



**IBCs:
Promoting Optimal Practice Now
and in the Future
Biosafety Training for
High Containment Researchers**

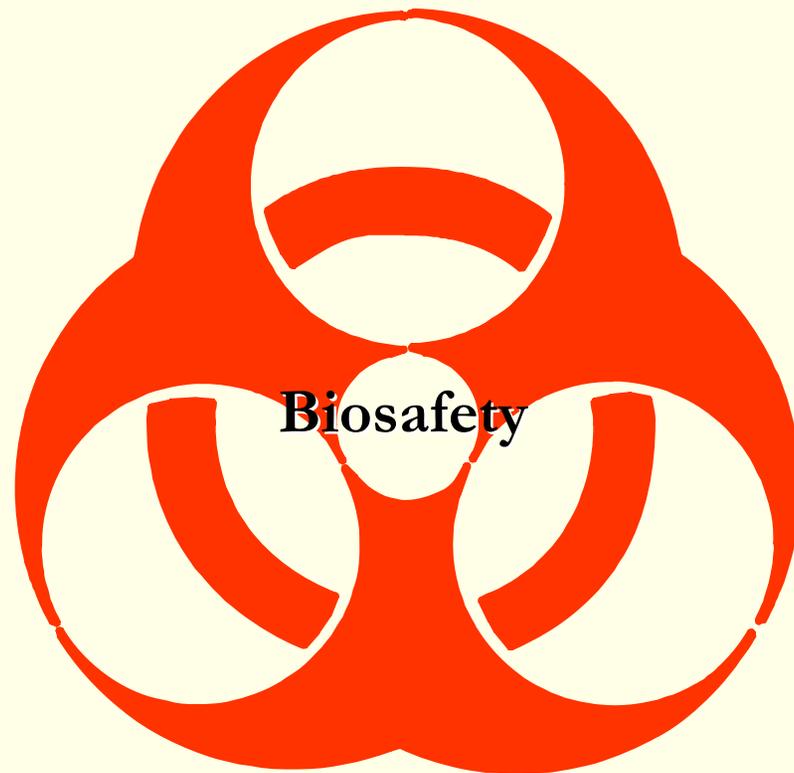
Joe Kanabrocki, Ph.D., C.B.S.P.

University of Chicago

Great Lakes RCE

June 25, 2009

Universal Biohazard Symbol



Biological Terrorism



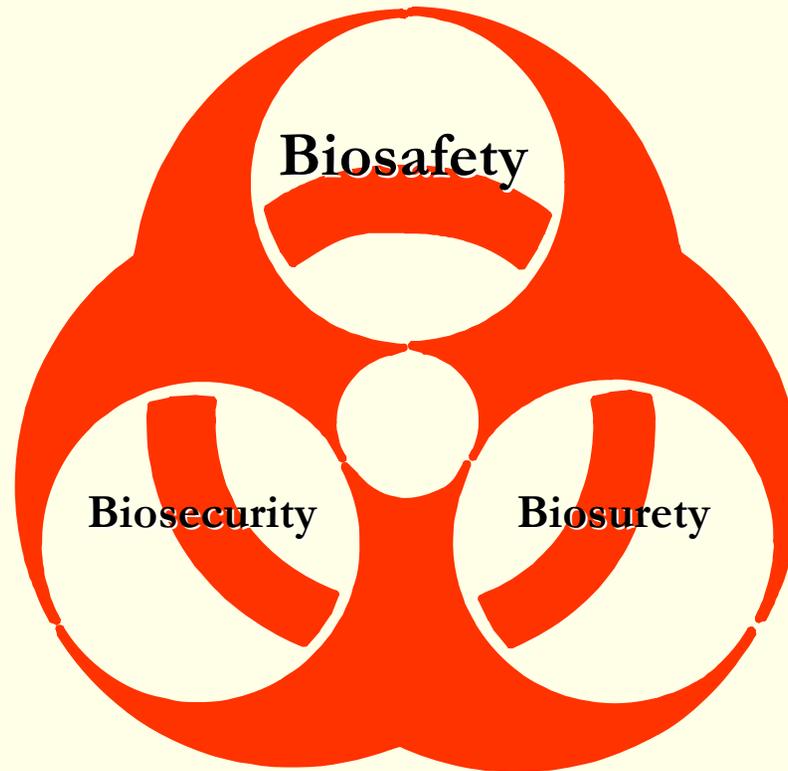
Emerging Diseases



Combating Ebola epidemic in Congo

Examples of new and reemerging diseases.

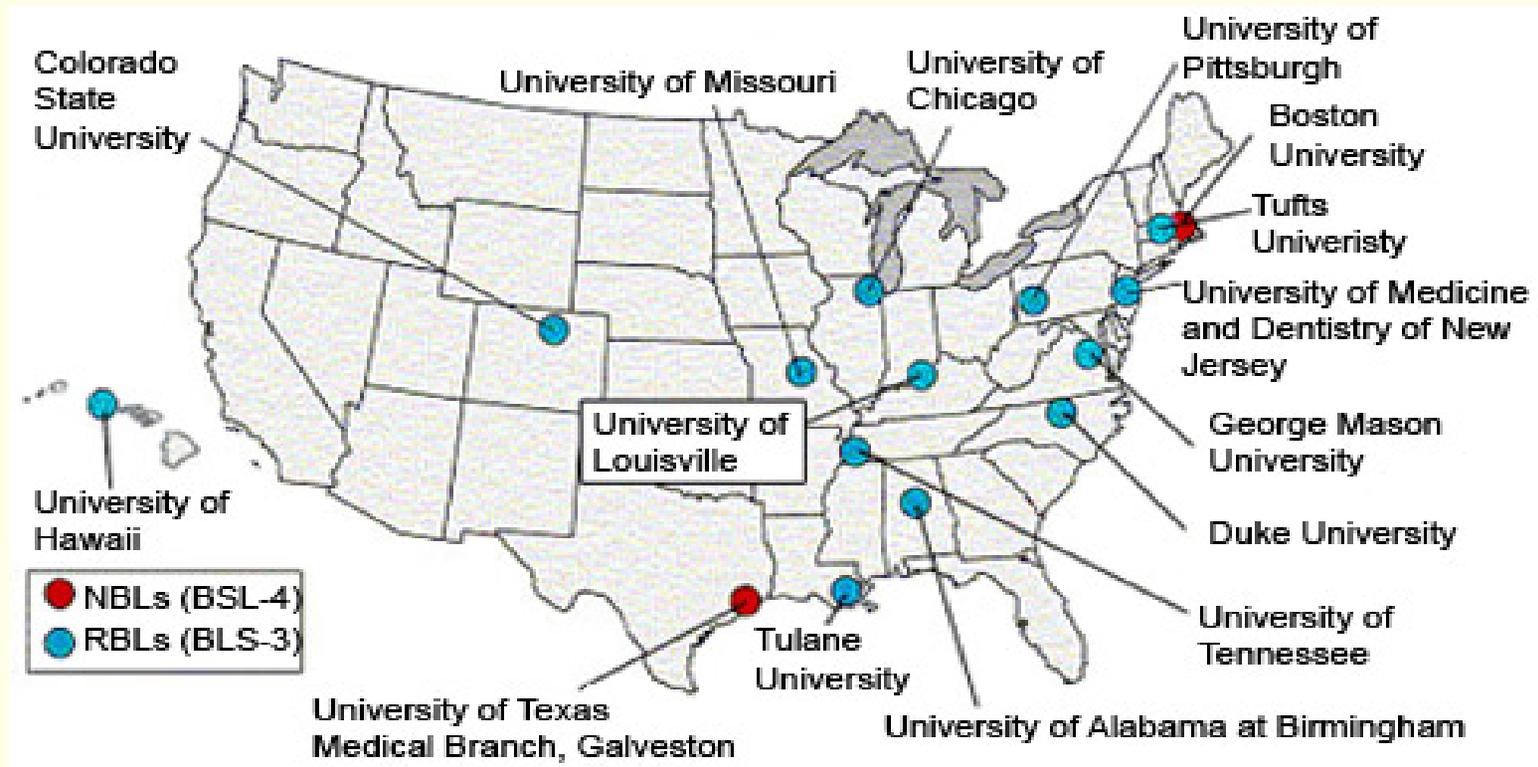
BioSAFETY Post-9/11



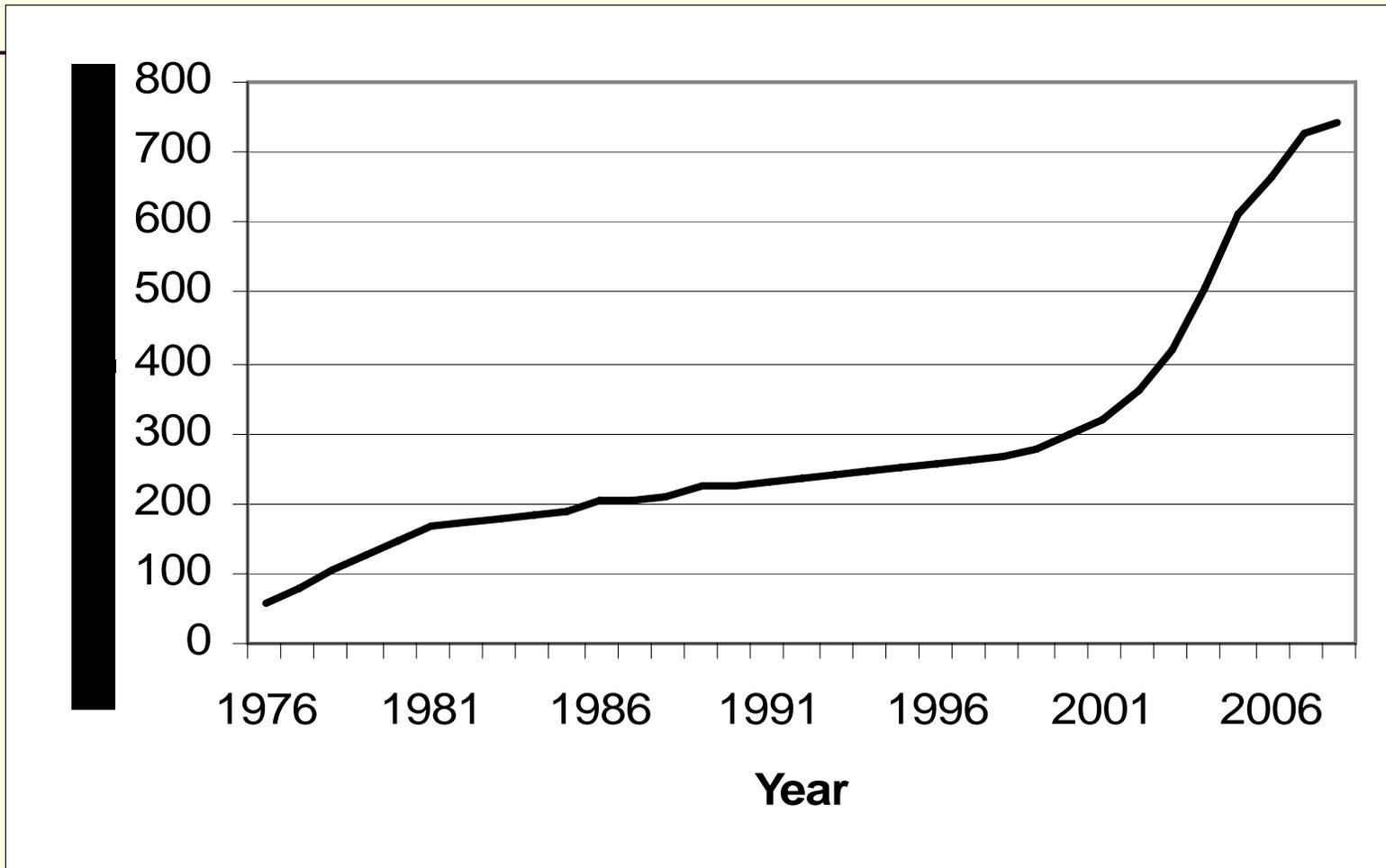
Expansion of Containment Laboratories

- Before 2001:
 - only a handful of BSL4 labs
 - NIH, CDC, USAMRIID, ?
- As of 2008:
 - 13 BSL4 labs on 11 sites
 - 1356 BSL3 labs registered with CDC/APHIS Select Agent Programs
 - 336 registered entities
 - 14,612 registered lab researchers and support staff

NIAID National (2) and Regional (13) Biocontainment Labs



Growing Prevalence of IBCs



Biosafety Training Programs in the U.S.

Berger, Frankel, Luke, Sta.Ana (AAAS, 2009)

Agency/ Institution	Program Title	Program Objectives	Format
American Association for Laboratory Animal Science	AALAS Learning Library	The Animal Care and Use Library has courses on certification, regulatory mandates, bioethics, biomethodologies, biosafety, and management.	On-Line Modules
American Biological Safety Association	Working at Animal BSL-1, BSL-2, BSL-3	Training in worker safety and laboratory practices when working with animals	Online videos
American Biological Safety Association	Principles & Practices in Biosafety	Describe potentially hazardous biological materials, the risks associated with their use, and the means to minimize risk and to protect against or prevent release or exposure; discuss ways to provide technical expertise in situations involving potentially hazardous biological materials; and identify, locate, and efficiently use key biosafety resources.	Five-day, Forty-hour biosafety course

Biosafety Training Programs in the U.S. (con't)

Berger, Frankel, Luke, Sta.Ana (AAAS, 2009)

Agency/ Institution	Program Title	Program Objectives	Format
American Biological Safety Association	Spring Seminar and Review Course	Understand 65 biological safety task areas that will be covered in the exam; review all critical subject matter under each of the tasks; provide an overview of regulations and critical biological safety reference materials with which they must be familiar; recognize the exam structure and format based on topics covered, create awareness of specific subject areas	Two-day, Sixteen hour course
Centers for Disease Control and Prevention	Laboratory Biosecurity	Differentiate biosafety and biosecurity, conduct risk assessment, develop biosecurity plan	Online modules
Colorado State University	Biosafety and Biosecurity Training Course	Training in general biosafety and biosecurity, training in animal and plant handling	Eight-day classroom workshop

Biosafety Training Programs in the U.S. (con't)

Berger, Frankel, Luke, Sta.Ana (AAAS, 2009)

Agency/ Institution	Program Title	Program Objectives	Format
Control of Biohazards, Inc	Control of Biohazards in the Research Laboratory	Introduction to biosafety for new biosafety professionals, researchers and lab managers	Five day course with lab activity
Department of Health and Human Services	Integrated Medical, Public Health, Preparedness and Response Training Summit	Skills development, knowledge enhancement, and information sharing	Lecture sessions followed by question and answer sessions
Eagleson Institute	Custom courses, seminars, and conferences	Various biosafety and biosecurity concepts	Varies
Emory University	ALERT Training Program BSL-2, BSL-3, BSL-4	Strengthen internal relationships and partnerships with first responders	Onsite customized training
Emory University	Behavioral-Based Biosafety Trainer Preparation Program	Training in laboratory practices and safety concerns for appropriate lab safety level	Five-day classroom and laboratory course
Emory University/Elizabeth R Griffin Research Foundation	Leadership Institute for Biosafety Professionals	Training trainers, building leadership skills	Four-day workshop
Frontline Healthcare Worker Safety Foundation	On-Site Training	Biosafety, Biosecurity, Laboratory practices, Animal, bio	Client site, Custom
Lovelace Respiratory Research Institute	BSL-3 & ABSL-3 Training	Provide scientific, technical, animal care, facilities, and security staffs with knowledge and skills for level 3 work	Forty-hours, lectures and practicum exercises



Biosafety Training Programs in the U.S. (con't)

Berger, Frankel, Luke, Sta.Ana (AAAS, 2009)

Agency/ Institution	Program Title	Program Objectives	Format
Midwest Research Institute - Center for Biological Safety and Security (CBS2)	National and International training programs in Biological Safety and Security Principles and Practices; Compliance with established standards and regulations; Biosafety Levels 3 and 4 and Animal Biosafety Level 3.	Tailored awareness and skill-based training in biological safety and security principles and practices.	On-site classroom laboratory- based and field site; Train-the- trainer.
National Institutes of Health/Frontline Healthcare Worker Safety Foundation	National Biosafety & Biocontainment Program	Operations & Maintenance or Biosafety & Biocontainment Certificate	Ten courses, final project, work practicum
National Institutes of Health/Frontline Healthcare Worker Safety Foundation	National Biosafety & Biocontainment scholarship	Prepare biosafety and biocontainment professionals	Two-year scholarship
Sandia National Laboratory	International Biological Threat Reduction	Teach scientists, managers, and policy makers on importance of biosafety and biosecurity	Scheduled workshops and meetings

Biosafety Training Programs in the U.S. (con't)

Berger, Frankel, Luke, Sta.Ana (AAAS, 2009)

Agency/ Institution	Program Title	Program Objectives	Format
University of Chicago	GLRCE Cognitive and Practical Biosafety Education	Train researchers in latest biosafety principles and practices	Four-day classroom and laboratory course
University of Texas Medical Branch	Laboratory Biosafety Training Program	Establish base of laboratory skills and apply biosafety principles	Lectures and practicum courses
Washington University in St. Louis	MRCE Biosafety for the Research Scientist	Train researchers in latest biosafety principles and practices	Five-day classroom and laboratory course



The RCE Beginning: The RFA

- **REGIONAL CENTERS OF EXCELLENCE FOR BIODEFENSE AND EMERGING INFECTIOUS DISEASES RESEARCH (RCE)**
- **RELEASE DATE:** August 1, 2002
- **RFA:** AI-02-031
- **National Institute of Allergy and Infectious Diseases (NIAID)**
- **LETTER OF INTENT RECEIPT DATE:**
 - November 15, 2002
- **APPLICATION RECEIPT DATE:**
 - January 15, 2003



Regional Centers of Excellence



Original RCE Strategic Goals

To accomplish this the Centers will receive support to:

- 1) to develop and conduct programs of investigator- directed research;
- 2) **to train researchers and other personnel for biodefense activities;**
- 3) **to develop and maintain comprehensive core facilities to support the research and training activities of the RCE;**
- 4) to develop translational research capacity for testing and validating vaccine, therapeutic and diagnostic concepts for biodefense and emerging infectious diseases;
- 5) **to maintain and make available core facilities and other support to qualified investigators from academia, biotech companies, the pharmaceutical industry, and other appropriate entities in the region for the purpose of performing basic research and for testing and evaluating vaccines, therapeutics and diagnostics for CDC Category A-C Agents;**
- 6) **to be ready and available to provide facilities and scientific support to first-line responders in the event of a national biodefense emergency.**



Career Development Projects

“The RCE must include a consistent and significant commitment to career development **with the goal of increasing the availability of researchers for biodefense.....** The training must be an integral part of the strategic plan, and complement the research activities. The long-range goal of the training component is development of an **expanded cadre of new researchers, clinicians, and technical personnel** who can help lead the national biodefense mission into the future.”

WHAT ABOUT BSO's?
What about facility operations?



GLRCE Biosafety Training Core

- **Integrated approach to Biosafety education**
 - coordinating and synergizing the educational experiences for research investigators and support staff, Biosafety professionals and biocontainment facility engineers.
- **Didactic and hands on training** in all areas of the safe use of pathogenic microorganisms at BSL3 and ABSL3, including Select Agents.
- **Synergistic Involvement of the University of Chicago Howard T. Ricketts Regional Biocontainment Laboratory (HTRL) at Argonne National Laboratories**
- **Biosafety scholarship program**
 - Will train scientist yearly to become biosafety officers, capable of establishing and supervising biosafety programs, with focus on high containment facilities.
 - Biosafety scholars will be expected to: (1) **assist with the preparation and delivery of Biosafety training courses and resources**, and (2) **contribute to GLRCE research endeavors in areas of applied Biosafety research** (e.g aerosol biology/biosafety) via collaboration with other GLRCE investigators, particularly investigations conducted at the HTRL.
- **Engineering internship**
 - Will be provided to facility engineers and maintenance staff responsible for the operation and maintenance of the physical infrastructure needed for BSL3 and ABSL3 research activities, particularly the NBLs and RBLs.
 - **Takes advantage of the HTRL laboratory and GLRCE infrastructure.**



GLRCE
Biosafety Training
Core

Biosafety Course
(Group Development
Program)

Individual Career
Development
Program

Biosafety
Scholarship
(PhD, DVM, MD)

Engineering
Internship

Cognitive and Practical Biosafety Education for Host-Pathogen Investigators

Joseph Kanabrocki, Lauriane Quenee, Nancy Ciletti, John Bivona, Lois Zitzow

	Monday, Feb. 18	Tuesday, Feb. 19	Wednesday, Feb. 20	Thursday, Feb. 21
8:00 - 8:30	Welcome & Introductions Joe Kanabrocki	Primary and Secondary Containment: BSC Selection & Use John Bivona & Joe Kanabrocki	NBBTP Biosafety Training John Tonkiss	Biological Toxins Bob Hawley
8:30 - 9:00	Safe Science is Good Science (or variation) Jim Welch			
9:00 - 9:30		(1) Biological Containment/Properties of Biological Agents (2) Risk Assessment of Biological Agents (2) LAI Epidemiology/ Exposure Sources/ Routes of Infection Joe Kanabrocki	Decontamination/ Disinfection Techniques Bob Hawley	Select Agent Program Management Joe Kanabrocki, Steve Beaudoin, John Bivona
9:30 - 10:00		Intro to Biocontainment: The OUTBREAK Lessons Joe Kanabrocki		Emergency Response Steve Beaudoin, Joe Kanabrocki, John Bivona
10:00 - 10:30	BREAK	BREAK	BREAK	BREAK
10:30 - 11:00	Laboratory Safety Operations Bob Hawley	Lab animal Allergies Joe Kanabrocki	Zoonoses Lois Zitzow	Lab Acquired Infections -Joek
11:00 - 11:30				Ricketts BSL3 Facility Design & Operations Judd Johnson
11:30 - 12:00	ABSL3 Operations Lois Zitzow	Respiratory Protection & Fit-Testing John Bivona	Lab Animal Risk Assessment Lois Zitzow	
12:00 - 1:00	LUNCH	LUNCH	LUNCH	LUNCH
1:00 - 1:30	CONCURRENT SESSIONS BSL3 Lab Exercises Dave Bressler and Lauriane Quenee ABSL3 Exercises Dave Bressler, Lois Zitzow and Nancy Ciletti rDNA Risk Assessment Case Studies	CONCURRENT SESSIONS BSL3 Lab Exercises Dave Bressler and Lauriane Quenee ABSL3 Exercises Dave Bressler, Lois Zitzow and Nancy Ciletti rDNA Risk Assessment Case Studies	CONCURRENT SESSIONS BSL3 Lab Exercises Dave Bressler and Lauriane Quenee ABSL3 Exercises Dave Bressler, Lois Zitzow and Nancy Ciletti rDNA Risk Assessment Case Studies	Tour of the Ricketts Lab
1:30 - 2:00				
2:00 - 2:30				
2:30 - 3:30				
3:30 - 4:00				
4:00 - 5:00	Risk Assessment Case Scenarios (Open Discussion)	Risk Assessment Case Scenarios (Open Discussion)	Risk Assessment Case Scenarios (Open Discussion)	QUIZ

Cognitive and Practical Biosafety Education for Host-Pathogen Investigators

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GLRCE Biosafety Scholarship Program

- GLRCE supports one Scholars per year
- “In-residence” one year program,
- NIH Stipend, plus benefits
 - Extramural support for additional biosafety staff
- Scholars support Biosafety/IBC activities, with primary focus on laboratory (esp. BSL3) and research safety.

GLRCE Biosafety Scholarship Program

- Scholars attend/present at national/regional meetings:
 - ABSA
 - MABioN
 - ASM
 - National Science Advisory Board for Biosecurity (NSABB)
- Scholars attend GLRCE-sponsored activities
- Scholars prepare and sit for the ASM NRCM-SM(BS) certification examination
 - Subsidized by the GLRCE Biosafety Core



GLRCE Biosafety Scholarship Program

Scholars conduct basic science research projects with applied biosafety implications.

Scholars participate in all BSO administrative activities:

- IBC protocol review/risk assessment
- Select Agent Program management
- Laboratory inspections
- Training (RCE *Cognitive and Practical Biosafety Education...*)
- HTRL BSL3 Facility Operations and Maintenance
- Emergency spill response
- All external inspections (USDA, CDC, FAA)
- Export Controls/Dual Use Program and MTAs

Engineering Internship

- Partnership with schools of engineering
- Internship rotations for school of engineering students.
- Engineering mentorship provided by UC Facilities and UW-Madison Environmental Health Program
 - BSC Certification Program
- Rotations at HTRL

Howard T. Ricketts Regional Biocontainment Laboratory





Animal Holding Rooms

- 5 large sized animal holding rooms
 - 4 ventilated racks
 - 2 Class IIA2 BSCs
- 2 small sized animal holding rooms
 - 2 ventilated racks
 - 1 Class IIA2 BSC



Aerosol Exposure Room



- Class III BSC
- Aerosol delivery of pathogen to animals
- Mimics natural exposure
- Uses a HEPA-filtered cart to safely transport animals too and from animal housing rooms

Equipment Decontamination



- 2 walk-in autoclaves
- Vaporous hydrogen peroxide decon room



Biosafety Challenges at RCEs?

Two Principles of Laboratory Safety

1. Scientific risk assessment is the foundation upon which safety protocols must be based.
2. Research safety must be integrated into the culture and fabric of the research enterprise.

Joe Kanabrocki

Contact Information

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