

Training Analysis for Biosafety Training Using BSL-2 Criteria

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Introduction

The Training Analysis for a BSL-2 Biomedical Laboratory was created to define all tasks and subtasks in biosafety for all persons working in an international infectious disease detection laboratory. The analysis was done using the Instructional Systems Design (ISD) methodology defined in the publication, *ISD From the Ground Up*¹. The product is a template that can be used as a reference for developing a laboratory-based biosafety training program for BSL-2 biomedical laboratories or as a base for the development of training for microbiological and containment laboratories. This template was originally used in the design of a competency-training program; however, this type of analysis can be applied to any training design and can be readily applied to the development of both didactic and practical training materials. Application of the training analysis in a competency training program is more fully described in “Quantifying Competency in Biosafety: Application of the Instructional Systems Design (ISD) to Biosafety and Laboratory Biosecurity” by Patricia Delarosa et al., *Applied Biosafety: Journal of the American Biological Safety Association*, 16(3), 2011.

¹Hodell, C. (2000). *ISD From the Ground Up*. American Society for Training and Development, Alexandria, VA.

Instructions

This is a “do it yourself” methodology for the development of biosafety training that incorporates biosafety tasks into working procedures and practices in the laboratory. The goal of the training design is to accurately define all biosafety training that an individual needs to safely complete their work and establish a method for practical integration of biosafety procedures on the job.

In brief, the template design is meant to be adapted to the facility and individual. In the template, tasks are broken down by subtask and each subtask is assigned an appropriate evaluation method and criteria (metric). When developing facility specific training, tasks can be used “a la cart” and assigned according to the needs of the individual (for competency training) or the entire task list may be used as a detailed description of training needs for the facility and translated into any desired form of training including PowerPoint slides and classroom practical materials. It is recommended that the task list and subtask list be expanded to reflect the needs of the laboratory or facility and that any training not reflective of the laboratory be eliminated.

Disclaimer

This material was designed as a training program. This list is not comprehensive. It is based on *Biosafety in the Biomedical and Microbiological Laboratory* (5th edition), but does not cover all aspects of required training for a U.S. laboratory but rather details the analysis of a particular training program. It is not intended for use as a biosafety assessment tool.

It is important to recognize that this table is not a training program and it is not a training checklist. It is only the analysis of a training program and may not reflect the needs of a different facility. These components must be reviewed and adapted to fit facility, laboratory and individual training needs. In the design of the training program for which this analysis was done the following materials were developed from this basic analysis:

- PowerPoint slides
- Classroom practical materials
- Classroom exams
- Student and Instructor guides
- Laboratory Practical materials
- Competency training checklists
- Proficiency Exams
- Train the Trainer materials for the Biosafety Instructor and Laboratory Trainer
- Biosafety Program Mentorship training
- Biosafety Program Indicators for tracking success of a biosafety program

Help

For help with this training methodology, please contact Patricia Delarosa.

Appendix 1: Training Analysis

A Matrix Template for Developing a Laboratory-based Biosafety Training Program that Measures Competency for BSL-2 Biomedical Laboratories

Job	Task	Subtask	Evaluation Method	Metric	Reference
<i>Suggested job titles are listed. Add a job title that is appropriate for your institution</i>	<i>Add tasks as suggested by the job description.</i>	<i>Add or remove subtasks as appropriate. Use active verbs to describe each subtask.</i>	<i>Insert appropriate evaluation method. Suggested methods are inserted into the cells.</i>	<i>Insert appropriate degree for successful completion.</i>	<i>List biosafety document describing the associated theory or procedure</i>
Clinical Laboratory Technician	Demonstrates Knowledge of Institute Biosafety Regulations	Lists main topics covered by the Laboratory Biosafety Manual	Exam	≥80%	
		Lists procedures to follow in the Emergency Response Plan	Exam	≥80%	
		Lists or complies with entry and exit procedures for the institute	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Lists procedures in spill response	Exam or Demonstration	≥80%	

	Demonstrates Knowledge of Preventative Care Measures	Lists pathogens that are contained in the institute and the medical signs and symptoms of diseases associated with those pathogens	Exam	≥80%	
		Obtains appropriate vaccines (based on risk assessment)	Inspection	Yearly review	
		Completes respiratory protection medical exam, fit test, and training when applicable	Inspection	Yearly review	
		Describes time period for flushing eye or body site after biological or chemical exposure	Exam	≥80%	
		Defines Select Agent	Exam	≥80%	
		Demonstrates Knowledge of Biosafety	Defines biosafety	Exam	≥80%
	Defines agent risk groups		Exam	≥80%	
	Differentiates between risk groups and biosafety levels		Exam	≥80%	

		Lists national and international literature fundamental to biosafety	Exam	≥80%	
		Lists common sources and causes of laboratory-acquired infections	Exam	≥80%	
		Lists factors important to a risk assessment	Exam	≥80%	
		Identifies situations that require a risk assessment	Exam or Demonstration	≥80%	
		Uses PPE appropriate to defined tasks	Exam and Inspection	demonstrates procedure over a 12 month period	
		Lists facility design elements that increase biosafety and biosecurity	Exam	≥80%	
		Lists common procedures that produce aerosols	Exam	≥80%	
	Demonstrates Knowledge of Waste Handling and Decontamination	List procedures to decontaminate liquids and culture media	Exam	≥80%	

		Identifies hazardous vs. non-hazardous waste	Demonstration, Exam and Inspection	demonstrates procedure over a 12 month period	
		Describes procedure for decontamination of laboratory equipment	Exam	≥80%	
		Lists conditions for decontamination of laboratory equipment	Exam	≥80%	
		Lists chemical and biological spill control procedures and responsibilities	Demonstration	demonstrates procedure over a 12 month period	
		Double bags solid waste for autoclaving	Demonstration	demonstrates procedure over a 12 month period	
		Separates biohazardous waste into labeled autoclave bags	Demonstration	demonstrates procedure over a 12 month period	
		Disposes of sharps in sharps container	Demonstration	demonstrates procedure over a 12 month period	
		Prepares a 1:10 bleach solution	Demonstration	demonstrates procedure over a 12 month period	

		Refreshes 1:10 bleach solution as required by a risk assessment	Demonstration	demonstrates procedure over a 12 month period	
		Adds water to biohazard waste as described in SOP	Demonstration	demonstrates procedure over a 12 month period	
		Uses secondary containers for transport of biohazardous waste to autoclave	Demonstration	demonstrates procedure over a 12 month period	
		Locates spill control materials	Demonstration or Inspection	demonstrates procedure over a 12 month period	
		Runs biological spore strip test (according to a predetermined schedule) to assure proper autoclave function and records results	Demonstration or Inspection	demonstrates procedure over a 12 month period	
		Uses autoclave gloves to open autoclave	Demonstration	demonstrates procedure over a 12 month period	
		Loosens lids on liquid containers before autoclaving	Demonstration	demonstrates procedure over a 12 month period	

		Tightens lids after liquid has cooled	Demonstration	demonstrates procedure over a 12 month period	
		Label biohazardous waste using designated labels	Demonstration	demonstrates procedure over a 12 month period	
		Maintains bleach solutions for decontamination as described in the laboratory manual	Inspection	Yearly review	
	Demonstrates Good Microbial Technique	Washes hands after working with organisms or when leaving the laboratory	Demonstration	demonstrates procedure over a 12 month period	
		Does not eat or drink in laboratory	Inspection	Yearly review	
		Wears PPE required for activity	Demonstration	demonstrates procedure over a 12 month period	
		Does not wear PPE in neutral spaces	Demonstration	demonstrates procedure over a 12 month period	
		Does not recap needles	Demonstration or Inspection	demonstrates procedure over a 12 month period	

		Assists in regular housekeeping of laboratory	Demonstration	demonstrates procedure over a 12 month period	
		Keeps hallways of laboratory clutter free	Demonstration	demonstrates procedure over a 12 month period	
		Wears closed toed shoes	Demonstration or Inspection	demonstrates procedure over a 12 month period	
		Does not store food in the laboratory refrigerator	Inspection	Yearly review	
	Effectively Uses Personal Protective Equipment	Selects and uses the proper personal protective equipment	Demonstration and Inspection	demonstrates procedure over a 12 month period	
		Demonstrate donning and doffing of PPE	Demonstration and Inspection	demonstrates procedure over a 12 month period	
	Demonstrates Knowledge of Biosecurity	Identifies institute signage	Exam	≥80%	
		Knowledge of required training for entry into contained areas	Exam	≥80%	
		Lists facility design elements and	Exam	≥80%	

		regulations that increase biosecurity			
		Identifies and reports a security incident	Exam	≥80%	
		Keeps a laboratory notebook	Inspection	demonstrates procedure over a 12 month period	
Demonstrates Knowledge of Bloodborne Pathogens		Lists main topics covered in the Exposure Control Plan	Exam	≥80%	
		Identifies common BBP	Exam	≥80%	
		Lists common ways that people are exposed to infectious organisms in the laboratory	Exam	≥80%	
		Lists common exposure control methods	Exam	≥80%	
		Identifies potentially infectious material	Exam	≥80%	
		Lists common symptoms of BBP disease	Exam	≥80%	
		Locates and reads emergency	Demonstration	Yearly review	

		response protocol			
		Works with all samples as if infectious	Demonstration	demonstrates procedure over a 12 month period	
		Uses pipette aid and does not mouth pipette	Demonstration	demonstrates procedure over a 12 month period	
		Disinfects bench tops and BSC surfaces	Demonstration	demonstrates procedure over a 12 month period	
		Uses sharps container	Demonstration	demonstrates procedure over a 12 month period	
		Lists other potentially infectious material worked with in the facility	Exam	≥80%	
	Demonstrates Knowledge of Chemical Hygiene	Lists main topics covered in the Chemical Hygiene Plan	Exam	≥80%	
		Properly stores chemicals	Demonstration	demonstrates procedure over a 12 month period	

		Stores only working dilutions on bench	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Separates acids and bases in storage cabinet	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Uses MSDS recommendations for disposal of assay chemicals	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Properly disposes of acids and bases after neutralization	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Uses fume hood to dilute acids, bases and other hazardous chemicals	Demonstration	demonstrates procedure over a 12 month period	
		Uses fume hood to measure acrylamide and SDS powder	Demonstration	demonstrates procedure over a 12 month period	
		Uses secondary containers to transport chemical hazards	Demonstration	demonstrates procedure over a 12 month period	
		Uses secondary containers to separate groups of liquid chemicals	Demonstration	demonstrates procedure over a 12 month period	

		Dates chemicals upon opening stock containers	Demonstration	demonstrates procedure over a 12 month period	
		Properly labels dilutions	Demonstration	demonstrates procedure over a 12 month period	
		Stores liquids below eye level	Demonstration	demonstrates procedure over a 12 month period	
		Locates MSDS sheets	Demonstration	demonstrates procedure over a 12 month period	
		Lists data contained in MSDS sheets	Exam	≥80%	
		Checks eyewash station weekly by activation	Demonstration	demonstrates procedure over a 12 month period	
		Understands when and how to use safety shower if available	Exam	≥80%	
		Describes time period for flushing eye or body site after chemical exposure	Exam	≥80%	

		Maintains a chemical inventory	Demonstration	demonstrates procedure over a 12 month period	
		Properly disposes of expired chemicals	Demonstration	demonstrates procedure over a 12 month period	
	Demonstrates Knowledge of Equipment Safety	Stores equipment according to directions	Demonstration	demonstrates procedure over a 12 month period	
		Regularly inspects equipment for safety problems prior to use	Demonstration	demonstrates procedure over a 12 month period	
	Demonstrates Knowledge of Exposure Control	Locates emergency spill response document in laboratory	Demonstration	Yearly review	
		Locates exposure control plan in laboratory	Demonstration	Yearly review	
		Locates and details necessary information on safety labels	Demonstration	Yearly review	
		Locates fire extinguishers	Demonstration	Yearly review	
		Locates eye wash station	Demonstration	Yearly review	
		Locates SOPs in laboratory	Demonstration	Yearly review	

		Locates algorithm for organism detection in laboratory	Demonstration	Yearly review	
		Demonstrates working knowledge of SOPs and algorithms	Demonstration	Yearly review	
<i>Suggested job titles are listed. Add a job title that is appropriate for your institution.</i>	<i>Add tasks as suggested by the job description.</i>	<i>Add or remove subtasks as appropriate. Use active verbs to describe each subtask.</i>	<i>Insert appropriate evaluation method. Suggested methods are inserted into the cells.</i>	<i>Insert appropriate degree for successful completion.</i>	<i>List biosafety document describing the associated theory or procedure</i>
Scientist	Demonstrates Knowledge of Biosafety Regulations	Assists in protocol-specific risk assessment	Exam or Demonstration	Yearly review	
		Trained in Respiratory Protection (as required)	Exam or Demonstration	Yearly review	
		Lists procedures for a Biological Spill Response	Exam or Demonstration	Yearly review	
		Lists main topics and details procedures in the Chemical Hygiene Manual	Exam or Demonstration	Yearly review	

		Lists topics and details procedures in the Laboratory Biosafety Manual	Exam or Demonstration	Yearly review	
		Lists topics in the Exposure Control Plan	Exam or Demonstration	Yearly review	
		Details procedures covered in the General requirements for handling pathogenic agents and toxins	Exam or Demonstration	Yearly review	
		Lists risk group associated with sample handling	Exam	Yearly review	
		Wears PPE suggested by protocol risk assessment	Demonstration	demonstrates procedure over a 12 month period	
	Demonstrates Knowledge of Aseptic Technique	Assures sterility of culture vessels before use	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Avoids cross contamination of material during manipulation	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Arranges workspace to flow from clean to dirty	Exam or Demonstration	demonstrates procedure over a 12 month period	

		Aseptically changes pipette tips	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Keeps tops of vessels closed except when in use	Demonstration	demonstrates procedure over a 12 month period	
		Decontaminates objects in contact with cultures	Demonstration	demonstrates procedure over a 12 month period	
		Uses flame on workbench	Demonstration	demonstrates procedure over a 12 month period	
		Does not use flame in BSC	Demonstration	demonstrates procedure over a 12 month period	
		Uses BSC when indicated by a risk assessment	Demonstration	demonstrates procedure over a 12 month period	
		Opens centrifuge rotor cups in BSC	Demonstration	demonstrates procedure over a 12 month period	
		Lists concept behind and follows Universal Precautions	Exam or Demonstration	demonstrates procedure over a 12 month period	

		Demonstrates ability to perform a risk assessment of assay protocol	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Selects and uses proper PPE for application	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Uses a splash pad to prevent aerosols	Demonstration	demonstrates procedure over a 12 month period	
		Demonstrates pipetting techniques that prevent aerosols	Demonstration	demonstrates procedure over a 12 month period	
		Demonstrates ability to decontaminate liquids by adding 10% bleach to waste	Demonstration	demonstrates procedure over a 12 month period	
		Separates biohazardous waste into labeled autoclave bags	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Separates sharps and disposes in sharps container	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Demonstrates proper biohazard labeling of samples	Exam or Demonstration	demonstrates procedure over a 12	

		and equipment		month period	
		Assures bleach solution is fresh before use	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Arranges workspace to flow from clean to dirty	Demonstration	demonstrates procedure over a 12 month period	
		Disinfects work area before and after work with organisms	Demonstration	demonstrates procedure over a 12 month period	
		Keeps doors of laboratory closed when working with organisms	Demonstration	demonstrates procedure over a 12 month period	
		Reports all spills and accidents	Demonstration	demonstrates procedure over a 12 month period	
		Demonstrates sequence for donning and doffing of PPE	Demonstration	demonstrates procedure over a 12 month period	
		Labels assay plates with hazard, experiment and researcher's name	Demonstration or Inspection	demonstrates procedure over a 12 month period	

Demonstrates Knowledge of Biosafety Cabinet (BSC) Use and Safety Procedures	Uses the BSC for operations that produce aerosols	Demonstration	demonstrates procedure over a 12 month period	
	Lists functions of the biosafety cabinet	Exam	≥80%	
	Lists limitations of the biosafety cabinet	Exam	≥80%	
	Performs pre-procedure cleaning and setup of the BSC	Demonstration	demonstrates procedure over a 12 month period	
	Maintains BSC free of clutter	Demonstration	demonstrates procedure over a 12 month period	
	Keeps necessary safety items (sharps containers, biohazardous waste containers, disinfectants, etc.) inside the BSC	Demonstration	demonstrates procedure over a 12 month period	
	Allows BSC to stabilize (at least 4 minutes) once all supplies and samples are inside before beginning	Demonstration	demonstrates procedure over a 12 month period	

		procedures			
		Maintains sash of biosafety cabinet at optimal level	Demonstration	demonstrates procedure over a 12 month period	
		Works with minimal hand movement in BSC	Demonstration	demonstrates procedure over a 12 month period	
		Maintains arms, equipment, and supplies off of front grille	Demonstration	demonstrates procedure over a 12 month period	
		Keeps samples 10 cm inside the front of the grille	Demonstration	demonstrates procedure over a 12 month period	
		Uses heat block instead of flame inside BSC (where applicable)	Demonstration	demonstrates procedure over a 12 month period	
		Uses vacuum line with hydrophobic filter inserted	Demonstration	demonstrates procedure over a 12 month period	
		Lists emergency procedure for exit out of and shut down of BSC	Exam	demonstrates procedure over a 12 month period	

		Decontaminates outside container and removes everything from inside BSC and performs post-procedure cleanup	Demonstration	demonstrates procedure over a 12 month period	
		Performs daily, and weekly/monthly scheduled cleaning of the BSC	Demonstration	demonstrates procedure over a 12 month period	
		Decontaminates objects placed in the biosafety cabinet	Demonstration	demonstrates procedure over a 12 month period	
		Maintains weekly maintenance schedule	Exam or Demonstration	demonstrates procedure over a 12 month period	
		Relates functional operations of the BSC to safe working procedures	Demonstration	demonstrates procedure over a 12 month period	
		Demonstrates BSC setup for work	Demonstration	demonstrates procedure over a 12 month period	
		Reads and records Magnehelic gauge	Demonstration	demonstrates procedure over a 12 month period	

		Works from clean to dirty in the biosafety cabinet keeping approximately a 30 cm distance between clean media and cultures	Demonstration	demonstrates procedure over a 12 month period	
		Defines HEPA Filter function	Exam	≥80%	
		Locates HEPA filter and BSC certification records	Exam	≥80%	
		Decontaminates workstation after completion of work	Demonstration	demonstrates procedure over a 12 month period	
		Removes PPE and stores in laboratory after work	Demonstration	demonstrates procedure over a 12 month period	
Demonstrates Knowledge of Institute Gloves Use Procedures		Wears one, or two, new fitting pair(s) of gloves when established by protocol and/or risk assessment	Exam / Demonstration	demonstrates procedure over a 12 month period	
		Understands the effects of caustic cleaners and chemicals (i.e., alcohol, bleach, etc.) on glove fibers	Exam	≥80%	

		Replaces gloves if they become torn, contaminated, soiled, or otherwise unusable	Demonstration	demonstrates procedure over a 12 month period	
		Replaces gloves between sample sets, and when inoculating different microbiological organisms	Demonstration	demonstrates procedure over a 12 month period	
		Does not wear gloves to manipulate or open common equipment (i.e. keyboard, telephone, door knob), or in common hallways and passages	Demonstration	demonstrates procedure over a 12 month period	
		While double gloved and inside the BSC, removes the outer pair of gloves and decontaminates the inner pair with disinfectant before removing hands from the BSC	Demonstration	demonstrates procedure over a 12 month period	

		Only disposes of used gloves in biohazard container	Demonstration	demonstrates procedure over a 12 month period	
		While double gloved and inside the BSC, only disposes of used gloves in biohazard container inside the BSC	Demonstration	demonstrates procedure over a 12 month period	
		While working inside the BSC, only disposes of used gloves in biohazard container inside the BSC	Demonstration	demonstrates procedure over a 12 month period	
		Performs a risk assessment prior to work that requires using a needle or sharp object	Exam or Demonstration	demonstrates procedure over a 12 month period	
	Management	Correlates spore strip results with chemical strip monthly to assure proper autoclave function	Inspection	Yearly review	
		Keeps track of training requirements and attends yearly retraining	Inspection	Yearly review	

		Maintains equipment	Demonstration	demonstrates procedure over a 12 month period	
<i>Suggested job titles are listed. Add a job title that is appropriate for your institution.</i>	<i>Add tasks as suggested by the job description.</i>	<i>Add or remove subtasks as appropriate. Use active verbs to describe each subtask.</i>	<i>Insert appropriate evaluation method. Suggested methods are inserted into the cells.</i>	<i>Insert appropriate degree for successful completion.</i>	<i>List biosafety document describing the associated theory or procedure.</i>
Clinical Laboratory Manager	Medical Surveillance and Epidemiology Knowledge Responsibilities	Lists case definitions for suspect and confirmed cases	Exam	≥80%	
		Lists Epidemiology of Disease corresponding to the organism(s) detected in the laboratory	Exam	≥80%	
		Lists local vaccines available for laboratory organisms in laboratory	Exam	≥80%	
		Works with biosafety officer to keep laboratory personnel current on required	Demonstration	Yearly review	

		vaccines			
		Lists average number of infectious organisms required for infection by organisms	Exam	≥80%	
		Lists natural route(s) and known LAI routes of infection of organisms	Exam	≥80%	
		Details accounts of LAI cases associated with organisms	Exam	≥80%	
		Lists risk group classifications for all organisms worked with in the facility	Exam	≥80%	
		Lists locations of endemic diseases	Exam	≥80%	
		Lists national epidemiological definitions for disease outbreak for all diseases	Exam	≥80%	
		Lists diseases that have potential as bioweapons	Exam	≥80%	

		List common symptoms of disease caused by exposure to EDPs and Bloodborne pathogens	Exam	≥80%	
		Collaborates with Biosafety Officer to maintain medical records of employees	Demonstration	Yearly review	
		Coordinates Incident Response Training	Demonstration and Inspection	Yearly review	
		Coordinates with local emergency response teams	Demonstration and Inspection	Yearly review	
		Coordinates supplies for incident response	Demonstration and Inspection	Yearly review	
		Lists differences between endemic and epidemic disease	Exam	Yearly review	
		Lists local endemic diseases and their geographic locations in country	Exam	≥80%	
		Lists common epidemic diseases in country	Exam	≥80%	
		Lists emerging infectious diseases	Exam	≥80%	

		in country			
		Lists case definitions for suspect and confirmed cases	Exam	≥80%	
	Chemical Safety Responsibilities	Responsible for maintenance of chemical inventory list for chemicals in the laboratory	Demonstration / Inspection	Yearly review	
		Responsible for maintenance of MSDS sheets in the laboratory	Demonstration / Inspection	Yearly review	
		Responsible for insuring that laboratory personnel follow MSDS recommendations	Demonstration / Inspection	Yearly review	
		Responsible for collaborating with the safety officer to write emergency response protocols for chemical spills in the laboratory	Demonstration / Inspection	Yearly review	
		Lists signs and symptoms of exposure to hazardous chemicals in the	Exam	≥80%	

		laboratory			
		Disposes of chemicals from the laboratory as biohazardous waste	Exam	≥80%	
		Lists permissible limits of toxic chemicals used in the laboratory	Exam	≥80%	
	Biological Safety Responsibilities	Responsible for collaborating with the biosafety officer to write emergency response protocols for biological spills in the laboratory	Demonstration / Inspection	Yearly review	
		Responsible for hazard communication and signage in the laboratory	Demonstration / Inspection	Yearly review	
		Interfaces with biosafety committee on scientific procedures conducted in the laboratory	Demonstration / Inspection	Yearly review	
		Lists algorithm for assays conducted in laboratory	Demonstration / Inspection	Yearly review	

		Defines sample and culture storage conditions	Inspection	Yearly review	
		Lists QC tests and testing schedules for assay controls used in the laboratory	Demonstration / Inspection	Yearly review	
	Training Responsibilities	Instructs laboratory personnel in spill response protocols	Demonstration / Inspection	Yearly review	
		Trains laboratory personnel in the labeling of samples, assay plates and centrifuge tubes		Yearly review	
		Trains laboratory personnel in the labeling of chemical solutions	Demonstration / Inspection	Yearly review	
		Retrains personnel in biosecurity within the laboratory	Demonstration / Inspection	Yearly review	
		Serves as in-lab mentor of good microbial techniques and biosafety practices	Demonstration / Inspection	Yearly review	
		Trains personnel in safety aspects of all equipment used in the laboratory	Demonstration / Inspection	Yearly review	

		Instructs laboratory personnel in safe packaging and package receiving protocol	Demonstration / Inspection	Yearly review	
		Uses Biosafety Task Lists to advance biosafety in the laboratory	Demonstration / Inspection	Yearly review	
		Trains personnel in decontamination of infectious agents used in the laboratory	Demonstration / Inspection	Yearly review	
		Collaborates with Biosafety Officer to maintain biosafety training required by personnel in the laboratory	Demonstration / Inspection	Monthly inspection	
	Security Responsibilities	Identifies actions by laboratory personnel that could compromise security	Demonstration / Inspection	Monthly inspection	
		Identifies personnel entering the laboratory who could compromise laboratory security	Exam / Inspection	≥80%	
		Coordinates with biosafety on restricted laboratory	Exam / Inspection	≥80%	

		entry			
Risk Assessment Responsibilities	List differences between organism risk group and biosafety level	Demonstration	Monthly inspection		
	Conducts protocol risk assessment when there is a change in procedure or personnel	Demonstration	Yearly review		
	Coordinates with safety officer on PPE required for assay	Exam	≥80%		
Biosafety Management Responsibilities	Informs biosafety when there is a change in protocol or procedure	Demonstration / Inspection / Exam	Yearly review		
	Implements biosafety policies as directed by the biosafety committee or biosafety officer	Demonstration / Inspection / Exam	Yearly review		
	Inspects equipment for problems that may compromise safety	Demonstration / Inspection	Yearly review		
	Supports Biosafety Officer in safety inspections	Demonstration / Inspection	Monthly inspection		

		Follows up on biosafety officer recommendations after a laboratory inspection	Demonstration / Inspection	Monthly inspection	
		Identifies biohazards and applies biohazard signs on equipment that may contain biohazards	Demonstration / Inspection	Monthly inspection	
		Responds to laboratory incident reports	Demonstration / Inspection	Monthly inspection	
		Communicates incidents to Senior management, Laboratory Director and Biosafety Officer	Demonstration / Inspection	Monthly inspection	
		Maintains emergency spill response current for laboratory	Demonstration / Inspection	Monthly inspection	
		Implements exposure control plan	Demonstration / Inspection	Monthly inspection	
		Ensures bleach solution is correctly diluted and fresh	Demonstration / Inspection	Monthly inspection	
		Maintains autoclave	Demonstration / Inspection	Monthly inspection	

	Records actions taken to address spore test failure	Demonstration / Inspection	Monthly inspection	
	Keeps printout sheet of autoclave cycles	Demonstration / Inspection	Monthly inspection	
	Lists laboratory test report logic for all diseases	Exam	≥80%	
	Troubleshoots problems with organism assays	Demonstration	Demonstration over time	
	Verifies quality controls for assays	Demonstration	Yearly review	
	Promotes a safety culture by supporting and promoting safety at a leadership level	Demonstration	Yearly review	
	Follows and corrects problems identified in an inspection	Demonstration	Yearly review	
	Maintains and revises safety documents	Demonstration / Inspection	Yearly review	
	Collaborates with BSO in interpretation and of national and international regulations	Demonstration	Biosafety Committee participation	

		Supports BSO in defining institute-wide biosafety procedures and practices	Demonstration / Inspection	Biosafety Committee participation	
		Member of the Institutional Biosafety Committee	Demonstration	Biosafety Committee participation	
		Approves requests for storage of organisms collected in the program	Demonstration / Inspection	demonstration over time	
		Maintains records of diagnostic research	Demonstration / Inspection	demonstration over time	
		Maintains a copy of the facility risk assessment	Demonstration / Inspection	demonstration over time	
		Supports security procedures outlined in the institutional biosecurity manual	Demonstration	demonstration over time	
		Reviews requests for visiting researchers to enter the laboratories	Demonstration	demonstration over time	
		Reviews biological research proposals	Demonstration	Biosafety Committee participation	

		Assures that research proposals are reviewed by the Institutional Biosafety Committee	Demonstration	Biosafety Committee participation	
		Acts to complete recommendations of the Institutional Biosafety Committee	Demonstration	demonstration over time	
	Shipping Responsibilities	Lists Category A and B infectious substances	Demonstration / Inspection	Yearly review	
		Lists shipping requirements for diagnostic samples	Exam	≥80%	
<i>Suggested job titles are listed. Add a job title that is appropriate for your institution.</i>	<i>Add tasks as suggested by the job description.</i>	<i>Add or remove subtasks as appropriate. Use active verbs to describe each subtask.</i>	<i>Insert appropriate evaluation method. Suggested methods are inserted into the cells.</i>	<i>Insert appropriate degree for successful completion.</i>	<i>List biosafety document describing the associated theory or procedure</i>
Biosafety Officer	Demonstrates Knowledge of Biosafety Procedures	Familiar with Institute General biosafety training	Exam	≥80%	
		Familiar with BMBL guidelines	Exam	≥80%	

		Familiar with WHO laboratory biosafety manual	Exam	≥80%	
		Familiar with national biosafety regulations	Exam	≥80%	
		Familiar with chemical hygiene plan	Exam	≥80%	
		Familiar with biosafety and biosecurity SOPs	Exam	≥80%	
		Lists practices included in standard microbial practices and technique	Exam or Demonstration	≥80%	
		Lists applications of assessment and risk mitigation techniques	Exam or Demonstration	≥80%	
		Defines biosafety training requirements and continuing education schedules for laboratory and administrative personnel	Exam or Inspection	Semi annual review	
		Lists entry and exit procedures for the institute	Exam or Demonstration	Yearly review	

		Lists procedures in spill response	Exam or Demonstration	Semi annual review	
		Lists pathogens that are contained in the institute and the medical signs and symptoms of disease associated with those pathogens	Exam or Inspection	Yearly review	
		List natural routes of exposure for Institute laboratory pathogens	Exam	≥80%	
		Lists most common exposure routes for laboratory acquired infections (LAI)	Exam	≥80%	
		Lists procedures in emergency response to a possible exposure	Exam or Demonstration		
		Lists procedure in a response to a confirmed (LAI)	Exam	≥80%	
		Lists main topics in the Institutional Biosafety Plan	Exam	≥80%	
		Lists main topics covered in the Institute Exposure Control Plan	Exam	≥80%	

		Lists main topics and regulatory aspects of the Respiratory Protection Plan	Exam	≥80%	
		Lists procedures to follow in case of an incident	Exam	≥80%	
		Lists main topics and procedures to follow in the Institute Medical Surveillance Plan	Exam	≥80%	
		List procedures to follow in case of a lost sample or culture	Exam	≥80%	
		Applies biosafety procedures to working practices in the laboratory	Demonstration	Monthly review	
	Demonstrates Knowledge of Disinfection Techniques used in Institute	Lists types of disinfectants and the concentrations necessary for cleaning of laboratory surfaces	Exam or Demonstration	≥80%	
Lists the steps necessary to decontaminate liquid waste with bleach		Exam or Demonstration	≥80%		

		Lists the steps in formaldehyde decontamination of the BSC or a room	Exam or Demonstration	≥80%	
		Demonstrates how to program and run the autoclave	Exam or Demonstration	≥80%	
		Lists common run conditions for the autoclave	Exam or Demonstration	≥80%	
		Lists the steps to follow to incinerate biohazardous waste	Exam or Demonstration	Monthly review	
		Oversees decontamination of equipment scheduled for repair or decommissioning	Exam or Demonstration	Monthly review	
	Biosafety Quality Management Requirements	Discusses biosafety protocols and procedures with biosafety manager or administration when appropriate	Demonstration	Monthly review	
		Trains laboratory staff in biosafety regulations and requirements	Demonstration or Inspection	Monthly review	
		Discusses violations of biosafety protocols or procedures with	Demonstration or Inspection	Monthly review	

	staff			
	Discusses repetitive violations of protocols or procedures with biosafety manager or administration when appropriate	Demonstration or Inspection	Yearly review	
	Involves administration in biosafety decisions	Demonstration	Yearly review	
	Supports biosafety compliance within the laboratory	Demonstration	Monthly review	
	Inspects sample labeling and storage for compliance with biosafety regulations	Demonstration or Inspection	Monthly review	
	Keeps medical and training records for all employees	Demonstration or Inspection	Yearly review	
	Monitors employees health	Demonstration or Inspection	Monthly review	
	Keeps vaccine records current	Demonstration or Inspection	Yearly review	
	Discusses biosafety protocols and procedures with Administration	Demonstration	Yearly review	

		Trains entry level BSOs in biosafety regulations and requirements	Demonstration	Monthly review	
		Discusses violations of biosafety protocols or procedures with staff	Demonstration / Inspection	Monthly review	
		Involves administration in biosafety decisions	Demonstration / Inspection	Monthly review	
		Applies Plan/Do/Check/Act continual improvement procedures to all biosafety management documents		Monthly review	
	Biosecurity Requirements	Keeps signage on entry doors current	Demonstration or Inspection	Monthly review	
		Oversees entry of maintenance personnel into the laboratory areas	Demonstration or Inspection	demonstration over time	
		Oversees entry of visitors, including visiting scientists, into the laboratory areas	Demonstration or Inspection	demonstration over time	
Inspection Responsibilities	Schedules regular laboratory	Demonstration or Inspection	Monthly review		

		inspections			
		Informs administration on necessary engineering changes to improve biosafety	Demonstration or Inspection	demonstration over time	
		Informs administration on necessary facility changes to improve biosafety	Demonstration or Inspection	demonstration over time	
		Informs laboratory managers on necessary procedure changes to improve biosafety	Demonstration or Inspection	demonstration over time	
		Inspects for problems with chemical storage, labeling and usage	Demonstration or Inspection	Monthly review	
		Conducts regular safety drills	Demonstration or Inspection	Semi annual review	
		Assures transport of materials and movement of personnel in the laboratory area meets safety requirements	Demonstration or Inspection	demonstration over time	

	Training Responsibilities	Trains scientists within the institute in biosafety concepts using didactic materials	Demonstration or Inspection	Monthly review	
		Trains scientists within the institute in biosafety concepts using approved proficiency level exams and task lists	Demonstration or Inspection	Semi annual review	
		Performs Risk assessment of protocols with appropriate laboratory managers	Demonstration or Inspection	demonstration over time	
		Performs Risk assessment of laboratory equipment with appropriate laboratory managers	Demonstration or Inspection	demonstration over time	
		Maintains facility risk assessment forms	Demonstration or Inspection	Semi annual review	
		Trains staff on risk management procedures identified by the institute biosafety	Demonstration or Inspection	demonstration over time	

		manual in the risk assessment			
		Works with laboratory staff on good microbial techniques and practices	Demonstration or Inspection	demonstration over time	
		Works with laboratory staff on aseptic techniques	Demonstration or Inspection	demonstration over time	
		Works with laboratory staff on donning and doffing of PPE	Demonstration or Inspection	demonstration over time	
		Works with laboratory staff on donning and doffing of required respirators	Demonstration or Inspection	demonstration over time	
		Trains visiting scientists on entry and exit protocols	Demonstration or Inspection	demonstration over time	
		Trains visiting scientists on necessary biosafety procedures	Demonstration or Inspection	demonstration over time	
		Informs visiting scientists of PPE requirements	Demonstration or Inspection	demonstration over time	

		Uses Biosafety Task Lists for hands-on laboratory training	Demonstration or Inspection	demonstration over time	
		Instructs laboratory managers in the use of Task Lists	Demonstration or Inspection	demonstration over time	
		Interfaces between the biosafety committee and administration	Demonstration / Inspection	Monthly review	
		Interfaces between the biosafety committee and laboratory managers	Demonstration / Inspection	Monthly review	
		Defines responsibilities of laboratory managers based on biosafety committee decisions	Demonstration / Inspection	Monthly review	
		Defines responsibilities of members of the safety committee	Inspection	Monthly review	
		Designs biosafety research to be conducted in the institution	Demonstration / Inspection	Yearly review	
		Assists QA manager in internal	Demonstration / Inspection	Monthly review	

		proficiency testing			
		Conducts biosafety audits	Demonstration / Inspection	demonstration over time	
		Assists government officials in biosafety audits of institutions	Demonstration / Inspection	demonstration over time	
		Reports inspection findings to institute	Demonstration / Inspection	demonstration over time	
		Adapts respiratory protection manual to institute needs	Demonstration / Inspection	Yearly review	
		Reviews and revises Biosafety Task Lists for personnel	Demonstration	Yearly review	
		Instructs BSOs and laboratory managers on Biosafety Task List training, biosafety performance reviews and using Task Lists for safety inspections	Demonstration	Yearly review	
	Designs and manages the biosafety program for the institute	Writes/Reviews the institute biosafety manual	Demonstration	Yearly review	
		Assists in biosafety	Demonstration	Monthly	

		committee		review	
		Assists in IACUC committee	Demonstration	Monthly review	
		Interfaces with institute quality manager	Demonstration	As needed	
		Interfaces with institute laboratory managers	Demonstration	As needed	
		Interfaces with institute institute director	Demonstration	As needed	
	Develops biosafety policy for the Institute	Develop and support a biosafety program in institute	Demonstration	Yearly review	
		Defines the purpose and scope of the institute biosafety manual	Demonstration / Inspection	Yearly review	
		Define the regulatory agencies involved in biohazard regulation in institution	Demonstration / Inspection	Yearly review	
		Define local regulators of biological research	Demonstration / Inspection	Yearly review	
		Defines biosafety and biosecurity responsibilities within the institute	Demonstration / Inspection	Yearly review	

		Defines training requirements and continuing education schedules	Demonstration / Inspection	Yearly review	
		Defines organisms stored or used within the facility	Demonstration / Inspection	Yearly review	
		Collaborates with Biosafety committee to define the biosafety levels for the laboratories based on the facility and equipment in the institute	Demonstration / Inspection	Yearly review	
		Defines institute procedures for receiving samples	Inspection	Yearly review	
		Defines institute procedures for shipping samples	Inspection	Yearly review	
		Outlines responsibilities for biosafety management and procedures in the institute	Inspection	Yearly review	
		Defines sterilization, disinfection and disposal procedures	Inspection	Yearly review	
		Outlines roles and responsibilities in	Inspection	Yearly review	

	the respiratory protection program			
	Outlines institute emergency procedures and policies	Demonstration / Inspection	Yearly review	
	Coordinates international and national biosafety laws into defined rules and regulations for the institute	Inspection	Yearly review	
	Defines the requirements for biosafety committee membership	Inspection	Yearly review	
	Defines the purpose and scope of the committee	Inspection	Yearly review	
	Defines the requirements for submissions to the committee	Inspection	Yearly review	
	Trains biosafety committee members	Demonstration / Inspection	Yearly review	
	Chairs biosafety committee meetings	Inspection	Yearly review	
	Keeps meeting minutes	Inspection	Monthly review	

	Research Responsibilities	Adapts training for cleaning, disinfecting, storing, inspecting, repairing and discarding respirator or filters to institute	Demonstration / Inspection	Monthly review	
		Recommends institutional standards for assessing air quality and flow for recommendation of respirator based on national or international guidelines	Demonstration / Inspection	Yearly review	
	Audit Responsibilities	Lists medical signs and symptoms that would limit respirator use	Exam	≥80%	
		Lists personal habits that can interfere with respirator function	Exam	≥80%	
		Advises on conditions within the institute that require respiratory protection	Demonstration or Inspection	As needed	

	Respiratory Protection Program Responsibilities	Assists or conducts training for laboratory personnel	Demonstration or Inspection	Yearly review	
		Understands adult education principles	Exam	≥80%	
		Designs and coordinates training sessions for entering biosafety officers	Demonstration	As needed	
		Collaborates with international trainers in biosafety	Demonstration	As needed	
		Collaborates with international researchers in biosafety	Demonstration	As needed	
		Conducts management level training classes for biosafety officers and laboratory managers	Demonstration	Yearly review	