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ABSA, the leader in the profession of biological safety.

Mission Statement

The American Biological Safety Association is dedicated to expanding biological safety awareness to prevent adverse occupational and environmental impact from biohazards.

Goals

• Expand professional and public awareness of biological safety through effective communication.
• Participate in the development of biological safety and biosecurity standards, guidelines, and regulations.
• Develop ABSA as the recognized resource for professional and scientific expertise in biological safety and biosecurity.
• Advance biological safety as a scientific discipline through education, research, and professional development.

About the Cover

This figure was reproduced with the permission of the authors. Three-dimensional computer modeling techniques were used to design a task specific vented robotic enclosure with efficient worker and sample protection during automated robotic operations. This diagram shows the projected trajectories traveled by individual weightless particles inside the enclosure work area. Read about this topic “Task-Specific Ventilated Robotic Enclosures for Product and Worker Protection Against Biological Hazards in High-Throughput Laboratories” on pages 188-199.
December 7, 2004

Dear Editor:

In doing historical work on the use of chlorine for disinfection in my book, “Disinfection, Sterilization, and Preservation” (Lippincott, Williams, & Wilkins, 2000), I found a paper in Lancet, 1827 (11:643-648) which recommended the use of chlorine for the use of the purification of drinking water in England. In the same paper were reported experiments by a Mr. Faraday in which the cowpox inoculum used in smallpox vaccination was destroyed by a 1:50 dilution of chlorine gas and could no longer produce a reaction when used to vaccinate people.

Could this Mr. Faraday have been the famous Michael Faraday? The latter was working with chlorine at this time but there was no mention in any of the books on him regarding his doing experiments of this nature.

A letter was written to the Royal Institution of Great Britain, who referred me to Royal Institution Centre for the History of Science and Technology, who referred me to Dr. Frank A. J. L. James, Lecturer in History of Science, who was making a study of Faraday’s correspondence.

Dr. James responded (1/10 1992), “The Mr. Faraday mentioned in the Lancet is without a shadow of doubt Michael Faraday.” He went on to say, “This is exactly the sort of work which Faraday did in large amounts when he was not working on electromagnetism.” He indicated, however, that he had found nothing in Faraday’s letters or note books to produce any specific evidence of this work.

So may we safely chalk up another first for the great chemist-physicist Michael Faraday, namely being the first to use chemicals to destroy viruses?

Seymour S. Block
Professor Emeritus, University of Florida, Gainesville, Florida

Editorial Note

Letters to the Editors (approximately 400 words) discuss information published in Applied Biosafety in the past nine months or discuss topic areas of general interest in the biosafety profession. Letters can be submitted electronically to Karen D. Savage, Production Editor, at ksavage@covad.net or by mail to ABSA National Office, Applied Biosafety, 1202 Allanson Road, Mundelein, IL 60060. Letters published in part or whole are subject to editing for clarity and special formatting.
Fabulous! That is the only way to describe the 2004 ABSA Conference in San Antonio. The Scientific Program was superb, the Local Arrangements Committee did an outstanding job, the number of exhibits was a record of 50 booths, there were 682 preconference course attendees, and conference registration was at an all time high of 609 attendees. Add to this the wonderful networking and sharing of ideas and knowledge, and you have one fabulous conference. Plans are already underway for the 2005 Conference in Vancouver.

Since I joined ABSA in 1990 a lot has changed in the field of biosafety, but one thing has stayed the same. The camaraderie and networking among biosafety professionals are as important today as they were in 1990. The sharing of knowledge and contributions to the field of biosafety by ABSA members is still a very important part of our organization.

What has changed is our membership, which has grown to 1,289 members with representation from 30 countries. And the field of biosafety has changed in that we have additional challenges such as biosecurity and management of select agent programs. To meet these challenges, in early 2004 the ABSA Council took a good look at the structure and function of ABSA and the current and future needs of biosafety professionals. As you know, an extensive management survey was conducted and the result was the creation of a strategic plan for the future of ABSA. We have organized committees into six teams, with each team led by a team leader who is a long-time member of ABSA and has either served on the ABSA Council or has been a committee chair in the past. The team approach allows our committees to focus on similar goals and issues. We’ve added some new committees to further serve our membership and folded other committees that have served their purpose. Overall, it’s about working smarter and empowering our volunteers to contribute their talents. I am happy to report that many components of the strategic plan have already been implemented and are beginning to show great benefit for our membership.

What can ABSA members expect in 2005? Here are just some of the changes that the Council believes will enhance membership benefits and allow you to stay connected to your organization:

• Periodic reports from the Council, Teams, and Committees will be available via the Member’s Only section of the ABSA web site. This will allow you to learn of new initiatives and progress toward the goals of our strategic plan.
• New products that will give you professional development opportunities will be introduced. For example, the Professional Development Team includes an Instructional Technologies Committee that is looking at new ways we can offer training, such as via the Web. Imagine being able to take one of our outstanding preconference courses while sitting at your computer in your office.
• Our alliances with organizations such as OSHA and the Elizabeth Griffin Foundation will allow ABSA to provide new resources to members. The alliance with OSHA was renewed on October 13, 2004, and we are looking forward to another 2 years of productive collaboration. The Elizabeth Griffin Foundation generously contributed to the ABSA Summer Seminar Series and the Conference, and we look forward to working with them in 2005 on new biosafety training initiatives.
• Staffing in the ABSA National Office has been increased. We welcome Julie Savage to the position

Betsy Gilman Duane
Cambridge, Massachusetts
of ABSA Administrative Coordinator. Julie will be working closely with our Teams and Committees to allow them to concentrate on what they do best without having to be bogged down with administrative details.

ABSA can also benefit greatly from our talented members and their contributions to our various Committees. I encourage each ABSA member to join at least one committee in the coming year. The 2005 Strategic Performance Areas and Teams in this issue of *Applied Biosafety* will give you an understanding of the various committee functions and team goals. Every ABSA member brings a unique perspective as well as knowledge and skills to any committee he or she volunteers for. This is what makes ABSA such a great organization and will allow us to continue to grow and serve our members in the coming years. So don’t be shy. Volunteer! I know that you will benefit from committee involvement, as will your fellow members. Contact Julie Savage via e-mail at jsavage2@covad.net if you would like to learn more about committees or want to join a committee.

And finally, I have one additional challenge for you. Please consider submitting a manuscript to this publication. If you gave one of the excellent presentations at the 2004 Conference, it would be wonderful to see your work in print. If you are involved in a biosafety-related research project or have practical information that would benefit the membership, submit a manuscript for publication. Guidelines for Submissions are summarized in the back of this journal issue.

I am honored to be your President and I look forward to an exciting and productive year ahead and sharing progress reports with you. If you have an idea or suggestion, don’t hesitate to contact me at egilman@absa.org.
Introduction

The changing function of the modern lab environment results in additional challenges requiring flexible task-specific solutions to minimize environmental impact, protect operator safety, and optimize overall process efficiency. In particular, the need to identify new drug components in the pharmaceutical industry has resulted in the use of advanced concepts of combinatorial chemistry requiring employment of automated analysis/discovery processes utilizing sophisticated computer and high-throughput robotic technology. It is well documented that handling solid and liquid toxic compounds results in aerosol generation (Sansone & Losikoff, 1977), requiring these operations to be performed in well-ventilated hoods. Likewise, many automated laboratory practices produce aerosols and particulates (e.g., weighing, pipetting, transferring, handling, autoclaving, and incubating). While robotic operations do not require continuous operator presence in front of the robotic equipment, routine equipment access and regular maintenance result in a significant risk of worker exposure. The need to contain these automated operations within vented enclosures is further reinforced by the documented cases of air and surface contamination during robotic handling of compounds of unknown toxicity. For instance, a recent study (Cooper, 2003) was conducted to investigate the potential for air and surface contamination with compounds of unknown toxicity during robotic operations. It indicated that there were detectable model compound levels present in air samples taken near the balance when the robot malfunctioned and dropped a vial, spilling its components. Thus, this clearly emphasized the need for robotic systems to be contained within appropriate vented enclosures to minimize the potential for inhalation exposure.

Conventional containment solutions (i.e., chemical hoods, biosafety cabinets, and/or glove boxes) are ill-suited for the task of robotic containment due to increased turbulence levels and airflow obstructions produced by the robot geometry, thus requiring enclosure design to permit adequate contaminant removal and provide efficient operator and sample protection. Computational fluid dynamics (CFD) (i.e., computer modeling of air and gas flows) provides unique insight into the detailed flow field characteristics of the entire ventilation process. It allows for studying the airflow patterns within the enclosure/robot system by providing directional velocity distribution within the enclosure and around the robotic equipment, hence pointing out the areas of potential concentration build-up and cross-contamination. Subsequent computer modeling iterations can be used to optimize enclosure geometry and operation to ensure smooth airflow movement within the robot work area. In addition, the exhaust characteristics of the enclosure can be modified to address the capture velocity at access openings.
within the framework of providing operator and product protection.

This paper presents the summary of the iterative CFD-driven design process.

**CFD Application Overview**

Over the past 30 years computational fluid dynamics has been used to simulate increasingly complex fluid/gas flows and heat exchange processes in a variety of applications encountered in, most notably but not limited to, the aerospace, automotive, construction, and nuclear industries. Recently, CFD has begun to gain acceptance as an important design tool in HVAC (heating, ventilation, and air conditioning) (e.g., laboratory hoods and vented enclosures) applications, as computing power and commercially available modeling software became more economically accessible for the industry. By providing detailed flow-field data, the CFD modeling approach allows for precise prediction of airflow parameters within various ventilation systems (Zhang et al., 1992), thus maturing into an important design tool for problems involving ventilation-type flows. Various performance aspects have been successfully addressed using CFD-based modeling techniques for a number of ventilation applications. Namely, Memarzadeh’s (1996) major work described laboratory hood containment performance. In that, the effects of diffuser/hood position, diffuser/hood separation, hood separation, hood position, and equipment arrangement within the lab on the airflow distribution near the sash opening were parametrically analyzed for a variety of geometric configurations. The airflow patterns in the lab itself were shown to create crossdrafts near the sash opening, indicating that their effect on hood containment performance must be investigated for specific lab configurations in order to provide a comprehensive containment analysis of the entire lab/hood airflow system. Mora et al. (2003) and Wurtz et al. (1999) documented significant improvements in estimating room airflow parameters achieved by using CFD analysis as opposed to more traditional zonal methods. They based their findings on comparing numerical results to the empirical velocity data available for a single mechanically ventilated room. Kirkpatrick and Reither (1998), Kolesnikov et al. (2002, 2003), and Lan and Viswanathan (2001) discussed details of flow field distribution within the hood work area and discussed their adherence to the available experimental data. Large-scale investigations of ventilation airflows in occupied spaces became possible with the advent of more powerful computer workstations and were documented among others by Jiang and Chen (2001), Baker et al. (1994), Yaghoubi et al. (1995), Rota et al. (2001), and Yang et al. (2000). Numerical aspects of turbulence modeling for ventilation type flows have been addressed by Nielsen (1998) and Zhang and Chen (2000), while an extensive literature review covering all aspects of CFD application for analysis of indoor air quality issues were published by Emmerich (1997).

**Governing Equations**

CFD is the science of utilizing advanced computer modeling techniques to solve the Navier-Stokes equations governing fluid/gas flows (Baker, 1983). The Navier-Stokes system is derived by applying the principles of conservation of mass, momentum, and energy to control a volume of fluid. The resultant equations are extremely complex and possess no known analytical (exact) solution. Instead, their approximate computer-simulated solutions are considered, with additional assumptions related to turbulence modeling and properties of the flow field being made based on the physics of the specific process. The solution is obtained using discretization techniques transforming the original, continuous partial differential equation forms into their discrete algebraic counterparts. The resulting algebraic system is then solved utilizing modern computer resources. The result is detailed velocity, pressure, and temperature distributions inside of a given solution domain. Given the approximate nature of the numerical solution, the computational results need to be validated experimentally. The conservation law system written for the incompressible flow class characteristic of most ventilation-type flows and incorporating the Boussinesq approximation is shown below (Baker, 1983, Emmerich, 1997).
Conservation of mass:

Conservation of momentum:

Conservation of energy:

where:

- \(i, j\) = summation indices
- \(g_i\) = gravitational acceleration in \(x_i\) direction
- \(H\) = volumetric heat source generation rate
- \(P\) = instantaneous static pressure difference
- \(t\) = time
- \(u_i\) = instantaneous velocity component in \(x_i\) direction
- \(x_i\) = Cartesian coordinates
- \(\beta\) = volumetric coefficient of expansion
- \(\kappa\) = thermal diffusivity
- \(\theta\) = instantaneous temperature difference
- \(\rho\) = density
- \(\nu\) = kinematic viscosity

**Robotic Enclosures**

Robotic enclosures are safety devices used in pharmaceutical, chemical, biological, and toxicological laboratory settings for handling of toxic substances. Analytically, a general robotic enclosure is a continually exhausted volume, operating at a negative pressure relative to the room. It vents air away from the user and the laboratory. In the real life laboratory environment, this translates into the following key design requirements to operate acceptably (Walters & Ryan, 2001):

- Maintain a high level of protection.
- Provide a nonturbulent airflow distribution inside the enclosure work area.
- Ensure that materials/operations inside the enclosure are undisturbed by airflow.

Unlike a laboratory fume hood requiring continuous operator access to the hood’s work surface, robotic enclosures present additional challenges for airflow optimization. Robotic processes are characterized by a high degree of automation with enclosed equipment performing specified tasks for extended periods of time without requiring an operator’s input. Here, the design goal is to minimize the turbulence intensity (level of flow fluctuations) characteristic of the airflow inside of a particular robotic enclosure work area. Ideally, a turbulence-free design would provide smooth transitional airflow inside the enclosure with the resulting laminar flow structure promoting containment efficiency without dispersing light powders and liquids or otherwise compromising process efficiency. These considerations must be balanced with the need to provide easy user access to the enclosed robotic equipment for maintenance purposes. These two distinct (open vs. closed) but mutually-dependent modes of operation must be considered simultaneously when addressing the containment control, airflow design, and ergonomic efficiency of a robotic enclosure.

Airflow pattern inside the enclosure work area is controlled mainly by its geometry, face velocity at the inlet opening, room air currents, and very importantly by the geometry of the robotic equipment placed inside of the work area itself. To optimize the airflow, therefore, one must concentrate on “task-specific” design solutions, when detailed understanding of the process requirements leads to a unique containment system developed for specific safety, performance, and ergonomic demands.

**CFD Flow Modeling and Optimization**

A three-dimensional CFD analysis is used herein to predict and optimize airflow velocity and flow field distribution in laboratory robotic enclosures. Computations were performed using a commercially available software package CFDsign™ developed by Blue Ridge Numerics, Inc. (2000) It consists of the following:

1. Preprocessor (geometry generation, discretization, and mesh generation)
2. Finite element based segregated solver appropriate for incompressible flow class
3. Postprocessor (output result visualization)

The solution domain included robot geometry inside of various robotic enclosure configurations as obtained during the iterative geometry optimization process. Velocity and pressure distributions were obtained by solving a Reynolds-averaged Navier-Stokes equation system using the two-equation k-e model with wall functions to model turbulence. Boundary conditions were set by specifying uniform normal velocity at the enclosure exhaust and uniform static pressure at the sash opening, in the case of the standard enclosure setup shown in Figure 1. Alternatively, fan flow rate and uniform static pressure at the enclosure exhaust and access ports were specified in the optimized final design case shown in Figure 8. No-slip (zero velocity at stationary walls) boundary conditions were specified at the walls in all considered cases. Numerical solution was implicitly time-iterated to a steady-state regime with 10 inner iterations performed at each time step. A nonuniform tetrahedral grid consisting of approximately 80,000 nodes significantly skewed towards the robot work area to provide accurate velocity gradient resolution was used in three-dimensional numerical simulations.

Figure 1 shows the initial robot/enclosure configuration. A generic U-shape geometry was selected to represent a common robotic footprint, while a standard vented enclosure setup was used to make preliminary assessment of the airflow pattern distribution. The main design objective remains unchanged, namely, a turbulence-free ventilation flowfield providing efficient containment of the work area without compromising overall process efficiency. Computer-simulated results depicting airflow patterns inside the laboratory enclosure are presented in Figures 2 and 3. Figure 2 represents a vertical slice through the enclosure, taken approximately

---

**Figure 1**

Initial robot/enclosure configuration.

---

![Initial robot/enclosure configuration](image-url)
at the plane of symmetry, and shows velocity vectors colored by velocity magnitude given in meters per second. Figure 3 illustrates the trajectories traveled by individual weightless particles inside the solution domain.

The airflow pattern is dominated by the jet of air entering the work area through the inlet opening, which, upon reflecting off the back wall of the robot, forms two significant vortex structures with opposite airflow circulation directions. While no loss of containment is predicted, the flow pattern is shown to be highly irregular, thus leading to potential problems related to light powder or liquid handling without additional design optimization.

Having gained insight into the airflow characteristics of the enclosure/robot system, it is possible to concentrate on making the necessary design changes aimed at eliminating areas of excess turbulence and material build-up thus improving containment performance. As noted above, laminar, nonturbulent airflow inside the vented work area is a crucial factor in providing stable containment protection. The results presented in Figures 2 and 3 indicate that geometric configuration of the robot, together with the presence of its moving parts, creates obstacles along the airflow pathways resulting in excess turbulence and leading to potential loss of containment. Hence, the airflow design objective is to laterally streamline the airflow pathways along the U-shaped robot geometry as opposed to moving air horizontally (front to back), characteristic of laboratory hoods and standard-vented enclosure airflow distribution, or vertically (top to bottom), characteristic of standard biosafety cabinet airflow. Towards this goal

**Figure 2**

Work area airflow pattern. Velocity vectors at the plane of symmetry.
**Figure 3**
Trajectories traveled by individual weightless particles inside the enclosure work area. Initial design configuration.

**Figure 4**
Initial enclosure optimization schematic.
the initial enclosure configuration (Figure 1) is replaced with the general configuration shown in Figure 4. The fan is positioned above the solid baffle to provide lateral (left to right) airflow distribution inside the work area.

Figure 5 illustrates the computer-generated pathways prevalent for this geometric configuration. While basic flow structure follows the preferred lateral pattern, the airflow velocity gradient at the corner of the baffle carries the bulk of the flow towards the base of the enclosure, producing a significant recirculation region directly in the middle of the enclosure work area, requiring additional modification. Two HEPA filters (to be replaced with appropriate carbon units when handling volatile chemicals) are placed inside the enclosure (Figure 6). While the main goal of the filtration system is to provide product sample protection with filtered air swiping the surface of the robot, its presence simultaneously creates uniform resistance along the airflow pathways leading to a uniform pressure distribution inside the enclosure work area, thus promoting unidirectional flow structure and allowing for the elimination of the recirculation zone shown in Figure 5.

Placing the filtration units strategically at the corners of the enclosure work area therefore plays a key role in promoting uniform work area airflow distribution, while achieving the design goal of establishing efficient sample protection. Computer-simulated results are shown in Figure 7 and confirm the desired unidirectional lateral airflow pattern.

The final design iteration involves modeling the complete robot/enclosure system configuration. In addition, the exhaust and front access ports are included in the model simulation to facilitate equipment access and excess air removal (Figure 8). Numerical modeling results are presented in Figure 9. The final flow field predictions, as well as airflow patterns observed during smoke tests conducted on the design prototype (Figure 10), confirmed the unidirectional horizontal airflow distribution throughout the work area. Consequently, the absence of turbulent recirculation zones inside the work area reduces the potential for concentration build-up and cross-contamination and provides reliable worker and product protection. As noted above, ergonomic demands play a crucial role in finalizing the production details and bringing virtual modeling design to

**Figure 5**

Trajectories traveled by individual weightless particles inside the enclosure work area. Initial optimized design configuration.
a real-life laboratory end-user. In this instance, additional engineering considerations included a custom fan unit design to ensure quiet and efficient operation, supplemental waste chutes, and service access doors or umbilical connections as requested by user-specific operation requirements, as well as the use of clear acrylic construction with unobstructed surfaces to facilitate easy visibility of the robotic process.

**Conclusions**

The presented results document the design of a task-specific vented robotic enclosure aimed at providing efficient worker and sample protection during automated robotic operations. Highlighted are the advantages of establishing a lateral work area airflow pattern to ensure efficient contaminant removal.

**Figure 6**
Final enclosure optimization schematic.

**Figure 7**
Trajectories traveled by individual weightless particles inside the enclosure work area. Final optimized design configuration.
Figure 8
Final model geometry.

Figure 9a
Work area airflow pattern. Velocity magnitude at the plane of symmetry.

Velocity magnitude m/s
Figure 9b
Trajectories traveled by individual weightless particles inside the enclosure work area. Final design.

Figure 10
Prototype design.
Computational fluid dynamics was extensively used to analyze airflow distributions inside the enclosure and to optimize equipment and enclosure layouts. The detailed flow field characterization inside the work area leads to a clear understanding as well as visualization of the process, thus providing a data set absolutely unavailable otherwise.

Computer simulation allows for an efficient parametric study of specific process geometry in order to obtain the most desirable, turbulence-free distribution of the internal flow. The study clearly shows the benefits of using advanced numerical simulation tools in promoting laminar airflow patterns inside the work area to provide the needed operational balance resulting in a stable, safe and predictable containment system. The unique lateral flow design attained by utilizing the developed double-filtration system is shown to naturally accommodate the longer layouts and various robotic equipment configurations. The task specific design solution loop is complemented by real-life laboratory demand considerations. In that, fan unit performance, ease of equipment access and addition of supplemental waste chutes were addressed to satisfy user requirements. Smoke tests were conducted on the prototype design to confirm the desired computer predicted airflow distribution inside the enclosure work area. Additional tests are currently underway to ensure the unit’s adherence to standard worker/product biological safety protection guidelines. The presented approach therefore combines state-of-the-art computer modeling techniques with manufacturing engineering expertise and end-user-specific requirements in delivering the final product.

References


Biosecurity Considerations in Public Health Laboratories

Norman A. Crouch
Minnesota Department of Health, Minneapolis, Minnesota

Author’s Note
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Good morning, everyone. I appreciate this opportunity to talk to you about functions of our state public health laboratories and what we are faced with these days in terms of safety. The title of my presentation, “Biosafety in the State Public Health Laboratory,” has an important subtitle, namely, “The Need to Address All Hazards.” This subtitle identifies the main point I hope to make. While our previous speaker, Dr. Takafuji, talked about biosafety regarding infectious agents and emerging infectious diseases, in state public health laboratories today we generally find biosafety a bit too narrow. Instead, we are now forced, because of potential terrorism, to think, plan, design, and operate using an all-hazards approach to safety.

Our state public health laboratories function in two general arenas: analytical testing and emergency response. In all state public health laboratories, analytical testing includes that required to identify infectious agents. In almost all of these laboratories, testing also includes screening every newborn for inherited diseases and congenital abnormalities, and in many of the laboratories testing also includes detection and identification of hazardous chemicals, including radiochemicals. To be able to analyze clinical specimens and environmental samples for a wide spectrum of biological and chemical agents within statewide jurisdictions, these laboratories have for the most part extraordinary capability.

As an extension of this analytical capability, our state public health laboratories play a major role in statewide emergency responses to public health threats that occur naturally, accidentally, or deliberately. Today, probably more than ever before, this emergency response role is on all of our minds and something for which we have to be continually prepared. This may involve emerging infectious diseases. We talk about severe acute respiratory syndrome (SARS), West Nile virus, and the possibility that there could be a pandemic of human influenza if strains of avian influenza occurring in chickens in the Far East suddenly develop the ability to be transmitted human-to-human. Our state public health laboratories, working with partners at CDC, are very much involved in these kinds of infectious disease issues. In addition, our emergency response role may involve environmental chemical hazards. An example of an important environmental hazard for which state public health laboratories provide analytical support today is the widespread problem of illegal methamphetamine laboratories and the necessary clean-up that is involved in these situations. There are many kinds of environmental hazards that our state laboratories must be able to analyze in emergency situations.

But the bottom line today, the situation that may keep many of us awake at night, is the possibility of an act of terrorism. Not just an act of bioterrorism, but of an act of terrorism. Such an act could involve biological, chemical, or radiological agents. As state public health laboratories, we are expected to be able to respond, to provide the analytical data needed by public safety and public health to implement effective interventions to protect the public.
To be able to do so, our state public health laboratories have made some progress over the last few years, working with CDC and other federal agencies, to become better prepared to respond.

I now want to talk briefly about three aspects of this state laboratory emergency preparedness. One of these aspects is the Laboratory Response Network, called the LRN. A second is where we are with chemical terrorism preparedness. The third, which is a very difficult problem in our state laboratories, is how to deal with “unknown” environmental samples. These are samples that could be biological, chemical, radiochemical, explosive, or all of the above. This presents us with a very dangerous situation that must be accommodated using an all-hazards approach.

Regarding the LRN, this is a laboratory network originally established in 1999 through a collaborative effort that included the CDC, FBI, and Association of Public Health Laboratories (APHL). It is depicted here as a pyramid with a broad base referred to as the Sentinel Laboratories. These are laboratories that conduct routine testing to detect and identify microbial agents. If an unusual agent is isolated from a patient, the role of these sentinel laboratories is to recognize it as unusual, try to rule out the possibility that it represents an agent of bioterrorism, and if they cannot rule it out, then immediately refer it to an LRN Reference Laboratory, shown as the middle section of the pyramid, for advanced confirmatory testing. In all states, the state public health laboratory is the LRN reference laboratory. In some states there are additional reference laboratories, selected by the state public health laboratory, to expand the state’s capacity to provide this reference function. In the reference laboratories, CDC standardized, validated test methods and reagents are used to confirm the existence of a bioterrorism agent. As an integral part of the LRN, our state public health reference laboratories work in close partnership with the National Laboratories at the top of the pyramid. These national laboratories, including CDC and USAMRIID, are responsible for definitive characterization of all bioterrorism agents.

Another way to look at the LRN pyramid is to tip it on its side to show how it represents an inclusive local, state, and national network. This is a very important, very functional network that fortunately was in place when our nation was faced with the anthrax situation in October 2001. As shown with the tilted pyramid, sentinel laboratories include clinical laboratories, food laboratories, veterinary laborato-
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ries, environmental laboratories, and local public health laboratories. These laboratories are always out there looking for something that might be unusual. They have testing protocols that allow them to rule out things that may be suspicious.

Regarding preparedness for chemical terrorism in our state public health laboratories, we are currently developing the ability to evaluate clinical specimens—not environmental specimens, but clinical specimens, such as blood and urine—to detect human exposure to chemical agents that might have been used in a chemical terrorism event. For this kind of preparedness, our state public health laboratories are defined at three different levels: Level 1, Level 2, or Level 3. Most of the state public health laboratories are developing their capability at Level 2. There are 39 of these laboratories. At Level 1 there are six and at Level 3 there are five. The Level 1 laboratories do not have the technical capability required to test for chemical terrorism agents in specimens collected from potentially exposed humans. Their role is to coordinate specimen collection and safe transport and to develop an operational plan involving first responders and other laboratories to determine if human exposure has occurred. The Level 2 laboratories have Level 1 capability plus state-of-the-art instrumentation and the advanced level analytical chemists necessary to test human clinical specimens for select chemical threat agents like heavy metals, lewisites, cyanide, and some toxic industrial chemicals. The Level 3 laboratories have Level 1 and 2 capability plus highly advanced analytical instrumentation such as tandem mass spectrometry. They have multiple advanced-level chemists and they also are able to test human specimens for Level 3 threat agents, which include nerve agents, mustards, mycotoxins, and the select toxic industrial chemicals.

Regarding the “unknown” environmental sample, what concerns us most is the question: How do we safely handle what potentially could be deadly material? As a state public health laboratory director, when I get a call from the FBI or I get a call from a first responder, and I am informed that something has happened somewhere in my state, or that nothing has happened but they found something suspicious that needs to be tested, they may have to bring an unknown sample to the laboratory. This poses a risk to the laboratory and its staff. We do not know whether the sample may contain a biological, chemical, or radiological agent, or a mixture of these, or if it is reactive to emit poisonous gas when mixed with water. It could even contain an explosive that might blow up part of the laboratory. Biological agents that

### Figure 2

The LRN for Bioterrorism

- Clinical
- Food
- Veterinary
- Environmental
- Public Health

Local, State, and National Network

Reference Labs

Sentinel Labs

National Labs
our state public health laboratories could receive in an unknown environmental sample might include infectious bacteria like *Bacillus anthracis*, or toxins like botulinum toxin, staphylococcal enterotoxin, or ricin separated from castor beans. Chemical agents that could come into the laboratory might be neurotoxins like sarin, asphyxiates like cyanide, respiratory irritants known as choking agents like phosgene, or blister agents like mustard gas. Radiological agents might also show up in the state public health laboratory. We are always concerned about the possibility of a “dirty bomb” being brought into the laboratory, or causing an incident in our state jurisdiction, with the release of alpha particles or beta or gamma radiation.

Our state public health laboratories are expected to respond to unknown environmental samples or unusual clinical situations. Since all incidents begin locally, the initial response may involve local emergency responders, i.e., police, fire, emergency medical services, or HAZMAT, concerned about an unknown material present somewhere in the environment, or a local sentinel laboratory with an unusual organism that cannot be ruled out as a possible bioterrorism agent. The initial response could also be a local medical facility where there is a cluster of patients having common symptoms without any known cause. Local poison control centers might also be the first to observe something unusual. In many states there is now a network established with poison control centers that serve to continuously monitor for any unusual number of calls about specific kinds of symptoms suggestive of mass poisoning. In these local situations, the state public health agency is notified and the state laboratory may become involved in the emergency response. This is described in the following schematic.

If there is an incident, samples or specimens are brought to the state public health laboratory. Ideally, the state public health laboratory works in close association with state epidemiology and environmental health. State public health laboratory, epidemiology, and environmental health officials interact with the state health officer or Commissioner of Health, who interacts directly with the Governor. The Governor provides state resources, if necessary. The health officer activates a variety of actions, including communication, assuring the public, telling the public what is happening, and what they need to do. The health officer also authorizes interventions, e.g., the use of antibiotics or vaccines when appropriate to protect the public. The essential role of the state public health laboratory is to receive the material submitted for analysis and to conduct laboratory tests that provide the critical data upon which subsequent public health and safety decisions are made regarding the incident. The laboratory works to help answer these questions: What agent is it? Who was exposed? What are the risks? What needs to be cleaned-up? Is the clean-up completed?

Figure 3
The role of the state laboratory also includes confirmation of field tests. Many first responders now have field test equipment they use to determine if a hazardous agent is detectable at an incident site. While these devices may provide some useful information, they often give results that are false positive or false negative. Consequently, it is imperative that the state public health laboratory confirm all field test results.

When unknown environmental samples are brought into the public health laboratory for analysis, there is a potential risk of laboratory contamination. This actually happened in at least one laboratory during the anthrax situation in 2001. If a powder, for example, is brought into a facility without proper safeguards to prevent its dissemination, the laboratory may become contaminated and all test results may become falsely positive. If this happens, the laboratory has to shut down.

As I have mentioned, we need to employ universal safety precautions to accommodate all the hazards that might enter today's state public health laboratory. The requirements for safety in these laboratories involve three inclusive steps: preanalytical, analytical, and postanalytical. Preanalytical safety measures must begin in the field. It is not just what happens in the laboratory that is important from a safety point of view. What happens in the field before a sample is brought to the laboratory is equally important. Preanalytical considerations include field test results, medical evaluation, intelligence, collection methods, and sample receiving. Field test information important to the laboratory includes knowing what field tests were done, what instrumentation was used, and what results were obtained. This information may be helpful in determining laboratory risk. Another critical piece of preanalytical information is documented assurance that the sample has been examined for explosives by a bomb squad or other qualified personnel. In addition, the sample needs to be examined for radiation before being brought into the public health laboratory for analysis. If there is any reason to believe a sample might be radioactive, it should be tested for radiation out in the field. Bringing a highly radioactive sample into the laboratory could endanger laboratory staff and might contaminate the laboratory, making it useless for analysis of low-level radioactive substances. Yet another important piece of preanalytical information is medical evaluation in the field. Are there injuries? Are there symptoms? Are there fatalities in humans or in animals? Having this information also helps the laboratory assess risk. In addition to all this preanalytical information to assess safety risk when a sample is received by the laboratory, available intelligence information can be very helpful too. Does intelligence suggest that an event may have occurred? Does it suggest a possible agent? Occasionally, we get a call in the laboratory about testing and it makes little sense for us to test the sample being considered. If, however, the FBI or local police provide us with intelligence information regarding the sample, it may become very important for us to conduct appropriate laboratory tests.

Sample collection in the field is also a part of the preanalytical process that is important to the laboratory, both in terms of safety and appropriateness for analysis. During the anthrax crisis in 2001, we had in my state a situation in a public museum. Someone observed by a security camera had entered the building carrying a briefcase. When this person left the building some time later, he no longer had the briefcase. A few minutes later, security found the briefcase sitting near one of the building’s air ducts. A major concern at the time, of course, was that anthrax or some other agent might have been introduced into the air handling system. In response to the situation, the police arrived and called in a HAZMAT team. The event unfolded throughout the night. Our state public health laboratory was notified about possible testing and we prepared to do so. Eventually, I received a call to come to the front of the Health Department building. When I got there, two huge fire trucks and a large fire department van filled with air filters from the museum were parked at the curb. Unfortunately, I had to tell the fire officials that we could not bring any of the filters into the laboratory. I explained that if they would in fact contain anthrax, or some other agent, bringing them into the laboratory might contaminate the facility and expose individuals to a safety hazard. I went on to explain that what we really needed were either a small piece of each filter, or a swab of the filters, all appropriately contained. This is an example of why
appropriate sample collection in the preanalytical phase and communication are essential when a sample must be tested in the public health laboratory.

When a sample to be tested is actually brought to the laboratory, we are still in the preanalytical phase of the testing process. Upon arrival of the sample in the laboratory’s receiving area, field test results are evaluated, explosive screening is checked, and the sample is examined for radiation using a handheld meter. At the sample receiving part of the testing process, it is important for our state public health laboratories to have in place a rigorous triage plan. We cannot accept just anything. During the anthrax situation, the first day or so state public health laboratories were receiving office equipment, furniture, even automobiles. They were asked to test all sorts of things that just did not fit into the biocontainment areas of our laboratories. Having a rigorous triage in place helped determine whether a sample would be accepted, whether it needed to be rejected, or whether it needed to be held for possible testing after further information was made available. These pictures show laboratory staff screening a sample for radioactivity and then placing the sample inside the containment laboratory.

With the sample received, checked, and placed into the containment area of the state public health laboratory, we now move into the analytical process with its associated safety considerations. The purpose of containment, as you all know, is to reduce or eliminate exposure, to protect laboratory workers and others, and to protect the environment outside the lab. If a sample that is dangerous is brought into the laboratory, we cannot risk having material from it accidentally released inside the laboratory or outside the laboratory building.

Primary containment involves protecting personnel and the laboratory environment. This involves good laboratory technique and appropriate safety equipment, which includes biological safety cabinets, personal protective equipment, and laboratory safety equipment. Whenever samples are manipulated in the laboratory, using processes that might create aerosols (e.g., centrifugation, mixing, homogenization, or other steps of that nature), we have to be sure we use proper equipment to eliminate the possibility of generating an aerosol that could expose individuals or contaminate the laboratory area. Personal protective equipment includes gloves, goggles, face-shields, masks, coats, gowns, aprons, and respiratory
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protection. The following slide shows an example of the kind of personal protective equipment that is used in our state laboratory. Below, you see an individual through the window of our Biosafety Level 3 (BSL-3) containment facility putting on a respirator in addition to being gowned up from head to toe.

Biological safety cabinets are an essential part of primary containment in the state public health laboratory. While designed for biological containment, in the initial stages of the analytical process we depend on these cabinets for primary containment of even chemical agents. There are a variety of different classes of these biological safety cabinets: Class I, II, and III. The Class I cabinets are horizontal flow. Air flows in at the front of the cabinet and is drawn to the back. In some Class I designs, the intake air is recirculated into the room, while in other designs the air exhaust is hard-ducted into the ventilation system with no recirculation into the laboratory area. The Class II cabinets are laminar flow. A curtain of HEPA-filtered air flows downward inside the cabinet into vents located at the front and back of the work surface. Individuals working at the Class II cabinet place their hands inside the cabinet, inside the front curtain of air. The filtered air that flows down over the front prevents contaminated air from getting in from the outside or out from the inside. With the Class II A cabinet, about 70% of the air passing through the cabinet is recirculated after being drawn through a HEPA filter to remove any biological agent that might have been introduced into the air flow by working with a sample. If a possible chemical agent is present, the use of the Class II A cabinet is not advised because of this recirculation of air. With Class II B2 and Class II B3 cabinets, no air is recirculated, making them more suitable for handling samples that might contain low levels of toxic chemicals. The Class III biological safety cabinet is completely sealed. With these cabinets, an individual works through two sealed glove ports. There is no recirculation of any of the air and the flow of air inside the cabinet is negative with respect to the outside.

Because in the state public health laboratory we have to use an all-hazard approach to safety and consider chemical as well as biological agents in samples we receive for testing, the choice of which biological safety cabinet to use in our containment facility is

Figure 5
critical. While the Class I hood could be used for volatile chemicals because it has a horizontal flow away from the operator, as long as it is ducted to the outside without air recirculation, it should be used only if the amounts of volatile chemicals are minimal. Class II B2 and B3 cabinets can be used to handle limited amounts of volatile chemicals, ranging from minute amounts to small amounts, because no air is recirculated. The amounts of such chemicals have to be very small, however, because working at the cabinet could disrupt the airflow enough to cause excessive amounts of volatile chemicals to spill out into the laboratory and expose the operator. To avoid this risk, the best thing to use with both biological and chemical agents would be the sealed, glove port, negative air flow, hard-ducted Class III cabinet. This next slide shows an example of somebody in our laboratory working in a Class II B3 hood.

Secondary containment has to do with protecting the environment external to the laboratory. This depends on facility design and how the laboratory building’s air flows, changes, and exhausts. It is recommended that air not be recirculated in these buildings. Instead, outside air should be drawn in, conditioned, circulated, and then exhausted to the outside. Other features of secondary containment include increasing negative air flow in areas of the laboratory where the need for containment is increased. This includes the use of impervious bench tops, means to decontaminate equipment, easy cleaning of the facility, appropriate hand washing sinks, and strategically located emergency eye wash stations and showers. Secondary containment also involves operational practices that limit access to laboratory areas and proper engineering and maintenance.

Containment areas within state public health laboratories are defined as biosafety levels 1-4 (BSL 1-4). The first level, BSL-1, is appropriate only when working with noninfectious agents, for example, in a teaching setting. BSL-2, the most common space in the public health laboratory, is used for routine work with infectious agents that are not transmitted by aerosol. Work that involves infectious organisms transmitted by aerosol, or when the laboratory handles specimens or samples that may contain agents of terrorism, a BSL-3 space under negative air flow is
utilized. In addition to conducting the work in this kind of BSL-3 space, the work is also done within appropriate biosafety cabinets to insure safety. For maximum containment to work with unusual, life-threatening agents for which no treatment exists, BSL-4 space is used. Most state public health laboratories do not have BSL-4 space and have had to modify existing space to acquire the BSL-3 accommodations needed to handle agents of terrorism and emerging infectious diseases. An example of such modified space in my state’s public health laboratory is shown in the next slide. This acquired BSL-3 space has an ante-room, a negative air flow general laboratory room, and two additional rooms with even greater negative air flow that are equipped with Class II B biosafety cabinets. This small BSL-3 suite is entered at the arrow shown in the lower right hand corner of the diagram. From the hallway, a person enters into an ante-room, which provides an airlock between the hallway and the first laboratory area. Before the door to the laboratory can be opened, all of the ant-room doors have to be closed. Beyond the first laboratory room, there are two additional, more restricted laboratory rooms. As you go deeper into the 600-foot suite, you get progressively more negative, in terms of—not attitude, but in terms of the direction of air flow [Laughter].

The security of our BSL-3 requires limited access to accommodate select agent regulations. Only designated persons can enter this BSL-3 suite, and their access is continually monitored through the use of an electronic card reader, as shown on the next slide. Whenever a card is used, a record is kept of who entered and when.

For additional security, we also have a motion sensitive video recorder in the hallway, in front of our BSL-3 laboratory. If anyone tries to enter after-hours, they will be videotaped. The camera, shown on the next slide, is motion sensitive. If there is any movement near the door, the video recorder will start. When we first installed the camera, we kept using tape, but nothing was on it. There was just the door. We thought we either had a poltergeist that was activating the video equipment or something else was going on. It turns out, the explanation was simple. While this BSL-3 suite was set up with all kinds of gauges and bells and whistles, with lights and pressure differential gauges, and with lights that
go green and lights that go red and alarms that sound, we also put in place a fail-safe back-up system. We hung a piece of tissue paper from the ante-room ceiling so we can see if the air is on and if it is flowing in the right direction. This always works. But the video camera detected this tissue flapping in the after-hours breeze. The movement was turning the camera on, so we were recording nothing of particular interest. I just point this out in case you have a similar problem in your institution, this could be it [Laughter].

I have discussed factors that are important to safety in the public health laboratory during the preanalytical and analytical phases of testing samples and specimens for agents of terrorism and emerging threats. Now I would like to talk about postanalytical considerations. This involves the concern and the need to be rigorous about decontamination and waste disposal. Storage also is an important postanalytical consideration. When dealing with agents of terrorism or emerging infectious diseases, it is imperative that they be stored securely in the laboratory with appropriately displayed hazard warnings for fire, police, or HAZMAT teams if they should need to come into the facility in response to an emergency call. For secure storage in my laboratory, again, we use card readers on our storage freezers for restricted, documented access.

In the state public health laboratory, management is responsible for having in place a safety program to protect laboratory staff and the public. Management is responsible for providing a safe work environment and for actively promoting appropriate safety awareness and training. This is not always easy. There may be some staff members who have been doing certain things certain ways for many years and they may not see any reason to change. While the risk of infection among laboratory workers has always been of some concern in our laboratories, I think today risk awareness has to be even greater.

Today we have to be concerned not only about possible exposure during the testing process, but we also have to be concerned about the risk in bringing unknown samples and specimens into our laboratories before testing occurs. Risk assessment has become very important. In the state public health laboratory, we need to analyze all of our activities and

**Figure 8**

![Security: BSL-3 Access](image)

- Electronic card reader
  - Restricted access
  - Monitored access

Security: BSL

Security: BSL

Access

Access

Electronic card reader

Restricted access

Monitored access

Figure 8
Biosecurity Considerations in Public Health Laboratories

procedures for potential risk. What do we do that might result in exposure? Are the workers in the laboratory experienced and well trained? Regarding potential agents that might be brought into the laboratory, what is their pathogenicity or toxicity, their morbidity and mortality, their epidemic potential, and the risk they may pose for families of the laboratory staff? What is the infectious or toxic dose, the mode of transmission, the environmental stability, and the availability of treatment? Regarding any possible chemical agent, what is its toxicity, flammability, and reactivity? What physical effects might the chemical have? Is the agent radioactive? These and many other questions need to be asked to be sure risk is adequately assessed.

An important feature that state public health laboratories should have in place is an all-hazards safety program. There should be a safety officer, a safety plan, a safety committee, a containment laboratory, safety training, and an exposure response plan. I would like to talk briefly about each of these. The safety officer should be an individual knowledgeable about laboratory risks who preferably reports directly to the person in charge of the laboratory, namely the director. Ideally, the safety officer should also be knowledgeable about personnel safety and engineering fundamentals. While the individual need not be an engineer, the person should clearly understand the engineering fundamentals that make laboratory containment effective.

The role of the safety committee is quality assurance, to continually monitor laboratory activities and systems to identify and correct safety-related problems. The committee should develop policies and procedures that insure the safety of the laboratory workers, as well as the environment and persons outside the laboratory. A safety plan should be in place to assess potential risks, control potential exposures, and describe required actions when an exposure occurs. If exposure to a hazardous agent occurs in the laboratory, there needs to be a plan in place before this happens. As part of the plan, there should be a mechanism for immediate reporting of any safety-related incident. Even if an individual only thinks they may have been exposed, there should be a report. In addition, anyone potentially exposed should have a medical evaluation. If there has been an exposure, an investigation should be carried out.
to determine why the incident occurred and what can be done to prevent it from happening again in the future.

Because state public health laboratories are expected to handle terrorism agents and other emerging threats, which may be infectious organisms or toxic chemicals, there is a need to have BSL-3 containment space, as I have described, within the laboratory facility. To design and construct new BSL-3 space, or to renovate existing space to meet BSL-3 standards, it is important to elicit consultative input from professionals at CDC or NIH. In addition, it is important to have the laboratory’s BSL-3 space certified to make sure its operation is correct and effective. Because our state public health laboratories must be prepared for the possibility that unknown biological or chemical agents may be brought into the laboratory for testing, these laboratories should in fact have a Class III biological safety cabinet (i.e., a sealed, ducted glove box) to provide BSL-4 containment in the sample receiving area.

To be sure biological and chemical safety issues are clear and safety measures are implemented, safety training for the entire laboratory staff is essential. There should be a comprehensive checklist, developed and approved by the laboratory’s safety committee, which includes general safety training for all employees and specific BSL-3 laboratory training for the individuals who work in this high-containment area. Because BSL-3 training is critical to the all-hazards safety approach in our public health laboratories, there should be a mechanism to certify training has occurred and that the person trained is proficient and knows how to deal with any hazardous situations that might arise.

Finally, the public health laboratory should have an exposure response plan in place. If suddenly an exposure occurs in the laboratory, What needs to be done about first aid? In our BSL-3 suite, we always have at least two people present. One person remains outside the laboratory, observing the work that is going on within the BSL-3 area through a glass window. If something goes wrong within the containment space, the observer is safe and can take action from the outside to get appropriate help. Also, if a dangerous spill occurs anywhere in the laboratory, it is essential that a plan be in place to take quick, effective action. These actions should be thoroughly planned in advance. Included in the exposure plan, there should be procedures for incident documentation and laboratory decontamination. The laboratory should have a safety plan to prevent exposure and an exposure plan to direct appropriate action if something goes wrong.

In conclusion, our state public health laboratories have broad safety requirements. We need an all-hazard approach to safety. This approach has to reach from the preanalytical stage of an incident, out in the field, all the way to the postanalytical stage, where the material tested is ultimately decontaminated or securely stored. While progress is being made in both primary and secondary containment, significant gaps in the safety of our state laboratories still exist. For example, there is a critical need to develop and publish useful laboratory guidelines for chemical containment. I believe such guidelines are in the process of being developed by CDC. Regarding these guidelines, what I have seen so far indicates that chem-safety will likely be categorized into four levels: low risk, moderate risk, substantial risk, and high risk. The risk level of a particular laboratory will depend on the kind of agents it is expected to handle. Another significant safety gap is the unavailability of specific, validated procedures to handle and assay seriously dangerous chemical agents in a plethora of possible environmental samples. It is very difficult for our state public health laboratories to acquire and implement procedures that might be needed to analyze such samples, despite the fact that we are expected to do so within our respective states. These procedures do not exist in any of our laboratories. Finally, there is a training gap. It is very important that we have expert personnel in our state public health laboratories trained and able to handle all kinds of hazardous agents. We are asked to do this almost every day, safely and proficiently.
Biosecurity Perspectives

Edwin Taylor

United States Air Force (Retired)

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I’m going to present security issues from the point-of-view of the terrorist. The difference in risk in safety and risk in security is merely that of malevolent, human intelligence. The same kinds of procedures that mitigate risk and safety mitigate risk and security.

Everything we say in security sounds very easy. It sounds pretty simple: Secure that stuff. Keep it out of the hands of the bad guys. Don’t bother us anymore. But, as we get into the nuts and bolts, as we wrestle with the philosophical, the technical, the monetary concerns, we realize it is extremely difficult to do. Living organisms are one of the most difficult things to secure because of the nature of living organisms. Very small amounts become very large amounts. Small amounts that we cannot account for, that we cannot see, can become large amounts once taken out of our control by a thief.

Threat? That’s what out there. What might happen? Vulnerabilities are the weaknesses we have against that threat. Risk assessment is basically weighing the probability and consequences of those potential events. Where does threat come from? I would imagine that most people have asked everybody that they can, “What is the threat? What is out there? Who is going to do what? What should I be prepared for?”

How many people in the audience have had a security incident at their facility? Is there anybody here from USAMRID? During the 1980s, two individuals armed with handguns, at different times, entered that facility. Neither one was there for hostile purposes. One was there to visit someone and forgot he had a gun. The other one was there to commit suicide because of some personal problems. The visitor who happened to be carrying a gun did not use his weapon, but the suicidal individual did. So, there are things that happen out there. It may be more likely than we like to think. Intelligence estimates tell us who might be out there and what they might be capable of, but if we look at some of the political consequences of intelligence estimates over the last year, we find that sometimes intelligence is wrong. Intelligence estimates are basically a guess. We hope they are the best guess, but they may not be correct.

Design Basis Threat (DBT) is a planning guideline. For example, if you were worried about a car bomb, your Design Basis Threat would be a vehicular-delivered device. You make a conscious effort to decide how big a device, how close to the building, etc. The reason that you make a decision is that your decision about how close to the building and how big a device might be used directly impacts the mitigation efforts and how much money it costs to defend against that threat. The same would be true if you decide an armed intruder might attack your facility. If you decide to consider an armed intruder, you decide as your Design Basis Threat, “Yes, we are going to protect against an armed intruder.” Then the question of the security professional would be, “Okay, armed with what?” There is a difference between somebody being armed with a handgun and somebody being armed with an AK-47. This goes from being a guess or an estimate to a concrete thing. That’s what the engineers and professionals use to plan.

Methodology or Gaming Basis Threat is a varia-
tion of that the DBT, and that is where you play a mind game and you say, "If I were attacking my facility, what would I do?" When I'm evaluating a facility and somebody asks me for vulnerabilities, I put on my bad guy hat. If I want to get into the facility, what would I do? If I wanted to damage the facility, what would I do? And once you have an idea of that, you know what things you need to protect against, and you can act accordingly.

Your Targets
What might the bad guys' target? The focus, almost exclusively, in all our meetings and conferences, are the select agents, because the government has written a whole set of rules and regulations on what we must do to comply with, in order to possess, use, and work on select agents. But if I'm the bad guy, and I'm the evil, malevolent human intelligence, I have a lot more areas to target. And if I target something else at your facility, not the organisms themselves, but I can damage your facility, can I not get a positive, from my point of view, result? If I can get a bomb into your facility and blow it up, or blow up the half your facility that doesn't even contain select agents, what happens in the news media? What happens to your funding?

Your Organisms
This is a fairly obvious thing, up to a point. What are we talking about here? The security guys talk about inventories, etc. Where are the organisms located in your facility? If you deal with animals, do you deal with infected animals? Do you have the same security on your infected animals and their carcasses that you have on the stock cultures in your freezer? One of the things I know, as the malevolent, human intelligence, is that sometimes the waste products are much easier to get to than the stock cultures. If I want a sample of what you are working on in your laboratory, can I go five blocks away and plug into a laboratory sewer system and pull out a sample? You should notice now that there is a difference between a security threat in a sewer system and a public health threat in a sewer system. A very small amount of material in a sewer system may not be a public health threat, but it may provide me with what I need as far as a sample of what is in your facility.

Personnel
What if I target your personnel? What if your Senior Investigator wakes up to find me in his bedroom and I hold his wife hostage and tell him to go to the laboratory, come back with a vial or else. I had this discussion with Dr. Peter Jarling, and he actually brought it up to me because he realized, after being named in several of Richard Preston's books, that maybe he had put himself into a visible and vulnerable position. If I'm the malevolent guy, and my point is to attack your organization, your facility, what about your folks? What about when they are away from the facility? The facility itself? How long does your lab operate if I destroy your air handlers? For a big facility, what if I damage your electricity? What if I damage your steam-generation capability? What if those actions, although not directly targeted at the lab itself, cause an overpressure problem and you have an inadvertent release? What you have then is a public relations nightmare. I have achieved my goal.

Information
Most of you are in the business of producing information. That's what science is. It's open information. Without open information, we have no science. I also know that there are a lot of organisms that aren't select agents that grow the same way, that have some of the same characteristics. I know that manipulating plasmids inside E. coli allows me the same technology of manipulating plasmids in some other organism, and I know that provided I can get a small sample, that some of those same procedures in the laboratory will, in fact, transfer from a less pathogenic organism to a select agent. I also know, as a terrorist, that there is a huge amount of information in the libraries and reference materials of this and other nations that tells me how to do all these things. I may not have access to the most modern technology, but guess what? The weaponization of anthrax was developed in the United States in the 1960s. Some of that work is classified, but believe it or not, everything about how do it is available to those who know where to look. If I'm a terrorist, I already know that. So, trying to hide that information or information geared towards certain, specific organisms may not be effective.
If I’m a terrorist and I show up at this meeting, I look in the back of that book and there is a list of everybody in attendance. Can’t I have a reasonable expectation that for every person listed as a being associated with a university that at that particular university I will find select agents? As a terrorist, my expectation is pretty high. Why else would you be here? That’s open information. It’s available to anyone who might wish to obtain it, and we don’t think about it because we live in a free society where that information exists. What am I telling you? I’m telling you that there are certain things we might want to restrict, like building blueprints and security codes and people’s home phone numbers; however, there is other information that trying to put a lid on it is probably impossible. Now, it becomes a question of cost. Do we go through all the trouble to classify information that I can obtain other ways, or do we take that money and put it somewhere else? That is a management decision. As a terrorist, I laugh if you classify your work on Bacillus anthracis. I laugh if you classify stuff on how to make it into a powder. If I know the secret of Arid Extra Dry, I know the major secret of weaponization of microorganisms.

Operational Process

As an evil terrorist, my most fruitful target is to directly attack your operation and the operation of others. If I wish to conduct biological terrorism in the United States, what must I attack first? It would be the ability of the United States to deal with such terrorism. Where is the ability of the United States to deal with that terrorism? At all your facilities, your operations, etc. So, if I can do something that shuts down your operations, I remove you as a threat. If I do something to your facility or near your facility that causes people to think there is a problem, and that you have a malfunction, the regulators will shut you down. If my point is to make a terrorist statement, if my point is to shut you down, I can do it and I won’t even have done anything overt.

Threats and Vulnerabilities

What might I do? Well, I have three basic ways I’m going to come after you. The first one is an overt attack. I just attack you. The next is clandestine entry attack, and the last one is an operational disruption attack.

Over Attacks

The first is a standoff attack and all that means is I am outside your facility and I shoot someone. For example, you have a laboratory and you have lots of windows. I take a rifle and shoot holes in the windows. That’s a standoff attack. Do we have sniper incidents in the United States? If you are located in Fallujah, Iraq a standoff attack is somebody with mortars and rockets. So, some of your vulnerabilities have to deal with where you are. The second is a proximity attack: That is where someone gets close to your facility and does something. A good example here is a car bomb, a vehicular device. Does that happen in the United States?

The last is a penetration attack. This is where I just come through the front door and start shooting, or I drive a vehicle into your building, or I fly an airplane into your roof. Those things happen in the United States. The most common hostile event in the workplace is a penetration attack, and that is where the disgruntled individual shows up at the door, either mad at a supervisor or mad at a significant other, is armed, and goes into the facility, or office, or post office, or school, and starts shooting. Statistically, that can happen anywhere. Airplanes have been flown into buildings in the United States.

Clandestine Attacks

This is where a person or persons sneak in and sneak out. This is everything from the intelligence agent, a.k.a. James Bond or Mission Impossible, to the criminal who has decided that you have a lot of nice lab equipment, and he’d like to take it. This includes the outsider, who is someone on the street, and the insider, the person that is legally working there that suddenly decides for his or her own reasons that he is going to do something wrong or illegal, and he is going to attempt to do it in a clandestine way. So, a knowledgeable insider attempting to remove an agent falls into this category. You can have a combination. You can have someone working on the inside that, for whatever reason, is in collusion with people on the outside, and helps them. This is a very significant level of threat because this allows me as the terrorist on the outside to have enough information to make my attack very successful.
Operational Disruption Attacks

This goes back into my favorite area where I attack you without ever coming near your facility. And why is that a good thing to do? Because even though you might have security, do the people who provide you with electricity have security? These are attacks against your support systems. These are attacks of your utilities. For example, you follow all the procedures for transportation. You give the agent to UPS or FedEx. If I steal the agent from FedEx, who is held responsible? If I steal the agent from FedEx, whom does the press blame? Those are things to consider.

Attacks against personnel away from the institute: You may know about the case where someone, knowing what went on in a facility, showed up in the morning GW Turnpike rush hour with an AK-47 and started shooting people, stopping traffic. Fortunately, that was the CIA and not a biological research institute, but can that happen in the United States? Yes, it can.

Attacks against the operational process: What happens at your institute if I somehow get inside and seed your hallways with the agent you are working on? What if I contaminate an adjacent laboratory or another facility or a classroom at a university with an agent you are working on? The resulting furor and investigation will certainly shut down your operation. What are your vulnerabilities? Openness. Practically everybody in this room does open, scientific research. That means people know what you do, people know where you are. It’s not a secret. That makes you vulnerable.

Visibility

This is similar to openness, but this means how visible you or your assets are to a threat. There was a good example of a low tech way of reducing visibility that I heard earlier today, and that is: Do your vials say, “Warning! Don’t touch this particular vial because it’s dangerous.” Or do they all have similar, relatively innocuous labels? If you take a facility and you put a barbwire fence around it today, and it didn’t have one there yesterday, the terrorist goes, “Hmmm. Maybe there is something in there.” In fact, the more security I see go around a site, the more likely I might think that there is a valuable target in there. Visibility can become a vulnerability.

The more visible you are as a target, the more likely you appear on somebody’s radar. Which scientists in the United States working with select agents might be the most likely to be attacked if somebody wanted to attack a scientist? Guys whose names get in books. The more times they are in a book, the more likely they are to become a target.

Facility Design

Almost every biological facility in the United States was designed as an open academic laboratory. The BSL Suites are generally fairly well protected, at least from a safety standpoint, but the rest of the facility is pretty much open. I know that because when you try to go and retrofit security to a lot of them, it’s very difficult. But that openness, the use of glass, the use of open space, and all those things we like in our facilities, increases our vulnerability to attack. If one of the threats we think we have is a car bomb, it does not make much sense to put an entire glazed front on a facility.

Security Methodology

How your security is done or not done may be your vulnerability. Having been a security guard, I can tell you people fall into ways of behaving and bad habits. You may have guards searching vehicles at the entry control point, and they may be sweeping a mirror underneath the vehicle to look for bombs. They see hundreds of vehicles. My experience as a terrorist tells me, in most cases, I could put a bomb under there and they would not see it. And I hate to tell you that my experience as a simulated terrorist revealed that if I paint it red and write B-O-M-B on it in white letters, they still might not see it because they have fallen into the habit of seeing what they expect to see. Putting guards and fences around the outside of your facility may make you vulnerable to the insider threat in a couple of ways. One, now you have your focus on this perimeter. You don’t have your focus inside your laboratory. Two, you’ve spent a lot of money on a fence, and it doesn’t leave you enough money to spend on insiders.

Security Equipment

Your security equipment might be nonexistent. Your fence might not stop vehicles when it is sup-
posed to. You might have a fantastic alarm system, but... You might have a state-of-the-art entry control system, but you have so many entry points and so many alarm messages coming in at one time that your central processing units have a message queue length of a minute and a half, which means when the alarm comes in, instead of instantaneous display, it comes and sits in that queue. Being a terrorist, I love that because it’s a minute and a half from whenever I set off that alarm until the guard even knows about it.

**Operational Weaknesses**

Not only might your security force fall into bad habits, but your operational people might as well. Your receiving department, how well do they check packages? How many packages do they receive? How well do they follow the procedures they are supposed to follow when they receive packages? Can I send a package to your facility addressed to a specific individual and it goes to his desk without screening? As a terrorist, that’s a nice thing to have, and it is very common.

**Planning Methodologies**

Okay, what do you do against me? How do you plan to deal with me when I show up at your facility? There are two basic ways of doing security planning. One method is to plan for each specific threat. The other is compliance-based. Somebody gives you a set of guidelines, oh I don’t know, maybe a CFR or something like that, and tells you the things you need to do, and that they are going to come and inspect you and see if you are doing them. The smart way is to combine the two methods because if you look, for example, at the current CFRs, most of what they mandate is documentation, planning, authorizations, and procedures, and very little in hard security on the ground. The facility itself, the people working in the facility, still have to decide how they are going to implement the security on the ground. If the CFR mandates access controls, you still have to decide what your access controls are going to be and how you are going to use those access controls to deal with the threat.

**Risk Management**

This is when you take that risk assessment and you say, “Okay, this is my risk. How likely are these things to happen? What might happen? What can I do to address it? If these are my threats, and this is my pool of resources I have available, where do I align my resources against the threat to get the best
"bang for the buck?" Because there is no one, including any government organization that has all the money in the world they need to address every security threat, I don't think there is any facility represented within this room that has the capability of mitigating, to any significant extent, a Boeing 767 crashing into the building. So, you make a decision about what threats you will deal with and how you'll deal with them.

**Risk Assessment**

This is when you look at what your threats are, what your vulnerabilities are, and you assess: "What is my risk?" If you have a threat of an armed outsider and you have no access control and you have an open door, how high is your risk? If you have an aircraft flying around and it's going to crash into your building, how high is your risk? This is a management decision. This is a decision made within the facility and organization with the help of security professionals, but hopefully, with major input from the folks who work there, because this is the thing that you are going to have to use to plan.

Likelihood of the event. How likely is that particular event? What are the consequences of the event? For a very unlikely event that is catastrophic, how much does that weigh against a likely event which has negligible influence? That's the decision. How likely is it for any threat? If I'm the terrorist, do I have the opportunity, capability, and intent? Opportunity is: "Can I actually do what you are worried that I might do?" If what you are worried about is an insider stealing an organism and I am the terrorist, I have opportunity only if you let me in. Do I have the capability? That is a judgment call. Am I capable of carrying out the event? The hardest to deal with is intent. When the FBI hired Robert Hanson and the CIA hired Aldrich Ames, were they able to judge their intent? At the time both were hired, if you could have judged their intent, I don't think you would have found they intended to be spies for a foreign power. But since none of us can read minds, it's very, very difficult to judge intent. This is one of the problems intelligence analysts have when trying to address a threat or tell somebody what might happen. Unless that person comes forward and says, "I intend to do this," we don't know. What has occurred in past? How many laboratories here have had a theft by an insider? That goes to address likelihood of any risk assessment. If it hasn't happened, how likely is it to occur? You could throw that back at me because on September 10, 2001, how likely was it considered that somebody might crash an airplane into a building?

**Consequences**

Monetary costs. Operational costs. Social costs. If you have a major event of a hostile nature at a laboratory containing select agents, the most significant one of those will be the social costs. Because what is going to happen then is going to be massive disruption to your operation and the operation of everyone else and the ability to conduct this kind of research. The monetary costs and the operational costs would be significant, but not necessarily the killer.

To do a risk assessment right, there needs to be cooperation between security professionals and operators. And you need to have feedback among all elements. Quite often, I see assessments being done where people come to a place, they walk around, they look at it, and they talk to maybe the safety people, if the facility is lucky. They talk to some senior people, but never once go out into the laboratories and talk to the workers. They don't talk to the custodial staff. They don't talk to the guards around the outside or the police that deal with the community adjacent to the site. As a result, they don't get all the information that they probably need to make a good assessment.

Risk management is mixing the threat, the vulnerability that we find, and the risk assessment and putting them together in a matrix to tell us what threats we'll address, how we will address them, and how much we are willing to spend to address those threats. But also, and more importantly, how much risk are we willing to accept, because life without risk is impossible.

We look for measures to prevent an event, measures to mitigate an event, and measures to recover from an event. For example, let's talk about an airliner hitting the building. I'm not expecting you to be able to prevent it, but as a society, I would expect you to be able to tell me what was in your building after the airplane hit it. Are all your records and data...
stored only in one facility at one place, so it can all be knocked out at once? If the responders show up to a major fire at your facility, are all the records that would tell them what is in there and where it is located in that same facility? Risk management is a decision by the operator, the laboratory, the people doing the work, the supervision, and the folks responsible. What is it we are willing to do? What is it we can do? And what is it we are willing to accept?

Some Guidelines

Security measures should never impede the operation that you are doing, and there is a reason for that. If I’m the terrorist and I can make you do security procedures that stop you from doing the work you are doing, then that’s as effective as actually going in, personally, and stopping you from doing the work that you are doing. Or, if I make you put so many guards around something and so many locks on it that you can no longer work on it, I have achieved my goals. Also, if the security is an impediment and it gets in the way, people have a way of dealing with impediments. We all know this. We all use them in our lives everyday and they are called “work arounds.” If I put such restrictive requirements on removing an item from a freezer or a stock culture that it makes it very, very difficult to work, how much does that increase the chance that a researcher or someone else in the laboratory will maintain a bootleg stock of culture somewhere? If my measures make it too hard to comply, what happens then to my insider threat? In other words, I’ve created more of a problem inside the facility than I’ve helped.

You the operator know more about how to secure what you do than I as a security professional would ever know. If I come to you and I say, “What could someone do to hurt you?” you can probably tell me better than I’ll be able to figure out on my own. You may not tell me what the effects are of a 20 lb. explosive device as opposed to a 50 lb. explosive device, but you can tell me the consequences of what would happen if there was such a device. You could tell me the consequences of what might happen within your facility. You can tell me where your doors are probably weak, where your operation is probably weak. As a professional, that is something that I really want from you.

If you are involved in the process, you know the old buzz word “buy-in.” If laboratory workers are involved in the process, that makes them feel part of security. What catches the insider, what lets us know...
about illegal insider activity, are the workers who work around them. In the case of Hanson and Ames, for quite a while before they were caught, it was folks who worked around them who said, “There is something weird going on here with these guys.” These are people who passed all the personnel reliability stuff we have available in the U.S., but turned anyway, and they were identified to us first by people who worked with them. That’s the result of getting the operators involved and getting them to participate in security and see security as part of what they do rather than a set of onerous guidelines and directives imposed upon them. If you provide the security for whatever it is you are working with, it makes it a lot more effective and a lot cheaper than having some program imposed from above by another organization.

There are three questions to ask, and they are simple questions, but the answers are not so easy.
1. What is it we want to protect?
2. Where is it located?
3. What do we want to protect it against?

Basically, our measures against the threat are these: For every threat that we identify, we want to have measures that might deter the threat, might detect, delay and channel it, assess it, respond and neutralize it, and recover from it. When you have a set of threats, you need to think about each one of those measures against each one of those threats. The things that work against a knowledgeable insider are not the same things you would use to work against a casual person who wanders down the hall in a laboratory and might walk into a secured area. The things that you might use against a hostile intruder armed with a handgun are not the same that you would use to deal with a truck bomb. For each threat you develop a security plan to meet those objectives against that threat, and you evaluate it realistically against that threat.

Some objectives against some cannot be met. Deterrence is a nice thing. We think if we put a fence around the place, it deters. If your threat is an armed commando force, what are you going to use to deter them? There is nothing that will deter them. They have been assigned a mission. Your security measures rather than deterring them become an impediment, and they just plan around them. How do you deter somebody from wandering down the hallway of a university laboratory and walking into an area that contains select agents? Perhaps a door lock and a sign. Some threats you can deter. Some threats you cannot deter. Please be aware that deterrence is in the mind of the terrorist or perpetrator. It is not in your mind. So, what deters you does not deter them. What deters a normal, rational human does not deter a distraught, disgruntled person who shows up at your door.

Below is a matrix. For each threat, we talk about the target. We talk about the threat itself, the vulnerability, how likely it is, what the costs are, and then what actions you might choose to take. In this example, an anthrax culture in an incubator, the threat we are worried about is an insider. How vulnerable is it to the insider? How likely is it? What would be the cost if it occurred? What measures am I going to use to mitigate that threat?

Or as you see, in this case, deterrence and detection. I’m primarily concerned with what we call “Personnel Reliability Program.” This is knowing who works there and having the coworkers know who is working around them, and how they are acting. You need to develop your anticipated threat, based on what you actually do. And I say this: Are you reasonably a target for a huge terrorist attack? If you are not, don’t plan for huge terrorist attacks. If you work in a diagnostic laboratory, is your operation less of a target than if you worked in an advanced research institute? Are the amounts of materials you deal with significant enough to make you a target? You plan your security measures based on the threat that you have decided upon. One of the problems we have as a country is that we really don’t have a good handle yet on what exactly we should be worried about. We all have some ideas, but everybody you talk to has a slightly different take.

You should exercise and evaluate your security program against the threat. It’s nice to have inspections, but I know of many military units that pass inspection after inspection, and yet if you came in and acted as a terrorist, you could get right through their security measures. There is a difference between inspecting and exercising the security measures. A good example is: We know in the United States that there is a threat of explosive devices and
weapons being smuggled onto airliners. We know that it is likely. We know the cost of it, and we have developed a set of things to mitigate that risk. We have exercises. How do you check to see if your measures work against smuggling guns on an airplane? You try to smuggle a gun on an airplane. But just because you exercise it, how do you evaluate it? Does anybody know the success rate of the tests of smuggling weapons through TSA onto aircraft at this time? In other words, the government evaluators who were sneaking guns on airplanes, how effective are they at getting them through? They are a lot more effective than we would like. So, if you have security measures, test them. It is easier to test ahead of time, when you are in control, than have it tested by me as the terrorist at some time of my choosing. You have to make this evaluation and test fair, and you have to make it without retribution.

One of the problems I had in penetrating nuclear weapons security was every time I penetrated it, the poor kid that was standing there got disciplined, even if I penetrated it through no fault of his or because he “failed in his job.” If you have a guard force that makes a mistake during an evaluation and you fire them, what you’ve done is fired the most experienced folks you have. If somebody sends a SWAT team to get into your building, they’ll probably get in because they are trained to do that. If somebody sends the SEALS to test your security and they don’t get in, we need to stop paying the SEALS because we’ve trained them to get in. What we need to do is use that as a learning experience. When we evaluate, we need to use it as a learning experience not a disciplinary experience. In a lot of cases, we try to fix blame instead of fixing problems. If you tell me that your security measures are effective, my answer is, “When is the last time they were tested?”

You have to be careful about applying other programs. Linking biological research materials with weapons of mass destruction leads us down a very, very poor path towards security. And the reason I say that is it is really hard for you to go into a nuclear storage area, put a nuclear weapon under your arm and walk out with it, for a lot of reasons. The same is true of chemical weapons. We link biological agents used by terrorists with radiological and chemical agents, but there is a difference in the security between a weapon, which is an end item that is normally in storage behind lock and key and not normally accessed, and materials held out in the open for research purposes.

In nuclear security, we do not go to Fermilab in
Batavia, Illinois and tell those scientists who work on the accelerator that they’ll have to account for every particle they generate. First off, they’d quote some guy named Heisenberg and tell you to go away. But secondly, we don’t do that, because guess what? They are not working with weapons. Can the knowledge they are developing there be used for weapons? Yes. Can some of the materials they use be converted into weapons? Yes, but they are not weapons. The same is true of organisms being used for research. So, you have to be careful. Things designed to do one thing don’t necessarily transfer very easily. An example in biology is the requirement to do exit inspections at facilities because we think someone’s going to carry out the agent. Searching the briefcase of everybody leaving the facility every day does nothing to stop a knowledgeable insider from carrying an organism out of the building. It looks good, but if we think about it, if we are not searching the guy’s pockets, what stops him from putting it in his pocket? What stops him from applying it to his hand? You can say, “Yeah, we are doing exit inspections, but how effective are they against the threat?” If I put on my terrorist hat, I laugh. Ok, search my briefcase.

We have inventory controls. At one point, I know, people were saying we had to account for every microorganism. As microbiologists, we all go, “Very funny. I can’t even tell you how many are in this one tube because guess what, oh, one died today.” And there was a requirement to record the destruction of every microorganism, and it was like, “Well, what happens when they die on their own?” You get what I call the “deer in the headlights look” because nuclear materials do have a decay rate, but the bombs don’t die on their own. The chemicals don’t die on their own. But, if you leave a tube in an incubator long enough, everything in there is dead. There are some very significant differences.

There are some pitfalls that we all fall into. My favorite is the mosaic versus the big picture. If you get far enough away from a mosaic, it looks like a solid picture. If you are at a high enough level in the government or any organization, it looks like you see the big picture. But, there is no big picture. There are thousands and thousands of little tiny pixels. One pixel might be letting box cutters on an airplane. Another little pixel might be that down in Phoenix, there is an Arab immigrant taking flying lessons who doesn’t show much interest in landing or taking off. Another pixel might be all aircraft hijackings result in peaceful landing of the aircraft and sometimes hostile events, but usually the release of the hostages. If you move back far enough, you don’t see any of those pixels. You see one nice big rosy picture. But, we know now because of hindsight, that those pixels mattered. The same is true in any security program dealing with anything. We have to be very careful that by looking at the big picture, we don’t miss some very, very significant small details.

Threat is a guess. Intelligence is a guess. We hope it’s a good guess, an educated guess, but it is a guess. It’s a guess about what is going to happen in the future. We all like to think we can predict the future, and for most of us, our past lives and what happened yesterday do give us an indicator of what might happen in the future, but ultimately, there is no guarantee. We think we know if we leave this room and walk out there and walk across the street, we’ll be fine. We don’t imagine that we will walk out there and be struck by a car, but there is a statistical chance that if you cross that road you will be struck by a car. Things change. You didn’t predict it. All terrorist acts cannot be predicted. It is easy after an event to put together that little chain of data points to say, “Oh well, we should have seen this. How stupid were we not to see this?” Well, it’s easy now to connect the dots backward in time. It’s not so easy to connect those dots going forward because each dot has so many other permutations. The farther back in time you go, the more permutations you have at the end. So, you might guess right, but you might guess wrong. Intelligence is a political product, and by that I mean politics with a small “p” because it is a product of a human bureaucracy. We’ve seen how intelligence may not necessarily be correct. It may not be wrong. It just may be slightly incorrect. It can have very large consequences.

Group Think

This is where we make a decision that we’ll all think the same, that if our threat is the insider that we will say, “Oh well, we will go worry about the insider.” If our way of dealing with the insider is this, we’ll all deal with the insider this way. But,
what about the critic? What about the guy in the back of the room who raises his hand and says, “But, but, but, but, but. Sir, excuse me. That won’t work because of this, this, and this.” What do we tell that guy? Do we tell him to sit down and shut up and do what we tell you? He is doing for free what the terrorist is going to do to you at great cost. He is pointing out potential problems. If that guy in the corner can see problems with your security or your operation, somebody else might see it. There is nothing wrong with listening to dissent. The more eyes you have, the better the chances are that you won’t miss something. Now, just because he sees a problem with how you are doing it, doesn’t mean you have to stop how you are doing it, as long as you take that into account when you make your decision. Everybody had an opinion and maybe not all points of view can be put into the final product, but let us not silence the critics who might be the guys telling us what we want to know.

If someone in your field offices tells you, “I think somebody’s learning to fly airplanes for nefarious reasons,” let’s not shut down that voice. If we have somebody in a laboratory saying, “You know, it’s great to have all these security measures, but I can still smuggle the organism out this way,” let’s not tell him to shut up and just do what we are telling him. It is important to allow that kind of criticism. When you evaluate your security program over time, you need to incorporate those things you learn through that criticism, in the changes that you make. Wishful thinking. We all would like a nice safe place. We would like life to be very comfortable and without risk. We would like to think that we can throw a security fence around a building and we are suddenly safe. If we silence the criticism and we continue to indulge in wishful thinking, we set ourselves up. We set ourselves up for a very dangerous fall because we’ve assumed, “Okay, we have these security measures in place, and they’ll deter the terrorist.” Maybe they won’t.

That concludes my presentation. I hope I’ve given you some food for thought, and I hope to hear some feedback, and I hope to not catch too many spears.
In recent years registered biosafety professionals (RBPs) had to adapt to a dramatic increase in research on exotic and especially dangerous biological agents. This increase was in response to fear of forthcoming terrorist attacks with biological weapons. Due to this threat, RBPs now have to implement biosafety guidelines in an increasing number of newly inaugurated high-containment facilities. They also have to turn into biosecurity experts because they are now expected to take part in safeguarding exotic agents from theft and misuse. In the near future, RBPs may, in their role as members of Institutional Biosafety Committees, be expected to classify ongoing or planned experiments according to their potential risk for the general public, and to make recommendations as to whether each experiment should be initiated or continued.

Media and scientific discussions about dangerous pathogens have mainly focused on bacterial agents causing anthrax and plague or viral agents belonging to the Arenaviridae (e.g., Lassa virus), Filoviridae (ebola- and marburgviruses), and Poxviridae (e.g., Variola virus). However, RBPs will also have to familiarize themselves with many more or less exotic viruses from other families. Many of these are listed as Select Agents (biological agents or toxins deemed as a threat to the public), Category A-C agents (pathogens that pose a risk to national security), or agents whose handling requires extraordinary bio-

safety precautions for the laboratory worker.

Among these dangerous pathogens, RBPs should familiarize themselves especially with the alpha-, henipa-, and flaviviruses. Notorious alphaviruses are the Biosafety Level (BSL)-3 agents Chikungunya virus and Semliki Forest virus, and the select and Category B agents Eastern, Venezuelan, and Western encephalitis virus. The henipaviruses encompass the select agents Hendra and Nipah virus, which require BSL-4 working conditions and are listed as Category C agents. Important flaviviruses in regard to biosafety and biosecurity are, among others, the Central European and Russian spring-summer encephalitis viruses (Tick-borne encephalitis virus complex), which have been listed as select agents and Category C and BSL-4 pathogens. All these viruses are known to be transmissible from animals to humans, where they cause encephalitides or other central nervous syndromes.

Since 1990, the publishing house SPRINGER has published supplements to its journal Archives of Virology. These supplements have developed into independent scientific texts. Such diverse areas as the history of virology, viral taxonomy, and specific viral families or syndromes are covered in the series. Each of these books presents a well-balanced mix of review and scientific articles, as well as personal observations and unpublished results by individual authors.

Supplement 18, edited by Prof. Charles H. Calisher from the Arthropod-borne and Infectious Disease Laboratory at Colorado State University and Prof. Diane E. Griffin from the Johns Hopkins Bloomberg School of Public Health, was published in 2004 and covers the “Emergence and Control of Zoonotic Viral Encephalitides.” The book consists of
21 articles by world-renowned experts in the field of viral zoonoses. A wide range of subjects ranging from phylogenetic analyses of alphaviruses, the description of novel encephalitides caused by various bat viruses, vaccine development, and the creation of small-animal models for alphavirus pathogenesis are discussed. In addition to the many chapters on alpha-, henip-, and flaviviruses, the book also contains single articles on other important encephalitis viruses. For example, the progress of worldwide poliovirus eradication is described, as well as advances in understanding the neuroinvasive strategy of Rabies virus. However, chapters dealing with other important zoonotic encephalitis viruses, such as Cercopithecine herpesvirus 1 (Herpes B) or the various California encephalitis viruses are missing.

The illustrations in the book are, unfortunately, almost entirely black and white and could have been more artistic, and the chapters are arranged in a somewhat arbitrary order. However, the book is a fascinating introduction to the rapidly expanding field of vector-borne zoonotic viruses that cause devastating diseases globally, and which could prove to be disastrous in the hands of bioterrorists. It contains several outstanding chapters, which alone would make it worthwhile to acquire. For instance, an article by Weaver et al. on the genetic determinants of the emergence of Venezuelan equine encephalitis not only gives a superb overview of current knowledge on these viruses, their vectors and hosts, and outbreaks they have caused, but also contains previously unpublished observations on virulence factors and vector adaptation. Similarly, an excellent chapter by Gould et al. describes the evolution of encephalitic flaviviruses. Subsequent articles by Mackenzie et al. and Eaton et al. provide comprehensive and detailed introductions to the only recently discovered henipaviruses and their bat reservoirs.

In summary, Calisher and Griffin managed to create a compelling and important book that provides RBPs with essential background information on zoonotic encephalitic viruses.
Biotechnology Research in an Age of Terrorism

Reviewed by Roxy Grossnickle
Southern Research Institute, Frederick, Maryland

The executive summary outlines seven recommendations developed by the committee. For example, one of the recommendations is to augment the existing role of the Recombinant DNA guidelines to include review of experiments that may have dual use-like implications. In the months since the text was published, we have already seen change consistent with the recommendations. For example, one recommendation was to create the National Science Advisory Board for Biosecurity for which a charter was signed by the Secretary of HHS, Tommy Thompson, on March 4, 2004. A “Case Study in Preconsideration” on a mouse pox virus study performed in Australia drives the point that international policy needs to be implemented. This was a study that has dual use implications which would not be publishable under U.S. guidelines, but could have been published in European or Australian journals where U.S. policies have no effect.

The information found in this text can help the mid- and senior-level professional understand the relationship between the vast collections of policy encountered daily in the biosafety profession. It also serves to provide the entry level professional an introduction to the policies that one can expect to encounter as experience is gained in the field.

*Authored by the National Research Council’s Committee on Research Standards and Practices to Prevent the Destructive Application of Biotechnology, Development, Security, and Cooperation, National Research Council
Updated Regulations on the Transport of Infectious Substances—WHO


Laboratory Exposure to Burkholderia pseudomallei—Los Angeles, 2003

MMWR, 53(42), 988-990 (October 29, 2004)

On July 26, 2003, the Los Angeles County Department of Health Services (LACDHS) received a report that a local clinical laboratory had isolated from specimens Burkholderia pseudomallei a category B biologic terrorism agent and the causative organism for melioidosis, which is endemic to certain tropical areas. Because laboratory workers had manipulated cultures of the organism, CDC was asked to assist in the subsequent investigation. This report summarizes the results of that investigation, which included assessment of laboratory exposures, postexposure chemoprophylaxis, and serologic testing of exposed laboratory workers. The findings underscore the need to reinforce proper laboratory practices and the potential benefits of chemoprophylaxis after laboratory exposures.

Eagles Imported Illegally into Europe from Thailand Test Positive for H5N1

An individual traveling from Thailand illegally attempted to bring two eagles into the European Union. Subsequently, these two eagles tested positive for H5N1. As a result, prophylactic treatment has been provided to a number of exposed individuals. This incident raises concerns regarding the detection of illegally imported animals, especially those with zoonotic diseases. This past February, the European Commission banned imports of live birds and poultry products from countries in south Asia, including Thailand, and Malaysia. This ban has been extended to 31 March 2005.

Eighth Case of vCJD Identified in France Had Been a Blood Donor

Eurosurveillance reported another case of variant Creutzfeldt-Jakob (vCJD) disease in France, the eighth since 1996. The patient donated blood on
several occasions between 1993 and 2003. The risk of vCJD transmission has been previously reported. However, the risk of vCJD transmission by plasma-derived products remains to be determined. The fractionation process may reduce the risk.

www.eurosurveillance.org/ew/2004/041028.asp#2

**Select Agent Rule Guidance**

Because there are many aspects of the Select Agent rules that have proved confusing to those who must comply with the regulation, the CDC has developed the following guidance.

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**Guidance Document for Application for Laboratory Registration for Possession, Use, and Transfer of Select Agents and Toxins**

[www.cdc.gov/od/sap/forms/01319-1f.pdf](www.cdc.gov/od/sap/forms/01319-1f.pdf)
[www.cdc.gov/od/sap/forms/01319-2f.pdf](www.cdc.gov/od/sap/forms/01319-2f.pdf)
[www.cdc.gov/od/sap/forms/01319-3f.pdf](www.cdc.gov/od/sap/forms/01319-3f.pdf)

**Guidance Document for Report of Theft, Loss, or Release of Select Agents and Toxins**

[www.cdc.gov/od/sap/forms/01316-f.pdf](www.cdc.gov/od/sap/forms/01316-f.pdf)

Home page for the Select Agent program is: [www.cdc.gov/od/sap/](www.cdc.gov/od/sap/).

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Do you have a biosafety question and you’re not sure who to ask? Send your questions to the “Ask the Experts” column and I’ll get them answered for you. Drawing from my own experience or that of other experts in the field we’ll try to compile a thorough and comprehensive answer to your question. Please e-mail your questions to jkeene@biohaztec.com or to Co-Editor Barbara Johnson at barbara_johnson@verizon.net or Co-Editor Karen B. Byers at karen_byers@dfci.harvard.edu.

Do Biosafety Level 3 laboratories need to be gas decontaminated prior to annual laboratory certification and maintenance?

As with most questions about Biosafety, the answer is: “It depends.” Given the fact that even the most “innocuous” of gaseous decontamination processes might cause significant risk to personnel and the environment, if such decontamination could be avoided it would be prudent to do so. BSL-3 personnel should attempt to minimize the need for this process as much as possible by faithfully following established procedures. Laboratory work with BSL-3 agents is to be performed within a certified biosafety cabinet (BSC). Therefore, it is highly unlikely that any spills would occur outside of the BSC. It is only in the case of such a spill that gaseous decontamination would be necessary.

What would indicate that there would be a need for gaseous decontamination? The answer to this question would be: “A significant potential for contamination of the laboratory during the year, would indicate the need for such decontamination.” Therefore, a risk evaluation of the lab personnel’s activities, the history of safety incidents and repairs within the laboratory since the previous laboratory shutdown, is required. This evaluation would include:
1. A review of training procedures and documentation to confirm that all personnel are properly trained
2. A review of the laboratory logs and the documentation regarding the number and types of spills within the BSC and laboratory during the year
3. A review of the lab personnel’s response to spills and documented clean-up procedures

All personnel should be encouraged to report even minor spills and document the clean-up procedures used.

In conclusion, if personnel are properly trained, encouraged to report spills and document clean-up procedures, and there are no indications of any spills outside the BSC, there should be no need for the gaseous decontamination of the whole laboratory. However, any spill outside the BSC should be considered sufficient cause to shut down the laboratory and perform a gaseous decontamination procedure. In addition, it should always be remembered that there is the potential for slight contamination of equipment and surfaces within the laboratory. Therefore, a thorough surface decontamination of the laboratory should always be performed prior to shutdown for yearly maintenance.

Who should perform gaseous decontaminates?

Because of the personnel and environmental hazards associated with gaseous decontamination, any such decontamination should be performed by knowledgeable personnel who have a thorough understanding of the hazards associated with the disinfectant gas as well as the methodology for generation and neutralization of that gas.
Biosafety Tips
Karen B. Byers
Dana Farber Cancer Institute, Boston, Massachusetts

Biosafety Tips brings you practical approaches to biosafety or “news you can use.” If you are looking for a useful and sensible solution to a biocontainment problem or perhaps a reference to help convince a skeptical researcher of the need for caution, this is the place to look. In this column I will share some biosafety insights for managing a variety of workplace situations. I welcome feedback or suggestions for future topics. Please e-mail any comments or suggestions to karen_byers@dfci.harvard.edu or to Co-Editor Barbara Johnson at barbara_johnson@verizon.net.

Staphylococcal Enterotoxin B (SEB) Laboratory Exposures

Is lab staff reluctant to wear personal protective equipment when working with toxins? These case studies warn that an itchy eye or nose can result in an exposure to experimental materials. Check out the September issue of Emerging Infectious Diseases at www.cdc.gov/ncidod/EID/vol10no9/04-0250.htm.

Researchers may relate to the three exposed laboratory workers in this article, since the procedures described are commonplace in many laboratories (Rusnak, 2004). For example, Worker 1 was injecting SEB into the endotrachial tube of a rabbit using a needle and syringe without a LuerLok. Less than 150 micrograms of Staphylococcus enterotoxin B (SEB) sprayed onto the researcher’s glove, and later he scratched his nose and the area around his left eye. Worker 2, who was not wearing gloves, was reconstituting SEB in the biosafety cabinet and was in the process of injecting 500 ug of SEB into a sealed vial, which was under pressure. Approximately 100 uL of SEB in solution foamed from the sealed vial and one finger came into contact with the foam. She immediately washed her hands with soap and water, but rubbed her eye before drying her hands. It is estimated that Worker 2 was exposed to less than 50 micrograms of SEB. Worker 3 cleaned up a dime-sized amount of liquid found outside a biosafety cabinet. Within hours of these exposure incidents, all three patients had eye irritation, excessive yellow ocular discharge, and a swollen eyelid or face that did not resolve for 4 to 5 days. Workers 1 and 2 suffered severe gastrointestinal symptoms for 2-3 days [see article for details].

This paper is important, since it is the first report of conjunctivitis with eyelid or facial swelling resulting from ocular or cutaneous exposure to SEB. Gastrointestinal symptoms of SEB intoxication are documented in the literature. The author cites three historical incidents of aerosol exposure to SEB that occurred during the U.S. offensive biological warfare program conducted from 1945 to 1969. Twenty-four staff members were exposed in the three incidents, and 17 developed SEB intoxication symptoms (Wedum, 1996).

Published reports such as this article are a public service. Biosafety professionals should consider sharing this type of information with researchers to help prevent similar exposure incidents. If you have staff working with SEB, you should also send the web address for this article to your occupational health services. The discussion in the article emphasizes that SEB exposure incidents result in symptoms similar to that of an infectious exposure and your occupational health staff may find the report extremely helpful for proper diagnosis and follow-up after SEB exposures (Rusnak, 2004).
References


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Pandemic Plan
National Vaccine Program Office
Hubert H. Humphrey Building, Room 725H
200 Independence Avenue, SW
Washington, DC 20201

October 25, 2004

Dear Sirs:

The American Biological Safety Association (ABSA) is an organization of biological safety practitioners who work in a variety of academic, governmental, healthcare and private work environments. ABSA has many members in the United States, Canada, and in other countries. We are recognized as a leading authority in the field of biological safety.

We have reviewed the Draft Pandemic Influenza Preparedness and Response Plan that was published in the August 27, 2004 issue of The Federal Register. Please consider the following comments:

Specific biosafety levels should be assigned for activities detailed in the document. Points of reference that may need to be noted are the Laboratory Safety Guidelines from the National Institutes of Health (NIH) and the American Society for Microbiology (ASM). At minimum, guidance as spelled out in the most recent edition of Biosafety in Microbiological and Biomedical Laboratories (BMBL) should be specifically detailed as the point of reference for appropriate biosafety levels for laboratory testing of diagnostic specimens. Additional safe work practices may be instituted upon receipt or isolation of a novel virus, but appropriate containment must be in place before the virus is cultured. If a site is unable to provide adequate containment, it will need to seek out and identify in advance of a pandemic an appropriate reference laboratory where these activities can be conducted. The BMBL does not currently address recommended biosafety levels for the virus production activities mentioned in the document, but the NIH and ASM references do provide more specific guidance for this activity. There will be many challenges for laboratories during a pandemic, and they should have clear points of reference for safe work practices and containment during their preparation activities.

The document should address medical surveillance and reporting of febrile illness for research and production staff (and family members) working with possible pandemic strains. As the recent Severe Acute Respiratory Syndrome (SARS) incidents in Asia demonstrate, even knowledgeable staff can transmit the virus into the community. In addition, the possibility of asymptomatic individuals transmitting virus should be considered in any surveillance program.

The public may be quick to seek treatment for perceived illness, especially if disease information is communicated to the public through the media and not through health care professionals. Increased demand for evaluation and treatment by the “walking well” will likely place additional pressure on a health care system that will already be strained. Most of these requests will come through outpatient visits to physicians and clinics that may not be reached by the Public Health Training Network (PHTN) and other training forums. There will be a critical need to provide accurate technical information to health care professionals in the medical community. There will also be a need to provide accurate information that can be readily understood by the public at large.
The Centers for Disease Control and Prevention (CDC) has a sampling and surveillance program in place to monitor influenza during the flu season. This program should be structured for rapid expansion to screen a large number of patient samples, at least in the initial stages of an outbreak. The anthrax bioterrorism incidents in 2001 showed that many sections of the public health network, such as the state health labs, can be quickly overwhelmed by unusual demands (i.e., requests to analyze mysterious white powders).

The plan indicates that the U.S. Department of Agriculture (USDA) has surveillance mechanisms for avian influenza and other potential sources of new strains. The National Institutes of Health (NIH) should work with the USDA to assure that veterinary staffs are aware of appropriate biosafety precautions to observe when sampling suspected animal outbreaks in order to prevent direct transmission of the virus to humans.

Both the summary and the annex discussing vaccine production mention “reverse engineering” and “reassortment” as methods to improve the growth of influenza strains in eggs (or tissue culture) for vaccine production. The NIH Office of Biotechnology Affairs (OBA) may wish to consider convening a panel to issue additional guidance regarding biosafety practices and containment for such recombinant DNA activities. USDA should be involved as well because of the risk to the poultry industry.

Since information and data will need to be developed regarding the virulence of this virus it will also be important to preserve viral cultures for future reference and for present characterization in the management of the pandemic. Reference should be made to appropriate standards of the U.S. Department of Transportation (USDOT) or the Dangerous Goods Regulations of the International Air Transport Association (IATA) for sites to note and follow in the preparation of shipments of these materials.

Thank you for providing ABSA with the opportunity to participate in the review of this draft plan. ABSA members are prepared to be of further assistance in developing a more useful and current document. We wish you well in the finalization of your plan of action.

Sincerely,

Elizabeth Gilman Duane, MS, RBP, CBSP (ABSA)
President, American Biological Safety Association

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2005 Strategic Performance Areas and Teams

Betsy Gilman Duane

Cambridge, Massachusetts

**Alliance Team—Mary Cipriano, Team Leader**

This team brings together existing and new alliances as well as a new Media and Public Relations Committee. The new committee will focus on developing promotional pieces on biosafety and ABSA, developing a media plan, and contacting suitable organizations, associations, agencies, and media to develop alliances. The current alliances, some formal and others informal, include OSHA, The Elizabeth Griffin Foundation, EPA, UN, WHO, International Biosafety Working Group, and AIHA.

**Conference Services Team—Larry Gibbs, Team Leader**

The Conference Services Team brings together all of the existing committees that support our annual biosafety conference. These committees include Exhibitor’s Advisory, Local Arrangements, and Scientific Program. This will allow for a cohesive approach to planning our annual conferences. This team is planning to author a conference services guide that will become a valuable resource for planning future conferences.

**Defining the Profession Team—Janet Peterson, Team Leader**

This team brings together the existing Historical, Registration, and Certification Committees. It also adds a new Mentoring Committee and task forces to look at the body of biosafety knowledge and ways that we may promote credentialing. This team will evaluate and enhance existing certification and registration programs and establish a body of knowledge for biosafety professionals. The new Mentoring Committee will develop a mentoring program with criteria for the mentor, mentee, and the mentoring relationship.

**Management Team—Debbie Hunt, Team Leader**

The Management Team consists of a number of existing committees and a new committee that support the overall function of ABSA. The committees include Affiliate Relations, Awards, Bylaws, Website (formerly the Communications Committee), Finance, Marketing, Membership, and Nominating. This team focuses on many important communication-related activities of ABSA, as well as the member-services aspects of our organization.

**Professional Development Team—LouAnn Burnett, Team Leader**

This team includes the existing Publications Committee along with four new committees that replace the Training & Education Committee. The new committees include Educational Operations, Instructional Technologies, Instructional Resources, and Curriculum Development. This team will allow ABSA to expand our excellent course and seminar offerings, and allow us to continue to deliver high-quality programs while looking at new ways to provide this resource. They will also develop instructor talent and curricula for biosafety.

**Regulatory & Technical Affairs Team—Richard Fink, Team Leader**

The Regulatory & Technical Affairs Team consists of a Regulatory Review Committee and a Technical Review Committee. This new structure replaces the former Technical Resources and Technical Review Committees. This team will influence the development and implementation of regulations and standards, and provide ABSA’s members with guidance regarding regulations and standards.
2004 ABSA Conference Abstracts Information

Editorial Note

All opinions by the authors or speakers are those merely of the author and not the American Biological Safety Association (ABSA) or endorsed thereby. The underlined name in these abstracts denotes the speaker. The Scientific Program Committee would like to encourage everyone whose paper has been approved for poster or oral presentation to submit the paper to be considered for publication in Applied Biosafety: Journal of the American Biological Safety Association. For more information, contact the ABSA National Office at 847-949-1517.

REVIEW COURSE FOR BIOSAFETY AND NATIONAL REGISTRY OF MICROBIOLOGISTS (NRM) EXAM IN BIOLOGICAL SAFETY MICROBIOLOGY
Mary Cipriano, RBP, CBSP; Marian Downing, CBSP; Richard Fink, CBSP; Glenn Funk, PhD, CBSP; Melina Kinsey, RBP, Linda Wolfe, RBP, CBSP

BIOSAFETY LEVEL 3: FACILITY DESIGN CONSIDERATIONS AND LABORATORY OPERATIONS
Robert Ellis, PhD, CBSP, Colorado State University; Paul Langevin, PEng, Merrick & Co.

CURRENT UNDERSTANDING AND ADVANCES IN MOLD ASSESSMENT, SAMPLING AND ANALYSIS
Chin Yang, PhD, P&K Microbiology

BASIC CELL BIOLOGY
Richard Giles, PhD, M.D. Anderson Cancer Center

BIOLOGICAL TOXINS: SCIENCE AND SAFETY
Joe Kozlovac, MS, RBP, CBSP, ARS Homeland Security Biological Safety Program; Robert J. Hawley, PhD, RBP, CBSP Midwest Research Institute

CRISIS COMMUNICATION
Louise S. Barden, PhD, Health Scientist, Centers for Disease Control and Prevention

REVIEW COURSE FOR BIOSAFETY AND NATIONAL REGISTRY OF MICROBIOLOGISTS (NRM) EXAM IN BIOLOGICAL SAFETY MICROBIOLOGY
No presenters listed.

BIOSAFETY LEVEL 3: FACILITY DESIGN CONSIDERATIONS AND LABORATORY OPERATIONS
No presenters listed.

ADVANCED BIOHAZARD RISK ASSESSMENT
Lynn Harding, MPH, CBSP, Biosafety Consultant; Diane O. Fleming, PhD, RBP, CBSP, Biosafety Consultant

BASIC VIROLOGY & VIRUS BASED GENE VECTORS
Patrick Condreay, PhD, Research Investigator, GlaxoSmithKline Discovery Research

TRAIN THE TRAINER: BIOSAFETY FOR SECURITY AND MUNICIPAL RESPONDERS
Tom Boyle, University of Pennsylvania and Brian Petuch, Merck Research Laboratories

PLANT BIOSAFETY IN PRACTICE
Dr. Benedictus J. Verduin, Biosafety Officer, Department Plant Sciences, Wageningen University (WU); Neil E. Hoffman, PhD, APHIS/USDA
AUDITING FOR SAFETY PROFESSIONALS
Richard Rebar, MS, RBP, CBSP, Manager Global Audits, GlaxoSmithKline

OCCUPATIONAL HEALTH SURVEILLANCE AND MONITORING IN BIOLOGICAL LABORATORIES
Gary R. Fujimoto, MD, Palo Alto Medical Foundation, Palo Alto, CA, Associate Professor of Medicine, Stanford University School of Medicine, Stanford, CA, Assistant Clinical Professor of Medicine, University of California, San Francisco School of Medicine, San Francisco, CA

THE TRANSPORT OF DIAGNOSTIC & INFECTIOUS SAMPLES BY AIR—SEMINAR ON THE CHANGES
Nicholas Mohr, Peter East Associates Ltd., London; Joyce Beerbower, President, COO, Safety Compliance Services, Inc.

BIOTERRORISM RESPONSE
Brian Petuch, MA, Merck and Thomas Boyle, MS, University of Pennsylvania

ANIMAL BIOSAFETY LEVEL 3 CONTAINMENT FACILITIES—DESIGN TO OPERATIONS
Barbara Fox Nellis, RBP, CBSP, Biological Safety Officer & Responsible Official, University of Florida; Maureen Long, PhD, DVM, Assistant Professor Large Animal Clinical Sciences, University of Florida; Kelly J. Flint, BS, LAT, Animal Care Services Coordinator for Safety & Compliance Supervisor, University of Florida

SHIPPING INFECTIOUS AND DIAGNOSTIC SPECIMENS
Eric Cook, Assistant Biosafety Officer, MIT

FUNDAMENTALS OF BIOSAFETY LEVEL 4 CONTAINMENT
David S. Bressler, MS, Centers for Disease Control and Prevention; Robert J. Hawley, PhD, RBP, CBSP, Midwest Research Institute

BASIC DISINFECTION/STERILIZATION/DECONTAMINATION
Richard Fink, CBSP, Wyeth Biopharma; Glenn Funk, PhD, CBSP, Lawrence Livermore National Laboratories

EFFECTIVE BIOSAFETY COMMITTEES: EXPECTATIONS AND EXAMPLES
LouAnn Crawford Burnett, MS, CBSP, Vanderbilt University; Allan Shipp, MHA, NIH, Office of Biotechnology Activities; Barry Cohen, MPH, CBSP, Transkaryotic Therapies, Inc.

SELECT AGENT REGULATIONS: OVERVIEW AND GENERAL REQUIREMENTS
Lori Bane, Select Agent Program, CDC; James Blaine, Constella Health Sciences; Diane Martin, Constella Health Sciences; Charles Schable, Office of Terrorism Preparedness, CDC; Charles Brokoff, Select Agent Program, CDC; Lee Ann Thomas, APHIS; John Strovers, FBI; Ross Spears, Select Agent Program, CDC; Doug Brown, Department of Commerce; Ken Cremer, NIH

ADVANCED DISINFECTION/STERILIZATION/DECONTAMINATION
Richard Fink, CBSP, Wyeth Biopharma; Glenn Funk, PhD, CBSP, Lawrence Livermore National Laboratories

WRAPPING UP THE MAD COW STORY
Paul W. Brown, MD, Bethesda, MD

ELIZABETH R. GRIFFIN RESEARCH FOUNDATION LECTURE
Dr. Julia Hilliard, National B Virus Resource Center

CASE REPORT: TRANSMISSION OF LYMPHOCYTIC CHORIOMENINGITIS VIRUS FROM LABORATORY MICE TO AN ANIMAL TECHNICIAN
Andrew Braun and Henry Warren, Harvard Medical School, Boston, MA

PERFORMANCE OF NEW BSC CONTROL SYSTEM IN BSL3 LABORATORY
Katsuaki Shinohara¹, Takao Ohkubo², Kazutoshi
Kogure\textsuperscript{2}, Yuji Yamanaka\textsuperscript{2}, Kazuhiro Matsuzaki\textsuperscript{2}, Masayuki Uezono\textsuperscript{2}, Yuusuke Koba\textsuperscript{2}, Yoshikage Miura\textsuperscript{2}, Katsumi Sekiguchi\textsuperscript{4}, Hirotaka Takagi\textsuperscript{1}, Kazuyoshi Sugiyama\textsuperscript{1} and Atsuo Kitabayashi\textsuperscript{2};\textsuperscript{1}National Institute of Infectious Diseases (NIID) Japan; \textsuperscript{2}Hitachi Air Conditioning Systems Co., Ltd.; \textsuperscript{3}Hitachi Plant Construction and Services Co., Ltd.; \textsuperscript{4}Albarnet Co., Ltd.

NEW BSL-3 LABORATORY IN NIID JAPAN
Katsuaki Shinohara, Hirotaka Takagi, Kazuyoshi Sugiyama and Takeshi Kurata National Institute of Infectious Diseases Japan

MOBILE MODULE-TYPE BSL-3 LABORATORIES
Brian Kim, General Advisor, GCEM (Green Cross Engineering Maintenance Co. Ltd), Seoul, Korea; Cheon Kwon Yoo and Young Rhan Joo, Korea National Institute of Health (KNIH)

WHICH WAY DO YOU SWING?
Sandy Ellis, RA; Paul E. Langevin, P.Eng, Merrick & Co., Denver, CO

ELECTRONIC INVENTORY TOOL FOR BIOLOGICAL SELECT AGENT AND TOXINS
Dina M. Sassone, Los Alamos National Laboratory, Los Alamos, NM; David Saunders, Ex3, Inc. Tempe, AZ; Mark Kleinman, Ex3, Inc. Tempe, AZ; Raji Dasari Ex3, Inc. Tempe, AZ

DEVELOPMENT OF A USER’S GUIDE AND TRAINING MODULES FOR SELECTAGENT COMPLIANCE
Joanne Jones and Sherry L Henry, Occupational Health, Safety and Environment (OHSE), Centers for Disease Control and Prevention (CDC), Atlanta, GA and Division of Vector-Borne Infectious Diseases (DVBID), Centers for Disease Control and Prevention, Fort Collins, CO

STAPHYLOCOCCAL ENTEROTOXIN AS A BIOLOGICAL WEAPON: RECOGNITION, MANAGEMENT, AND SURVEILLANCE OF STAPHYLOCOCCAL ENTEROTOXIN
Ejem Ahanotu, Damaris Alvelo-Ceron, Tim Ravita, Constella Group Inc., Constella Health Sciences, Statistics & Public Health Research, Atlanta, GA

SELECT AGENT RULE COMPARED WITH THE CLINICAL LABORATORY IMPROVEMENT AMENDMENTS: IMPACT ON REGULATED LABORATORIES
Edward E. Gaunt, Constella Group Inc., Constella Health Sciences, Statistics & Public Health Research, Durham, NC

EXPRESSED DIAGNOSTICS OF ANTIBODIES AND ANTIGEN OF EBOLA VIRUS
T. S. Chepurnova, N. I. Fedosova, I. N. Egoricheva, F. Elgh, A. A. Chepurnov, State Research Center of Virology and BiotechnologyAVector, Koltsovo, Novosibirsk Region, Russia

SELECT AGENT REGISTRATION DATABASE
Sherry L. Henry and Joanne Jones Division of Vector-Borne Infectious Diseases, Centers for Disease Control and Prevention, Fort Collins, CO and Occupational Health, Safety and Environment, Centers for Disease Control and Prevention, Atlanta, GA

COMPARISON OF THE CANADIAN INDUSTRIAL SECURITY MANUAL AND THE UNITED STATES NATIONAL INDUSTRIAL SECURITY PROGRAM OPERATING MANUAL
Andrew Hammond, Constella Group Inc., Constella Health Sciences, Statistics & Public Health Research, Atlanta, GA

REVIEW OF INTERNATIONAL BIOSECURITY AND BIOTERRORISM LEGISLATION
Andrew Hammond, Constella Group Inc., Constella Health Sciences, Statistics & Public Health Research, Atlanta, GA

A DISCUSSION OF THE NATIONAL INDUSTRIAL SECURITY PROGRAM AND BIOSECURITY
Patrick Fenneran, Constella Group Inc., Constella Health Sciences, Statistics & Public Health Research, Atlanta, GA
SUSPICIOUS PACKAGE RECOGNITION TRAINING FOR MAIL HANDLERS: A CONTINUING NEED
Julie A. Johnson, Karin K. Schoen, Tru F. Twedt, Alan D. White, Iowa State University, Ames, IA

REVIEW AND COMPARISON OF GERMICIDES APPLIED TO LABORATORY WASTE MANAGEMENT AND LABORATORY DISINFECTION
Tim Ravita, Medhat Henein-Azer, Constella Group Inc., Constella Health Sciences, Statistics & Public Health Research, Atlanta, GA

THE RATIONAL INVESTIGATION INTO SAFETY AND CONTAINMENT AS APPLIED TO THE LABORATORY ENVIRONMENT
Brian Satterfield, Constella Group Inc., Constella Health Sciences, Statistics & Public Health Research, Atlanta, GA

THE PREVENTION OF LABORATORY ANIMAL ALLERGY
Jyl Burgener, GlaxoSmithKline, Environmental Health & Safety Department, Research Triangle Park, NC

BASICS BIOSAFETY TRAINING FOR NON-BIOLOGICAL LABORATORY PERSONNEL
Lolly S. Robinson, Midwest Research Institute, Kansas City, MO

USE OF MULTIPLE SOP STYLES TO INCREASE PERSONNEL COMPLIANCE AND SAFETY WITHIN A BSLII/BSLIII ANIMAL FACILITY
Andrea Mitchell, Jeri Ellis, Tim Ruddy; University of Arizona Animal Care, Tucson, AZ

MANAGING POTENT COMPOUNDS SAFELY
Brenda E. Barry, Nanette E. Moss, Environmental Health & Engineering, Inc., Newton, MA

LIQUID AND SOLID WASTE DECONTAMINATION IN LABORATORIES

ESTABLISHING ACCEPTABLE PARAMETERS FOR AUTOCLAVING BIOHAZARDOUS WASTE
Joseph P. Carrier, Johns Hopkins University APL, Laurel, MD

A PARADIGM SHIFT IN BIOTECHNOLOGY FROM FROZEN TO CRYOGENIC
David Petreccia, MD, Infectious Diseases, St. Jude Hospital, CA; Patrick Mullens, MD, Pathology Brea Hospital, CA

REVIEW OF BENEFITS ASSOCIATED WITH THE IMPLEMENTATION OF A QUALITY ASSURANCE PLAN
Maria L. Velázquez, Tim Ravita, Constella Group Inc., Constella Health Sciences, Statistics & Public Health Research, Atlanta, GA

AEROSOL EXPOSURE SYSTEM FOR RABBITS: APPLICATION TO M. TUBERCULOSIS INFECTION
Liana Tsenova; Ryhor Harbacheuski; Evette Ellison; Claudia Manca and Gilla Kaplan, Laboratory of Mycobacterial Immunity and Pathogenesis, The Public Health Research Institute, Newark, NJ

VERIFICATION OF COMPLETE INACTIVATION OF HIGHLY INFECTIOUS RESPIRATORY VIRUSES
Jill M. Bieker, Sandia National Laboratories, Albuquerque, NM; Joe Anderson, Richard D. Oberst, and Sanjay Kapil, Kansas State University, Manhattan, KS

HARNESSING FLOW CYTOMETRY FOR THE RAPID ENUMERATION AND VIABILITY ASSESSMENT OF AIRBORNE BACTERIA
R. Thomas Leonard, University of Virginia, Charlottesville, VA

VAPROIZED HYDROGEN PEROXIDE BASED BIODECONTAMINATION OF A HIGH-CONTAINMENT LABORATORY UNDER SLIGHT NEGATIVE PRESSURE
Jay Krishnan, Greg Fey, Stefan Wagener, Canadian Science Centre for Human and Animal Health, Winnipeg, Manitoba, Canada
CHLORINE DIOXIDE GAS DECONTAMINATION OF THE UNIVERSITY OF PENNSYLVANIA’S GEORGE D. WIDENER LARGE ANIMAL HOSPITAL INTENSIVE CARE UNIT
Henry S. Luftman and Michael A. Regits, Micro-Clean, Inc., Bethlehem, PA; Paul Lorcheim and Mark A. Czarneski, ClordiSys Solutions Inc., Lebanon, NJ; Thomas Boyle, University of Pennsylvania, Philadelphia, PA; Helenb Aceto, Barbara Dallap and Donald Munro, University of Pennsylvania School of Veterinary Medicine New Bolton Center, Kennett Square, PA

CURRENT ISSUES & TRENDS IN BSE AND OTHER PRIONS
Moderator: Barbara Fox Nellis, RBP, CBSP; Participants: Dr. Paul Brown, NIH; Pierluigi Gambetti, Director of the National Prion Surveillance Center, Case Western University; Paul Gibbs, PhD, DVM, University of Florida; Bob Hillman, Texas Animal Health Commission; Dr. Donald Knowles, USDA, ARS; Donald O’Toole, PhD, FRC Path, Director, Wyoming State Veterinary Laboratory

BRIEF SUMMARY OF TOPIC: BEST PRACTICES FOR HANDLING SUSPECT BSL-2 ANIMAL TSE DIAGNOSTIC SAMPLES IN ANIMAL HEALTH LABORATORIES
Donald O’Toole, Wyoming State Veterinary Laboratory, Laramie, WY

USDA TRAINING REQUIREMENTS FOR FIELD RELEASE OF GENETICALLY MODIFIED PLANTS PRODUCING PHARMACEUTICALS AND INDUSTRIAL COMPOUNDS
Beryl J. Packer and Karin K. Shoen, Iowa State University, Ames, IA

USE OF MULTIPLE SOP STYLES TO INCREASE PERSONNEL COMPLIANCE AND SAFETY WITHIN A BSLII/BSLIII ANIMAL FACILITY
Andrea Mitchell, Jeri Ellis, Tim Ruddy; University of Arizona Animal Care, Tucson, AZ

PREPARING THE EXTERNAL EMERGENCY RESPONDER FOR INSTITUTIONAL HAZARDS
Melina Kinsey, RBP, Midwest Research Institute Palm Bay, Florida; Lolly Robinson, MBA, Midwest Research Institute, Kansas City, MO

TB, BLOODBORNE PATHOGENS AND MORE
Melody Sands, Director, Office of Health Enforcement, OSHA

THE MOLECULAR BIOLOGY OF HEPATITIS B AND C VIRUSES
Robert E. Lanford, PhD, Department of Virology and Immunology Southwest Foundation for Biomedical Research, San Antonio, TX

MOLECULAR BIOLOGY OF ALPHA VIRUSES AND ALPHA VIRUS-BASED EXPRESSION OF VECTORS
Hans W. Heidner, PhD, University of Texas at San Antonio, San Antonio, TX

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Jeff Kempter, U.S. Environmental Protection Agency, Washington, DC

THE GENERATION OF CHLOROFORM AS A BY-PRODUCT OF DISINFECTION
Robert J. Hashimoto; Joseph Mooring II; Carol Robinson; Sabrina Ossiander; and Debra Van der Sluis, Genentech Inc., Environment Health and Safety, South San Francisco, CA

COMPARISON OF SPORE STRIPS AND SELF-CONTAINED BIOLOGICAL INDICATORS FOR USE WITH FORMALDEHYDE DECONTAMINATION
Betty Kupskay, Health Canada, Winnipeg, Manitoba, Canada

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Allan M. Bennett and Simon R. Parks, Health Protection Agency, Porton Down, Salisbury UK
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Julie A. Johnson, Tru F. Twedt, James A. Roth, Iowa State University, Ames, IA

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Rebecca Ryan, Boston University Medical Center, Boston, MA; Ross Ferries, Smith Carter Architects, Atlanta, GA; Jon Crane, CUH2A Architects, Atlanta, GA

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Richard Fink, CBSP, Wyeth BioPharma, Andover, USA; Dr. Enda Moran, Wyeth Medica Ireland, Dublin, Rep. of Ireland

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Nicholas Mohr, CEO; Peter East Associates, Ltd., London, UK; Joyce Beerbower, President, Safety & Compliance Services Inc., Kulsville, PA

John S. Colladay, PhD, University of California, Riverside, Riverside CA

AEROSOL COLLECTION MEDIA: EFFECT OF ANTIFOAMS ON CELL VIABILITY AND VIRUS INFECTIVITY
J. R. Hermann1; R.B. Evans1; S. Hoff2; J. Zimmerman1; 1College of Veterinary Medicine, 2College of Agriculture, Iowa State University, Ames, IA

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Dr. Nicoletta Previsani, Project Leader Biosafety, Department of Communicable Disease Surveillance and Response, World Health Organization

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Jonathan Richmond, PhD, RBP

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Gerald E. McDonnell, PhD; Iain F. McVey; Anthony W. Dallmier, PhD; and Peter A. Burke, PhD, STERIS Corporation, Mentor, OH

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Deborah Wilson; Murray Cohen; National Institutes of Health, Bethesda, MD; Thomas E. McWhorter, CDG Research Corp., Bethlehem, PA

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Yu-Rong Chu, Environmental Health & Engineering, Inc., Newton, MA; Donald Redpath, Acambis, Inc., Cambridge, MA

PARAFORMALDEHYDE DECONTAMINATION OF LABORATORY SPACES
James T. Wagner, Controlled Environment Consulting, Bethlehem, PA; Michael A. Regits and Henry S. Luftman, PhD, Micro-Clean, Inc., Bethlehem, PA

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Jennifer Gaudioso and Reynolds M. Salerno, Sandia National Laboratories, Albuquerque, NM

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Susan B. Rivera, Jennifer Gaudioso, and Reynolds M. Salerno, Sandia National Laboratories, Albuquerque, NM

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Bill Nauschuetz, PhD, LTC Richard Walker, COL
Noel Webster, US Army Medical Command, Fort Sam Houston, TX

RISK ASSESSMENT ACROSS THE BIOSAFETY COMMUNITY
Paul J. Huntly, DNV, Aberdeen UK; Dr. Stephen McAdam, DNV Research, Hovik, Norway; Dr. Stefan Wagener, Canadian Science Centre for Human and Animal Health, Winnipeg, Canada

BIORISK MANAGEMENT SYSTEM ASSESSMENT B EXPERIENCES FROM BOTH SIDES OF THE FENCE
Paul J. Huntly, DNV, Aberdeen UK; Dr Stephen McAdam, DNV Research, Hovik, Norway; Dr. Stefan Wagener, Canadian Science Centre for Human and Animal Health, Winnipeg, Canada; Dr. Ingegerd Kallings, Swedish Institute for Infectious Disease Control, Solna, Sweden

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Kenyon D. Yoder, Bayer Corporation, Pittsburgh, PA

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Penny H. Holeman, MPH, RBP, CBSP, Johnson and Johnson, Raritan, NJ; Kevin Turner, MS, Johnson & Johnson, Spring House, PA

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Debra C. Sharpe, MPH, Southern Research Institute, Birmingham, AL

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Robert Emery, University of Texas, Houston, TX

PRIVACY, ACADEMIC FREEDOM AND THE PUBLIC’S RIGHT TO KNOW: TRAINING AND EDUCATION WORKSHOP
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Ross Ferries, Smith Carter Architects, Atlanta, GA, Jon Crane, CUH2A Architects, Atlanta, GA and Rebecca Ryan, Boston University, Boston, MA

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M. Randy Kray, Smith Carter, Atlanta, GA, Jon Crane, CUH2A, Atlanta, GA

MOBILE LABORATORIES-CONCEPT DESIGN AND IMPLEMENTATION
Monica Heyl, U.S. Army RDECOM, ECBC, Aberdeen, MD; Stan Duarte, Morehouse School of Medicine, Atlanta, GA; Charles Henry, U.S. Army RDECOM, ECBC, Aberdeen, MD; Keith Landy, Purified Microenvironments, Ormond Beach, FL

CONCEPT TO REALITY CONSTRUCTION AND COMMISSIONING OF A STAND ALONE MODULAR A BSL-3 FACILITY AT THE UNIVERSITY OF FLORIDA
Kelly J. Flint and Barbara Fox Nellis, SM, RBP, CBSP; University of Florida, Gainesville, FL

DESIGNING FOR ANIMAL SPACES IN HIGH CONTAINMENT LEVEL 3 AG AND 4
Harry G. Wiber, PE, Hemisphere Engineering, Edmonton, Alberta, Canada; Christopher Kiley, PE, Hemisphere Engineering, U.S., Inc., Atlanta, GA
RECOMMISSIONING OF EXISTING BIOSAFETY LABORATORIES

BL3 LAB SPACE AND A RENOVATED ANIMAL FACILITY COMMISSIONING
Stan Duarte, Morehouse School of Medicine, Atlanta, GA

BSL3/4 LABORATORY SECONDARY CONTAINMENT DESIGNS
Paul E. Langevin, PEng; James (Sandy) Ellis, RA, Merrick & Co.

HVAC MANAGEMENT: TO LEAK OR NOT TO LEAK
Paul E. Langevin, PEng; James (Sandy) Ellis, RA, Merrick & Co.

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The ABSA 2004 Conference in San Antonio hosted 21 preconference courses and featured 76 presentations (29 of which were poster presentations). ABSA was pleased to welcome 306 new members and 47 exhibitors. Over 600 attendees were present for the scientific program and enjoyed various conference related social activities, including the closing banquet at a Texas institution, the Leon Springs Dance Hall, featuring a nationally recognized performer Bobby Flores. From the crowds on the dance floor it was apparent that Texas Two-Step and Swing Dancing translated not only to Texans but to many ABSA members. Now with nearly 1,300 members and several years of steady ABSA growth, we again invite and welcome all members to become involved in ABSA.

Above: The ABSA cake was the unique dessert at the banquet held on Tuesday at Leon Springs Dance Hall.
2004 ABSA Service Award Recipients

Award Presentations from the ABSA Conference, October 2004

Arnold G. Wedum
Distinguished Achievement Award
W. Emmett Barkley, PhD
Howard Hughes Medical Institute
Chevy Chase, Maryland

The award shall be given to an individual for outstanding contributions to biological safety through teaching, research, service or leadership.

In 2004, the Arnold G. Wedum Distinguished Achievement Award was presented to Dr. W. Emmett Barkley, who exemplifies the Biological Safety Professional. Emmett has fulfilled all four criteria for this nomination: teaching, conducting original biosafety research, providing service to the profession, and always being an accomplished leader in Biosafety. Some of his contributions are:

• Research that lead to the development of criteria and fabrication of Class II Type B Biological Safety cabinets.
• Sponsoring original biosafety research conducted by graduate candidates in Public Health.
• Initiating, funding, and teaching National Biological Safety courses.
• Initiated Safety Training Course for Research Involving Recombinant DNA Molecules.
• Coordinated development of NCI Safety Symposium on Biological Safety and Containment Facilities and Equipment.
• Served as Chair for the development of Laboratory Safety Monographs.
• Co-Chair on the International Agreement for Recombinant DNA Safety Protocols and Containment Facility Design.
• Co-author of the CDC/NIH Biosafety in the Microbiological and Biomedical Laboratories.
• ABSA Past-President

John H. Richardson
Special Recognition Award
Jerome P. Schmidt, PhD, CBSP
San Antonio, Texas

The award shall be given to an individual in recognition of a specific contribution that has enhanced the American Biological Safety Association and/or the profession of biological safety.

In 2004, the John H. Richardson award was given to Jerome P. Schmidt in recognition of his significant contribution in the establishment of the first Biosafety Examination through ASM and NRM. The designation of CBSP has been a hallmark and defining moment for ABSA. It has provided an opportunity for Biosafety Professionals to challenge their knowledge and experience. Dr. Schmidt is a compassionate individual who always adds his considerable wealth of acquired knowledge to any discussion. With the exam for CBSP, he contributed to ABSA’s recognition as an international leader in biological safety.

Outstanding Means of Communication Award
This award was presented by the Training and Education Committee for the Stanford Internet Biosafety Training Program, submitted by:

David H. Silberman
Director, Health and Safety Programs
Stanford University School of Medicine

Keith A. Perry
EH&S Specialist
Stanford University School of Medicine

Ellyn D. Segal
Biosafety Manager
Stanford University EH&S
Richard C. Knudsen Memorial Publication Award
R. Mark Buller, PhD
Saint Louis University Health Sciences Center
St. Louis, Missouri

The award shall be given, when merited, to the author(s) of an article that reports a significant contribution in scientific investigation and/or health and safety in areas of interest to Richard Knudsen during his career. The award recipient need not be a member of the American Biological Safety Association.

Presented to R. Mark Buller, PhD, for the article “Mousepox: A Small Animal Model for Biodefense Research” which appeared in Applied Biosafety, Volume 9, Number 1, 2004.

Fund Donations

Editorial Note

ABSA thanks the many of you have generously contributed to the Richard C. Knudsen Memorial Fund. The proceeds from this fund will be used to establish an award to honor Rich’s memory. Those wishing to make donations to this fund should make their checks payable to the American Biological Safety Association. Please add a notation to the memo line that the check is to be used for the Richard C. Knudsen Memorial Fund. Checks should be mailed to ABSA, 1202 Allanson Road, Mundelein, Illinois 60060-3808.

Barbara Johnson/Co-Editor, Applied Biosafety
Karen B. Byers/Co-Editor, Applied Biosafety

Knudsen Fund Donations as of November 1, 2004—Total $14,068.53

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<td>Dana Masi</td>
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The Argent Hotel, San Francisco California
Contact: Phone: 925-254-1744 x 12, Fax: 925-254-1093, E-mail: registrar@TradelineInc.com,
Web Site: www.TradelineInc.com

October 23-26, 2005
American Biological Safety Association (ABSA) 48th Annual Conference
Westin Bayshore Hotel, Vancouver, British Columbia, Canada
Contact: Phone: 847-949-1517, Fax: 847-566-4580, E-mail: absa@absa.org, Web Site: www.absa.org

October 15-18, 2006
American Biological Safety Association (ABSA) 49th Annual Conference
Marriott Copley Hotel, Boston, Massachusetts
Contact: Phone: 847-949-1517, Fax: 847-566-4580, E-mail: absa@absa.org, Web Site: www.absa.org

October 7-10, 2007
American Biological Safety Association (ABSA) 50th Annual Conference
Opryland Hotel, Nashville, Tennessee
Contact: Phone: 847-949-1517, Fax: 847-566-4580, E-mail: absa@absa.org, Web Site: www.absa.org

Join a Committee

Have you ever considered joining a committee? When you choose to serve on a volunteer committee, you open up a world of possibilities for networking, professional growth, and career opportunities while serving your profession. Volunteer member groups are the backbone of the association because they:

• Serve as a forum for exchange of information
• Advance the science in all specialties of biosafety
• Develop guidelines and standards
• Provide education and training
• Link ABSA to many other institutions

You should explore committees in areas of the profession where you are active or have an interest. There is a great variety; you can be sure to find one of interest to you. Please review the list of committees and identify those areas in which you would like to participate or contact the chair of the committee (http://www.absa.org/abocommittees.html) that interests you to find out more information about the committee’s goals. You are also invited to attend the committee's meeting during our national conference or at any other time (all committee meetings are open).
Please visit our ABSA Chapters, Affiliates, and Affiliated Organizations for more biosafety information and news.

- www.absa-canada.org
- www.anbio.org.br
- www.socalbionet.org

- biosafety@comcast.net
- www.duke.edu/~alder002
- www.chabsa.org

- www.ebsa.be
- www.mabsa.org
- www.sebsa.net

Biological Safety Association of Japan (BSAJ)
(Note: BSAJ affiliate status is in process.)
ksugi@nih.go.jp

EGilman@absa.org
The Elizabeth R. Griffin Research Foundation is a 501(c)(3) non-profit foundation dedicated to the support of professional scientific and educational organizations that endeavor toward the common good of humankind. This includes, but is not limited to, supporting scientific research that aims at the solution of human health and societal problems and supporting worker safety training in dealing with non-human primates and other animal subjects.

The Foundation was established by the family of Elizabeth R. Griffin (1975-1997) following her tragic and premature death that was brought about by an ocular exposure to the macaque-borne B Virus. At the time of her death, Beth was a research assistant at the Yerkes Primate Research Center at Emory University in Atlanta, Georgia.

Dedicated to both supporting the research that Beth loved and working to assure no more Beth Griffin tragedies need occur, the Foundation has consistently endeavored to seek optimal avenues to carry out its missions.

Since the formation of the Foundation in 2000, the Foundation has funded over $500,000 in professional research grants. The Foundation has also granted over $30,000 in funding support to biosafety seminars and has provided over $20,000 of educational materials to institutions and organizations involved in laboratory animal science and research.

The Foundation has also funded over $50,000 in research internships and externships, the most significant being an ongoing internship program for an Agnes Scott College (Beth’s alma mater) student to work with Dr. Julia Hilliard at the National B Virus Resource Center at Georgia State University. The Foundation also funds a clinical veterinary research extern program that is operated through the Association of Primate Veterinarians.

In supporting its missions, the Foundation works closely with professional groups such as ABSA. Members of ABSA share the same strong interests in improved biosafety opportunities and methodologies, and the Foundation is excited about our future in working together. To date, the Griffin Foundation has provided financial support for seminar training sessions operated through ABSA and has also established the Elizabeth R. Griffin Lecture as a significant part of the ABSA annual meeting.

The ABSA Council has established a Griffin Committee to explore future ways the Foundation might assist ABSA in accomplishing its goals by determining how best to allocate resources. The Griffin Committee’s members include ABSA members Ben Fontes, LouAnn Burnett, and Betsy Weirich, and Jim Welch of the Griffin Foundation.

In addition to working with ABSA, the Foundation also has developed close working relationships with AALAS (American Association of Laboratory Animal Science), ACLAM (American College of Laboratory Animal Medicine), APV (Association of Primate Veterinarians), CALAS (Canadian Association of Laboratory Animal Science), and ILAR (Institute of Laboratory Animal Research). Through numerous ongoing collaborative efforts with these groups, biosafety issues are now often found in the forefront of professional meetings and symposiums.

The Elizabeth R. Griffin Research Foundation is headquartered in Kingsport, Tennessee and is governed by a board of directors that includes William Griffin, MD, Rev. Caryl Griffin, Kimberly Hicks, MD, Karen Thompson, PhD, Julia Hilliard, PhD, and Ted White, Esq. The Foundation is managed by an executive director, Jim Welch (jwelch@ergriffinresearch.org), and can be found on the web at www.griffinresearch.org.
ABSA Announces Professional Publications for Purchase

Anthology I: Perspectives on Laboratory Design—Contents include, in part: Management of Biosafety; Primary Biocontainment Devices; Open BSL-2 Laboratories; Facility Guidelines for BSL-2 and BSL-3 Biological Laboratories; Design of BSL-3 Laboratories; Building a Maximum Containment Laboratory; Designing the BSL-4 Laboratory; Role of the Class III Cabinet in Achieving BSL-4; Biosafety Considerations for Design of Large Scale Facilities; Small Animal Research Facilities and Equipment; Small Animal Research Facility Management; Large Animal Research Facilities; and Waste Management Considerations.

Anthology II: Facility Design Considerations—Contents include, in part: Biocontainment of Highly Pathogenic Avian Influenza Viruses; Maximum Containment for Researchers Exposed to Biosafety Level 4 Agents; Modular/Mobile BSL-2/3 Laboratories; Facility Maintenance Operations (Skilled Trades) for Biological Containment Laboratories; Construction and Commissioning Guidelines for Biosafety Level 4 (BSL-4) Facilities; Safety and Health Considerations for Conducting Work with Biological Toxins; and Toxicology Laboratories.

Anthology III: Application of Principles—Contents include, in part: Risk Assessment for Working with Infectious Agents in the Biological Laboratory; Biosafety Considerations in rDNA: Viral Gene Transfer Vectors, DNA-based Vaccines and Xenotransplantation; Biosafety Issues in Hospital Settings; An Overview: Biological Safety from a Global Perspective; Ergonomic Considerations in Biomedical Research Laboratories; and Applied Safety Training in the Biomedical Facility.

Anthology IV: Issues in Public Health—Contents include, in part: Autopsy Biosafety; Bioterrorism: Public Health Preparedness; Biological I Chemical Terrorism and the University; Global Perspectives on Infectious Substance Transportation; Biosafety Needs in Laboratories in Developing Countries; Understanding, Assessing, and Communicating Topics Related to Risk in Biomedical Research Facilities; Biological Safety and Public Health Laboratory Design; and Investigations of Emerging Zoonotic Diseases.

Anthology V: BSL-4 Laboratories—Contents include, in part: Emergence of Bacterial and Other Zoonoses: Why Always a Surprise?; Security Considerations for Microbiological and Biomedical Facilities; Working at Biocontainment Level 4—Contain the Operator or Contain the Bug?; A Class III Cabinet BSL-4 Laboratory; Medical Emergency Planning for BSL-4 Containment Facilities; Monitoring of Specific Contamination of Virology Laboratories During Work with Filoviruses; and Animal Necropsy in Maximum Containment.

Anthology of Biosafety VI: Arthropod Borne Diseases—Contents include, in part: Arthropod Vectors and Their Role in Transmitting Pathogens to Humans and Animals; Laboratory-acquired Infections; Biosafety Issues and Solutions for Working with Infected Mosquitoes; Working Safely with Recombinant Viruses and Vectors; Arthropod Containment Guidelines; and Biosafety Practices in Field Research: A Reviewed Experience.

Anthology of Biosafety VII: Biosafety Level 3—Contents include, in part: Biosafety Level 3 Laboratory Design; Formaldehyde Fumigation for BSL-3 Facilities; The Class III Biological Safety Cabinet; Comparative Pathology in Biosafety Level 3 Containment; Biocontainment in Developing Countries; The Moment of Truth: Crisis Communication for Laboratories; Transport of Infectious Substances—The Development of New Regulations; Treatment of Solid and Liquid Biowaste and ISO Registration of the Process; and U.S. Laboratory Response Network and Its International Expansion.
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Articles, Reviews, and Summary Articles—Reviews may focus on the theory, practice, and overarching areas relevant to biological safety, biosecurity or related areas. Articles must include an abstract not to exceed 250 words summarizing the main topic of the article. Typically articles do not exceed 20 pages in total length.

Reports—Articles that focus on the results of research are appropriate for this section. Brief reports should include information on the research design, methods, and results. An abstract not to exceed 250 words must also be included. Articles vary in length.

Viewpoints—Short articles focusing on personal experiences may be submitted to this section. Articles vary in length.

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Commentary/Editorial—Brief comments on submissions published in Applied Biosafety, issues critical to the profession and practice of biological safety, or letters to the Editor may be submitted to this section. Individuals may be invited by the Editors to submit a guest editorial article.

Presentations—Articles that recount or summarize information relevant to the field of biological or biosecurity that has been presented at a conference. Presentation articles vary in length.

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2. Submission guidance:
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