



**Washington Department of Health
Public Health Laboratories**

**Risk and Safety Assessment
Scope of Work**

June 10, 2008

PHL – Scope of Work for Risk Assessment and Safety Assessment Contract Request for Qualifications

Introduction and Background Information

Throughout the United States, state public health laboratories have evolved to address new and changing issues concerning public health and safety. Laboratory activities may include water quality & food safety analysis, infectious disease identification, newborn screening, and analytic studies for radiation, chemicals, and other environmental hazards.

The Washington State Department of Health's Public Health Laboratories (WA-PHL) have been in operation at 1610 NE 150th St. Shoreline since 1985. Prior to that, the Public Health Laboratories were in the Smith Tower in downtown Seattle.

The current WA-PHL facility is a 70,000 square foot facility that includes several laboratories (microbiology, environmental and newborn screening), shipping/receiving, maintenance areas, storage, and offices. The Department of Health (DOH) is currently planning to add on to the existing laboratory with a combined highly infectious disease laboratory and centralized specimen receiving facility to accommodate existing program growth and changes in laboratory design standards since 1985. This addition will be used for the traditional WA-PHL role of identifying and helping to prevent the spread of infectious diseases.

Like all state public health laboratories around the country, WA-PHL is currently a Reference Laboratory for smaller laboratories, local Health Jurisdictions, and hospitals/clinics throughout the state which provides diagnostic capabilities for certain microbial and toxic substances.

Recently, concerns have been raised about potential risks to the community surrounding the Public Health Laboratories. The Department of Health has developed a Request for Qualifications (RFQ) to solicit qualified experienced consultants to conduct a thorough Risk & Safety Assessment for the activities at the WA-PHL as they may affect the surrounding community and recommend appropriate risk management measures for any risks identified through the Assessment.

This consultant study will identify and evaluate any potential hazards posed by the laboratories to the local community surrounding the labs, including: Biological; Chemical; Physical and/or Radiological. The assessment will look at potential Hazard Events and their possible risks to laboratory employees and the general public. It will also identify potential risks to the community, identify WA-PHL procedures that mitigate these risks, and recommend additional actions.

When considering risk, the consultant should look at most probable case scenarios to assess the WA-PHL's ability to manage and respond to the risk. The question "would this most probable scenario, and the WA-PHL's response to that risk, pose any risk to the community" is central to this Assessment. Consideration should be given to both the potential and probability of a given risk.

Deliverables:

1. From the local community's perspective, conduct a thorough biological, chemical, radiological, and physical Safety and Risk Assessment of the Washington State Public Health Laboratory's (WA-PHL) facility, planned addition, operations, and laboratory activities. Identify potential risks to the community posed by the laboratory.
2. Compare the location of the laboratory to other Public Health Laboratories in the United States and determine the appropriateness of the laboratory's location from a risk standpoint. Compare such things as location (rural, urban, residential, etc.), location vis-à-vis served populations, etc. Identify any "best practices" found at other PHL's that reduce risk and enhance community safety.
3. Review WA-PHL incident/emergency response plans for accidental releases of materials. Review the potential risk of worker exposures and/or laboratory acquired infections, or failures in the laboratory containment systems and the potential risk to the community. Report on emergency response planning with local law enforcement, fire, schools and other appropriate entities.
4. Evaluate and report on compliance with local, state, and federal regulations and requirements for potential hazards and activities.
5. Provide a written report describing actions needed to reduce any identified potential risks to the community identified during the Assessment. Include an executive summary that describes technical findings in the body of the report in language that people who are not experts in the field can understand ("plain talk"). Provide a summary of some typical risk mitigation strategies, focusing on the issues described above. These risk reduction proposals should be based on the risk assessment conducted for WA-PHL.
6. Report to a stakeholder group during the project to review progress. This will be done at least twice during the assessment prior to the final draft being presented.
7. Prepare a plan for presenting findings to various interested parties and the general public. Include in the plan a component to educate the local community about the activities at the laboratory.

Risk Considerations

Mitigation strategies for chemical, radiological and physical hazards rely on reducing concentrations of substances or reducing the risk of events that may cause a release. Efforts to reduce biological risk typically focus on interrupting the "chain of infection" of microorganisms.

The WA-PHL, is currently regulated by the College of American Pathologists (CAP), state and federal Clinical Laboratory Improvement Amendment 1988 (CLIA) programs, the Environmental Protection Agency (EPA), and is licensed and inspected by the Centers for Disease Control and Prevention (CDC) as a registered laboratory under the Select Agent Rule. There are a number of applicable regulatory or guidance documents related to laboratory design & operations and management of biological hazards, including those shown in **Appendix A: Laboratory Design Documents**. The WA-PHL is also regulated by state agencies including the Dept. of Labor & Industries, Ecology, Office of Radiation Protection, as well as Shoreline police and fire.

Microbiological laboratories work with materials that, by their nature, may pose risks to their workers, and, in some cases, to the community. Risk associated with biological organisms are evaluated qualitatively and require looking at the ability of microbes to infect, survive and ultimately cause harm to a person. Risks associated with working with radiological materials, chemicals, or physical hazards (such as electricity) are much easier to evaluate, as there are quantitative standards that can be used.

*Biosafety in Microbiological and Biomedical Laboratories (BMBL)*¹ is a Centers for Disease Control and Prevention publication that describes the combinations of standard and special microbiological practices, safety equipment, and facilities that are needed for various biosafety levels. These levels and their practices are recommended for work with a variety of infectious agents in various laboratory settings. The BMBL describes biological risk assessment as a process used to identify:

- the hazardous characteristics of a known or potentially infectious organisms or material,
- the activities that can lead to a person's exposure to an infection organism or material,
- the likelihood that exposure will cause a laboratory acquired infection (LAI), and
- the probable consequences of such an infection.

Successful controls of laboratory hazards also protect persons not directly associated with the laboratory, including other occupants of the same building, and people who live or work near the facility.

A qualitative process provides the best means of assessing the risk in a biological setting. In estimating the probability of a laboratory acquired infection (LAI) or other biological risks, biological safety officials rely on their best professional judgment; based on the characteristics of the substance; what's being done with it; the volumes of infectious material that will be generated; and the competency of the laboratorians and the ability to contain the substance. There is a considerable knowledge base regarding experiences and guidance documents that have been developed to provide safe working conditions and protection of the surrounding community.

The primary factors to consider in biological risk assessment and selection of precautions fall into two broad categories:

1. Hazards of the substance and,
2. Laboratory facility and operational hazards.

In addition, the capability of the laboratory staff to control and mitigate hazards must be considered. This capability will depend on the training, technical proficiency, good habits of all

¹ U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Institutes of Health, Fourth Edition, May 1999, <http://www.cdc.gov/od/ohs/biosfty/bmb14/bmb14toc.htm>

members of the laboratory, and whether containment equipment and facility safeguards work as designed.

This Risk and Safety Assessment will look at the following areas:

- Biological hazards
- Chemical hazards
- Radiological Hazards
- Physical Hazards
- Hazard Events
- Emergency Response

A brief description of the areas and examples of potential questions are below. The questions posed below are examples of questions that may be asked during the Assessment. They are not meant to be all-inclusive nor definitive. It is expected that the consultant will use experience and knowledge to develop relevant questions to adequately assess the WA-PHL's risk to the community within the scope of this Risk and Safety Assessment.

Biological Hazards

The BMBL recommends five steps to conduct a biological risk assessment:

1. **Identify hazards from substances and perform an initial assessment of risk.** Consider the principal hazardous characteristics of the substance: identify its capability to infect and cause disease in a susceptible human host, severity of disease, and the availability of preventive measures and effective treatments.

Questions in determining the nature of the substance:

- Does the laboratory have an effective Biosafety Program?
- What biological materials does the laboratory test?
- How do materials enter or arrive at the laboratory and how are they disposed of?
- What materials are stored and in what quantities? Are the materials stored securely?
- What are potential risks to the community based on the nature of these substances?

2. **Identify laboratory procedure hazard.** Principal laboratory procedure hazards are: concentration of substances, volume of material in suspension, equipment /procedures that generate small particle aerosols and larger airborne particles (droplets), and use of sharps (needles, knives, syringes). Procedures involving animals can present a number of special hazards such as bites and scratches, exposure to zoonotic (animal-source) infectious material, and handling of infectious substances in an aerosol (vapor) form.

Laboratory Work Practices and Procedures: The principal hazardous characteristics of a substance are: its capability to infect and cause disease in a susceptible human or

animal host; its virulence as measured by the severity of disease, and the availability of preventive measures and effective treatments for the disease.

The prime routes of disease exposure or transmission of disease in the laboratory are: direct skin, eye or mucosal membrane exposure to a substance; injection by a syringe needle or other contaminated sharp, or by bites from infected animals and arthropod vectors; ingestion of liquid suspension of an infectious substance, or by contaminated hand-to-mouth exposure; and inhalation of infectious substances that have become aerosolized .

Questions determining appropriate work practices and procedures

- Does the laboratory have an effective employee safety program and are all procedures documented and followed?
- What is the safety record of the laboratory?
- Are the standard and special practices described in the BMBL and other regulatory agencies followed?
- Are potentially high risk protocols reviewed regularly?
- What are the potential risks to the community in the area of practices and procedures?

Laboratory Management Topics: These questions may be considered to assess the effectiveness of laboratory management pertaining to safety:

- Does the laboratory have an effective and competent management team?
- How is the safety of the laboratory managed?
- Is employee health monitored?
- Are the laboratorians trained and has their proficiency been tested?
- Do employees receive the education needed and are appropriate background checks conducted?
- What are the potential risks to the community in the area of laboratory management?

A reference for evaluating and modeling effective laboratory management is found in **Appendix A: Management References.**

- 3. Make a final determination of the appropriate biosafety level and select additional precautions indicated by the risk assessment.** The final selection of the appropriate biosafety level and selection of any additional laboratory precautions require a comprehensive understanding of the practices, safety equipment, and facility safeguards described in the BMBL.

Facility Design, Verification & Monitoring: The BMBL states that all BSL-3 design, operational parameters, and procedures must be verified and documented prior to operation of the facility. The laboratory must be re-verified and documented at least annually. The verification process is designed to do two major things: 1. ensure the

client that the facility has been built according to the architectural design; and 2. ensure that the facility meets the requirements of the BMBL.

Facility-related Risk Assessment Questions:

- Does the laboratory have an effective facilities management program?
- What inspections occur to ensure the laboratory is safe and operating correctly?
- Are the current verification plans and activities adequate?
- What would be the effects of natural disasters such as earthquakes or floods?
- How is physical security managed?
- Is there enough space to safely conduct current and future levels of testing?
- How likely is exposure to the community from accidental release from the laboratory?
- What are the potential risks to the community in the area of facility-related findings?

Suggested references are included in **Appendix A: Facilities**

4. **Evaluate the proficiencies of staff regarding safe practices and the integrity of the safety equipment and building containment systems.** The protection of laboratory workers, other persons associated with the laboratory, and the general public will ultimately depend on the laboratory workers themselves. In conducting a Biological Risk Assessment, the laboratory director or principal investigator must ensure that laboratory workers have acquired the technical proficiency in the use of microbiological practices and safety equipment required for safe handling of the substances, and have developed good habits that sustain excellence in the performance of those practices.

An evaluation of a person's training, experience handling infectious substances, proficiency in using sterile techniques and safety equipment, ability to respond to emergencies, and acceptance of responsibility for personal and other workers safety is important assurance that a laboratory worker is capable of working safely.

Questions regarding the worker safety program:

- Does the laboratory have an effective employee safety program?
- What measures are in place to ensure employee safety?
- Do employees embrace or reflect a "safety culture" in their day-to-day operations?
- What is the laboratory's record of laboratory-acquired infections?
- What is the nature of the first aid/emergency response program?
- What are the potential risks to the community in the area of worker-related findings?

Training: Training for laboratorians is an important component of laboratory safety. Specific training opportunities are provided for persons handling radio-isotopes,

hazardous chemicals, and microbiological agents. In addition, the BMBL requires that laboratorians undergo proficiency testing (by their supervisors) to demonstrate their knowledge of biological safety and their performance of specific procedures before work begins and any time work practices and procedures change.

Questions regarding the worker training program:

- Do workers receive adequate training and are they provided necessary safety equipment?
- Is worker competency monitored?
- Does worker training and competency adequately protect the community?

Suggested Reference material is included in **Appendix A: Occupational Health Reference Material**

- 5. Review the risk assessment with a biosafety professional and appropriate subject matter experts.** A review of the risk assessment and selected safeguards by knowledgeable individuals is beneficial and sometimes required by regulatory or funding agencies. It is expected that the consultant will acquire the necessary expertise of have access to safety professionals to review findings and propose recommendations.

Four excellent references regarding biosafety and biological agent risk assessments are shown in **Appendix A: Risk Assessments**.

Chemical Hazards

Work in the WA-PHL laboratory involves a wide assortment of chemicals, ranging from simple salt solutions to acids and bases. Fortunately, WA-PHL laboratory work requires the use of very limited quantities of these chemicals, ranging in volume from less than a drop to several gallons.

Modern microbiological diagnostics typically use specimen plates for their tests. This means that only very small quantities of any hazardous material (radiological, chemical or biological) are handled at any given time. The Environmental Protection Agency and other regulatory agencies including the Shoreline Fire Dept. specify how such materials are acquired, stored, and disposed. There are many publications on safe handling procedures for even the most toxic or caustic chemicals.

Chemical manufacturing companies have improved container labeling in the past 20 years, providing safety information on such topics as: the significant hazard, compatibility for storage, and personal protective equipment to be worn when handling specific chemicals. Even more helpful are Material Safety Data Sheets (MSDS) which must be supplied by the manufacturer (or are available online, [<http://www.ilpi.com/msds/index.html>]). The Department of Labor, Occupational Safety and Health Administration, has strict regulations that govern the use of chemicals in laboratories and require labs to develop and implement a chemical hygiene plan. [http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=10106, 29 CFR Occupational exposure to hazardous chemicals in laboratories – 1910.1450].

Questions determining appropriate work practices and procedures:

- How do chemicals arrive at the laboratory and how are they disposed of?
- Does the Laboratory have an effective chemical management program?
- What type of chemicals are being used and are they stored appropriately?
- Are employees trained in the use of MSDS?
- How is chemical waste handled?
- Are there any risks to the atmosphere, soil or ground water posed by the WA-PHL?
- Is there a risk of accidental release to the environment and what procedures are in place to mitigate this risk?
- What are the potential risks to the community in the area of the chemical management program?

Radiological Hazards

The radiation and industrial hygiene communities have developed protocols to assess and mitigate risks of working with radiological materials. Radioactive materials are strictly controlled by the Nuclear Regulatory Commission (NRC) which has stringent regulations covering acquisition, use, storage, and waste disposal [<http://www.nrc.gov/site-help/search.html?cx=014311028302829740899%3Avo1uexxrz88&q=research+laboratories&sa=&cof=FORID%3A11#1472>]. Both regularly scheduled and unannounced inspections are conducted annually to ensure laboratories are in full compliance.

Questions determining appropriate work practices and procedures:

- How do materials arrive at the WA-PHL and how are they disposed of?
- Does the laboratory have an effective radiation management program?
- What radioactive materials are found at WA-PHL?
- Are there written protocols for their use, storage, and disposal?
- How is the material managed; handling, storage, disposal, monitoring, and employee safety?
- What are the potential risks to the community in the area of the radiological management program?

Physical Hazards

Slips, trips and falls can happen in any workplace, but generally impact only the person involved. Bumping into things, lifting heavy objects, tripping on items left on the floor, crushing injuries or other events that can cause physical damage or injury are also typically limited to the worker. Other physical hazards that may be present in laboratory environments include: electricity, cuts, bites or scratches by a laboratory animal, and repetitive motion injuries (such as carpal tunnel syndrome). These are also limited to the worker and usually do not result in risk to family members or the community.

Questions determining the risk of any physical hazards:

- Are there any unsafe areas of the WA-PHL external grounds that pose a risk to the community?
- Are any physical hazards exacerbated due to operating practices?

Hazard Events

Events which may have an effect on the environment and the community (including neighbors, schools or other public places) near the WA-PHL would be from the release of a hazardous material from the facility. Some examples include:

- **Accidental** — such as a large spill in the containment laboratory, inadvertent discharge of potentially contaminated liquid materials into the local sewer system or failure of the air handling systems, which could release materials into the air.
- **Deliberate** — similar to above, but purposefully caused by a disgruntled employee or a person illegally gaining entry to the laboratories.
- **Theft** — similar scenario to deliberate release.
- **Natural Hazards** - Earthquakes, fire, flood, weather-related or other natural hazards.
- **Terrorism Events** — similar to deliberate, but also associated with the role of the WA-PHL assisting local, state and federal authorities in determining the unknown contents of suspect containers/packages.

Questions determining appropriate work practices and procedures:

- Do the laboratories have an effective emergency management plan to address bio- or chemical-terrorism and other threats?
- Has the threat level of the laboratory been assessed?
- Does the geology of the site place the PHL at increased risk for earthquake damage?
- Is there an effective plan in place to deal with Natural Hazards – e.g. auxiliary power, alternate testing sites, evacuation, etc.
- What check and balances are in place to prevent accidental or deliberate spills or vandalism or theft?
- Does the WA-PHL have a lock-down procedure in the event of an emergency or workplace violence?
- What happens to building systems in the event of a power failure?
- Can the WA-PHL react effectively to a most probable scenario during an emergency?

A release could have several outcomes: 1) no effect on anyone; 2) exposure and possible infection of the worker or other persons with various outcomes; 3) secondary spread to a family member or close associates with various outcomes; 4) wide-spread exposure into the community with serious illness and/or mortality.

Emergency Response

The events of September 11, 2001, stimulated agencies to develop relationships within their local communities to coordinate responses to specific emergencies. Laboratory management has reached out to fire and police agencies that would be the first responders to any biological, chemical, or radiological event at the WA-PHL facilities or elsewhere in the community. These outreach activities typically involve training, on-site visits, table-top exercises and on-site simulated events.

At the WA-PHL, incident, accident, near-miss, spill control, and response to releases should be evaluated. Sample questions might include:

Questions determining appropriate work practices and procedures

- Who is responsible for emergency planning? How is it managed?
- Has WA-PHL collaborated with the local community; Fircrest, Shoreline fire, police, safety council?
- Are there written procedures for response to and cleanup of hazardous material spills?
- What is the probability of and what happens in the event of a release of a hazardous substance from WA-PHL?
- What contacts have been made with local emergency responders?
- Do WA-PHL employees participate in on-site emergency drills, and if so, what are they?
- Are evacuation plans coordinated with local community partners?

Suggested reading is included in **Appendix A: Emergency Response Information**.

Communication and Transparency

A key issue arising from a recent U.S. Government Accountability Office (GAO) report on laboratories was the lack of transparency between laboratory facilities and the general public and community, state, and federal agencies. Transparency has been defined as the use of plain talk that acknowledges that lay people do not generally understand “laboratory speak” jargon and acronyms. It also implies “openness” of the laboratory management with workers and the community about the work and operations of the laboratory

The consultant report will outline methods to effectively communicate the findings of this report to the community and stakeholders in language that is clear and easily understood.. The plan should include meetings, materials, and/or ideas for answering questions and providing background information to interested parties.

The stakeholder group is interested in ideas for continued outreach from the WA-PHL and methods to effectively educate the community about the laboratory and the safety and risk of activities conducted therein.

Suggested reference materials are included in **Appendix A: Communication Reference Material.**

APPENDIX A –Reference Materials & Applicable Standards

Laboratory Design Documents

Centers for Disease Control & Prevention/National Institutes of Health (CDC/NIH), Biosafety in Microbiological and Biomedical Laboratories, 5th edition. (BMBL 5) [Only available electronically at this time]:

<http://www.cdc.gov/od/ohs/biosfty/bmb15/bmb15toc.htm>

College of American Pathologists (CAP) - laboratory inspections:

http://www.cap.org/apps/cap.portal?_nfpb=true&cntvwrPtl_t_actionOverride=%2Fportlet%2FcontentViewer%2Fshow&_windowLabel=cntvwrPtl&cntvwrPtl%7BactionForm.contentReference%7D=laboratory_accreditation%2Fchecklists%2Fchecklist.html&_state=maximized&_pageLabel=cntvwr

CDC's Select Agent Program: <http://www.cdc.gov/od/sap/>

Association of Public Health Laboratories (APHL), laboratory standards:

<http://www.aphl.org/programs/LSS/Pages/default.aspx>

Environmental Protection Agency (EPA) - Regulatory Information by Topic:

<http://www.epa.gov/lawsregs/envtopics/index.html>

CDC, Laboratory Response Network, Emergency Preparedness and Response:

<http://www.bt.cdc.gov/labissues/>

World Health Organization (WHO), International Classification of Diseases (ICD):

<http://www.who.int/classifications/icd/en/index.html>

International Air Transport Association (IATA), Transportation of Infectious Substances:

<http://www.iata.org/ps/publications/issg.htm>

International Air Transport Association (IATA), Transportation of Dangerous Goods

Regulations: <http://www.iata.org/ps/publications/9065.htm>

Cipriano, M, 2008. Transport of Infectious Materials, Chapter 4, Anthology of Biosafety, X. Animal Biosafety, pp 43-52. American Biological Safety Association, Mundelein, IL.

Risk Assessments

CDC/NIH, *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, 5th edition, Agent Summaries

<http://www.cdc.gov/od/ohs/biosfty/bmb15/bmb15toc.htm>

American Biological Safety Association's Risk Group Classification for Infectious Agents

<http://www.absa.org/XriskgroupsX/index.html>

Biological Material Safety Data sheets prepared by Health Canada <http://www.phac-aspc.gc.ca/msds-ftss/index.html#menu?>

American Public Health Association, *Control of Communicable Diseases Manual*.

The World Health Organization has published a booklet on biorisk reduction:
(http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_EPR_2006_6/en/index.html).

Management Standards

CEN International Biorisk Laboratory Management Standard
(<http://www.cen.eu/cenorm/businessdomains/technicalcommitteesworkshops/workshops/ws31.asp>).

Facilities Reference Materials

National Environmental Policy Act (NEPA): <http://epa.gov/oecaerth/nepa/index.html>

Anthology of Biosafety publications of the American Biological Safety Association
(www.ABSA.org)

- I, Perspectives on Laboratory Design
- II, Facility Design Considerations
- IV, Issues in Public Health
- VII, Biosafety Level 3
- VIII, Evolving Issues in Containment
- IX, Exploring the Performance Envelope for BSL-3 and BSL-4 Laboratories.

American Public Health Association's **Designing a Modern Microbiological/Biomedical Laboratory, Lab Design Process and Technology** (1997).

Kalish, R and Linder, S, 2001. **Biological safety and Public Health Laboratory Design**, Anthology of Biosafety, IV, Issues in Public Health (JY Richmond, Ed), American Biological Safety Association, Mundelein, IL.

American Society of Microbiology's **Biological Safety, Principles and Practices**, 4th edition (2006).

Richmond, JY, Crane, J, Phillips, J and Howard, W, 2001. **Biosafety in Public Health Laboratories**, Anthology of Biosafety, IV, Issues in Public Health (JY Richmond, Ed), American Biological Safety Association, Mundelein, IL.

Focused training for facility engineers has been offered at many ABSA conferences:
<http://www.absa.org/conpastprecon.html>

Occupational Health & Training Reference Material

Chosewood, LC, 2008. Medical Surveillance for Personnel Working with Animals, Chapter 3, Anthology of Biosafety, X. Animal Biosafety, pp 31-43. American Biological Safety Association, Mundelein, IL.

The American Industrial Hygiene Association (AIHA) provided information on “Required Biosafety Level Three (BSL-3) Practices, Procedures, Facilities, and Safety Equipment for BSL-3 and BSL3/2 Laboratories”

(<http://www.aiha.org/aihce02/handouts/fm239kowalewsky3.pdf>)

Specific training for personnel working in BSL-3 facilities is available through various sources, including: competent independent contractors, or ABSA (www.ABSA.org), and the Eagleson Institute (www.Eagleson.org).

Training is also offered online, for example at:

(http://www.sph.emory.edu/CPHPR/biosafetytraining/Progress_Report.pdf) or

(<http://www.ehs.uiuc.edu/bss/training/index.aspx>) or onsite, for example, see

(<http://www.sph.emory.edu/CPHPR/biosafetytraining/BSL3.htm>) or

(<http://cphp.kent.edu/BSL-3%20Nov16-17.htm>) or (<http://www.k-state.edu/media/nbaf/Tradelinereprint.pdf>).

Management training for EH&S personnel is offered at the Harvard School of Public Health:

http://www.absa.org/cgi-bin/calendar.pl?view=Event&event_id=295

The Yale Center for Public health Preparedness also offers interesting courses:

<http://info.med.yale.edu/eph/ycphp/projects/phprep.html>

Communication Reference Materials

CDC/NIH, Biosafety in Microbiological and Biomedical Laboratories, 5th edition, Section 3. [Only available electronically at this time]:

<http://www.cdc.gov/od/ohs/biosfty/bmb15/bmb15toc.htm>.

CDC’s **Crisis and Emergency Risk Communication**, 2002.

Knudsen, R., 2000. **Risk Assessment for Working with Infectious Agents in the Biological Laboratory**, Anthology of Biosafety, III. Applications of principles (JY Richmond, Ed), American Biological Safety Association, Mundelein, IL.

Johnson, B, 2001. **Understanding, Assessing, and Communicating Topics Related to Risk in Biomedical Research Facilities**, Anthology of Biosafety, IV, Issues in Public Health (JY Richmond, Ed), American Biological Safety Association, Mundelein, IL. This issue has recently been reported in detail (Race, MS, Evaluation of the Public Review Process and Risk Communication at High Level Biocontainment Laboratories, Applied Biosafety 13(1):45-56, 2008).

Emergency Response Information

Best, M and Heisz, M, 2002. Emergency Response Action Plan for Pathogens, Anthology of Biosafety, V, BSL-4 Laboratories (JY Richmond, Ed), American Biological Safety Association, Mundelein, IL.

Royse, C and Johnson, B, 2002. Security Considerations for Microbiological and Biomedical Laboratories, Anthology of Biosafety, V, BSL-4 Laboratories (JY Richmond, Ed), American Biological Safety Association, Mundelein, IL.