinfectants: Autoclaves	Instructor presents	18-22	5/6	T
	5	02:30	Autoclave pros and cons	Small group discussion	23	5	F
	5	02:35	Autoclave safety	Instructor presents	24-26	5	T
	5	02:40	Incineration	Instructor presents	27-29		T
	10	02:50	BREAK				
	10	03:00	Validation methods	Instructor presentation	31	7	T
	30	03:10	Waste segregation	Small group activities	32-34	8	F
	15	03:40	Review and wrap up				F

KM = key messages ; T/F = teaching versus facilitation (instructor-based versus student-based)