DOE/EA-1442R

Final Revised Environmental Assessment for The Proposed Construction and Operation of a Biosafety Level 3 Facility at Lawrence Livermore National Laboratory, Livermore, California

Issued: December 2002

Revised: January 2008

Department of Energy
National Nuclear Security Administration
Livermore Site Office

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FORWARD

The National Nuclear Security Administration (NNSA) of the Department of Energy (DOE) has responsibility for national programs to reduce and counter threats from weapons of mass destruction including nuclear, chemical, and biological weapons (bioweapons). NNSA's bioscience work at Lawrence Livermore National Laboratory (LLNL) in support of these missions requires work with infectious agents, including those historically used for bioweapons. Much of the proposed work must be performed with Biosafety Level 3 (BSL-3) containment and protection. Accordingly, NNSA proposed to construct and operate a BSL-3 facility at LLNL to meet the NNSA mission to "develop, demonstrate and deliver technologies and systems to improve domestic defense capabilities and, ultimately, to save lives in the event of a chemical or biological attack." A Environmental Assessment (EA) and a Finding of No Significant Impact for the proposed BSL-3 facility was issued in December 2002 (BSL-3 EA, DOE/EA-1442), and construction of the facility began.

On September 16, 2003, Tri-Valley CARES filed a lawsuit in the federal district court in San Francisco challenging the adequacy of the EA for the proposed BSL-3 facility. On September 10, 2004, the district court found the EA to be adequate. On November 8, 2004**,** Tri-Valley CARES filed a notice of appeal with the Ninth Circuit Court of Appeals. On October 16, 2006, the appellate court issued a memorandum opinion (D.C No CV-03-03926-SBA). In light of the Ninth Circuit's recent ruling in an unrelated case, the court remanded the matter for DOE to consider whether the threat of potential terrorist activity necessitates the preparation of an environmental impact statement. DOE issued interim guidance on how to address intentional destructive acts in NEPA documents (DOE 2006) as a result of the Ninth Circuit's decision.

In response to this ruling and the guidance, NNSA has revised the 2002 EA to consider the potential impacts of terrorist activity. NNSA has limited the changes to the document in matters not related to the terrorist analysis; however, some updates were necessary. The Appendices to the original EA were not revised. Since this EA, NNSA has issued the *Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* (SWEIS, DOE/EIS-0348, DOE/EIS-0236-S3, DOE 2005). Background information in this EA has been updated to reflect more current information in the SWEIS if the updated information is pertinent to NNSA's determination of the potential effects of the proposed action on human health or the environment. Also since 2002, the proposed building has been constructed and all facility-related equipment installed. As such, NNSA acknowledges that the impacts related to construction that are discussed in this document have already occurred; these impacts were analyzed in the 2002 EA and considered in issuing the Finding of No Significant Impact (FONSI). Other minor changes have been made if guiding regulations or DOE policies have been updated since 2002. Change bars (a vertical line in the margin next to the text which was changed) indicate significant changes in the document made since the revised draft was made available for public comment in March, 2007.

EXECUTIVE SUMMARY

The National Nuclear Security Administration (NNSA) of the Department of Energy (DOE) has responsibility for national programs to reduce and counter threats from weapons of mass destruction including nuclear, chemical, and biological weapons (bioweapons). NNSA's bioscience work at Lawrence Livermore National Laboratory (LLNL) in support of these missions requires work with infectious agents, including those historically used for bioweapons. The laboratory's pioneering work on biological agent (bioagent) detection and counter-terrorism technologies, and basic research understanding of emerging and re-emerging natural diseases are key elements of the LLNL efforts to support the NNSA mission. As a result, the need to conduct research with infective agents in a secure environment at LLNL and within NNSA is growing rapidly.

DOE does not currently operate any microbiological laboratory facility above Biosafety Level 2 (BSL-2). Much of the proposed work must be performed with Biosafety Level 3 (BSL-3) containment and protection. BSL-3 facilities provide for environmentally safe and physically secure manipulation and storage of infectious microorganisms, many of which are potential bioweapon agents. NNSA's BSL-3 work would require efficient high-quality sample processing, and, for scientific and security reasons, assurance of sample security and integrity. These requirements also necessitate that cross-contamination and degradation of samples be minimized by reducing excessive handling and transportation. Commercial or governmental BSL-3 facilities currently available are often heavily committed to other projects or tailored to work with specific types of microorganisms. In order to more effectively utilize and capitalize on LLNL's existing onsite facilities, expertise, and capabilities, and ensure the necessary quality, integrity, and security of microbiological work, NNSA needs BSL-3 laboratory capability at LLNL.

The Proposed Action and alternatives differ mainly in how the facility would be constructed. In all but the No-Action alternative, the BSL-3 facility would be designed and operated in accordance with guidance for BSL-3 laboratories established by the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH). Physical security would be implemented commensurate with the level of work being performed within the facility. No radiological, high explosives, or propellant material would be used or stored in the proposed BSL-3 facility. The proposed facility would have the unique capability within DOE to perform aerosol studies to include challenges of rodents using infectious agents or biologically derived toxins (biotoxins). Sample shipments would be received only in compliance with all established shipping guidelines and requirements. The samples would be stored in the BSL-3 laboratory within a locked labeled freezer or refrigerator according to the needs of the sample for preservation. Biological wastes would be disposed of in accordance with CDC and NIH guidance, and other applicable federal, state, and local regulations.

The Proposed Action is to assemble on-site an approximately 1,500 ft^2, one-story permanent prefabricated BSL-3 laboratory facility which would have three individual BSL-3 laboratory rooms (one capable of handling rodents), a mechanical room, clothes-change and shower rooms, and small storage space. The building footprint would take less than one-quarter acre. It is estimated that the operational design life of the proposed building would be at least 30 years.

Under the Remodel/Upgrade Alternative, NNSA would create a single BSL-3 laboratory from an existing BSL-2 laboratory at LLNL. This would require substantial building modification and probable disruption of other on-going work in the facility. This alternative has the lowest waste generation during construction and operation since it is only a single laboratory while the other two options consist of three laboratories each. This alternative would be in accordance with NNSA's purpose and need for action. Being only a single BSL-3 laboratory, it would be self-limiting to the amount of research that could be conducted.

The Construct On-Site Alternative would meet NNSA's purpose and need for action. This alternative does not differ significantly from the Proposed Action for operation and decontamination and decommissioning with one exception. The longer time it takes to construct the facility under this alternative affects the duration of noise, dust, and truck traffic and disruption of workers in adjacent buildings. This longer period also means it would be months longer before the facility would be operational.

Under the No Action Alternative, NNSA would not construct or place a BSL-3 facility at LLNL. In this event, NNSA would continue to have its BSL-3 laboratory needs met by using existing or new BSL-3 laboratories located offsite from LLNL. There would continue to be certain NNSA national security mission needs that could not be met in a timely fashion, or that may not be able to be met at all. The No Action Alternative would not meet the NNSA's identified purpose and need for action.

The environmental consequences from site preparation, construction and routine operation would be minor and would not differ greatly between the Proposed Action and alternatives. The potential human health effects of the proposed BSL-3 laboratory would be the same as those demonstrated for similar CDC-registered laboratories that are required to implement the guidelines established mutually by the CDC and NIH. Relevant human health information gathered from LLNL's past experience with BSL-1 and BSL-2 laboratories, from the U.S. Bureau of Labor Statistics, and from anecdotal information in published reports, indicates that while laboratory-acquired or laboratory-associated infections sometimes occur, they should be considered abnormal events due to their infrequency of occurrence (see Appendix B). As such, the potential human health effects from these events are discussed as Abnormal Events and Accidents. No cases of illness would be expected to result from implementing the Proposed Action as a result of an abnormal event or accident.

On September 16, 2003, suit was filed in federal district court challenging the adequacy of the prior version of this EA. The district court ruled that the EA was adequate and plaintiffs appealed to the Ninth Circuit. In October 2006, the appellate court issued its decision. It concluded that while NNSA did take a hard look at identified environmental concerns and that its decision was fully informed and well-considered, the NNSA had not considered whether the threat of potential terrorist activity would necessitate the preparation of an environmental impact statement. The Court therefore remanded the matter to NNSA.

In accordance with the Ninth Circuit's remand, NNSA has reviewed the threat to the facility from terrorists and the potential environmental effects that might derive from various terrorist

acts against the facility. Three terrorist acts were considered: 1) a terrorist attack resulting in facility damage; 2) a theft of pathogenic agent by a terrorist from outside of LLNL; 3) a theft of pathogenic agent by an insider. This review finds that:

1) a successful terrorist attack involving facility damage and loss of containment is not expected to occur due to the extensive layered security programs at the LLNL; in any event, the environmental consequences would be bounded by the effects that would occur during catastrophic events or operational accidents;
2) because pathogenic agents are available in nature and other, less secure locations, operation of the LLNL BSL-3 facility would not make pathogenic agents more readily available to an outside terrorist, or increase the likelihood of an attack by an outside terrorist; and
3) the theft of pathogenic materials by an insider from any bio research facility could have very serious consequences; this scenario is not expected to occur at LLNL due to human reliability programs, security procedures, and management controls at the Facility.

NNSA believes that the probability of a successful terrorist attack on the BSL-3 facility is so uncertain that the possibility of such an event cannot be accurately quantified. The EA concludes that the systems and technologies developed by using the proposed facility would likely reduce the probability and consequence of a bio-terrorist act against the public in general.

Since the original EA and its Finding of No Significant Impact were issued in December 2002, NNSA has issued the *Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* (SWEIS, DOE/EIS-0348, DOE/EIS-0236-S3, DOE 2005). Background information in this revised Environmental Assessment has been updated to reflect more current information in the SWEIS if the updated information is pertinent to NNSA determination of the potential effects of the proposed action on human health or the environment. Since 2002, the facility has been constructed and equipment has been installed. To date, no work with BSL-3 material has been performed in the building. As such, DOE acknowledges that the impacts related to construction that are discussed in this document have already occurred. Changes have been made in this revised EA to reflect the "as-built" condition of the facility only if those changes are pertinent to the discussion of impacts from planned operations or reasonably-foreseeable accidents. Other minor changes have been made if guiding regulations or DOE policies have been updated since 2002. Appendices A and B to the original EA was not revised. Appendix C was update as necessary to reflect the comments received on the revised version of the EA.

Vertical bars in the margins indicate changes from the Revised Draft EA made in response to public comments or to update information pertinent to the 9th District Court remand.

Contents

Figures

Tables

ACRONYMS AND ABBREVIATIONS

AAA	American Antiquities Act
AAALAC	Association for Assessment and Accreditation of Laboratory Animal Care
ABSA	American Biological Safety Association
ACGIH	American Conference of Governmental Industrial Hygienists
AFIP	Armed Forces Institute of Pathology
AIDS	Acquired Immune Deficiency Syndrome
ANSI	American National Standards Institute
APHIS	Animal and Plant Inspection Service
BA	Biological Assessment
BASIS	Biological Aerosol Sentry and Information System
BBRP	LLNL Biology and Biotechnology Research Program
BDRP	Biological Defense Research Program
BLS	Bureau of Labor Statistics
BMBL	Biosafety in Microbiological and Biomedical Laboratories
BMI	Battelle Memorial Institute
BMP	Best Management Practice
BRTA	Biological Risk and Threat Assessment
BSC	Biological Safety Cabinet
BSL	Biological Safety Level
BWC	Biological Weapons Convention
CAA	Clean Air Act
CBNP	Chemical and Biological National Security Program
CDC	Centers for Disease Control and Prevention
CDF	California Department of Finance
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CRDEC	Chemical Research Development and Engineering Command
D&D	Decontamination and Decommissioning
DA	Department of the Army
dB	decibel (a measure of noise level)
dBA	A-weighted decibel
DBT	Design Basis Threat
DHS	California Department of Health Services
DNA	Deoxyribonucleic Acid
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOP	Dioctyl phthalate
DOT	U.S. Department of Transportation
DPG	Dugway Proving Ground
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EIS/EIR	Environmental Impact Statement/Environmental Impact Report

EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
FDA	Food and Drug Administration
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GSA	General Services Administration
HAP	Hazardous Air Pollutant
HEPA	High Efficiency Particulate Air-Purifying
HHS	US Department of Health and Human Services
HID	Human Infective Dose
HID_{50}	Human Infective Dose - 50 percent
HMIS	Hazardous Material Information System
HRSA	HHS, Health Resources and Services Administration
HVAC	Heating, ventilation, and air conditioning
IACUC	LLNL Institutional Animal Care and Use Committee
IATA	International Air Transport Association
IBC	Institutional Biosafety Committee
ID_{50}	Infective Dose - 50 percent
ISMS	Integrated Safety Management System
JH	Johns Hopkins
kW	Kilowatt
LAA	Laboratory Animal Allergy
LANL	Los Alamos National Laboratory
LBNL	Lawrence Berkeley National Laboratory
LBOC	LLNL Biosafety Operations Committee
LD_{50}	Lethal dose at 50 percent mortality
LLNL	Lawrence Livermore National Laboratory
LR/SAT	Laboratory Registration/Select Agent Transfer
LWRP	Livermore Water Reclamation Plant
MCE	Maximum Credible Event
MMWR	Morbidity and Mortality Weekly Report
NAAQS	National Ambient Air Quality Standards
NAI	Nonproliferation, Arms Control, and International Security
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NIH	National Institutes of Health
NNSA	National Nuclear Security Administration
NSC	National Safety Council
ORPS	Occurrence Report Processing System
OSHA	Occupational Safety and Health Administration
PEIS	Programmatic Environmental Impact Statement
PM	Particulate Matter
PPE	Personal Protective Equipment

RCRA	Resource Conservation and Recovery Act
RDT&E	Research Development Testing and Evaluation
RG	Risk Group
RO	Responsible Official
RNA	Ribonucleic Acid
SA	Supplement Analysis
	Select Agents
SAHRP	Select Agent Human Reliability Program
SNL	Sandia National Laboratories
SNL/CA	Sandia National Laboratory, California
SNL/NM	Sandia National Laboratory, New Mexico
SOP	Standard Operating Procedure
SSH	Suppression Subtractive Hybridization
SWEIS	Site-wide Environmental Impact Statement
SWPP	Storm Water Pollution Prevention
TLV	Threshold Limit Value
UC	University of California
USAMRIID	United States Army Medical Research Institute for Infectious Diseases
USC	United States Code
USDA	United States Department of Agriculture
USDHS	United States Department of Homeland Security
USFWS	United States Fish and Wildlife Service
USPS	United States Postal Service
VEE	Venezuelan Equine Encephalomyelitis
WMD	Weapons of Mass Destruction
WHO	World Health Organization

EXPONENTIAL NOTATION: Many values in the text and tables of this document are expressed in exponential notation. An exponent is the power to which the expression, or number, is raised. This form of notation is used to conserve space and to focus attention on comparisons of the order of magnitude of the numbers (see examples):

1×10^{4}	=	10,000
1×10^{2}	=	100
1×10^{0}	=	1
1×10^{-2}	=	0.01
1×10^{-4}	=	0.0001

Metric Conversions Used in this Document

Multiply	By	To Obtain
Length		
inch (in.)	2.54	centimeters (cm)
feet (ft)	0.30	meters (m)
yards (yd)	0.91	meters (m)
miles (mi)	1.61	kilometers (km)
Area		
Acres (ac)	0.40	hectares (ha)
square feet (ft^2)	0.09	square meters (m^2)
square yards (yd^2)	0.84	square meters (m^2)
square miles (mi^2)	2.59	square kilometers (km^2)
Volume		
Gallons (gal.)	3.79	liters (L)
cubic feet (ft^3)	0.03	cubic meters (m^3)
cubic yards (yd^3)	0.76	cubic meters (m^3)
Weight		
Ounces (oz)	29.57	milliliters (ml)
pounds (lb)	0.45	kilograms (kg)
short ton (ton)	0.91	metric ton (t)

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1.0 PURPOSE AND NEED

1.1 INTRODUCTION

The *National Environmental Policy Act of 1969* (NEPA) requires Federal agency officials to consider the environmental consequences of their proposed actions before decisions are made. In complying with NEPA, the United States (U.S.) Department of Energy (DOE), National Nuclear Security Administration (NNSA[1]) follows the Council on Environmental Quality (CEQ) regulations (40 *Code of Federal Regulations* [CFR] 1500-1508) and DOE's own NEPA implementing procedures (10 CFR 1021). The purpose of an environmental assessment (EA) is to provide Federal decision-makers with sufficient evidence and analysis to determine whether to prepare an Environmental Impact Statement (EIS) or issue a Finding of No Significant Impact (FONSI). This EA has been prepared to assess environmental consequences resulting from the construction and operation of a Biosafety Level 3 (BSL-3) laboratory[2] facility within the boundaries of the Lawrence Livermore National Laboratory (LLNL), Livermore, CA (Figure 1-1). LLNL is one of the national security laboratories under the authority of the Under Secretary for Nuclear Security of the NNSA who serves as the Administrator for Nuclear Security and Head of the NNSA (50 USC Chapter 41, § 2402(b)).

The objectives of this EA are to (1) describe the underlying purpose and need for NNSA action; (2) describe the Proposed Action and identify and describe any reasonable alternatives that satisfy the purpose and need for NNSA action; (3) describe baseline environmental conditions at LLNL; (4) analyze the potential indirect, direct, and cumulative impacts to the existing environment from implementation of the Proposed Action and other reasonable alternatives; and (5) compare the impacts of the Proposed Action with the No Action Alternative and other reasonable alternatives. For the purposes of compliance with NEPA, reasonable alternatives are identified as being those that meet NNSA's purpose and need for action by virtue of timeliness, appropriate technology, and applicability to LLNL.

The EA process also provides NNSA with environmental information that can be used in developing mitigative actions, if necessary, to minimize or avoid adverse effects to the quality of the human environment and natural ecosystems should NNSA decide to proceed with implementing the construction and operation of a BSL-3 facility at LLNL. Ultimately, the goal of NEPA and this EA is to aid NNSA officials in making decisions based on an understanding of environmental consequences and taking actions that protect, restore, and enhance the environment.

[1] The NNSA is a separately organized agency within DOE established by Congress in 2000 under Title 50 United States Code Chapter 41, Subchapter I, Section 2401.

[2] A biosafety level or BSL is assigned to an agent based upon the activities typically associated with the growth and manipulation of the quantities and concentrations of infectious agents required to accomplish identification or typing as determined by the Centers for Disease Control (CDC) and National Institutes of Health (NIH). Additional information about the various BSL assignments is provided in later sections and within Appendix A of this EA.

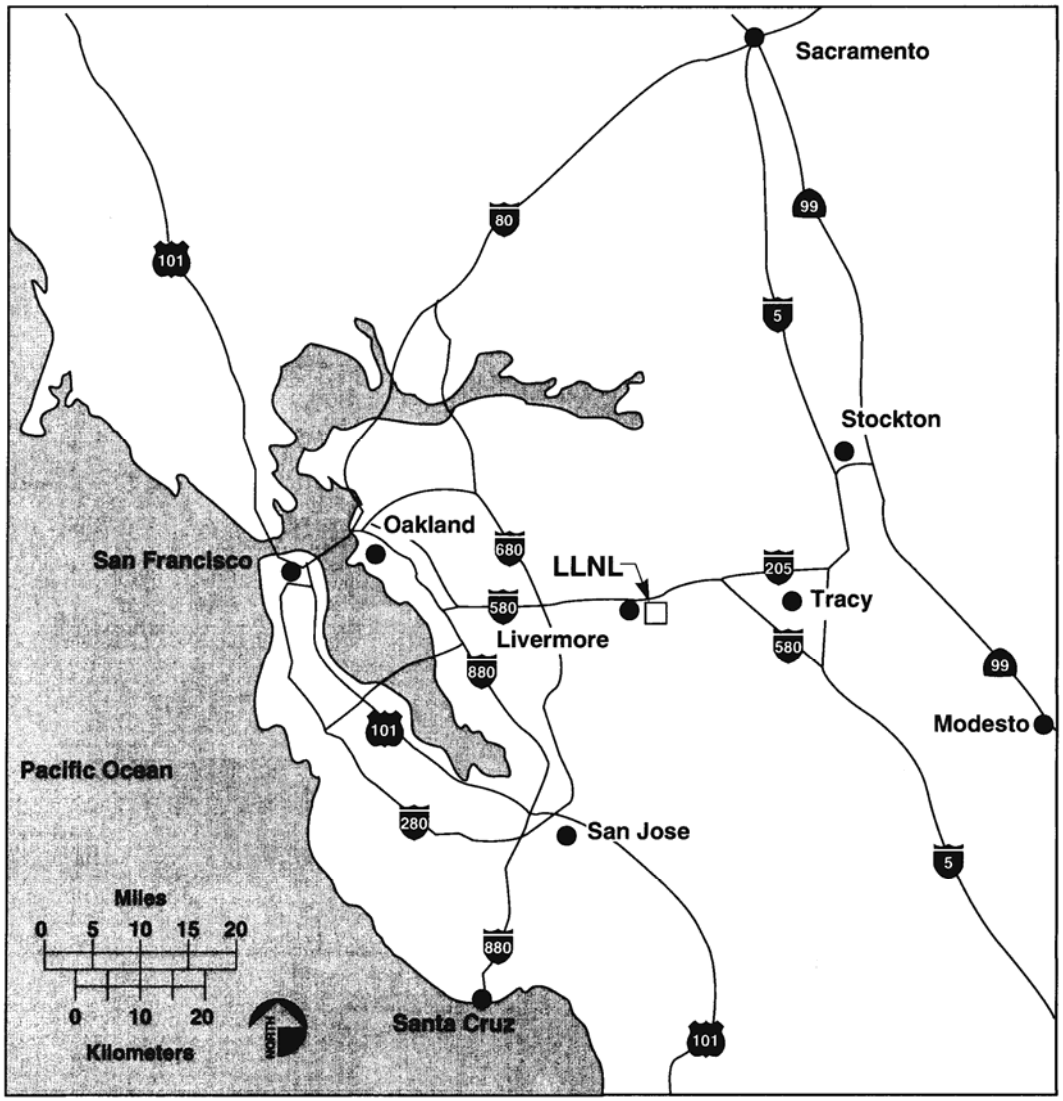

Figure 1-1. Location of Lawrence Livermore National Laboratory (LLNL)

1.2 BACKGROUND

The LLNL Livermore site lies just outside the boundary of Livermore, California. It occupies a total area of approximately 1.3 sq miles (821 acres), and is about 40 miles east of San Francisco at the southeast end of the Livermore Valley in southern Alameda County, California. The City of Livermore's central business district is located about 3 miles to the west. Figure 1-1 and Figure 1-2 show the regional location of the LLNL Livermore site and its location with respect to the City of Livermore. Lawrence Livermore National Laboratory (LLNL) is a U.S. Department of Energy national laboratory operated by the University of California (UC). Since the publication of this EA, a new M&O contractor for LLNL has been selected, Lawrence Livermore National Security, LLC (LLNS). LLNL was founded in September 1952 as a second nuclear weapons design laboratory to promote innovation in the design of our nation's nuclear stockpile through creative science and engineering. LLNL has also become one of the world's premier scientific centers, where cutting-edge science and engineering in the interest of national security

is used to break new ground in other areas of national importance, including energy,

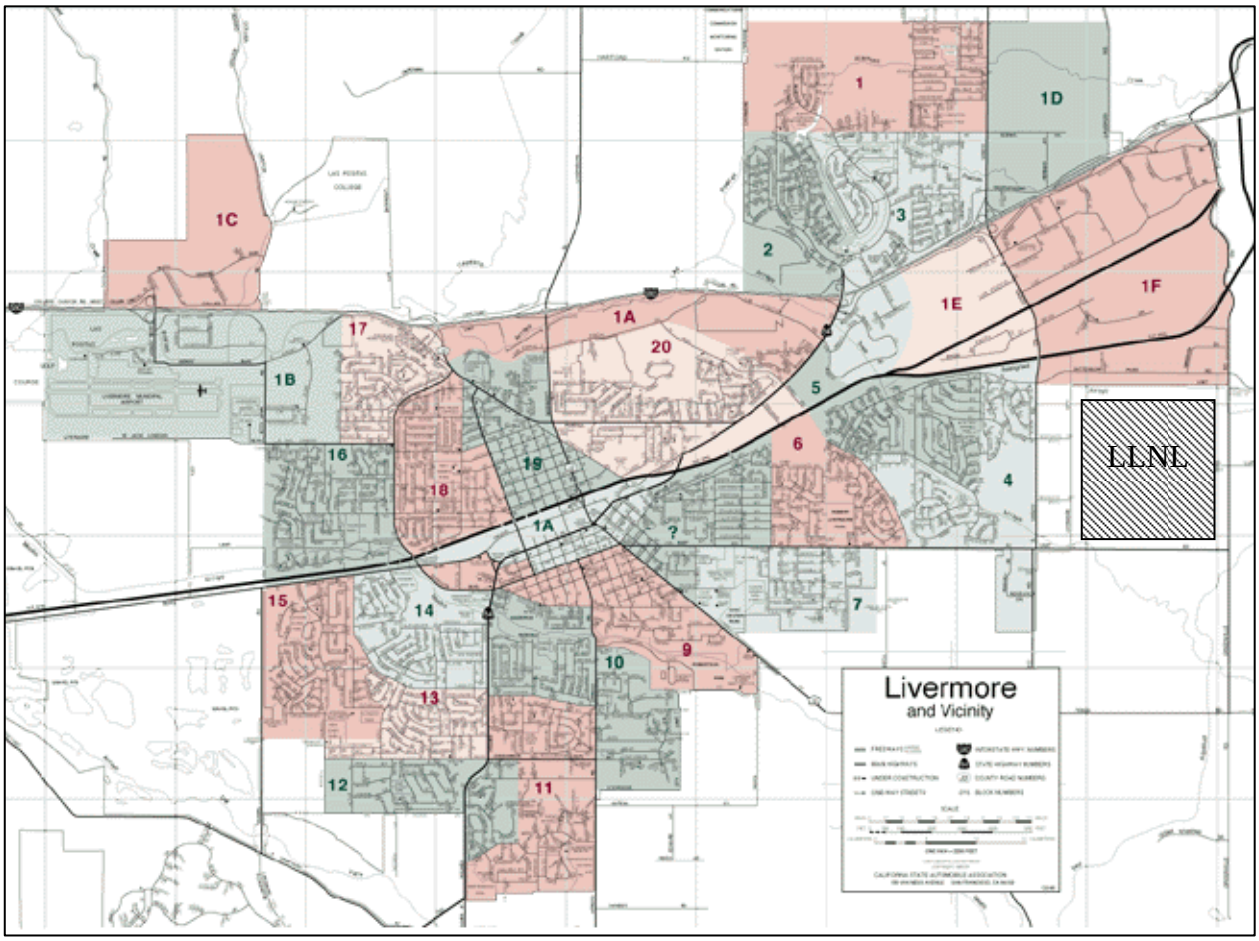

Figure 1-2. Location of LLNL with respect to the City of Livermore, CA

biomedicine, and environmental science.

Current NNSA mission-support work at LLNL includes research and development work performed for a variety of programs within the NNSA, other DOE programs, as well as cost-reimbursable work that is identified as "work for others." This designation, "work for others," encompasses non-DOE sponsored work performed in support of other Federal agencies, universities, institutions, and commercial firms, which is compatible with the NNSA mission work conducted at LLNL and which cannot reasonably be performed by the private sector. Within DOE, the NNSA mission is "(1) To enhance United States national security through the military application of nuclear energy; (2) To maintain and enhance the safety, reliability, and performance of the United States nuclear weapons stockpile, including the ability to design, produce, and test, in order to meet national security requirements; (3) To provide the United States Navy with safe, militarily effective nuclear propulsion plants and to ensure the safe and reliable operation of those plants; (4) To promote international nuclear safety and nonproliferation; (5) To reduce global danger from weapons of mass destruction (WMD); and (6) To support United States leadership in science and technology" (50 USC Chapter 41, § 2401(b)). Work

conducted at LLNL provides support to these NNSA missions, with a special focus on national security.

NNSA has the responsibility for national programs to reduce and counter threats from weapons of mass destruction (nuclear, biological, and chemical weapons). Activities conducted in this area include assisting with control of nuclear materials in states of the former Soviet Union, developing technologies for verification of the Comprehensive Test Ban Treaty (September 1996), countering nuclear smuggling, safeguarding nuclear materials and weapons, and countering threats involving chemical and biological agents.

The DOE Chemical and Biological National Security Program (CBNP) was initiated in fiscal year (FY) 1997 to engage the DOE and its laboratories more fully in the development and demonstration of new technologies and systems to improve U.S. domestic preparedness and response capabilities to chemical and biological attacks. The CBNP is a needs-driven program focused on addressing the highest priority area to counter chemical and biological threats against the people and economy of the United States of America as well as the threat against democracy and freedom. The CBNP was established in response to the *Defense Against Weapons of Mass Destruction Act* passed by Congress in 1996 (50 USC § 2301).

DOE and the national security laboratories have a long history of supporting nonproliferation and national security policy. As part of its primary nuclear science and technology mission, DOE has developed extensive capabilities in chemistry, biology, materials and engineering science, computations, and systems engineering at these laboratories. These capabilities, in areas such as genomic sequencing, development of new deoxyribonucleic acid (DNA[3])-based diagnostics, advanced modeling and simulation, and microfabrication technologies, as well as the joining of these capabilities with expertise in nonproliferation and national security, form the basis of NNSA's role in combating the chemical and biological threat. In addition to the chemical and biological nonproliferation activities supported by this program, the national security laboratories conduct work in chemical and biological defense research for other government agencies.

Since this EA was originally published, some of DOE's missions relating to biological security have been transferred to the Department of Homeland Security (DHS). However, DOE and LLNL continue to support this critical mission by performing work for the DHS on a "work for others" basis. The Homeland Security Act of 2002 authorizes DHS to access the capabilities of DOE's laboratories and other sites to further DHS mission objectives. In this revised document, references to DOE or NNSA missions should be understood to include work conducted on behalf of DHS in support of their mission objectives.

LLNL has been assigned research and development activities in support of these NNSA responsibilities. The LLNL Biology and Biotechnology Research Program (BBRP) (now part of the Chemistry, Materials, Earth, and Life Sciences Directorate) has been assigned the primary responsibility for conducting work related to biological science research including work with national health security issues and emerging diseases. Program objectives include understanding genetic and biochemical causes of disease, countering biological terrorism, bioengineering

[3] DNA is the polymeric deoxyribonucleic acid that determines the hereditary information in cells.

research, and developing and applying computational biology capabilities. Most of the on-site work is conducted in the Building 360 Complex area (Figure 1-3). Current research performed at this complex includes structural, molecular, and cellular biology, biophysics, biochemistry, and genetics research.

The BBRP work in the biosciences arena at LLNL has been ongoing for more than 40 years, and is conducted according to the accepted national standards for biosafety level (BSL)-1 and -2 work that have been developed by the U.S. Department of Health and Human Services, Public Health Service, through their subsidiary organizations, the CDC and the NIH. Details regarding BSLs -1, -2, and -3 and specific information and requirements for work in microbiological laboratories are provided in Appendix A of this EA. In addition, prior to commencement of any

Figure 1-3. Map of LLNL showing the location of the Building 360 Complex Area (within the dashed line)

LLNL experiments involving biological agents[4], work is reviewed and must be approved by the LLNL Laboratory Biosafety Operation Committee (LBOC). Certain projects must also be reviewed and approved by the LLNL Institutional Biosafety Committee (IBC), which is made up of LLNL staff members, UC and community health care providers, a DOE Federal member, and

at least two members of the public. The IBC typically meets in the Building 361 Complex several times per year, depending on demand. In general, BSL-2 facilities are used for working with a broad spectrum of biological agents (or bioagents) or biological toxins[5] commonly present in the community and may be associated with human disease of moderate severity. Facilities using CDC and NIH standards have demonstrated safe and secure working conditions with infectious agents. According to these standards for BSL-2 (CDC 1999) laboratories, the primary hazards to personnel working with agents at this level relate to accidental exposures through skin punctures or contact with mucous membranes, or ingestion. The organisms routinely manipulated at BSL-2 are not known to be transmissible, person-to-person by the airborne pathway. Examples of diseases include Hepatitis, measles, and salmonellae. Limited access, separated from public areas with posted BSL-2 biohazard signs, waste decontamination facilities, together with standard and special microbiological practices, are required for these laboratories. Common examples of BSL-2 facilities are those located in hospitals, medical schools, veterinary schools, biology research institutions, and dental offices.

According to their standard for BSL-3 (CDC 1999), the primary hazards to personnel working with agents at this level relate to accidental injections, ingestion, and exposure through airborne pathway. In BSL-3, more emphasis is placed on primary and secondary barriers to protect personnel in contiguous areas, the community, and the environment from exposure to potentially infectious aerosols. There are currently over 1350 BSL-3 laboratory facilities in the United States at various non-DOE sites (GAO 2007). BSL-3 laboratory facilities are specifically designed and engineered for work with bioagents with the potential for aerosol transmission that may cause serious or potentially lethal disease by inhalation if left untreated (such as the bacteria responsible for causing tuberculosis in humans). Examples of common BSL-3 facilities include hospital surgical suites, clinical, diagnostic, and teaching laboratories associated with medical or veterinary schools, and university research and development laboratories. Requirements of operating a BSL-3 facility (CDC 1999) are detailed in Appendix A.

Current research and technology development work conducted at LLNL targets both the reduction of the national threat from terrorism using biological weapons and enhances the Nation's public health capabilities. For example, in support of these responsibilities LLNL has developed the Biological Aerosol Sentry and Information System (BASIS) for early detection and rapid response to biological attack, conducts "expression studies" of *Yersinia pestis*, the causative bacterial agent in plague to understand the mechanisms of virulence, and performs "suppression subtractive hybridization" (SSH) to study the fundamental biology of microbes through DNA segmentation and similar-strain comparison. This current research and technology development work is focused on the development of scientific tools to identify and understand the pathogens of medical, environmental, and forensic importance.

The importance of work performed by NNSA laboratories in bioscience research and development in support of the national security WMD nonproliferation mission is increasing. This mission is to develop, demonstrate, and deliver technologies and systems to improve domestic defense capabilities and, ultimately, to save lives in the event of a chemical or biological attack. The threat presented by terrorists and rogue nations to the American people and our allies, including military personnel, amplifies the need for threat reduction research. Current work at LLNL in bioscience research is limited to BSL-2. Pending and future work in

support of the DOE, NNSA, and DHS national security missions requires specialized facilities to safely and securely handle and store infectious organisms beyond that which can be provided by BSL-2. DOE does not currently have under its administrative control within the DOE complex any microbiological laboratory facility capability beyond BSL-2, but BSL-3 facilities are proposed both at LLNL (as outlined in this EA) and at Los Alamos National Laboratory (LANL) (DOE 2002b).

Additional information regarding the DOE and NNSA mission areas of work conducted at LLNL is presented in the *Final Environmental Impact Statement and Environmental Impact Report for Continued Operations of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore, August 1992* (DOE/EIS-0157) (DOE 1992), its associated Supplement Analysis (SA) (DOE 1999), and the *Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* (SWEIS, DOE/EIS-0348, DOE/EIS-0236-S3, DOE 2005).

1.3 PURPOSE AND NEED FOR AGENCY ACTION

DOE conducts bioscience work in support of its biology and biotechnology research programs, work for other agencies, and work in support of CBNP. The NNSA CBNP mission is to "develop, demonstrate and deliver technologies and systems to improve domestic defense capabilities and, ultimately, to save lives in the event of a chemical or biological attack."

In order to meet these mission requirements, it is necessary to expand some existing capabilities to test the understanding and effectiveness of research on infectious agents and biotoxins, particularly those associated with potential bioweapons threats. Efficient execution of the NNSA mission therefore, also requires the capability to handle operations involving small-animal (rodent) challenges of bioagents (and possibly biotoxins) and the ability to produce small amounts of biological material (enzymes, DNA, ribonucleic acid[6] [RNA], etc.) using infectious agents and genetically modified agents under conditions that would require management of the facility at the BSL-3 level.

This capability does not currently reside within DOE/NNSA facilities, but some of the research is carried out for the LLNL Nonproliferation, Arms Control, and International Security (NAI) Directorate primarily by the BBRP using external (private-sector and University) laboratories to conduct the BSL-3 level components of the research. The nature of BSL-3 work requires efficient sample processing, handling of a variety of organisms concurrently, and assurance of sample security and integrity. NNSA's mission requirements for sample integrity necessitates that the chances of cross-contamination and degradation of samples be minimized by reducing excessive handling and transportation. The several key off-site BSL-3 facilities that conduct work for LLNL in support of NNSA, are often heavily committed to other projects or tailored to work with microorganisms not of specific interest to NNSA. This has especially become an issue since September 11, 2001. Because of this these laboratories are unlikely to be able to provide the quick response that may be necessary to support the NNSA need.

An on-site BSL-3 facility would provide safe and secure manipulation and storage of infectious microorganisms at a time when these issues are imperative to national security. In order to more effectively utilize and capitalize on existing onsite facilities and capabilities at LLNL, including informatics and DNA sequencing capability, and to ensure the quality, timeliness, integrity and security of microbiological work, NNSA needs BSL-3 laboratory capability within the boundaries of this national laboratory.

1.4 PUBLIC INVOLVEMENT

The Draft EA was originally made available for public comment from July 24 through August 23, 2002. The comment period was extended through September 7, 2002.

The revised document was made available for a 30 day comment period beginning April 11 and ending May 11, 2007. No comments received were excluded from the record. All comments were accepted even if they were received after the 30 day period.

1.5 COMMENT SUMMARIES AND NNSA RESPONSES

The full text of the comments received by NNSA on the Revised Draft EA by stakeholders and members of the public are included in Appendix C-2 of this EA. Where comments were duplicated, as in the presentation of form-type letters, only one is shown in its entirety. Many of the topics generated from public responses are of broad interest or concern and were categorized into twelve general issues which comprise the twelve sections in Appendix C-1. Comments and concerns voiced by the commentors were addressed through changes made to the document text to the extent practicable. Some commenters raised issues that are not pertinent to the NEPA review. These were also addressed to the extent practicable. The following general issues are discussed in the appendix:

1. NEPA Compliance: Documentation/Review Level
2. Safety of Laboratory Operations
3. Defensive vs. Offensive-oriented Research
4. Compliance with the Biological Weapons Convention
5. Public Health and Safety, and Worker Safety Issues
6. Accident Analysis
7. Threat of Terrorist Attack/Sabotage
8. Transportation Safety
9. Purpose and Need
10. Adequacy of Alternatives Analysis
11. Waste Disposal
12. Timeline for the BSL-3 Facility
13. Oversight
14. Public Comment Period and Public Hearings

Appendix C includes only those comments received on the Revised EA. Comments previously received on the original document have been left out to reduce the length of the appendix. The original responses from the 2002 EA have been revised or updated where public comments on

the Revised Draft EA provided new information pertinent to the proposed action or expressed concerns that were not responded to previously.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

Section 2.1 describes the Proposed Action for the EA that would allow NNSA to meet its purpose and need for agency action. Two additional alternatives are presented in Section 2.2 and 2.3, respectively. The No Action Alternative is presented in Section 2.4 as a baseline for comparison with the consequences of implementing the Proposed Action. Alternatives that were considered in this EA but were not analyzed further are discussed in Section 2.5, and related actions are identified in Section 2.6.

Readers of this revised document should note that since the original Environmental Assessment and its associated Finding of No Significant Impact were issued in December 2002, the facility has been constructed and equipment has been installed. This document has been revised to address the issues regarding terrorist attacks pursuant to the Ninth Circuit Court's remand. NNSA acknowledges that the impacts related to construction that are discussed in this document have already occurred. Changes have been made in this revised EA to reflect the "as-built" condition of the facility only if those changes are pertinent to the discussion of impacts from proposed operations or reasonably-foreseeable accidents.

2.1 PROPOSED ACTION TO CONSTRUCT AND OPERATE A BSL-3 FACILITY AT LLNL

NNSA proposes to construct and operate a BSL-3 facility at LLNL for the purpose of conducting biological research projects involving indigenous or exotic agents which may cause serious or potentially lethal or debilitating effects on humans, plants, and animal hosts, therefore, potentially impacting human health as well as agriculture, food, and other industries. LLNL's existing BSL-2 laboratory capability which cannot be used to perform this work is primarily located in the Building 360 Complex area (see Figure 1-3). As proposed, the BSL-3 facility would be an essential component for future advanced biological sciences research and development performed by LLNL's staff but would not replace the other biological laboratory capabilities at LLNL. The BBRP would continue to support current biological sciences initiatives at LLNL through the existing BSL-2 laboratories. The proposed facility (Figure 2-1) would be a permanent modular unit that would be constructed off-site and assembled on-site near the northwest corner of Building 361. It would have the same life expectancy as a facility constructed on-site.

The construction would be permanent and meet applicable building code, and required structural, seismic, plumbing, electrical, and fire standards. The proposed facility would include three BSL-3 laboratory rooms, one of which would be capable of holding rodents. The building would include clothes-change and shower rooms, a mechanical room, and some storage space, but no office space. When complete, the BSL-3 facility would be about 1,500 ft^2 (135 m^2) in size and would normally be occupied by no more than 6 workers. As currently projected, these staff members would come from the adjacent Building 360 Complex laboratory facilities (Figure 2-1) with no requirement for permanent relocation. Any additional staffing needed to support BSL-2

work previously done by workers who would be performing BSL-3 work may be made up by hiring locally or regionally, as necessary, to find qualified individuals.

The BSL-3 facility would be designed with a lifetime expectancy of 30 years (minimum) of operation. During the operational life of the building, the performance of routine maintenance actions would be expected. At the end of the facility's useful life, final decontamination and demolition would be performed as needed.

2.1.1 Proposed BSL-3 Facility Location and Construction Measures[7]

The proposed location is in the current parking area and access-drive directly adjacent to (east of) building B-365 and northeast of the intersection of Fifth Street and West Inner Loop (see Figure 2-1). Approximately 20 parking spaces of the paved current parking area would become

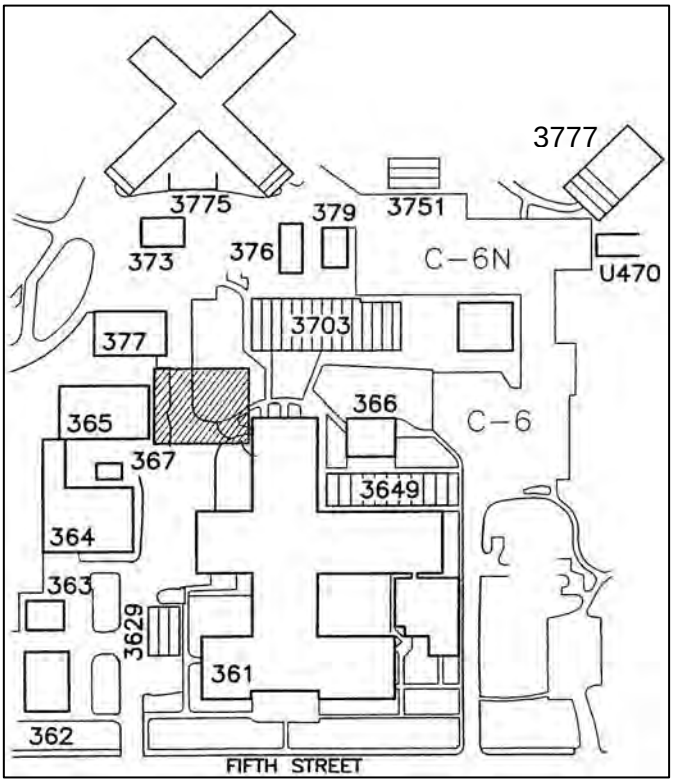

Figure 2-1. Map of the Building 360 Complex Area showing the location of the proposed BSL-3 facility (cross-hatched area)

permanently unavailable for use due to the footprint of the building and it may be necessary to redirect part of the parking access driveway.

The footprint of the proposed building would be less than one-quarter of an acre. Utilities necessary for construction and operation of the BSL-3 facility would be available within 50 ft (15 m) of the proposed construction site facility. These include potable water, natural gas, steam, sewer, electricity, and telephone service. Some minor trenching (at depths less than about 4 ft [1.3 m]) would be required to bring those utilities to the site.

Construction Measures[8]: As noted above, the project construction site would be at a location that has previously been cleared of buildings or structures and is within existing paved parking areas. No undeveloped (so called "green field") areas would be involved. No construction would be conducted within a floodplain or a wetland. The building would not be constructed over a known geologic fault or vertical displacement of a fault line, nor would it be sited within 50 feet of such a condition. No construction would be conducted within a solid waste management unit.

The BSL-3 facility building would be designed in accordance with guidance for BSL-3 laboratories established by the CDC and NIH (CDC 1999, NIH 2001). The CDC, which is part of the Department of Health and Human Services, provides guidelines for the operation of BSL-3 facilities, registers facilities that will access, use and transfer select agents, and then periodically inspects these facilities during operation. DOE Order O420.1 (DOE 1996b) which addresses natural phenomena hazard mitigation for non-nuclear facilities would be considered in preparing the final design criteria for seismic, wind and flooding events.

Sustainable design features would allow the structure to operate with improved electric and water use efficiency and would incorporate recycled and reclaimed materials into the construction as much as practicable while still meeting the requirements specified by CDC for laboratory interiors. For example, the facility could incorporate building and finish materials and furnishings made of reclaimed and recycled materials, low-flow lavatory fixtures to minimize potable water use, and energy-efficient lighting fixtures and equipment to reduce electric consumption. Where possible, the finished landscaping of the involved construction area would utilize non-potable water, reused and recycled materials, and native plant species.

Clearing or excavation activities during site construction have the potential to generate dust and encounter previously buried materials. If buried materials or remains of cultural or paleontological significance were encountered during construction, activities would cease until their significance was determined and appropriate subsequent actions taken in accordance with the National Historic Preservation Act (NHPA, 16 USC 470) or the American Antiquities Act (AAA, 16 USC 430). Standard dust suppression methods (such as water spraying) would be used onsite, if needed, to minimize the generation of dust during all phases of construction activities.

All construction work would be planned and managed to ensure that standard worker safety goals would be met. All work would be performed in accordance with good management practices, with regulations promulgated by the Occupational Safety and Health Administration (OSHA, 29 CFR 1910 and 29 CFR 1926), in accordance with various DOE orders involving worker and site safety practices, and in accordance with the LLNL Environment, Health and Safety Manual (LLNL 2001c). The construction contractor would be prohibited from using chemicals that generate *Resource Conservation and Recovery Act* (RCRA)-regulated wastes (40 CFR 261). Engineering best management practices (BMPs) would be implemented at the building site chosen, as part of a Storm Water Pollution Prevention (SWPP) Plan executed under a National Pollutant Discharge Elimination System construction permit. These BMPs may include the use of hay bales, plywood, or synthetic sedimentation fences with appropriate supports installed to contain any excavated soil and surface water discharge during construction

of the BSL-3 facility. After the facility is constructed, mounds of loose soil would be tested for previous contaminants, removed from the area, and either reused or disposed of appropriately.

During site preparation and construction, noise levels (for short time periods) would be consistent with those expected from the construction of single-story frame non-residential structures using metal studs and cross members. The use of welding equipment, air compressors, riveting tools, and heavy equipment is reported to range from 65 to 125 dBA[9] continuous or intermittent noise. Power-actuated tools (for example, those for setting fasteners into concrete) can go up to 139 dBA of impact-type noise near the point of generation (ACGIH 2000).

Vehicles and heavy machinery (such as front-end loaders, dump trucks, cranes, and cement mixer trucks) would be used onsite during the construction phase. These vehicles would operate primarily during the daylight hours and would be left onsite overnight. If needed, temporary task lighting would be used. Wastes generated by site preparation and construction activities would be expected to be nonhazardous.

Construction of the BSL-3 facility is estimated to start in FY 2003 and take several months to complete. Construction materials would be procured primarily from local California suppliers. Construction workers would be drawn from local communities or would be derived from the current in-house LLNL staff.

2.1.2 BSL-3 Facility Description and Operations

Facility Description: The proposed BSL-3 facility would be a one-story building with about 1,500 ft^2 (135 m^2) of floor space (Figure 2-2) housing three BSL-3 laboratories (one with rodent handling and maintenance capability), showers, sinks, lavatories, and mechanical and electrical equipment areas. The BSL-3 facility would most likely be constructed using concrete footing and stem walls with concrete slab-on-grade floors. Walls would be steel stud framed and the roof construction would consist of metal decking over steel bar joists. The exterior walls would have an application of stucco and the painting of the building would be visually consistent with surrounding structures. The interior surfaces of walls, floors, and ceilings of the BSL-3 laboratory areas would be constructed for easy cleaning and disinfection. The walls would be finished with an easily cleanable material with sealed seams, resistant to chemicals and disinfectants normally used in such laboratories. Floors would be coated and slip-resistant. All penetrations in floors, walls, and ceiling surfaces would be sealed, or capable of being sealed to facilitate disinfection, to aid in maintaining appropriate ventilation system air pressures, and to keep pests out. Laboratory furniture would be capable of supporting anticipated loading and use, and bench tops would be impervious to water and resistant to moderate heat, chemicals used, and disinfection solutions. Spaces between benches, cabinets, and equipment would be accessible for cleaning with disinfectants.

Each of the three BSL-3 laboratories would have at least one Class II Type A-2 biological safety cabinet[10] (BSCs) (Figure 2-3). Class II BSCs provide their own airflow, have High Efficiency Particulate Air-Purifying (HEPA)[11] filtration internally within the cabinet and would be designed to provide personal, environmental, and test material protection. Exhaust air from the BSCs would exit the room via the thimble-type connection to HEPA filters in the mechanical rooms,

then outside the building. With the use of Class 11, Type A-2 BSCs, some room air from outside the BSC may exit directly (through the thimble connection) to the building exhaust system without first going through the BSC. All BSC air and room air would be 100 percent exhausted to the outside through the building heating, ventilation, and air conditioning (HVAC) and HEPA filtration system (air exhausted from BSCs is doubly-filtered). Class II Type A-2 BSCs are designed to operate at a minimum inward flow of a 100 linear ft per min (30.5 linear m per min) at the face opening (CDC 2000b). BSCs would be located away from doors, room supply louvers, and heavily

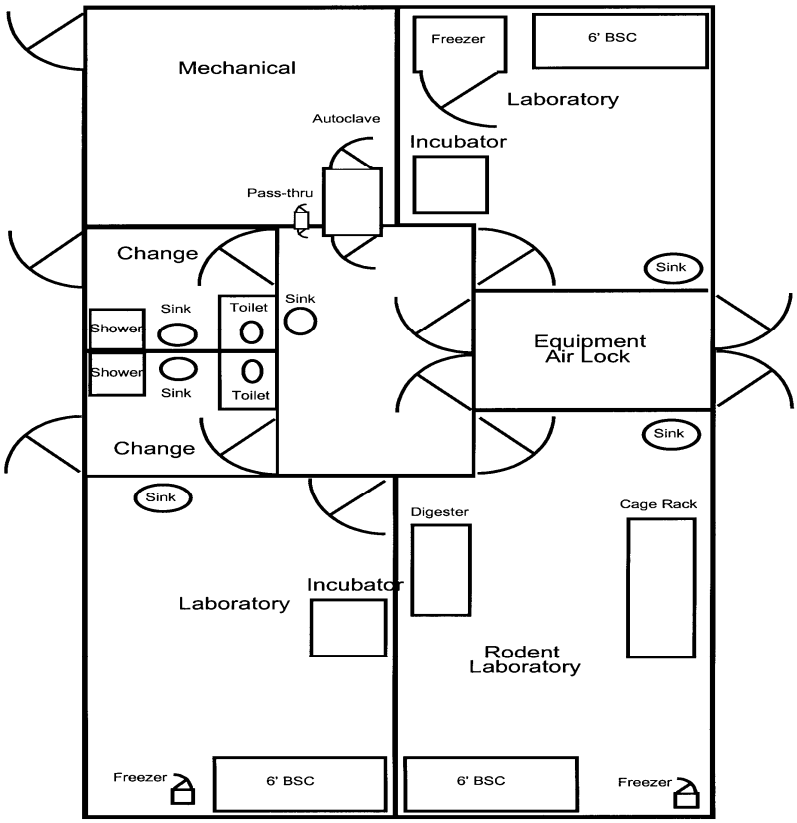

Figure 2-2. Conceptual floor plan for the proposed BSL-3 facility at LLNL (not to scale) (The As-Built facility does not significantly vary from this drawing.)

Figure 2-3. Photo of a NUAIR - Class II Type A-2 BSC[12] with Thimble Connection

traveled laboratory areas. BSC interiors would be cleaned by use of appropriate methods and could include ultraviolet light or chemical disinfection. BSCs would be tested and certified annually and after installation, repair, or relocation in accordance with CDC guidance (CDC 2000b).

No windows would be installed in the BSL laboratory's exterior walls. Non-opening observation windows would be placed on interior doors. Centrifuges or other equipment that have the potential to produce aerosols would be operated in BSCs or with appropriate combinations of personal protective equipment (PPE), physical containment, or control devices. Vacuums would be provided to critical work areas using portable vacuum pumps properly fitted with traps and HEPA filtration.

Each laboratory would also contain at least one refrigerator or freezer. Biological materials would be stored either in regular refrigerators for short-term use or in ultra-low temperature mechanical freezers operating between –50 and –85^{o}C for long-term sample storage or archiving.

The BSL-3 laboratory used for rodent handling would have a tissue digestor for the purpose of sterilizing all animal tissues at the conclusion of each study involving small rodents. Figure 2-4 shows an example of a tissue digestor unit that could be used. The digestor would use an alkaline hydrolysis process at an elevated temperature to convert all of the organic material (as well as infectious microorganisms) into a sterile aqueous solution of small peptides, amino acids, sugars, and soaps. The alkali would be used up in the process. Aside from the aqueous solution, the only byproducts would be mineral (ash) components of the bones and teeth.

The BSL-3 laboratory used for rodent testing would also contain an rodent caging system similar to that shown in Figure 2-5. These ventilated cages would be pressurized with HEPA-filtered air, thus reducing both ammonia and carbon dioxide. The negative pressurization would provide

Figure 2-4 Photo of a Waste Reduction Inc. ™ small-capacity tissue digestor[1]

Figure 2-5. Photo of an Allentown Caging Equipment Co.™ BioContainment Unit for small animals[10]

continuous quarantine status, protecting personnel and preventing contact with the other rodents in the cage rack. A maximum of 100 rodents, mainly mice (some rats and possibly guinea pigs), would be used at any one time. Once a rodent would be used in testing it would never leave the cage except for cage-cleaning and inspection which would occur only in the confines of the BSCs. Once removed from a cage the rodents would only be placed back into a clean cage. The dirty cage and its contents would be autoclaved[13] prior to reuse. All rodents used would be supplied by the already-existing rodent quarantine facility located and operated in an adjacent building. The cage rack would be restrained from toppling over by resisting about 1g of lateral acceleration. Cage latches have been tested to 2g's of pull force.

Some rodents would be exposed to infectious agents in the BSC through inhalation via a device known as a collision nebulizer. This device creates aerosol particles of known size (depending upon the specific nozzle used) to which rodents would be exposed through a nose-piece. The nebulizer consists of a 32-ounce Pyrex™ glass liquid storage container with a "T-shaped" stainless steel aerosol jetting-device operated by compressed air. The device would only be used in the BSC and would be chemically disinfected in place after use. Once exposed, the rodent would (while still in the BSC) be placed directly into a clean cage and placed back into the ventilated cage rack for observation.

Physical security of the facility building would be implemented commensurate with the level of work being performed. The facility safeguards would be based upon a security analysis conducted during the project planning stage. As in all facilities managed at LLNL, security in the proposed facility would be maintained by limiting access to only authorized DOE-badged personnel. Employee qualifications and training requirements are described in CDC-NIH guidelines (CDC 1999) along with a discussion of appropriate management of security concerns.

Fire suppression for the BSL-3 facility would be provided by a standard wet-pipe fire sprinkler system. Water flow alarms would be connected to LLNL's fire alarm monitoring station so that designated responders would be notified. Water used for fire suppression that might become pooled on the building floor would be discharged from the floor drains to a retention tank system, for containment, characterization, and disinfection as needed, prior to discharge to the sanitary sewer system.

Two HEPA filter banks in series in the building exhaust system would filter all room air one-time-through and provide secondary filtration for exit air from the BSCs. Filter banks could be switched or alternated to permit disinfection and filter replacement. Routine maintenance of the filter banks would be conducted by certified technicians, including replacement of the filters. Replaced filters would be chemically sterilized prior to disposal. There would be only one electrical room with access for maintenance from the exterior of the building. The BSL-3 facility would employ lightning protection designed to meet the requirements of the National Fire Protection Association (NFPA 1997 and 2000). Entry of personnel into the BSL-3 laboratories would be through the change rooms which would serve as self-closing double-door access.

The air-handling systems, including the heating, ventilation and air conditioning (HVAC) systems, would be designed in accordance with CDC guidelines to provide for individual temperature and ventilation control zones as required in the BSL-3 laboratories and support

areas. A ducted exhaust HVAC system would draw air into the BSL-3 laboratories from the adjoining areas toward and through the BSL-3 laboratories areas with no recirculation from the BSL laboratories to other areas of the building. The BSL-3 laboratories would be under the most negative pressure with respect to all other areas of the building. Air discharged from the BSL-3 facility would be dispersed well above the roofline and away from adjacent building air intake ducts. Direction of airflow into the laboratories and the BSCs would be verifiable with appropriate gauges and an audible alarm system to notify personnel of HVAC problems or system failure. Operation of all equipment would be designed to avoid interference with the air balance of the BSCs or the designed airflow of the building.

In the event of a power outage, all biological materials would immediately be placed in a "safe" configuration, such as confinement or chemical disinfection. The HVAC systems would be supplied with backup power from an adjacent facility diesel generator to minimize power supply interruption. Exhaust stacks would be placed well above the roof (10 ft (3 m) or greater) and away from the buildings' air intakes.

Should power be lost to the building and the HVAC system, the air supply system would shut down and zone-tight dampers would close automatically to prevent air migrating from the laboratory areas to other areas of the building.

All research-related biological waste from the BSL-3 laboratory would undergo either autoclaving or chemical disinfection. These wastes would be discharged from laboratory sinks, floor drains, or the tissue digestor and would be held and disinfected in retention tanks before being discharged into the sanitary sewer system. Tap water entering the BSL-3 laboratories through spigots in the sinks or shower heads would have backflow preventers to protect the potable water distribution system from contamination. Biological cultures could be disposed of in the sinks after undergoing treatment with chemical disinfectants for an appropriate amount of time.

The electrical requirements for the BSL-3 facility would be about 60 kilowatts (kW); the building would be attached to an adjacent building which has a diesel generator sized to supply laboratories with electric power in the event of a power failure from the supply grid system. In the event of a power outage, the generator would immediately supply electricity to the laboratories so that workers could shut down the laboratories safely.

Parking would be in nearby common-use lots with handicapped-accessible parking near the building entry (ANSI 1998).

Operations: The BSL-3 facility would be operated according to all guidance and requirements established by the CDC and NIH (CDC 1999), DOE, and LLNL. Prior to operating the facility using select agents, the facility would be registered with a unique registration number obtained from the Secretary of the US Department of Health and Human Services (HHS) according to the *U.S. Code of Federal Regulations* (CFR) requirements by providing "sufficient information that the facility meets biosafety level requirements for working with the particular biological agent" (42 CFR 72). The CDC is the supporting governmental agency under the HHS responsible for the management of the Laboratory Registration/Select Agent Transfer (LR/SAT) Program and would be the main point of contact for LLNL's Facility Responsible Official. LLNL would be

required in accordance with the Integrated Safety Management System (ISMS) to participate in and follow the requirements of the CDC LR/SAT Program for handling of select agents[14] and must follow the provisions that apply to the six LR/SAT components as appropriate, which include (1) the list of approximately 40 "select agents" that are "viruses, bacteria, rickettsia, fungi, and toxins whose transfer in the U.S. is controlled due to their capacity for causing substantial harm to human health;" (2) registration of the facilities; (3) filing of approved transfer form; (4) verification using audits, quality control, and accountability mechanisms; (5) agent disposal requirements; and (6) research and clinical exemptions (42 CFR 72). No select agents would be handled in the proposed BSL-3 laboratories without first obtaining IBC approval in accordance with ISMS and secondly prior registration and approval from CDC. Microorganisms that are not select agents would also be used in the BSL-3 laboratories but would still be handled according to CDC and NIH guidances and requirements. Operation of the proposed facility would also involve handling of microorganisms that are regulated by the U.S. Department of Agriculture (USDA) and require BSL-3 containment.

Microorganisms expected to be cultured (i.e., viable organisms) at the BSL-3 facility in the near term would be, but not limited to, the select agents *Bacillus anthracis, Yersinia pestis, Clostridium botulinum, Coccidioides immitis, Brucella spp., Francisella tularensis, and Rickettsia spp.* (see Appendix A). The facility may be used to handle small amounts of biotoxins which are generally handled at the biosafety level established for the microorganisms that produce them. The CDC and NIH guidances and requirements also extend to handling genetically modified microorganisms. All research in microbiology laboratories that involves altering microbial genomes follows standard procedures approved by NIH (NIH 2001). It is possible that the facility would receive genetically altered microorganisms. Before any infectious microorganisms would be handled in the BSL-3 laboratories, the IBC and the researcher, in accordance with CDC guidance, would perform a risk analysis. LLNL occupational medicine and the local medical community would be informed of the microorganisms to be handled in the BSL-3 laboratories and would be aware of the methods of identification and control of associated diseases.

All work with infectious microorganisms in the proposed facility must be approved and authorized by LLNL management in strict accordance with the following:

- Biological Weapons Convention Treaty (BWC 1972) permits defensive research for the purpose of developing vaccines and protective equipment.
- Appendix G of the UC Contract with DOE specifies, among other things, Work Smart Standards, which include adopted standards from CDC (42 CFR 73), NIH (2001), and the U.S. Occupational Safety and Health Administration (OSHA) (29 CFR 1910, 29 CFR 1926).
- The LLNL Biosafety Operations Committee (LBOC), a diversified group of LLNL operational-level researchers and representatives from all LLNL-affected institutional and regulatory compliance organizations who are responsible for the first-level reviews of projects/microorganisms and provide recommendations to the IBC.

- The LLNL Institutional Biosafety Committee (IBC) who reviews and approves each project such as those involving recombinant DNA or pathogenic organisms and toxins before such work can be undertaken at LLNL.
- When completed,[15] LLNL safety and security documentation (Facility Safety Basis, Facility Safety Plans, Hazard Control Plans, Human Pathogens Exposure Program, and security assessments) would provide the key documentation framework for operation of the BSL-3 facility.
- The BSL-3 facility would undergo a readiness review prior to startup to ensure that the infrastructure for safe operation is implemented and that the health and safety of workers, public, and the environment is protected.

Operation of the proposed BSL-3 facility would also be in compliance with a variety of state and Federal regulations. For example, these regulations would include those promulgated by the U.S. Department of Agriculture (7 CFR 330, 9 CFR 92), U.S. Department of Commerce (15 CFR 730), OSHA (29 CFR 1910.1030), U.S. Postal Service (USPS) (39 CFR 111), U.S. Department of Transportation (DOT) (49 CFR 171-178), and the HHS (42 CFR 73). NNSA, LLNL, and currently applicable BMBL requirements (according to Work Smart Standards) would be certified as having been met before operations would begin at the proposed BSL-3 facility. Other non-governmental organizations that provide guidance for transportation of infectious agents include the *Dangerous Goods Regulations,* the *Infectious Substances Shipping Guidelines* of the International Air Transport Association (IATA 2006), and the *Guidelines for Safe Transport of Infectious Substances and Diagnostic Specimens* of the World Health Organization (WHO) (WHO 1997).

Appropriate PPE used by employees entering the laboratories would include eye protection, gloves (in some cases the worker would be double-gloved), and disposable closed-front gown or clothing (including disposable booties and disposable cap). Air-purifying respirators might be worn as an additional safety measure for some tasks. Workers' hands would be washed with disinfectant immediately before and after putting gloves on or after any potential contamination with infectious agents. Workers could shower after finishing their laboratory work upon removal of their PPE clothing if deemed necessary. Worker's hair would be kept short or secured away from the face and no skin would be exposed below the neck; workers would be required to wear socks, closed shoes, and long pants underneath the disposable coverings. The majority of all materials used in the BSL-3 facility would be disposable, but some reusable laboratory apparatus, such as test tubes or culture dishes may be needed for some minor amount of sterile work. No open flames would be allowed within the BSCs. Work in the three laboratories would be scheduled and planned to avoid conflicts within the laboratory areas. All workers in the BSL-3 laboratory areas would be informed of what other workers would be handling so that appropriate staging of work could occur. Open cultures would only be handled in BSCs. BSCs would be at negative pressure with respect to the room and the rest of the building. Airflow would always be directed away from the worker and into the BSC. Workers would be offered appropriate immunizations for the microorganisms being handled. They would also be tested for normal immunocompetancy[16], and would have medical treatment readily available in the event of an accidental exposure.

No radiological material would be used or stored in the BSL-3 facility. A pest program would be in place to control vector populations.

One of the three BSL-3 laboratories would have rodent handling capability (<100 rodents). The rodents (mice, rats, and possibly guinea pigs) would be in the BSL-3 facility only when part of a research study. These rodents would be cared for in accordance with federal regulations and guidelines. LLNL adopted the requirements of the Animal Welfare Act of 1968 (7 USC 2131-2157, as amended) and voluntarily adheres to the guidelines for the use of vertebrate animals in research established by the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) International. These requirements are administered by the LLNL Associate Director for the BBRP and are implemented by the LLNL Institutional Animal Care and Use Committee (IACUC).

Rodents would be held in quarantine in another Building 360 Complex laboratory for at least 30 days prior to use in a BSL-3 laboratory. They would be maintained in enclosed cages that would individually be connected to the building exhaust air duct. All rodent studies would occur only in the BSL-3 BSCs. Rodents are routinely transferred from dirty to clean cages in the BSCs. Used cages would be closed, autoclaved without dumping the litter, then further cleaned and disinfected prior to reuse. Rodent studies could involve intravenous injections and therefore the laboratories would have sharps, sharps containers, and a "needlestick" program that would be developed at the outset and would focus on ensuring workers do not accidentally inject themselves (autoinjection). All rodents brought into the proposed facility would be euthanized for the purpose of post-mortem medical examination (necropsy). All necropsied rodents and rodent tissues would be sterilized in a tissue digester located in the rodent BSL-3 laboratory.

The BSL-3 facility would not be a large-scale research or production facility, which is defined as working with greater than 10 liters of culture quantities (NIH 2001). Quantities of each cultured microorganism would be further limited by experiment-specific procedures under IBC approval. Less than 1 liter of cultured microorganisms in their stationary growth phase (maximum cell density of about 10^8 cells per ml) would be the maximum quantity handled in any BSL laboratory at any point in time. This 1-liter quantity would only be removed from the BSC in 250 ml double-contained plastic containers with safety-caps. No open cultures (where the free liquid surface is exposed directly to the ambient air) would be allowed outside of the BSC.

Seed cultures or samples would be provided by commercial suppliers, research collaborators, or other parties associated with the LLNL projects. These may contain either previously identified or unidentified organisms. Identification provides diagnostic, reference, or verification of strains[17] of microorganisms present. Diagnostic and reference strains, which may include the geographic source of the sample, contribute to the understanding of the microorganism's original source and ability to cause disease. Rapid, accurate reference or verification of strains improves containment of infection through early and effective medical intervention, potentially limiting the progress of illness for those exposed to pathogens, determination of antibiotic resistance, and contamination or infection of others.

The CDC would periodically inspect the facility over the life-time of its operation. The inspections would be performed by CDC staff or its contractors.

Sample Arrival at the LLNL BSL-3 Facility for Processing: Sample shipments would only be received at the BSL-3 facility operating within the parameters specified in all established guidelines and requirements. If the samples would be select agents, they would only be accepted when the CDC Form 2 has been completed per regulations, the registration verified, and the requesting facility responsible official notified in advance of shipment according to CDC registration requirements. Biological materials or infectious agents could only be shipped to LLNL by commercial package delivery services, the U.S. Postal Service (USPS), other authorized entity, or delivered to the receiving area from an origination point within LLNL by a designated LLNL employee acting as a courier (39 CFR 111; 42 CFR 72; 49 CFR 171-178). Generally, shipment sample sizes would be small; a typical sample would consist of about a milliliter of culture media (agar solid) with live cells (a milliliter is about equal to one-fifth of a teaspoon in volume). Smaller samples could be shipped that would be microliters in size; the maximum probable sample size would be 15 milliliters.

The protocol for receiving and handling of samples (such as soil) would be worked out prior to receipt and reviewed and approved by the IBC. Receipt of the select agents must be acknowledged electronically by the requesting facility responsible official within 36 hours of receipt and a paper copy or facsimile transmission of receipt must be provided to the transferor within 3 business days of receipt. Upon this acknowledgement, the transferor would be required to provide to the LLNL-requesting-facility responsible official a completed paper or facsimile transmission copy of the CDC form within 24 hours to the registering entity (holding that facility's registration), in accordance with §72.6(c)(2) (42 CFR 72) for filing in a centralized repository.

All incoming packages (regardless of origination point) containing infectious agents would have to have been packaged in DOT-approved packages (42 CFR 72) (see Figure 2-6). These packages would be about 6 to 8 inches (15 to 20 cm) in height and about 3-4 inches (8 to 10 cm) in cylinder diameter. All shipping containers would be made of plastic and the samples would be double- or triple-contained. Transportation and interstate shipment of biomedical materials and import of select agents would be subject to the requirements of the U.S. Public Health Service Foreign Quarantine (42 CFR 71), the Public Health Service, and DOT regulations. Additionally, the U.S. Department of Agriculture regulates the importation and interstate shipment of animal or plant pathogens (7 CFR 330 and 9 CFR 92). Strict chain-of-custody procedures for samples arriving at the LLNL receiving site would be followed.

Biological shipments to and from LLNL could initially be as much as ten times the current levels (4 in and 2 out per month now) of shipments to existing LLNL biological research laboratories. Once the facility became fully operational and "stocks" of needed materials were established, the level of shipments would remain above current levels for these types of shipments but decrease from start-up levels. Due to the perishable nature of the samples at the BSL-3 facility, receiving and shipping of samples normally would only occur during weekday daylight hours and samples must be opened and used or restored (put in growth media) within 8 hours of arrival. External packaging material from packages received at the facility would be inspected, removed, auto-claved, and disposed of according to LLNL waste handling procedures. The biological material samples and their packaging would be left intact and in accordance with the established chain-of-custody record. The packages would be placed in safe and secure condition within the respective BSL-3 laboratory where workers would process them. Shipment of samples from the BSL-3

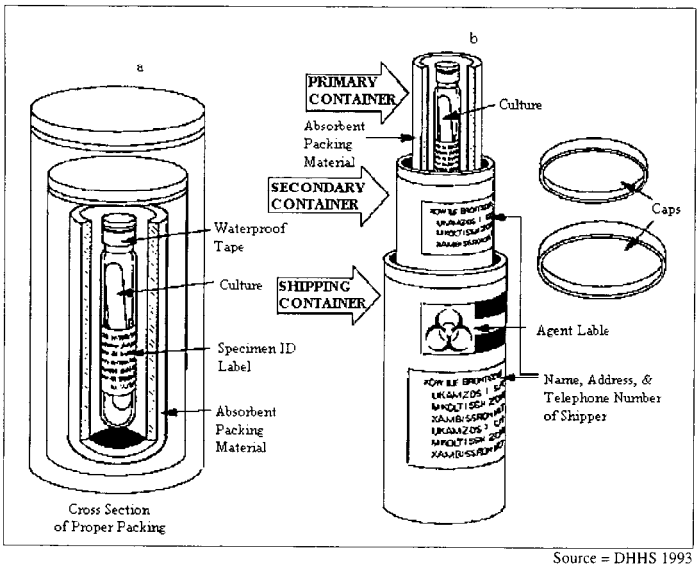

Figure 2-6. Example of a Primary Shipping Package.

facility to other researchers or the CDC would require following the same guidelines and requirements for the sample shipment that applied to samples received at the facility.

The samples may arrive at LLNL Shipping and Receiving in various fresh, frozen, or "fixed" (for example, in formaldehyde) forms including aqueous liquids, solids, or as material contained in bodily fluids. Samples would normally only contain vegetative forms (active growing stage) of microorganisms, but some spores could be present in samples. Other samples may contain proteins, DNA, or attenuated microorganisms (organisms that have been partially inactivated).

Upon arrival at LLNL Shipping and Receiving, these sample containers would be examined for damage, logged in, and taken to the BSL-3 laboratory for removal of the external packaging material. Damaged packages would be handled in accordance with procedures for BSL-3 laboratories (to be developed once the project obtains approval). The removed packaging would then be autoclaved and disposed as solid waste. The interior packing with the intact sample would be placed safely and securely in the respective BSL-3 laboratory under chain-of-custody procedure until the authorized researcher is ready to process the samples. Unpacking any select agent primary container would only be done in the BSC. The samples would be stored in the BSL-3 laboratory within a locked freezer or refrigerator, according to the needs of the sample for preservation. Inventories of all samples and cultures would be kept. Samples and cultures would be identified by a numeric or alpha-numeric code rather than by the name of the microorganism or source. Sensitive information about samples and results would be maintained elsewhere at LLNL in a safe and secure manner in accordance with applicable NNSA and LLNL security requirements. The samples could also be immediately processed, in which case the materials would be placed directly into culture media (such as a liquid or semi-solid nutrient material or media). All preparations and manipulations of cultures or samples would only occur within a fully operating BSC. When the external packaging materials were removed, they would

be autoclaved within the facility and disposed of according to LLNL's solid waste handling procedures (LLNL 1994).

Culture of Samples in a BSL-3 Laboratory: For culturing, the samples or seed cultures would be removed from their primary containers in a BSC, and a tube, flask, or plate containing a specific nutrient media would be innoculated with the sample to create a culture. All culture work would be completed and cleaned up within one work-shift (8 hours) except for materials being incubated. Culture and culture-storage containers would typically be made of plastic and always be double-contained. The culture container would be transferred to a temperature-controlled incubation chamber to grow the organisms (multiply the number of microorganisms) for a period lasting up to several days. Centrifugation of live, intact microorganisms would be conducted in sealed containers placed inside sealed tubes to minimize the potential for aerosolization[18] of microbes, or, if appropriate, centrifugation could be conducted inside a BSC. Cultured materials, which are sources for research materials, could be "lysed" (broken open) or killed (inactivated) by the addition of a variety of chemicals such as detergents or the chemical known as phenol. The lysed or killed cells and the culture media could be processed into biological material that would later be analyzed by various research methods at various LLNL research laboratories, and potentially at other laboratories off-site. Following incubation (hours to days), all cultured materials would be cleaned up within one work-shift (8 hours). Many cultures would be archived in small quantity and maintained in the ultra-freezers in each laboratory.

Waste Generation at the BSL-3 Facility: It is expected that little soil and construction debris would be generated from site preparation and construction activities of the proposed BSL-3 facility that would require disposal and removal from the construction site. Sanitary waste from portable toilets used during construction would be removed by commercial vendors and be disposed of in a sanitary sewer system offsite from LLNL in accordance with the permit requirements applicable to the commercial vendors.

During operation of the BSL-3 laboratories, the disinfection after each use of the interior working surfaces of the BSCs would generate waste products. All wastes generated in the laboratories of the facility (including sample packaging materials, culture materials, petri dishes, PPE, and associated process wastes) would leave the laboratories only after decontamination using the facility's autoclave or after being chemically sterilized. The autoclaving process involves placing waste to be autoclaved in a special container. When autoclaving occurs, an indicator strip on the container changes color. This allows facility workers and waste management workers to be able to tell at a glance whether waste has undergone autoclaving. Performance of the autoclave is automatically tracked electronically to insure its effectiveness. This method is the same waste management method used by hospitals and similar facilities to sterilize their waste. Solid waste landfills may accept autoclaved or chemically sterilized wastes for disposal depending on their individual waste acceptance criteria and operating permit requirements. Alternatively, LLNL could contract to send sterilized wastes produced by the proposed BSL-3 facility to a licensed commercial incinerator located offsite for waste disposal.

Laboratory research experiments would be expected to generate about 22 lbs (9.9 kg) of lab trash (gloves, pipette tips, culture tubes, tissues, etc.) per week or about 1,144 lbs per yr (515 kg per

yr). Other "solid waste" (note-paper, etc.) generated in the non-laboratory portions of the facility would raise the total solid waste production to less than 2,000 lbs per yr (900 kg per yr).

Sanitary liquid waste also would be generated from the proposed BSL-3 facility. Sanitary waste would be generated from research activities and from toilets, showers, and sinks in the building bathroom facilities. Sinks in each of the three laboratories would also generate sanitary waste. Soluble or liquid waste materials generated from laboratory operations can be disposed in the laboratory sinks after first being treated by autoclaving or with disinfectants. Other non-sewerable liquid wastes will be treated with disinfectants and removed by waste technicians. Waste generated from research is projected to be about 3 gal per wk (11 liters per wk) or 156 gal per yr (590 liters per yr), and could be disposed in the sanitary sewer system. An additional 40 gal per day (152 liters per day) or 10,000 gal per yr (37,900 liters per yr) can be produced by toilets and showers, although it shouldn't be considered a net increase since the BSL-3 facility workers are already working in adjacent BSL-2 buildings with toilets and showers.

Minimal amounts of hazardous waste (less than 2 gallons per year) and no radiological waste would be generated by the facility.

Chemical disinfectants would be used to disinfect portions of the laboratories that are not readily accessible, such as the ductwork. These disinfectants would be in a gas form as appropriate for the respective chemical. The space to be disinfected would be sealed, personnel would be excluded, and the gas would remain in the space for several hours before release to the environment. This procedure would be conducted by a certified technician using a standard protocol. The quantities of chemicals used would be well below the reportable quantities for both the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 300) and the Emergency Planning and Community Right-to-Know Act (EPCRA) (40 CFR 350). For example, if paraformaldehyde is used, the CERCLA-reportable quantity is 1000 lb. and for the vapor phase produced, formaldehyde, it is 100 lb. The EPCRA-reportable threshold for formaldehyde is 10,000 lb. Formaldehyde is also listed as a Hazardous Air Pollutant (HAP) under the Clean Air Act Amendments. HAPs are limited to 10 tons per yr individually.

All hazardous chemicals used in the proposed facility (such as: formaldehyde, chloroform, phenol, ethyl alcohol, isopropyl alcohol, amyl alcohol, and sodium hypochlorite) would not become waste for this facility. Only small quantities of these chemicals (sufficient for daily activities) would be present in the facility at any time due to a lack of storage space in the facility. These chemicals would either be used up in process (becoming non-hazardous) or would leave the facility as a stabilizing or sterilizing chemical for samples being sent to other laboratories. About 30 lbs per month (14 kg per month) or 360 lbs per yr (168 kg per yr) of sodium hydroxide or potassium hydroxide would also be used for rodent tissue digestion/sterilization. These chemicals would be used up in the digestion process. Waste fluid generation may need pH adjustment prior to discharge to the sanitary sewer system if it is too alkaline to meet discharge standards.

For any chemical disinfectant used by the BSL-3 facility, quantities used annually would not exceed reportable quantity volumes. Decontamination of the facility would include the use of

chemical disinfectants, as discussed in the previous paragraph. This would allow the facility to be decontaminated, decommissioned, and demolished using standard construction practices. The resulting waste could be disposed of at a local landfill.

2.1.3 BSL-3 Facility Decontamination and Decommissioning

It is estimated that the operational design life of the proposed building would be at least 30 years. Decontamination and either demolition, removal, or reuse of the facility would likely occur. After decontamination (which would include disinfection of certain parts of the facility) the building could be disassembled and disposed of through the existing LLNL program for disposition of excess government property. This could ultimately require that the facility's modular components be moved offsite from LLNL. Alternately, the facility could be demolished and disposed of in a solid waste landfill offsite. Another alternative would be the reuse of the facility, either in whole or in part by other LLNL users, since BSL-2 laboratory space is traditionally in short supply at LLNL. Additional NEPA compliance review would be required when the decontamination and future-use options were ripe for review/decision.

The ultimate decontamination and decommissioning (D&D) of the BSL-3 facility would involve only the normal deconstruction and disposal of construction debris. This facility would undergo a final fumigation and testing to insure that microbes were not lingering in the remnants of the building. The building would not contain any radioactive or hazardous components.

2.2 ALTERNATIVE ACTION TO REMODEL/UPGRADE A SINGLE-ROOM LABORATORY IN BUILDING B-365 TO BSL-3

It is expected that the cost of upgrading an old facility, such as a laboratory room in LLNL building B-365 (Figure 2-1) would approach or exceed the cost of constructing a new facility with the same single-laboratory capabilities. The initial problem of upgrading is the need for physical isolation of the laboratory space. Since the facility was not originally intended for this purpose it would not lend itself directly to physical isolation. The most significant retrofits in terms of cost and time would involve HVAC systems; HEPA filtration' fumigation systems; and sealing of walls, floors, ceilings, plumbing and electrical conduits. Often a new room inside the room must be installed to insure complete sealing of entrance/exit points around all the normal breaches, such as wall electrical outlets. The "remodel" option also often has problems; for example, with: sanitary sewer drainage (where this lab is located relative to others in the same building); HVAC pressure balancing (effects from other room doors opening/closing and BSCs); addition of HEPA filter banks for disinfection without shutdown of system; and location of exhaust stacks relative to other existing intakes.

This option is not necessarily a cost-effective one, but it can and has been done by the CDC in Atlanta, GA. Discussion with personnel from the CDC (PC 2001a, 2001b) suggest that their biggest problems come from retrofit laboratories. The CDC personnel would not recommend this alternative.

2.3 ALTERNATIVE ACTION TO CONSTRUCT AND OPERATE AN ON-SITE-CONSTRUCTED BSL-3 FACILITY

An alternative to a modular construction would be on-site construction. The only appreciable difference in the installation of a modular assembly constructed off-site and the on-site construction option is the duration of the construction phase and the associated noise, traffic, and movement of building materials. The installation of a modular assembly on-site takes a matter of weeks while the on-site construction takes months and is more disruptive for a longer period. Once constructed, there is no appreciable operational difference between them. The operational and D&D phases would, for all intents and purposes, be the same as for the proposed action.

2.4 NO ACTION ALTERNATIVE

The No Action Alternative provides a description of what would occur if the Proposed Action were not implemented to compare with the potential effects of the Proposed Action. This alternative must be considered even when the Proposed Action is specifically required by legislation or court order (10 CFR 1021.321[c]). Under the No Action Alternative, NNSA would not construct or operate the BSL-3 facility. In this event, NNSA would have to continue to rely on meeting its BSL-3 laboratory needs by exporting work and staff to existing or new BSL-3 laboratories located offsite from LLNL. It is expected that while the potential tasking of LLNL by DOE and through work-for-others would grow, no new workers would be hired within the BBRP at LLNL since the only need to hire additional staff under this option would be to be able to export staff and equipment to offsite laboratories as workloads increase rather than to conduct the research on-site with currently existing staff assets which should remain sufficient for the foreseeable future. Also, there would continue to be certain NNSA national security mission needs that could not be met in a timely fashion, or that may not be able to be met at all. The No Action Alternative would not meet NNSA's identified purpose and need for action at LLNL.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

Additional alternatives were considered but have been dismissed from detailed analysis in this document.

2.5.1 Construction and Operation of the Proposed BSL-3 Facility at Another Mainsite LLNL Location

The LLNL mainsite is very space-limited. There are few remaining open areas available for new construction, and none in the near vicinity of the BBRP complex. However, any location other than the proposed location would be, at a minimum, a logistical problem. First, it is expected that the researchers and staff who would be working in the proposed BSL-3 facility would have offices and regular work assignments in buildings adjacent to the proposed facility location in the Building 360 Complex under the preferred alternative. This is also where the rodent colony and quarantine areas are located, as are all the supplies for the proposed building. From a safety perspective, the LLNL Biosafety Officer and the most highly trained and experienced staff would also be located in the buildings immediately adjacent to the currently proposed building location. A remote location would be a safety and security risk that is unnecessary. This

alternative was dismissed from further consideration in this NEPA analysis although it would meet the Agency's purpose and need for action.

2.5.2 Construction and Operation of the Proposed BSL-3 Facility at Site 300

The same issues apply to Site 300 as they do for another mainsite LLNL location (section 2.5.1), although the significance of the safety issues and issues related to ground transport of infectious agents and toxins between the two sites are greater. This alternative also was dismissed from further consideration in this NEPA analysis although it would meet the Agency's purpose and need for action.

2.5.3 Construction and Operation of the BSL-3 Facility at Another National Security Laboratory

The NNSA supports three national security laboratories: Los Alamos National Laboratory, at Los Alamos, New Mexico, the Sandia National Laboratories at Albuquerque, New Mexico (SNL/NM) and Livermore, California (SNL/CA), and Lawrence Livermore National Laboratory (LLNL), at Livermore, California. Construction and operation of the proposed BSL-3 facility at either SNL or LANL to the exclusion of LLNL was considered, as it is possible to construct such a facility at any of the national security laboratories at approximately the same cost and schedule. This alternative would not, however, meet the purpose and need for NNSA to conduct future BSL-3 level work at LLNL in support of its assigned national NNSA security –and science mission responsibilities.

This alternative would almost be the same as the No Action Alternative with the exception being that work could be done under more precise quality assurance procedures and under conditions that would meet the necessary national security requirements needed. However, it would not allow the work to be performed as quickly or efficiently as may be needed in all cases. LLNL has qualified and experienced personnel and a sophisticated existing biological infrastructure in the BBRP. Placing the BSL-3 laboratory at another NNSA laboratory would require significant duplication of this capability. Also, none of the existing or proposed (DOE 2002b) NNSA locations, which are all now operating at the BSL-2 level, have or would have the capability to conduct aerosol challenges of rodents.

Work at each of the national laboratories is expected to complement rather than be duplicated at each of three national laboratories. While these other facilities may consider the construction and operation of a BSL-3 facility in the future, the operation of these laboratories would be directed toward meeting their individual mission work requirements and would not be identical to that performed by the other laboratories in the NNSA complex. Therefore, the alternative to constructing a BSL-3 facility at either of two other national security laboratories is not considered further in this EA analysis as it does not meet NNSA's purpose and need for agency action at LLNL.

2.6 RELATED ACTIONS

There are no known related actions.

3.0 AFFECTED ENVIRONMENT

The *Final Environmental Impact Statement and Environmental Impact Report for the Continued Operation of Lawrence Livermore and Sandia National Laboratories, Livermore, August 1992* (LLNL FEIS/EIR) (DOE 1992) and its associated Supplement Analysis (SA) (DOE 1999) provided a detailed discussion of the affected environment baseline for the original version of this EA. In 2005, DOE issued the *Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* (SWEIS, DOE/EIS-0348, DOE/EIS-0236-S3, DOE 2005). Background information in this version of the EA has been updated to reflect information in the SWEIS if the updated information is pertinent to NNSA evaluation of the effects of the proposed action on human health or the environment.

This section describes the environmental resources that may be affected as a result of implementing the Proposed Action to construct and operate a BSL-3 facility. Resources are described using the sliding scale approach with more detail provided for resources that might be most affected. Resources are either addressed in this section or eliminated from detailed discussion, as shown in Table 3-1 in Section 3.2.

3.1 REGIONAL AND LOCAL SETTING

The LLNL Livermore site occupies a total area of approximately 3.3 km^2 (821 acres) at the southeast end of the Livermore Valley, located about 80 km (50 miles) east of San Francisco, in southern Alameda County, California. The Livermore Valley is characterized by nearly level, shallow-to-deep soils that vary in texture from clays to sandy clay loams or mixed gravels. The valley forms an irregularly shaped lowland area about 16 miles long east-to-west and 7 to 10 miles wide north-to-south. The floor of the valley slopes to the west at about 20 ft per mi (4 m per km). The soils tend to be high in sodium, calcium, magnesium, iron, chlorides, and sulfur, and low in organic matter, nitrates, phosphates, and potassium. The characteristics of the soil series found at the Livermore site are hard when dry and plastic when wet; the soils have high permeability and high water-retention capacity. Since the Livermore site is nearly flat, there would be no areas of potential slope instability in the location of the proposed project.

3.1.1 Climate and Meteorology

The Livermore Valley is characterized by mild, rainy winters and warm, dry summers. The mean annual temperature for the 30-yr period from 1950 through 1980 is 14.5°C (58.1°F) with daily extremes ranging from -8°C (18°F) to 45°C (113° F).

Both rainfall and wind exhibit strong seasonal patterns. Most of the annual rainfall, which averages 36 cm (14 in.), occurs between October and April and is associated with migratory, low-pressure systems from the Gulf of Alaska. Prevailing winds are from the west and southwest from April through September. During the wet season, northeasterly and north-northeasterly winds that are associated with post-frontal, anti-cyclonic flow are also common. Figures 3-1 and

3-2 show the day and nightime wind roses for LLNL for the five-year period from January 1997 through January 2002.

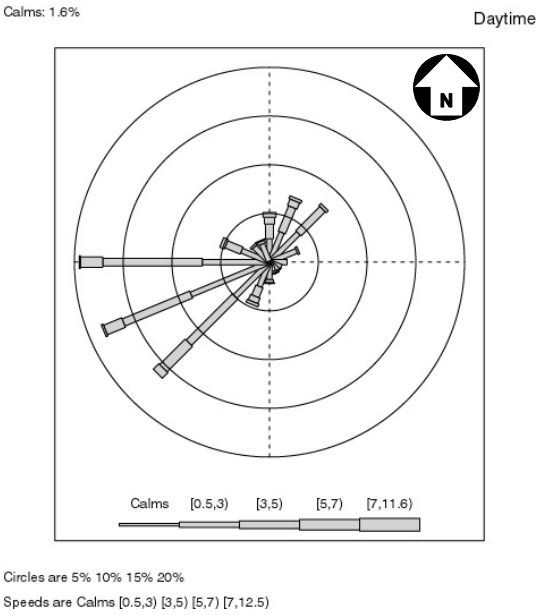

Figure 3-1. 5-Yr daytime wind rose for LLNL

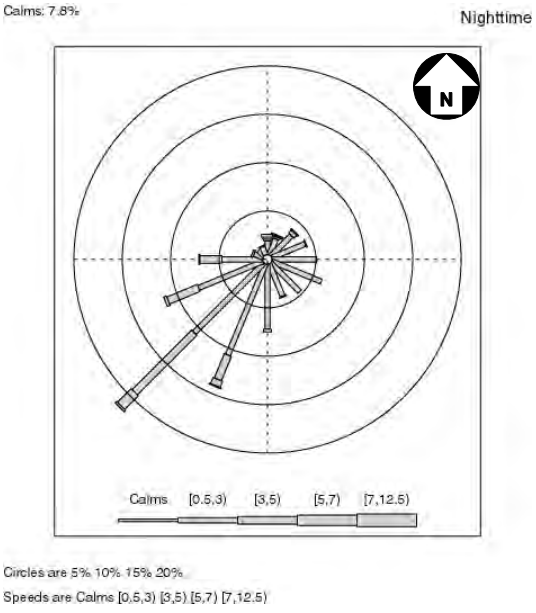

Figure 3-2. 5-Yr nighttime wind rose for LLNL

3.2 ENVIRONMENTAL RESOURCES NOT AFFECTED

Discussion of the Affected Environment is limited to existing environmental information that directly relates to the scope of the Proposed Action and the alternatives analyzed. Table 3-1 shows the resource categories and whether they are applicable or not (EA section is not applicable, NA, and a brief explanation of why not) and where they are discussed if they have a direct bearing on the analysis.

Table 3-1. Applicability of Resource Categories to the BSL-3 Analysis

Resource Category	Applicability	BSL-3 EA Section
Ecological Resources	Yes	3.3.1
Human Health	Yes	3.3.2
Air Quality	Yes	3.3.3
Noise	Yes	3.3.4
Waste Management	Yes	3.3.5
Geology/Soils/Seismology	Yes	3.3.6
Socioeconomics	The projected financial expenditures for the proposed construction project would be too small to have any perceptible affect on the local environment. No net increase in the number of workers would be anticipated.	NA
Visual Resources	This facility would be consistent in architectural style with, and in the midst of, a number of larger buildings. No visual issues would be perceived.	NA
Transportation	The number of LLNL material shipments associated with operating the proposed facility would be imperceptible to LLNL and there would be no net change in the number of individuals working in the Building 360 Complex area.	NA
Utilities/Infrastructure	The small size of the proposed facility and its intended location show that there would be no appreciable impact to utilities and infrastructures.	NA
Cultural Resources	No prehistoric or historic cultural properties greater than 100 yrs old are located at or adjacent to this site (DOE 1992).	NA
Environmental Justice	There would be no disproportionately high or adverse human health or environmental effects on minority or low-income populations (DOE 1992) as a result of operating an on-site BSL-3 facility in addition to the current BSL-2 facilities.	NA
Environmental Restoration	There are no potential release sites at or adjacent to the proposed location (DOE 1992).	NA

Table 3-1. Applicability of Resource Categories to the BSL-3 Analysis

Resource Category	Applicability	BSL-3 EA Section
Floodplains/Wetlands	The proposed facility is not within the 100-yr floodplain nor are there wetlands at or adjacent to it (DOE 1992).	NA
Land Use	The area surrounding the proposed site is made up of office buildings, laboratories, storage and warehouse facilities, and parking lots, all illuminated at night. The proposed construction and operation of a BSL-3 facility would not alter the character of the site areas or introduce new land use elements (DOE 1992).	NA
Water Quality/Hydrology	There would be no effect on surface water or groundwater quality and no perceptible increase in potable water use. There are no NPDES outfalls at the proposed facility location (DOE 1992).	NA

3.3 ENVIRONMENTAL RESOURCES POTENTIALLY AFFECTED

3.3.1 Ecological Resources

The Livermore site is a developed area that provides only marginal wildlife habitat because of the high degree of human activity and the few areas of undisturbed vegetation. Of the 3.3 km^2 (821 acres) comprising the Livermore site, 2.6 km^2 (640 acres) are developed. Annual wild oat along with non-grass annuals and perennials now dominate the grassy areas of the site. The common plant species are ripgut brome (*Bromus diandrus*), slender oat (*Avena barbata*), star thistle (*Centaurea solstitialis*), Russian thistle (*Salsola kali*), turkey mullein (*Eremocarpus setigerus*), alfalfa (*Medicago sativa*), sweet fennel (*Foeniculum vulgare*), California sagebrush (*Artemisia California*), and Italian ryegrass (*Lolium multiflorum*).

The LLNL Livermore site hosts numerous birds, reptiles, and amphibians, with a minimum of 3 species of amphibians and reptiles, 10 species of mammals, and 31 species of birds. Jackrabbits are the most common wild mammal present; gophers, snakes, and field mice can be found in the undeveloped areas of the Livermore site.

Resource surveys of LLNL Livermore, California, were conducted in 1986 (Orloff 1986), and a biological assessment (BA) in 1991 pursuant to the U.S. Endangered Species Act and the State of California Endangered Species Act addressed the status of threatened, endangered, and other species of concern (referred to as sensitive species) that may occur or are known to occur in these areas. Although several listed and proposed endangered and threatened species of plants and animals may occur in the general area of the LLNL Livermore site, the U.S. Fish and Wildlife Service (USFWS) determined that, to the best of its knowledge, these species were not known to occur within the boundaries and proposed future growth areas of these sites at that time (U.S. Fish and Wildlife Service 1991). Since that time, one State-protected bird species, the White-tailed kite (*Elanus leucurus*), has been found to nest along the eastern and northern tree line of the site, in spite of normal daily traffic and routine maintenance activities; also, one state species of special concern, the Burrowing Owl (*Athene cunicularia*), had been found in the north

buffer zone of the LLNL Livermore Site in the mid-1990s. Additionally, the Federally threatened California red-legged frog (*Rana aurora draytonii*) has been found in the Arroyo Los Positas (along the northern buffer zone). A BA was completed in 1997 and amended in 1998 to account for potential impacts to the frog from routine maintenance activities at the LLNL site. In 2001, a narrow strip along the northern and eastern edges of the site were designated as a portion of the federal critical habitat for the frog. The proposed BSL-3 facility would not be located in or near these natural resource-sensitive areas.

Although not usually considered as such, soils are also an ecological resource (Burden and Sims 1999). Soils are known to naturally contain a diversity of numbers and types of microorganisms. The range is substantial as it depends upon the environmental conditions, which dictate the bacteria and fungi microflora (plant microorganisms) that can survive. Infectious microorganisms can also be found naturally in soils. Some of these may be handled in the proposed BSL-3 laboratories (e.g., *Bacillus spp.* and *Clostridium spp.*).

3.3.2 Human Health

In 2000 there were approximately 1.3 million people living in Alameda County (HRSA 2000), in which Livermore is located, and about 6.9 million people living within a 50-mile radius of LLNL (LLNL 2001b). Health of individuals living here is favorable (better) relative to California peer counties and the U.S. as a whole (HRSA 2000). Infectious diseases are not common in the county. In fact, over the three year period of 1996, 1997, and 1998, most of the infectious diseases were diarrheal (63 cases from *Escherichia coli*, 809 cases from *Salmonella spp*. and 441 cases from *Shigella spp*.) associated with either unclean water or improper hygiene and food handling (HRSA 2000). There were also 472 cases of viral hepatitis A (infectious hepatitis), 21 cases of viral hepatitis B (serum hepatitis), 8 cases of the measles virus (Rubeola), and 109 cases of pertussis (whooping cough) reported to Alameda County Health officials (HRSA 2000).

Statewide there are appreciably more cases of infectious diseases. Table 3-2 shows the cases and deaths associated with selected notifiable diseases in the State of California for a four-year period (CDF 2001). These statistics show, for example, that while there were no cases of anthrax for the reported years, there were a few cases of plague (unspecified), psittacosis, Q-fever, brucellosis, tularemia, and typhus, along with a number of more common diseases. Although not on the table, there were 9 hantavirus cases in 1999. Acquired immune deficiency syndrome (AIDS) and venereal diseases are some of the most prevalent infectious diseases in California.

3.3.3 Air Quality

Air quality is a measure of the amount and distribution of potentially harmful pollutants in ambient air. Congress passed the *Clean Air Act* (CAA) to mandate that the U.S. Environmental Protection Agency (EPA) regulate those potentially harmful pollutants through the National Ambient Air Quality Standards (NAAQS) for pollutants of concern known as the criteria pollutants. EPA has identified six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides (NO_x), ozone (O_3), lead (Pb), and particulate matter (PM). These pollutants are emitted primarily from combustion sources such as boilers, emergency generators, and motor vehicles. Criteria pollutant emissions data for LLNL have not changed appreciably

TABLE 3-2. CASES AND DEATHS, SELECTED NOTIFIABLE DISEASES CALIFORNIA, SELECTED YEARS

T.C.D. 10th Edition		1990		1997		1998		1999	
		Cases	Deaths a/	Cases	Deaths a/	Cases	Deaths a/	Cases	Deaths a/
B20-B24	AIDS	8,827	5,041	6,774	1,857	5,786	1,432	5,358	1,558
A06	Amoebiasis	1,638	2	933	1	700	1	599	---
A22	Anthrax	---	---	---	---	---	---	---	---
A05.1	Botulism	36	---	48	1	51	---	65	3
A23	Brucellosis	26	---	30	1	12	---	18	---
P01.9, P35.8 *	Chickenpox (Varicella-Zoster)	904	32	n/r	23	n/r	22	n/r	---
B38 *	Coccidioidomycosis	441	23	704	50	719	36	939	28
A93.2	Colorado Tick Fever	---	---	---	---	1	---	---	---
P39.1	Conjunctivitis of the Newborn	25	---	23	---	25	---	21	---
	Diarrhea of the Newborn h/	---	---	---	---	---	---	---	---
A36	Diphtheria	---	---	---	1	---	---	---	---
	Encephalitis, Viral	125	17	76	17	79	14	108	---
	Food & Waterborne Illness	1,079	---	1,951	2	3,968	1	3,617	---
P35.0	Rubella-Congenital	8	6	3	1	---	2	2	---
B15-B19 *	Hepatitis, Viral	10,594	265	8,658	704	6,210	860	4,961	248
B15	A (Infectious)	6,408	15	6,422	21	4,178	10	3,439	20
B16	B (Serum)	2,940	145	1,658	186	1,445	222	1,234	58
B17.1, B17.8 *	Non-A, Non-B b/	623	---	467	467	464	595	191	131
B17.0	D	8	105	8	30	6	33	10	---
B19	Unspecified	615	---	103	---	117	---	87	9
A30	Leprosy	79	---	40	1	38	---	36	---
A27	Leptospirosis	3	1	12	---	2	---	1	---
B50-B54	Malaria	328	---	406	---	217	---	218	---
B05	Measles: Indigenous	12,719	39	22	---	6	---	14	---
	Measles: Imported	91	---	8	---	4	---	4	---
A87 *	Meningitis, Viral	1,525	7	2,307	3	3,040	4	1,544	4
A39	Meningococcal Inf.: d/	426	---	402	41	319	28	304	30
A39.2-A39.4 *	Meningococcemia	---	46	156	21	132	12	125	13
A39.0 *	Meningitis	---	---	215	12	153	13	154	10
B26	Mumps	571	1	151	---	110	1	95	---
A37.0 *	Pertussis	467	---	483	---	1,085	---	1,144	---
A20	Plague	---	---	2	---	1	---	---	---
A80	Poliomyelitis	---	---	2	---	1	---	1	---
A70	Psittacosis	8	---	8	---	6	---	3	---
A78	Q Fever	2	1	9	---	4	---	3	---
A82	Rabies, Human	---	---	---	---	---	---	---	---
A68	Relapsing Fever	10	---	7	---	7	---	8	---
100-102 *	Rheumatic Fever	25	11	11	12	5	15	10	2
A77.0	Rocky Mt. Spotted Fever	1	---	2	---	1	---	1	---
A01.1-A01.4, A02 *	Salmonella	5,725	8	5,993	6	4,724	6	4,208	4
A03	Shigellosis	5,703	4	3,221	1	3,033	---	2,364	---
A49.1 *	Streptococcal Infections c/	6	2	---	45	---	46	1	12
A33-A35 *	Tetanus	7	2	11	1	8	---	16	1
B75	Trichinosis	1	---	1	---	3	---	2	---
A16-A19 *	Tuberculosis	4,889	211	4,043	194	3,857	165	3,608	139
A21	Tularemia	---	---	4	---	3	---	3	---
A01.0	Typhoid Fever	149	---	83	---	83	---	73	---
A75 *	Typhus Fever	3	---	16	---	12	---	11	---
A50-A64 *	Venereal Disease e/	137,544	10	90,507	5	98,954	6	106,575	5
A57	Chancroid	159	---	13	---	14	---	6	---
	Chlamydia trachomatis g/	66,213	---	68,599	---	76,401	---	85,022	---
A54 *	Gonococcal Infections	54,076	1	18,002	1	19,555	---	18,656	2

TABLE 3-2. CASES AND DEATHS, SELECTED NOTIFIABLE DISEASES CALIFORNIA, SELECTED YEARS

T.C.D. 10th Edition		1990		1997		1998		1999	
		Cases	Deaths a/	Cases	Deaths a/	Cases	Deaths a/	Cases	Deaths a/
A58	Granuloma Inguinale	7	---	n/r	---	n/r	---	n/r	---
A55	Lymphogranuloma venereum	24	---	n/r	---	n/r	---	n/r	---
A50-A53	Syphilis, Total f/	17,065	9	3,893	4	2,984	6	2,891	3
A51 *	Primary	2,220	---	165	1	123	---	105	---
	Secondary	2,274	---	221	---	202	---	179	---

* The Tenth Revision of the International Classification of Diseases (ICD-10) codes may not be comparable to the Ninth Revision (ICD-9) codes. Caution should be used when looking at the number of deaths by year.

a/ Deaths shown above may not agree with deaths shown in vital statistics tables because some diseases are not listed separately in the International Classification of Diseases List of Causes of Death on which the vital statistics tables are based, or because the definitions of some of the diseases used in the International List differ from the definitions used for morbidity purposes.

b/ Non-A, Non-B is a new category added in 1982 by the Center for Disease Control, Atlanta, Georgia.

c/ Respiratory infections not included after 1988. After May 1989, cases reported only in foodhandlers, dairy workers and outbreaks.

d/ Prior subcategories combined for reporting beginning with 1993.

e/ Does not include NGU or PID.

f/ Also includes congenital, early latent, late and late latent syphilis.

g/ Chlamydia became a reportable disease in mid-1989; 1990 is considered the first full report year.

h/ Outbreak related cases only.

n/r No longer reportable.

Source: Department of Health Services, http://www.dhs.cahwnet.gov/
Cases--Communicable Disease Control Division, Office of Statistics and Surveillance, (916) 323-9808
Deaths--Office of Vital Records and Statistics, Vital Statistics Section, (916) 445-6355

since the 1992 FEIS (DOE 1992) with the exception that the Laboratory now lies within a federal non-attainment area for ozone. None of the criteria pollutants emitted from LLNL, when combined with existing background pollutant levels, substantially contributes to existing or new degradations of air quality in the Bay Area.

3.3.4 Noise

Noise levels to protect worker hearing at LLNL are based on DOE orders (DOE 1984), OSHA regulations (29 CFR 1910.95), and recommendations of the American Conference of Governmental Industrial Hygienists (ACGIH 2000). The standard unit used to report noise or sound pressure levels is the decibel (dB); the A-weighted frequency scale (dBA) is an expression of adjusted pressure levels by frequency that accounts for human perception of loudness. Noise levels that affect residential receptors are normally limited to the maximum of 65 dBA during daytime hours and 53 dBA during nighttime hours (between 9 p.m. and 7 a.m.). Activities that do not meet these noise standards normally require a city or county permit.

Noise levels at the proposed BSL-3 facility would be generated primarily by vehicle traffic and facility HVAC systems except during facility construction. Ambient noise measurements for typical lightly industrialized areas are around 50 dBA during morning and evening rush hours dropping a few dBA during nighttime hours. These levels are comparable to outside noise levels generated at urban centers during daytime hours and common indoor sounds such as the background noise in a large occupied conference room. Noise levels for heavy construction equipment can be more than 20 dBA higher than typical light industrialized areas depending upon the proximity to the source of the noise and the type of equipment being used.

3.3.5 Waste Management

LLNL has established procedures for compliance with all applicable laws and regulations for collecting, storing, processing, and disposing of sanitary liquid wastes, solid wastes and hazardous wastes at LLNL. The quantity of solid waste expected to be generated by construction activities, relative to LLNL-wide waste generation, is negligible and minimal hazardous waste generation (less than 2 gal per year) is projected; therefore, neither will be further evaluated.

Sanitary Liquid Waste. Sanitary liquid waste from LLNL is discharged by sewer to the City of Livermore Water Reclamation Plant (LWRP) in accordance with procedures specified in the LLNL ES&H Manual (LLNL 2001c). All discharges are continuously monitored with a radiation detector, an industrial pH probe, and an x-ray fluorescence unit for most regulated metals prior to discharge off-site. Discharges are regulated by the federal government under the Clean Water Act (also known as the Federal Water Pollution Control Act of 1972, 40 CFR 403). The State of California regulates these discharges under Title 22 of the California Code of Regulations, and the City of Livermore imposes restrictions under the LLNL Wastewater Discharge Permit which is issued under Livermore's municipal code. Discharge limits for non-radioactive parameters include 11 inorganic elements/constituents plus pH (acidity), total toxic organics, volatile halogenated solvents, total identifiable chlorinated hydrocarbons (pesticides), oil and grease, and polychlorinated biphenyls. Although no discharge limits currently exist for infectious materials which are commonly discharged by healthcare and veterinary facilities and laboratories or homes, liquid waste as generated from the proposed BSL-3 laboratory operations would be discharged to a retention tank system, for containment, characterization, and disinfection as needed, prior to discharge to the sanitary sewer system.

3.3.6 Geology/Soils/Seismology

The LLNL Site Seismic Safety Program recently performed a new analysis of the geologic hazards at the Livermore Site (LLNL 2002). Although new data and updated methodologies were used, the most recent study reports essentially the same results as previous studies for the prediction of the peak ground acceleration. The results of these seismic hazard analyses and the evaluation of structures are presented in the Sitewide Environmental Impact Statement for Continued Operations, Lawrence Livermore National Laboratory (DOE 2005).

The Livermore Site is located near the northwest-southeast trending boundary separating the North American and Pacific tectonic plates, or San Andreas Fault system (Figure 3.3). Regionally significant structures are associated with the San Andreas Fault system, including the Hayward and Calaveras faults east of the San Francisco Bay Area. The closest structure to the Livermore Site associated with the San Andreas Fault system, the Calaveras Fault, is situated approximately 15 miles west of the site. The San Andreas, Hayward, and Calaveras faults have produced the majority of significant historical earthquakes in the Bay Area, and accommodate the majority of slip along the Pacific North American plate boundary. These structures will likely continue generating moderate to large earthquakes more frequently than other faults in the region (LLNL 2002). Local structures include the Greenville, Mount Diablo, Las Positas, and Corral Hollow faults. Although the Greenville Fault outcrops are within 1 mile of the Livermore Site, they have the lowest slip rate of any structures associated with the San Andreas system. The Mount Diablo Thrust Fault, postulated to underlie the Livermore and Sycamore Valleys on the

basis of seismic reflection data, is related to the development of fold structures in the area. The Las Positas Fault passes 1 mile southeast of the Livermore Site and is considered capable of generating relatively infrequent moderate earthquakes. Additionally, the Corral Hollow Fault zone passes approximately 2 miles east of the site. In a recent study (LLNL 2002) assessing local seismic hazards, the existence and characteristics of the Verona, Williams, Livermore, and Springtown faults were considered.

A recent U.S. Geological Survey (USGS) study of the likelihood of major earthquakes in the San Francisco Bay Area determined that there is a 62 percent probability of one or more earthquakes with a magnitude of 6.7 on the Richter Scale or greater occurring within the next 30 years (USGS 2003). The study concluded that the probability of these earthquakes occurring along the Calaveras and Greenville faults, and the Mt. Diablo Thrust Fault within the next 30 years was 11 percent, 3 percent, and 3 percent, respectively. The study calculated that there was a 50-percent chance of the Livermore area exceeding a ground shaking of Modified Mercalli (MM) intensity VII to VIII. The Association of Bay Area Governments (ABAG) has mapped the distribution of ground-shaking intensity (Association of Bay Area Governments 2001). A large earthquake on the Greenville Fault is projected to produce the maximum ground-shaking intensities in the Livermore area with intensity ranging from strong (MM VII) to very violent (MM X). The MM IX level would result in damage to buried pipelines and partial collapse of poorly built structures (City of Livermore and LSA 2002).

Seismic hazard analyses have been performed for the Livermore Site to quantify the hazard. The analyses identify the probability of exceeding a given peak ground acceleration. The 2005 SWEIS describes the maximum horizontal peak ground accelerations at the Livermore Site for return periods of 500 and 1,000 years as 0.38 *g*, and 0.65 *g*, respectively. The technical basis for these peak acceleration values is provided in Appendix H of the 2005 Sitewide EIS (DOE 2005).

4.0 ENVIRONMENTAL CONSEQUENCES

This section evaluates the environmental consequences of the Proposed Action, Alternative Actions and the No Action alternative. Except for the No Action Alternative, this evaluation covers site preparation, construction, operation, abnormal events (accidents or malicious acts), and decontamination and decommissioning. The consequences of the Proposed Action and the Alternative to Construct On-site would be the same except for those related to construction. The Remodel/Upgrade Alternative would have no site preparation, so the discussion covers construction, operation, and D&D. The abnormal event (accident or malicious act) issues are the same for all alternatives since the work in all alternatives would be done in an individual laboratory conforming to CDC/NIH guidelines for design and operation of a BSL-3 laboratory.

4.1 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

4.1.1 Ecological Resources

As stated in Section 3.3.1, no threatened or endangered species habitat or buffer areas would be located at or adjacent to the proposed BSL-3 laboratory facility.

Site Preparation and Construction. Less than one-quarter acre of previously disturbed land would be used for site preparation, utility installation, and other construction activities. It would be expected that continuous and impact noise (described in Section 4.1.4) could have temporary effects to non-sensitive wildlife species in the immediate site location area. However, these minor effects would not be long term.

Site preparation and construction would have some effect upon the resulting soil characteristics. A small portion of some shallow soil horizons would be removed where they would be under foundation footings and other parts of the building's base. Soil microflora would be disturbed but only for the duration of soil-intrusive activity.

Operation. The operation of the proposed BSL-3 facility would have little if any effects on biota. Infectious microorganisms handled in the proposed facility might be introduced into the environment under two conditions. The first is the disposal of sanitary wastewater to the City of Livermore Water Reclamation Plant (LWRP) discussed previously. Sanitary waste passing through the wastewater treatment plant undergoes several stages of treatment that would inactivate any microbes that survived the initial disinfectant treatment at the BSL-3 facility (see discussion of water-borne transmission in Section 4.1.2, Human Health). This process is the same as for healthcare and veterinary facilities and laboratories in the area.

The second relates to emergency response operations. There is a potential for microorganisms to be introduced into the environment if they were not contained within the laboratory during a fire-response or natural phenomena event (e.g., seismic). However, even if they should escape containment, a number of environmental factors should effectively kill microorganisms in the vegetative state. These are enumerated in Section 4.1.2. They include ultraviolet light, dehydration, high temperatures, freezing temperatures, and the presence of free oxygen. The survival or death curves indicate that microbial populations die off quickly (DA 1989).

Decontamination and decommissioning. Other than the effect of noise at the localized site area from D&D activities (building demolition), there would be no effect on ecological resources.

4.1.2 Human Health

Site Preparation and Construction. Human health effects during site preparation and construction for the proposed BSL-3 laboratory would be the same as for any small single-story construction project at LLNL. The effects would be very localized and would affect only site workers or visitors to the site. There would be no public human health effects. Routine construction activities have the potential for exposing workers or officially-sponsored site visitors to a number of common hazards including, for example:

- Biological hazards (e.g., snake bites, poison ivy, and insect stings);
- Electrical hazards (temporary electrical drops, excavations in areas with underground utilities, heavy-equipment lifting with nearby overhead utilities);
- Fire and explosion hazards (portable gasoline containers for generators and other gasoline-powered equipment, fuel transfers for onsite heavy equipment operation);
- Physical hazards (slips-trips-falls, walking-working surfaces, powered hand-tool operation, pinch-points, hoisting, motor-vehicle operation, excavations, ladders, noise, heat stress, cold stress, sunburn, dust, and particulates).

These hazards would be reduced or eliminated by compliance with Federal Occupational Safety and Health Administration (OSHA) regulations (29 CFR 1910.12, 29 CFR 1926, 29 CFR 1990), National Fire Protection Association (NFPA) codes (NFPA 1997, 1998, 2000), and the DOE directives which mandate these worker protection requirements for DOE facilities (DOE 1997, 1998).

UC workers at LLNL would not be directly involved in the construction of the BSL-3 facility, but they would be active in management, site inspections, and utility hookups. LLNL workers are currently involved in similar activities on site. Because of the expected limited involvement of LLNL workers in the construction of the new buildings, only minor effects to these workers are anticipated. The Proposed Action is expected to have no substantial effect on the health of any non-LLNL construction workers under normal operation conditions. Construction workers would be actively involved in potentially hazardous activities such as heavy equipment operations, soil excavations, and the handling and assembly of various building materials. Construction activities would take several months to complete. Appropriate personal protection measures would be a routine part of the construction activities (such as gloves, hard hats, steel-toed boots, eye shields, and ear plugs or covers).

Operations. The type and rate of injuries and illnesses expected during operation of the proposed BSL-3 laboratory would be the same as those demonstrated for CDC-registered laboratories, U.S. Army Biological Defense Research Program (BDRP) laboratories and existing biological research laboratories operated by LLNL. While the most obvious potential concern of operating a BSL-3 laboratory involves handling of infectious organisms (listed in the tables in

Appendix A), the proposed facility would have attributes of most laboratories in that it would have identified physical, electrical, and chemical hazards.

The proposed laboratory would not use radioactive materials, propellants, or high explosive materials, and the quantities of hazardous chemicals stored in the facility at any one time would be just a few liters each of chemical disinfectants (such as sodium hypochlorite or potassium hypochlorite) and biologic stabilizers (phenol). Chemicals such as paraformaldehyde would not be stored in the facility but brought in only when required for fumigation (the facility has a minimal amount of storage space). The hazardous chemicals used and stored would be tracked using ChemTrack (LLNL's computerized chemical inventory system) and handled according to the BBRP directives (LLNL 2000a), the Building 360 Complex directives for Biohazardous Operations (LLNL 2001a), and the LLNL Chemical Hygiene Plan for Laboratories (LLNL, 2001c). Use of biotoxins are discussed later in this section.

The potential for injuries and illnesses involving routine laboratory operations presents a greater health risk to workers than does the potential for injury and illnesses associated with handling infectious substances. Moreover, the combination of utilizing the guidelines, standards, practices and procedures established by the CDC, NIH, Human Health Services, and public health services together with BSL-3 safety equipment and facility safety barriers, results in an overall potential risk of illness to site workers or visitors from operations involving select agents that would be best characterized as minor. There would be no discernable public human health effect from routine BSL-3 laboratory operations at the proposed facility.

There has been an extremely low incidence of laboratory-acquired infections associated with operations in CDC-registered laboratories since the implementation of CDC-developed guidelines issued in 1974 (See Appendix A). Specifically, a recent bibliographic database (Collins 2000) based on reports starting from about the beginning of the 20th century and continuing up through August 2000 reveals substantial reductions in laboratory-acquired infections reported in the 1990s. There is a notable lack of reported cases in the literature relating to laboratory-acquired infections in the United States particularly in the last 10 years.

The experience of the U.S. Department of the Army (DA) at its BDRP facilities over several decades provides further insight to the potential for laboratory-acquired infection. The DA program underwent a programmatic NEPA evaluation in 1989, the *Final Programmatic Environmental Impact Statement, Biological Defense Research Program* (BDRP)(PEIS) (DA 1989). Up to time of that publishing, there were no occurrences of overt disease in laboratory workers handling infectious organisms within the DA BSL-3 facilities, although in 1980, one focal infection with *F. tularensis* occurred at the site of a puncture wound (DA 1989)." Since then there was one incident in 2000 (CDC 2000c) where a worker was exposed to *Burkholderia mallei* the causative agent of human glanders. The individual was hospitalized and shortly recovered. The BDRP PEIS (DA 1989) also estimated laboratory-acquired infection rates for their U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) facility for different biocontainment levels (roughly equivalent to the CDC BSL levels) over different periods of time. For their BSL-3 equivalent laboratory operations from 1960 to 1962 they estimated there were six laboratory-acquired infections for a rate of 2 per million man-hours worked. For their BSL-4 equivalent laboratory operations from 1960 to 1969, they estimated

seven laboratory-acquired infections for a rate of 1 per million man-hours worked. These infections included sub-clinical infections and mild illnesses where hospitalization was not required (DA 1989).

Overall, the BDRP PEIS estimated the rate of public infection from USAMRIID as less than 0.001 per 1,000,000 person-years and the risk of death to a laboratory worker for the "Defensive Period" (1970 to 1989) as 0.005 per 1,000,000 person-years (DA 1989). By way of comparison, the "Offensive or Weapons Period" (1954 to 1964) was associated with values for the risk of death to laboratory workers of about 5 orders of magnitude higher (DA 1989).

Experience with biological research laboratories at LLNL spans a period of many years. Based on information provided by the LLNL BBRP Assurance and Facility Manager, LLNL has operated BSL-1- and BSL-2-equivalent laboratories for at least the last 20 years without any infections associated with their operation (PC 2002). Also, there were no unintentional releases to the environment or to the public associated with the LLNL biological research laboratories. Additionally, the LLNL BBRP Assurance and Facility Manager reviewed available Occurrence Reporting and Processing System (ORPS) Reports (from the past 10 years). These reports include information on workers at BSL-1 and -2 laboratories at LLNL. The result of this review was that there have been no incidences of laboratory-acquired infections recorded for LLNL workers (PC 2002). Based on extensive experience with the safe handling of biological materials at LLNL and the Department of the Army, it is projected that the National Defense-related and scientific research to be conducted at the proposed BSL-3 facility would not result in significant impacts from normal operations to workers or the public.

Anecdotal reporting of human health issues elsewhere at BSL-3 or similar laboratories have indicated that while laboratory-acquired or laboratory-associated infections (specifically, the "all other" category of nonfatal injury and illness rates reported by the BLS) do occur, they should be considered abnormal events due to their infrequency of occurrence (Appendix B). As such, the human health effects of these events are discussed within this chapter in Section 4.2, Abnormal Events. There are a number of reasons that routine BSL-3 laboratory or similar laboratory operations do not normally produce infectious disease-related health effects to workers, their families, or the general public. In general, these are a result of the implementation of the comprehensive CDC and NIH guidelines (see Appendix A) that are based upon historical published accounts (anecdotal information) over many decades of experience in medical and bacteriological laboratories (CDC 1999) (see Appendix B).

Potential Pathways for Infectious Agents to Escape BSL-3 Containment. Potential means for infectious agents to leave the BSL-3 containment and possibly cause human health impacts would include five pathways. These are direct transmission,[19] vector-borne transmission,[20] vehicle-borne transmission,[21] airborne transmission[22], and water-borne transmission.[23]

Direct Transmission. Operations as described minimize opportunities for direct transmission. Direct transmission would first require a worker to be exposed to an infectious agent. The likelihood of a worker inhaling or otherwise becoming exposed (for example, through cuts in the skin or ingestion) to an infectious agent would be extremely remote. While it would be very unlikely that a worker would be exposed, if exposed with a sufficient dose, it would be possible

for them to be carriers[24] for those agents and through direct transmission expose others. This potential is further reduced through the intervention of effective vaccines or therapeutic measures (CDC 1999).

Vector-borne Transmission. The facility would be designed to severely limit the potential for possible vector-borne transmission through insects and rodents. The use of pest control programs (Appendix G of CDC 1999) would limit the potential for transmission of infectious agents from animals to humans.

Vehicle-borne Transmission. The primary concern for vehicle-borne transmission would be by the workers' clothing or skin and hair, as all other materials leaving the BSL-3 must go through a sterilization by autoclave or chemical disinfection. The guidelines established by the CDC and NIH, which would be followed within the proposed BSL-3 facility, are designed to reduce or eliminate this potential method of transmission. This would substantially reduce any potential for a worker to unknowingly transport infectious microbes from the facility.

Airborne Transmission. All air leaving the BSL-3 laboratories during normal conditions would exit through ductwork that is HEPA-filtered prior to emission through stacks on the building roof. HEPA filters are rated as 99.97 percent efficient at a most-penetrating "design point" of 0.3 microns[25] diameter as tested by dioctyl phthalate (DOP) particles (NSC 1996). This means that HEPA filters are designed to remove at least 99.97 percent of all the particulates that hit the filters, even in the most-penetrating sizes of 0.1 to 0.4 microns. The remaining particles (less than 0.03 percent) can penetrate or pass through the filters. The number of viable vegetative microorganisms after HEPA filtration would be negligible. Filters are made from randomly laid non-woven natural or synthetic fiber materials made into a flat sheet that is pleated and placed into a filter container. Pleating increases the surface area and improves filter loading and reduces air resistance. HEPA filters have fiber diameters ranging from 0.65 to 6.5 microns in three diameter groupings. The process of aerosol filtration does not simply rely on the size of the opening between fibers, but uses a number of physical properties of air movement around fibers to capture the particles. These forms of capture are called interception, sedimentation, impaction, and diffusion. Electrostatic attraction also plays a part in capturing small particles and the fiber material is often selected specifically to enhance this effect (for example, electret fibers and wool resins). The exact combination of capture mechanisms varies. Larger particles are generally removed by impaction and interception while light particles are removed by diffusion and interception. These mechanisms remove essentially all particles larger than 0.6 microns in diameter and low flow rates let diffusion remove most all particles below 0.1 micron (NSC 1996). A "most-penetrating particle size" exists between 0.1 and 0.4 microns which is the reason for testing and certifying HEPA filters for particle removal at 0.3 microns (NSC 1996). The DOP test is highly conservative relative to microorganisms that may have sticky cell-walls and/or protuberances such as, flagella and pili (protein fibers 0.5 to 20 microns in length) which help them adhere to other cells. Bacterial spores are larger than their vegetative cells and have charged surfaces that promote attraction to other surfaces. Being sticky or with charges on their surfaces promotes their capture by the HEPA filter.

NNSA acknowledged in the LLNL Supplement Analysis for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore (March 1999, DOE/EIS-0157-SA-01) the issue of reduced removal efficiency of HEPA filters for particles in

the size range from 0.1 micron to 0.3 microns. The study which provided this information was from a dissertation written by Ronald C. Scripsick (Los Alamos National Laboratory Report, LA-12797-T, 1994). Even though the most-penetrating particle size in his study was slightly smaller than the HEPA filter "most-penetrating design point" of 0.3 microns, his results still showed a 99.97% removal efficiency or higher in the range from 0.148 to 0.196 microns.

HEPA filters at the LLNL BSL-3 facility (including those in the BSCs) would be tested annually and replaced as necessary. Given the proposed operations of the facility, there is no expectation that the HEPA filters would become moisture-saturated or torn – the two major reasons for HEPA filter failures.

Regardless of the presence or failure of HEPA filters, many environmental factors effectively and naturally kill airborne microbes in their vegetative state. These factors include ultraviolet light, dehydration, high temperatures, freezing temperatures, and the presence of free oxygen. Together these factors account for a substantial reduction in the number of microorganisms. While outdoors, the sun, temperature, and other atmospheric conditions ensure that microbial populations die off quickly, generally within minutes. Mathematical predictions of the potential survival of certain types of microorganisms in the environment estimate that only about 0.01 percent are able to resist the chemical or physical inactivation found in the outside environment (Mitscherlich and Marth 1984).

Water-borne Transmission. Potable water would not be affected by the implementation of the Proposed Action. Facility design features, such as backflow preventers and State of California-adopted uniform plumbing code requirements would prevent microbes within the facility from migrating back through the water supply piping to the public. Water exiting through the sink drains would be diverted to a retention tank where it would be disinfected before being sent to the sewer system and the LWRP facility.

According to the EPA Surface Water Treatment Rule (40 CFR 9, 141, and 142), public water treatment systems must physically remove or inactivate 99.9 percent of the cyst-forming protozoans *Giardia spp*. and *Cryptosporidium spp*. Treatment system operators comply with this rule by determining the amount of chlorine and contact time (along with temperature and pH) that it takes to produce the required killing of pathogenic microorganisms. Contact time on the order of hours along with a measurable free available chlorine content meets this requirement.

Animal Handling Operations. Appendix B presents some background information on laboratory-acquired infection due to animal handling. The most common effect is for the animal handlers to develop allergies to the hair, dander, urine, and possibly serum of rats or mice. This is, however, very controllable with adherence to standard operating procedures, maintenance of a high standard of quality for anything entering the cages, utilization of cages designed for high standards of ventilation and cleanliness, and a good overall design for the rodent facility. The proposed facility would use a state-of-the-art ventilated caging system similar to the one shown in Section 2. These systems have high rates of exchange air, are designed for easy cleaning, and are HEPA-exhausted for worker protection and for research quality maintenance. Also, once exposed to a pathogen or toxin, the rodents would not leave the cages except inside a BSC. Following proper recognized procedures would help to insure that workers aren't exposed to pathogens from the rodents.

When handling human pathogens or zoonotic disease-causing agents (capable of being exchanged between humans and other animals) workers would use personal protective equipment (PPE) and would be either immunized and/or would have medical treatment available (prophylaxis) for the specific pathogen. Human pathogens for which there is no immunization or prophylaxis would not be handled in the proposed BSL-3 laboratory in accordance with the BMBL guidelines.

Historically the greatest opportunity for contracting a disease from the animals is through an inadvertent needlestick (autoinjection) or from bites and scratches. These can be averted by adhering to standard operating procedures (SOPs) and safety procedures using safety equipment that virtually eliminates these occurrences. These SOPs would be in place, along with the use of appropriate equipment in the proposed BSL-3 facility, prior to operation.

Rodent Challenge Studies.

Activities planned for the proposed action include aerosol-studies using rodents (mice, rats, and possibly guinea pigs). These studies would only be done inside a BSC that meets all currently applicable BMBL requirements (according to WorkSmart Standards) for the materials involved. One possible aerosol-challenge device, a collision nebulizer, would have its reservoir filled while in the BSC from other containers. The rodent would be challenged with the aerosol and the rodent would be placed into a clean cage. The nebulizer would be cleaned and chemically disinfected while still in the BSC. Procedures would be written and adhered to that would insure the device could not be removed from the BSC and be capable of generating an aerosol. Compressed air is necessary for generating the aerosol and it would be immediately disconnected at the end of the process of challenging the rodent. After removal from the BSC, the device and all its parts would be put into an autoclave to insure sterilization.

Biotoxin Research.

The handling and use of a biologically-derived toxin is essentially the same as the handling of a hazardous chemical. As explained in Appendix B, there are three routes of exposure, but the most likely route of exposure would be the inadvertent needlestick. The probability of being exposed to a biotoxin if appropriate safeguarding and other safety procedures are followed would be extremely low. The Proposed Action facility would have appropriate procedures in place prior to operation of the facility.

Decontamination and Decommissioning. When the time comes for D&D of this facility, there would be no pathogens or toxins in the facility after it has been treated with chemical disinfectants and fumigated. Therefore there would be no human health effects related to biological materials expected from D&D activities. Also, no human health effects would be expected due to the deconstruction activities themselves since OSHA and EPA-type health, safety, and environmental protection procedures to control dust and noise would mitigate these potential issues.

4.1.3 Air Quality

Site Preparation and Construction. During site preparation and construction, the use of heavy equipment would generate combustive-engine exhausts that would contribute to air pollution. However, since there would be very few of these pieces of equipment and their use would be limited in time, the potential effect on ambient air quality would be temporary and localized. During construction there would be a temporary increase in particulate emissions. Operation of construction vehicles such as dump trucks, cranes, and those involved in waste disposal actions would also produce temporary and localized emissions of other air pollutants. Mobile sources, such as construction and waste transport vehicles, would produce other air pollutants (such as sulfur oxide), but the quantities would be minimal relative to the amount of mobile sources already in the area Air District.

Operation. Air quality effects during the operation of the facility relate in part to the generation of gas-combustion engine emissions from private motor vehicles during workers' commutes to and from work. Almost all of the workers are already working in adjacent buildings, so there would be no net effect to air quality from the travel of these individuals. Even the addition of a few new workers (if needed) would not produce a substantial contribution to air emissions. Since vehicle use would not change substantially as a result of operating the new facility, emissions from automobiles would not noticeably increase within the Building 360 Complex Area.

The emergency generator designated for the proposed BSL-3 facility is already operational at an adjacent building and therefore would not add to air emissions. No additional emergency generators, boilers, or other fuel-burning equipment would be added as a consequence of building and operating the proposed BSL-3 facility.

Periodic use of disinfecting gases could be part of the routine operation of the facility. These gases or vapors, such as formaldehyde (from paraformaldehyde) would not affect the local air quality since they would be inactivated at the end of each use. Effects of these gases, if any, would be temporary and localized and would dissipate very quickly. HEPA filtration of all laboratory exhausts removes virtually all biological particles and therefore there would be no incremental increase due to BSL-3 laboratory operation.

Decontamination and Decommissioning. Air emissions from D&D activities would consist of particulate dust emission due to demolition activities (controlled by water application) and mobile emissions due to trucks hauling building debris to the local landfill. These trips to the landfill would be minimal due to the small size of the building.

4.1.4 Noise

Site Preparation and Construction. It is possible that noise levels would exceed at least for periods of several minutes at a time the 8-hour 85-dBA threshold limit value (TLV) (ACGIH 2000), but only during daylight hours and only in the immediate vicinity of the site preparation and construction activity. Members of the public would not be exposed during the daytime or nighttime to noise levels exceeding city planning and zoning code standards (ambient noise level greater than 75 dBA beyond the boundaries of the site, nor greater than 60 dBA at the boundary

of a residential district) (City of Livermore 2000). This is predicated on the distance of the proposed facility being about one-half mile to the nearest residence (near West Gate, Figure 1-3).

Heavy equipment such as front-end loaders and backhoes would produce intermittent noise levels at around 73 to 94 dBA at 50 ft (15 m) from the work site under normal working conditions (Cantor 1996; Magreb 1975). Construction truck traffic would occur frequently but would generally produce noise levels below that of the heavy equipment. The finishing work within the building structures would create noise levels slightly above normal background levels for office work areas. Noise levels may go up to around 80 dBA at the work site if light machinery is used in this stage of construction (Cantor 1996). Workers would be required to have hearing protection if site-specific work produced noise levels above the LLNL action level of 80 dBA for steady-state noise. Sound levels would be expected to dissipate to background levels well short of the LLNL boundaries.

The additional construction-worker personal vehicular traffic would not be expected to increase the present noise level produced by vehicular traffic on Vasco and Greenville Roads and East Avenue during rush hour. The vehicles of construction workers would remain parked during the day and would not contribute to the background noise levels during this time.

Operation. The expected noise levels during operation of the proposed BSL-3 facility would be consistent with those of other existing LLNL bench-top research laboratory facilities. These noise levels would be due to vehicular traffic passing through the facility area and from the facility's HVAC system operation. Residential areas would not be exposed to ambient noise level greater than 75 dBA beyond the boundaries of the site, nor greater than 60 dBA at the boundary of a residential district (City of Livermore 2000).

Decontamination and Decommissioning. While there might be more trips from heavy equipment (dump trucks) during this phase of activity, the noise levels and extent of noise to the LLNL boundaries would be no more than that for site preparation and construction, or from other routine site infrastructure maintenance and construction activities.

4.1.5 Waste Management

Site Preparation and Construction. The incremental increase in waste materials produced during this phase of work would be minimal with respect to the waste production of the entire LLNL facility (2,363 tons in 2000, LLNL 2001b). Construction debris primarily comprised of wood, metal, asphalt, paper and plastic would be the typical waste expected to be generated during construction of the BSL-3 facility building and tearing up of associated parking area. This solid waste would probably be disposed at the Altamont Landfill (Alameda County Landfill). Additionally, the project could generate very minor amounts of excess uncontaminated soil from excavation activities. The soil could be stockpiled at an approved soil material management area for future use or disposal.

Operation. No additional waste disposal facilities would be developed as a result of the Proposed Action. Waste quantities and disposal practices were discussed in Chapters 2 and 3. The incremental sanitary sewer waste production associated with the operation of the facility would be minimal (on the order of 10,000 gal per yr or 37,900 liters per yr) with respect to the

total waste volumes generated by the entire LLNL facility (256,000 gal per day or 970,000 liters per day in 2000) (LLNL 2001b) and negligible with respect to the City of Livermore's sewer system discharge (6.5 million gal per day or 25 million liters per day in 2000) (LLNL 2001b). Retention tanks would be used to capture research-related biological liquid waste to ensure disinfection is adequate prior to discharge to the sanitary sewer system. There would be no need for waste accumulation areas since minimal quantities of hazardous waste would be generated (hazardous chemicals would typically be used up in process or leave the building as a stabilizing product for microorganisms and biological material).

Decontamination and Decommissioning. At the conclusion of operations, the building would be fumigated and surfaces would likely be washed down with dilute concentrations of household bleach to kill any pathogens. No appreciable hazardous waste would be generated from this operation. D&D of this facility would mainly generate solid waste which would be comprised almost entirely of construction debris. Construction debris is comprised primarily of wood, concrete, gypsum wall board, metal, asphalt, paper and plastic and would be typical of waste expected to be generated during demolition of any laboratory or light-industrial facility. This solid waste would probably be disposed at the Altamont Landfill (Alameda County Landfill).

4.1.6 Geology/Soils/Seismology

Site Preparation and Construction. Except for the temporary disturbance of up to a depth of a few feet on parts of one-quarter acre of land during site preparation and construction, there would be a negligible effect upon geology, soils, or seismicity. Soil erosion prevention measures (application of the SWPP Plan for mainsite LLNL activities) would be in place during the construction phase to minimize erosion from stormwater. Also, dust suppression measures would be employed to minimize wind erosion. The disturbed construction areas not covered by the building footprint or by parking areas would be reseeded.

Operation. There would be no effect from the proposed BSL-3 facility operation on geology, soils, or seismicity. Soils surfaces not covered by the building footprint or not paved would be landscaped to control erosion from stormwater runoff.

Decontamination and Decommissioning. Except for the temporary disturbance of portions of up to one-quarter acre of land during building demolition, there would be a negligible effect upon geology, soils, or seismicity. As noted above, soil erosion prevention measures would be in place during this phase to minimize erosion from stormwater. Also, dust suppression measures would be employed to minimize wind erosion. Once demolished, the building debris would be removed and the site would be stabilized for water and wind erosion.

4.2 ANALYSIS OF ABNORMAL EVENTS AND ACCIDENT SCENARIOS

4.2.1 Site Preparation and Construction

The site preparation and construction part of Section 4.1.2 deals with routine injury and illness related to nonresidential building construction. Routine accidents are those that commonly occur on construction sites (for example, slips, trips and falls). Because they are routine, they are not

considered abnormal events, nor do they take into consideration accidents with more substantial consequences, such as those resulting from catastrophic events.

4.2.2 Operation

This section evaluates potential abnormal event scenarios for operation of the BSL-3 facility that have a reasonable probability of occurrence and scenarios that involve malicious acts. Abnormal events are all selected on the basis of historical knowledge at similar facilities over many years of operation involving similar laboratory activities. The first discussion covers the potential for laboratory-acquired infections which, in the literature, is considered both a routine health risk and as an accident due to the frequency of exposures through, for example, needlesticks. The accident potential is discussed in Sections 4.2.2.1 through 4.2.2.3. The following sections discuss the potential for laboratory-acquired infection, a laboratory accident, and the potential for transportation accidents. Section 4.3 describes the potential for terrorist acts.

4.2.2.1 Analysis of Seismic Events for Facility Operation

The facility has the potential to be affected by earth movements due to earthquakes. Seismic analyses of the Livermore Site were performed to quantify the hazards (DOE 2005). The analyses identify the probability of exceeding a given peak ground acceleration. The 2005 SWEIS lists the maximum horizontal peak ground accelerations at the Livermore Site for varying return periods of 500 and 1,000 as 0.38 *g*, and 0.65 *g*, respectively (the technical basis for these peak ground acceleration values is provided in Appendix H of the SWEIS) (DOE 2005). The document also considers the effects of an earthquake with a peak ground acceleration of 0.73g.

The facility is capable of withstanding the g-force predicted for a return period of 1000 years without loss of containment or structural integrity (i.e., Performance Category-2, LLNL 2001c). As a result of conservative assumptions in the design process, damage to the structural systems from a horizontal peak ground acceleration of 0.73 g is expected to be very slight. Nonstructural elements, including ceilings and cladding, could experience minor cracking but would remain secured.

4.2.2.2 Analysis of Abnormal Events and Accidents for Facility Operation

Laboratory-acquired infection. Laboratory-acquired infections are those infections acquired by workers due to the routine performance of their duties. When the exposure to an infectious agent occurs during an event, it is often considered an accident (such as a needle-stick). When the exposure occurs incidentally during contact with a contaminated surface, it is considered a routine health risk. The following discussion deals only with the accidental laboratory-acquired infection.

Many sources were reviewed that compiled laboratory-acquired infection statistics (CDC 1999; Collins 2000; Collins and Kennedy 1999; Pike 1979, 1976; Pike et al. 1965; Sewell 1995; and Sulkin and Pike 1951, 1949). Much of these data are reviewed and discussed in Appendix B, Section B.1. The most recent bibliographic compilation of microbial disease reports (Collins

2000) covers the period from the turn of the century up until August of 2000, and shows a noticeable lack of laboratory-acquired infection reports in the United States during the last ten years. The Department of the Army (DA) *Final Programmatic Environmental Impact Statement, Biological Defense Research Program* (BDRP) (PEIS) (DA 1989) states that since 1976, there have been no occurrences of overt disease in laboratory workers handling infectious organisms within BSL-3- and BSL-4-equivalent BDRP laboratory facilities. The DA estimated the risk to its workers for laboratory-acquired infection for the period from 1970 to 1989 as 0.005 per 1,000,000 person-years (DA 1989). This was a period of heavy activity using large volumes of infectious agents. The incidence of infection appears to be much lower today in large part due to decreased laboratory activity levels since 1968, and in part due to greatly improved preventive measures.

Control of infection in laboratories has achieved a high level of sophistication, to the point that virtually no reports of infection occur in microbiological laboratories. The CDC says that common acceptance of standard laboratory practices indicates that laboratory-acquired infections should be virtually non-existent today (CDC 1999). However, they do still rarely occur and the primary route of exposure is through autoinnoculation by the unintentional injection or needle-stick (Sewell 1995). Needles would be used in the proposed BSL-3 facility. Broken glass with sharp edges could result from accidents with (infrequently used) glassware. Broken glass, needlesticks or even scalpels present a low likelihood of exposure but are obvious when they happen and can be promptly treated with antibiotics, antiviral drugs, or other appropriate medical strategies. The potential for accidental laboratory-acquired infection by these means would be reduced to the improbable level of occurrence.

Since this Environmental Assessment was originally issued in 2002, the CDC has investigated several laboratory incidents involving exposure of personnel to biological agents that resulted in infection. For example, in November 2004, three cases of tularemia were reported for Boston University laboratory researchers working with the live vaccine strain of *Francisella tularensis* (BPHC 2005). In February 2006, a worker at Texas A&M University was exposed to the select agent *Brucella* during cleaning of an aerosol chamber following an experiment (GAO 2007). Three Texas A&M researchers also tested positive for the bacterium that causes Q fever in April 2006 (Houston Chronicle, 2007). These and other exposures to biological agents during laboratory incidents since 2002 resulted only in treatable illness, and are not known to have resulted in either death or secondary infections. The relatively small number of accidental exposures during this 5-year period supports NNSA's assertion that although it is possible, it is improbable laboratory staff would acquire an accidental laboratory-acquired infection during the operation of the proposed BSL-3.

The Laboratory Release Accident Scenario. The potentially hazardous material to be handled in the proposed facility would consist of infectious microorganisms in containers holding liquid suspensions or on semi-solid media. Accident scenarios usually envisioned for DOE facilities would normally be seen to exacerbate or enhance a release or spread of the hazardous materials, but for the BSL-3 facility would potentially render these materials innocuous (heat, fire, sunlight, and wind). These would be avoided when working with microorganisms and would usually result in microorganisms being killed. Consequently, catastrophic events such as earthquake, fire, explosions and airplane crashes, normally considered as initiating events in DOE radiological or chemical accident analyses, were viewed as having the potential to actually

reduce the consequences of microbiological material releases. An earthquake, explosion, or similar event that would result in a breech or rupture of the facility's walls would be bounded by the hypothetical centrifuge-accident analysis of a *Coxiella burnetti* release from the proposed BSL-3 facility structure described later in this section. The probability of catastrophic events (due to earthquake) is already very low. The low probability of an earthquake capable of rupturing the facility containment, coupled with an additionally low probability of such an event occurring during a daytime activity where microorganism containment would be vulnerable, also makes it an unlikely event. The proposed laboratory hypothetical centrifuge accident-release scenario, which itself is very unlikely due to the simultaneous occurrence of several events/conditions that must be combined to produce a release, bounds the catastrophic release scenario. This accident-release scenario is the bounding biological accident-release scenario in the 2005 Sitewide EIS (DOE 2005) for all biological research activities at the Livermore Site. Appendix B provides background information on microbiological accidents. This scenario is also very similar to the BSL-3 accident analyzed in the recently published Final Environmental Impact Statement for the Construction and Operation of the New USAMRID Facilities at Fort Detrick, MD (USAMRMC 2006).

The BSL-3 facility would have only a few operations or activities that would hypothetically place up to 1 liter quantities of material containing infectious organisms at risk at any point in time. These operations or activities would occur at infrequent times and a release to the environment from a catastrophic event would require several simultaneous conditions to coexist: a worker is transferring a quantity of infectious material when the catastrophic event occurs; the containers aren't properly sealed; the entire set of containers is dropped; the containers break open; and the catastrophic event simultaneously causes a structural breach in the BSL-3 containment walls. Engineering and procedural controls minimize opportunities for this hypothetical scenario. For example, culture samples would be kept in locked freezers or within incubation chambers most of the time and would not become aerosolized in such an event. Therefore, catastrophic events capable of resulting in a substantial release of microorganisms from the confinement of the facility (specifically at greater than infectious dose quantities) would be unlikely to occur.

A literature search and discussions with BSL-3 laboratory regulators and operators (CDC, NIH, and the U.S. Army) revealed no incidents of infectious materials released from catastrophic accidents at microbiological laboratories. According to the U.S. Army (DA 1989), the likelihood of such catastrophic occurrences is too small to be considered as reasonably foreseeable. No such event has occurred in the more than 50 years in which the military has been conducting biological defense research activities (DA 1989). Based on this historical information, this hypothetical scenario was not analyzed further in this EA.

Historical information suggests that other types of accidents would be reasonably foreseeable; these could involve infectious material. Accidents involving the production of aerosols during the use of normal laboratory equipment such as centrifuges, blenders, homogenizers, shakers, sonicators, and mixers are reported. According to *Laboratory-Associated Infections and Biosafety*, this is the second most common route of exposure, the first being laboratory-acquired infection due to needle-sticks (Sewell 1995). Even though these accidents are more frequently reported, they rarely result in workers actually contracting diseases due to the use of vaccines and drug therapies.

Appendix B describes accident scenarios used in other NEPA documents for analysis of BSL facilities. One accident scenario that was analyzed involved the release of a biotoxin from the common soil bacterium *Clostridium botulinum* (BMI 1993). The accident scenario analysis resulted in an estimated potential release of biotoxin that was several orders of magnitude lower than the dose at which "no effect" resulted. Another NEPA document (DA 1996) accident scenario postulated the release of *Brucella spp*. bacteria transmitted by direct contact with animal secretions. The qualitative analysis indicated no release to the public.

Another relevant NEPA accident analysis was prepared by the U.S. Army for its BDRP PEIS covering several facilities across the United States and is considered most relevant to the Proposed Action. The DA has for decades operated a series of the most extensive infectious agent laboratory facilities in the world. This PEIS addresses the entire BDRP, including multiple facilities, and involves a far greater level of operations than NNSA proposes at LLNL. The reason this accident analysis should be considered relevant to the proposed BSL-3 facility at LLNL is because the PEIS analyzed BSL-3 facilities with engineering and operating characteristics similar to those proposed for LLNL, such as similar HVAC system designs for negative pressure and air turnover; the facilities having similar HEPA filtration; the facilities would operate under the same procedures established by CDC (CDC 1999; 32 CFR 627); and the facilities would be designed to handle the same types of microorganisms.

Important differences between the DA's accident analysis modeling and the conditions at the proposed LLNL BSL-3 facility would be due to the model's input parameters (also called modeling assumptions) associated with the meteorological conditions and the proximity to non-involved workers and the public. The DA's accident scenario assumes to have essentially non-windy site conditions and nearby non-involved facility workers and members of the public. The LLNL site is usually windy and members of the public would usually be a minimum of one-half mile away. The differences in the DA's modeling assumptions and the conditions at LLNL result in the accident analysis being much more conservative for LLNL conditions than the analysis modeled at the DA site. Therefore, the effects of such a scenario, if it were to actually occur, would be much less adverse at LLNL than those hypothesized for a DA site.

The BDRP PEIS accident scenario is referred to as the Maximum Credible Event (MCE) in accordance with the DA's *Biological Defense Safety Program, Technical Safety Requirements* (32 CFR 627). The microorganism chosen for the MCE accident is *Coxiella burnetii (C. burnetii)*, the organism responsible for causing Q fever. According to the *Control of Communicable Diseases Manual* (Benenson 1995), this organism has an unusual stability, can reach high concentrations in animal environments, and is relatively resistant to many disinfectants. The CDC states that *Coxiella burnetii* probably presents the greatest risk of laboratory infection. The organism is highly infectious and remarkably resistant to drying and other environmental conditions. The estimated human infective dose (HID) with a 25 to 50 percent chance of contracting the disease through the inhalation route for Q fever is 10 organisms (CDC 1999).

The rickettsial microorganism, *C. burnetii*, is considered representative of all types of BSL-1, BSL-2, and BSL-3 laboratory microorganisms (bacteria, rickettsia, viruses, fungi, parasites, and prions) because it is highly durable, infectious, and transmissible, and has excellent

environmental survivability. Other types of microorganisms were considered for accident scenarios but rejected for specific analysis because they represent a relatively lower human health hazard (fungi and parasites) or have a generally lower environmental survivability (specifically, the prions and viruses). All animal prions and human parasites are Risk Group 1 or Risk Group 2 microorganisms. Only one fungus identified by the CDC requires BSL-3 and all the rest only require BSL-2 or below (CDC 1999). Many viruses require BSL-3 procedures and equipment but cannot survive long in the environment without a host such as a human or other animal. Bacteria and their subcategory, rickettsia, represent a high risk to human health and many require BSL-3 or BSL-4 procedures and equipment.

Of the bacteria, *C. burnetii* is a durable rickettsia that can be handled in the laboratory with little or no loss in viability. It can survive being aerosolized and remain viable, although once separated from a nutrient food source, it dies off at a slow rate. This microorganism can be as infectious as any other microorganism. The CDC reports that exposure to only 10 microorganisms can cause an individual with normal immunocompetency to develop symptoms of disease. Others report this to be as low as five microorganisms or possibly even one (CDC 2001b). *C. burnetii* has the added "advantage" of being one of the CDC "select agents" (42 CFR 72) and is also considered a critical biological agent[26] (CDC 2000a) (also called Bioterrorism agents).

The scenario for the MCE (detailed in Appendix B) involves an instantaneous release of a fixed amount of infectious material as follows. A worker uses a BSC to place a 1-L slurry of *C. burnetii* into six 250-ml polypropylene centrifuge tubes. The worker fails to insert the O-rings or tighten the centrifuge caps, which are the screw-on type. The worker takes the tubes out of the BSC and inserts them into a free-standing centrifuge and turns the equipment on. All six tubes leak, with some of the slurry leaking into the rotor, and some leaks into the centrifuge compartment. Most of the slurry that is not aerosolized settles (99 percent) and 90 percent of that which settles becomes droplets inside the chamber. The worker opens the centrifuge and notices the leak. The worker obtains help from two co-workers, and four more workers enter the laboratory not knowing what has happened. The room air exhausts to the outside of the building through a stack on the roof after passing through two sets of HEPA filters that, for conservatism, were estimated to have a filter efficiency of only 95 percent.

For the workers, the accident produces 9,900,000,000 (9.9×10^9) airborne HIDs at a 50 percent rate of contracting the disease (HID_{50} or ID_{50}) which occurs in a 3 ft^3 of space above and around the centrifuge. This volume of contaminated air then disperses throughout the room in response to the ventilation system flow characteristics (for example, the volume of air in the room and the HVAC ducting, and the room air turnover rates). The excited worker who opened the centrifuge is potentially exposed to 100,000 HID_{50} due to a higher rate of respiration at l5 L or 0.5 ft^3 per minute (normal is 4 to 6 L or 0.14 to 0.21 ft^3) (NSC 1996). The two co-workers coming to his assistance receive an only slightly lower dose. The other four workers incidentally exposed receive 100 to 300 HID_{50}.

The result to the general public was calculated for this scenario using a gaussian plume dispersion model under relatively calm wind conditions (stronger winds would dilute more readily). At the maximum air-concentration described above, the model predicted less than 1

HID_{50} per liter of air at a distance of 7 ft (2 m) from the stack, less than 0.1 HID_{50} per liter of air at 53 ft (16 m) from the stack, and less than 0.01 HID_{50} per liter of air at a distance of 125 ft (38 m) from the stack. The concentrations dissipate readily after reaching these maximums since the accident scenario resulted in a one-time instantaneous release.

This hypothetical accident can be used as a bounding accident analysis for the Proposed Action LLNL BSL-3 facility. However, it is exceedingly conservative. From a slightly more realistic perspective, there are some aspects of this accident scenario that would significantly lessen the possible outcome to the point that it would not produce even one HID_{50} at the end of the stack in the case of the proposed facility at LLNL. Some of these are:

- Cultures in a centrifuge in their stationary phase (with 10^8 cells per ml) would quickly pack to the bottom of the centrifuge tube and the upper liquid phase that would become aerosolized would have very few cells (depending upon when the accident occurred in the cycle) – therefore the concentration of cells in the aerosol would likely be many orders of magnitude below that used for the analysis (extremely conservative).
- At LLNL (and most small BSL-3 laboratories) normally only two workers would be allowed in a BSL-3 laboratory at a time for safety reasons.
- In an emergency response mode, the responder would enter only after ascertaining the risk and donning appropriate personal protective equipment.
- The worker(s) would have the appropriate prophylaxis available or immunization prior to working in the laboratory and would not become symptomatic.
- If all the room air were doubly HEPA-filtered with each at a minimum of 95 percent efficiency, the overall filtration would be 99.75 percent efficiency (passing through the first filter with 95 percent efficiency would leave 5 percent to pass through and the second filter would remove 95 percent of the 5 percent – resulting in 99.75 percent overall removal efficiency).
- HEPA filtration is rated at 99.97 percent efficient at the most penetrating design point of 0.3 microns using the DOP standard for calibration and measurement which is a uniform size, shape, and non-charged. Removal efficiency is not based upon size alone because there are several physical processes which actually cause the particulate removal. Penetration of larger- or smaller-sized particulates than 0.1 to 0.3 microns (the most penetrating size range) is negligible (less than 0.03 percent). Actual microbes, especially wet, have biofilms on their surfaces, are not uniform in size or shape, agglomerate together, and would not likely penetrate even at 95 percent efficiency because of their physical characteristics.
- The hypothetical accident results of even these extremely small effects rely on compounding of several independent actions whose combined probability of sequential occurrence would be extremely low (o-rings are not inserted, caps not screwed on properly, all six tubes leak, the worker opens the lid not realizing the tubes leaked, the worker gets two other workers to come over and look, and four more enter not knowing what has happened).
- The aerosol efficiency of 0.1% assumed for the scenario is at least one order of magnitude higher than would be likely in a real situation.

- The modeling assumptions (as described in Appendix B) are for the most stable open-terrain conditions and LLNL is both urban and non-open due to the predominance of buildings and trees which increase turbulence and tortuosity (i.e., mixing) and settling.
- Increases in wind speed over the modeled rate of 4.5 mph would increase aerosol dilution while humidity (not considered by the model) enhances the settling of particulates and would also decrease airborne concentrations.
- The normal high rate of air-changes for a laboratory like this would not generate a single "concentrated slug" of aerosolized material to exit the building as proposed in the model.
- Last, but not least, Risk Group 3 agents (those handled in BSL-3 laboratories) are associated with serious or lethal human diseases for which preventative or therapeutic intervention may be available (high individual risk but low community risk).

The conclusion is that members of the public would have a very low likelihood of being exposed to even a small fraction of one HID_{50}. At LLNL, the nearest member of the public is about one-half mile away. Adverse health effects to uninvolved workers in adjacent buildings or the public would be extremely unlikely to develop from this scenario. Similarly, adverse effects to the environment from the accidental release of non-indigenous organisms would be extremely unlikely as well.

4.2.2.3 Transportation Accident

Infectious substances (etiologic agents) in transit on the Nation's highways, railways, and airports are regulated by the U.S. Department of Transportation (DOT) regulations (49 CFR 171, 172, 173, and 178). As a consequence of these regulations, the DOT tracks and reports accidents and, in particular, hazardous materials incident reports. The general population risk report by DOT from 1994 to 1998 from all hazardous materials transportation is 1 in 8,129,000, or as otherwise stated, 0.11 fatalities per million shipments (DOT 2001a). By comparison, the general population risk per year for motor vehicle accidents is 1 in 6,300 or 1.7 deaths per 100 million vehicle miles (161 million kilometers). The number of hazardous materials shipments is about 800,000 per day with at least 10,000 involving waste hazardous materials identified generally as medical wastes and various other hazardous materials. For the hazardous materials category that includes infectious substances, about 80 percent of these shipments are carried by truck with the remainder carried by rail (DOT 1998). There are an estimated 4,300 non-hospital waste generating facilities (laboratories) that are potential generators of medical waste and other kinds of infectious substances including diagnostics specimens. These facilities generate 73,037 tons per year of infectious medical waste and ship about 200 tons (181,000 kg) per day (DOT 1998). Information extracted from the DOT Hazardous Materials Information System (HMIS) database (DOT 2001b) on infectious substances transportation from 1995 to 1999 show that infectious substance incidents are too few to even be ranked. There is, however, an apparent national increase in overall hazardous materials incidents, which rose from 14,700 in 1995 to 17,069 in 1999.

LLNL has never had a biological-material transportation accident (PC 2002). However, an incident occurred in August-September 2005 in connection with a shipment of a collection of vials containing the select agent Bacillus anthracis (anthrax) to two laboratories, one located in

Florida and the other in Virginia. At one lab, workers unpacking the shipment discovered that some of the vials had leaked from their primary containers into the inner packaging of the secondary container. However, the material did not escape from the secondary container into the packing material within the tertiary shipping container. Although the unpacking process was conducted in a laboratory, it was not conducted in a Biological Safety Cabinet (BSC), as required, which resulted in five workers being exposed to liquid from the packages while unpacking the secondary containers. These employees received medical treatment as a precaution and there were no adverse health effects. No liquid penetrated the outer shipping container and there was no public release. At the second lab, discrepancies were noted between the shipping inventory and the samples in the container. As required by 42 CFR 73, the recipients of the shipments notified the Centers for Disease Control and Prevention (CDC) of these problems. As a result, the CDC suspended all LLNL transfers of select agents. An NNSA Occurrence report was filed regarding the incident and LLNL issued a full stand-down of all select agent work.

An analysis of the shipping incident resulted in multiple corrective actions to strengthen LLNL's packaging and transportation program for select agents and other bio-hazardous materials at LLNL. Actions taken to prevent recurrence included an expansion of the Select Agent Security Plan, additional training related to packaging and shipping regulations, clarifying roles and responsibilities, a new bio-governance model, and an improved inventory system.

The CDC and the Department of Transportation (DOT) conducted an inspection of the LLNL Select Agent Program in February 2006 in response to this shipping incident. The inspection noted improvements in the management of select agents that were made to address the root causes of the shipping incident. Following the inspections, CDC approved the resumption of select agent transfers to and from LLNL and re-authorized the select agent program at LLNL for an additional 3 years.

The Office of the Inspector General (OIG) of the Department of Health and Human Services (HHS) assumed lead responsibility for enforcement of the Select Agent and Department of Transportation Regulations. In a January, 2007 letter, OIG alleged that during these shipments, LLNL violated the transfer requirements of the select agent regulations by failing to comply with the applicable shipping and packaging laws when transferring a select agent. In addition, the OIG also alleged that LLNL failed to comply with security and access requirements by allowing an individual not authorized to have access to select agents to package the shipments of anthrax, and that LLNL's Responsible Official (RO) failed to ensure compliance with the shipping and packaging requirements of the select agent regulations. The individual had been authorized to package shipments before, but this authorization had lapsed and the RO had not requested a reinstatement of her registration prior to this shipment. The Regents of the University of California (UC) agreed to resolve its liability for these alleged violations through a settlement agreement. Under the terms of the agreement, UC agreed to pay the OIG $450,000 to resolve these allegations.

Accidents due to transportation of microorganisms are not expected to increase due to the Proposed Action. The addition of milliliter-quantity samples shipped to and from the BSL-3 facility through federal or by commercial or private courier would not be expected to change the

overall incidence of risk of transportation accidents. Samples could consist of cells in media contained within DOT-certified packages. The consequences of such accidents would be anticipated to be minor, based on the historical data.

4.3 Analysis of Threat of Terrorist Activity

Environmental reviews prepared under CEQ implementing regulations and DOE NEPA regulations require a presentation of the environmental impacts of the proposed action and the alternatives in comparative form, thus defining the issues and providing a clear basis for choice among options by the decision-maker. With regard to intentional malicious acts, the assessment should compare potential impacts of acts by a terrorist that could derive from the proposed action, or that could occur with significantly greater probability as a result of the proposed action, to the potential impacts from those that could already occur if research with pathogenic agents requiring BSL-3 level containment is not conducted at LLNL (the "No Action" alternative).

Intentional malevolent acts, such as terrorist acts, do not lend themselves to the type of probability analysis conducted in NEPA documents for accidents (DOE 2002a). For a typical NEPA accident analysis, one would attempt to estimate the likelihood of a particular accident scenario. If it was high enough to warrant concern, one would then consider the potential consequences and analyze them accordingly. Probabilities for accidents and catastrophic events can often be estimated by studying historical data of similar events. For malevolent acts, probability data is generally unavailable, since in addition to technical feasibility, one would also need to devise a means for assessing and quantifying as a weighting factor the willful intent of a purpose-driven individual or group. Such factors are not subject to estimation, and are likely to vary over time.

Therefore in dealing with the potential for terrorism and its NEPA implications, NNSA has adopted an approach based on that which is used in designing security systems and protective strategies, where one begins with the assumption that a terrorist act will occur, regardless of the actual probability of such an act. Increasing levels of protective strategies are then put into place to reduce the risk of a successful terrorist attack to an acceptable level, and subsequently the potential for the facility to be an attractive target for terrorism. The conclusions of the NNSA in the analysis that follows reflect the influence of that approach.

There is a broad range in malevolent and terrorist act scenarios that have been considered and taken into account in planning the design and operation of this facility. Malevolent acts centered on the facility could be perpetrated by a terrorist who has no other intent and no legitimate connection to the facility, but also by other individuals, including a knowledgeable insider. One could postulate that catastrophic damage to the facility could be accomplished either by air or ground attack or by an individual gaining direct access to the building. Similarly, one could postulate other acts of terrorism such as the covert theft of a sample of pathogenic material, so as to avoid immediate detection or discovery which would activate corrective measures and defeat the motives and intent of the terrorist. Research conducted in the proposed

facility would be specifically directed to developing technologies and systems to improve national defense against, and mitigate the consequences of these, and other similar terrorist acts.

As discussed below, because of the safeguards and security measures to be taken, NNSA considers the probability of a successful terrorist act at the LLNL BSL-3 Facility would be extremely low and is not expected during the life of the facility. However, potential impacts of acts by terrorists at the LLNL BSL-3 facility were evaluated. Three types of threats were considered:

1) facility damage or destruction from direct terrorist attacks that results in loss of containment;
2) the theft and subsequent release of a pathogenic material by a terrorist from outside LLNL; and
3) the covert theft and subsequent release of a pathogenic material by an insider with access to the facility.

Each of these scenarios are evaluated and the measures NNSA would implement to counter these threats are described. The potential impacts of these three scenarios were evaluated, including the potential impact that a successful terrorist attack would have.

NNSA believes the probability of a successful terrorist act at the LLNL BSL-3 Facility is very low, and it is not an event expected during the life of the facility. In addition, the Research that would be conducted in the facility would be directed to developing technologies and systems to improve national defense against bio-warfare and bio-terrorism, and thus increase the nation's ability to mitigate the consequences of terrorist acts in the future.

4.3.1 Facility Damage or Destruction from Terrorist Attacks that Result in Loss of Containment

Deliberate facility damage with the intention of releasing small tube-stored samples or working cultures of pathogenic agents would be possible if an individual were able to gain direct access to the facility or cause a catastrophic breach of all containment systems. For example, a suicidal plane crash could breach the facility's containment. Similarly, an explosive device delivered by a vehicle or an individual on foot could breach facility containment. Depending on the time of day and the type of research underway, a loss of containment could result in a release of pathogenic materials. It is probable that the organic biological material would be destroyed by any resulting fire (DOE 2002b). These types of scenarios at the Livermore Main Site would not be possible under the No Action Alternative as the facility would not exist, and are therefore scenarios unique to the proposed NNSA action.

Impacts of a Release Following Loss of Containment. Catastrophic events such as fire, explosions, and airplane crashes, normally considered as initiating events in NNSA radiological or chemical accidents, have the potential to actually reduce the consequences of microbiological material releases due to the heat produced by these events (DOE 2002b). As discussed below, the consequences of a malicious act designed to breach containment are bounded by the accidents and natural catastrophic events evaluated in the EA because they would result in a similar loss of containment.

During routine operations, very limited quantities of biological agents (such as *C. burnetii*) would be in use, usually only enough to begin cultures in petri dishes. Biological agents would typically be handled in a liquid- or solid -medium container, such as a petri dish or flask, which would release very few organisms to the air if spilled. As noted in Section 4.2.2.1, a few operations or activities could hypothetically place up to 1 liter quantities of a slurry of material containing pathogenic organisms at risk at any point in time. One liter of *C. burnetii* generated in tissue culture would contain a maximum of about 1 trillion bacteria. The remaining material would be stored in freezers. An explosion with a subsequent fire would result in a lower risk than without a fire because much of the biological material available for release would likely burn or be killed by heat rather than released to the environment (DOE 2002b). Breach of containment in the absence of an explosion is likely to rupture containers of disinfectant, such as bleach, which would also reduce the amount of viable agent expected to escape the facility following the attack. Additionally, exposure to several environmental factors could kill many airborne microbes in their vegetative state. These factors include ultraviolet light and dehydration. Together, these factors would account for a substantial reduction in the number of microorganisms released, generally within minutes. Therefore, a terrorist act, such as a plane crash, would not be expected to result in a release of greater magnitude than from other catastrophic events already considered in this document or, for example, from releases that routinely occur during lambing season at numerous local ranches, or from births of other infected domestic or wild animals. By way of comparison, one placenta from a ewe infected with *C. burnetii* contains about 10^{15} organisms (Welsh et al, 1951).

Risk Group 2 and Risk Group 3 agents proposed for use in the facility cause human diseases for which preventive or therapeutic interventions may be available. Nationally, health care providers have been trained to recognize symptoms of exposures to Risk Group 2 agents (such as anthrax) and Risk Group 3 agents. Local hospitals and health care providers in the Livermore area have been briefed by LLNL medical staff. For agents studied in the BSL-3 facility, prophylactic measures are available in the event of exposure. Individuals could be inoculated to prevent infection or treated to recover from exposure to a known biological agent, just as presently is done in medical facilities across the country when these same biological organisms from natural sources infect members of the general public. There have been a number of reported cases (in 4 selected years) of Q-Fever (18), Tularemia (10), and Plague (3), and other select-agent diseases, from natural and accidental exposures in California (see Table 3-2). Only one death (from Q-Fever) was reported within this group of select-agent diseases. These statistics reflect the widespread availability of diagnostic testing and treatments procedures for typical Risk Group-2 and -3 select agents in case of exposure and infection.

In general, considering the current levels of security awareness and response available, it is probable that if a successful terrorist attack on the facility resulted in the release of a biological agent to the environment, the effects of such a release would be localized in time (hours immediately following the terrorist act) and place (downwind from the BSL-3 facility). As noted, exposed individuals could be inoculated to prevent infection or treated to assist in recovery. For example, studies (DA 1989) reported that if a non-immunized person were exposed to defined aerosols of up to 150,000 pathogenic doses of virulent *C. burnetii*, the disease

could be avoided by giving one milliliter of vaccine within 24 hours after exposure and by instituting antibiotic therapy.

Security Measures to Counter Direct Attacks. It is not possible to accurately predict the probability of intentional attacks at LLNL or at other critical facilities, or the nature of these attacks. The number of scenarios is large, and the likelihood of any type of attack is unknowable (DOE 2002a). Nevertheless, in the aftermath of the attacks of September 11, 2001, NNSA reevaluated scenarios involving malevolent, terrorist, or intentionally destructive acts at LLNL in an effort to identify potential security vulnerabilities and assess possible improvements to security procedures and response measures. Security is a critical priority at DOE facilities, and DOE continues to identify and implement measures designed to defend against and deter attacks at its facilities. Substantive details of terrorist attack scenarios and security countermeasures are classified, because disclosure of this information could be exploited by terrorists to plan attacks.

The requirements for possession, use, and transfer of Select Agents (SAs) and toxins in the United States are established in 42 CFR Part 73. Section 73.11 requires facilities subject to the regulations to develop and implement a security plan establishing policies and procedures that ensure the security of areas containing SAs and toxins based on a risk assessment. A risk methodology, agreed to by the University of California /NNSA/Sandia National Laboratories/Department of Energy Risk and Threat Assessment Methodology Working Group, guides the development of security risk and threat assessments as they relate to LLNL operations. This methodology is still being used under the new LLNL M&O contractor.

The *Biological Risk and Threat Assessment* (BRTA) (LLNL 2005) developed for the BSL-3 facility at LLNL follows the methodology established by the Working Group and uses the DOE Design Basis Threat[27] to examine the potential vulnerabilities of the facility and its operations, and to mitigate risks. The BRTA is an in-depth analysis that focused on the Design Basis Threat and other potential scenarios, such as acts by terrorists or violent activists.[28] The *LLNL Select Agents and Toxins Security Plan* (LLNL 2006) is based on the BRTA and provides an integrated safeguards and security management approach to implementing a protection program for LLNL's SA and toxin use and storage areas in conformance with the SA requirements of 42 CFR Part 73. In addition to general security programs at the LLNL main site, this program encompasses both physical and personnel security aspects as described below.

When compared with other facilities and locations in the environment for which pathogenic agents could be obtained, the LLNL BSL-3 facility is one of the most physically secure against such efforts. Part 73 outlines minimum security requirements for possession and use of select agents and toxins. The key requirements are locking refrigerators and freezers to store select agents, and controlling access to areas where select agents and toxins are stored or used from the public areas of the building.

Several aspects of the layered physical security systems at LLNL exceed the security requirements imposed by Part 73 on similar facilities. There are over 1350 of these facilities nationwide; the majority of which are either academic or clinical/diagnostic facilities (GAO 2007). First, the LLNL site is surrounded by a patrolled security fence with badge-identification required for entry. The LLNL Protective Force Division provides numerous types of protection,

including perimeter access control, fixed access and surveillance points, random vehicle patrols, and an armed response force. The Protective Force Division conducts periodic drills and training to maintain its effectiveness. In March 2004, DOE's Office of Safeguards and Security Evaluations completed a comprehensive review of LLNL security programs and rated the protective force operations as "Effective Performance," which is the highest rating possible.

Building 368 is inside the LLNL protected perimeter. In addition, access to Building 368 is controlled by badge identification and limited to employees registered with CDC for work with select agents, authorized by LLNL management, and enrolled in the Select Agent Human Reliability Program. (This program is discussed in Section 4.3.3) Access to individual laboratories is further controlled by an additional personal identification system to only those staff members approved for work during specific shifts. Building and laboratory access are continuously monitored. Finally, all points of access to the facility, including foundation and HVAC access point, have been physically secured against unauthorized entry. Motion detectors have also been installed in the laboratories and mechanical rooms. Within the facility's laboratories, all select agents are kept in locked freezers when not in use.

4.3.2 Theft and Subsequent Release of a Pathogenic Material by a Terrorist from outside LLNL

The CDC defines a bioterrorism attack as "the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants." The CDC recognizes that terrorists may consider using biological agents because they can be extremely difficult to detect and some may not cause illness immediately. The CDC separates bioterrorism agents into three categories depending on how easily they can be spread and the severity of effects they cause. "Category A" agents are considered the highest risk. These agents include organisms or toxins that pose the highest risk because:

- they can be easily spread or transmitted from person to person;
- they result in high death rates and have the potential for major public health impacts;
- they might cause panic and social disruption; and
- they require special actions for public health preparedness.

As noted in other sections of this EA, several Risk Group-2 and Risk Group-3 organisms which may be handled and stored in the BSL-3 facility at LLNL are Category A agents (See Appendix A.3, Table A-1). These agents are routinely handled and stored at over 250 BSL-3 facilities in the United States, and in hospitals that specialize in infectious disease treatment.

Evaluation of the potential terrorist threat that could result from the presence of pathogenic agents in the BSL-3 facility is fundamentally different from that associated with threats to nuclear materials and other hazardous materials at a nuclear facility. As opposed to materials such as spent nuclear fuel rods or special nuclear material, pathogenic agents studied in a BSL-3 facility are usually zoonotic organisms that are present in many locations and occur widely in domestic and wild animal stocks. As such, these agents are already obtainable from the environment. For instance, anthrax (*B. anthracis*, a Risk Group 2 agent) can be found near certain sheep raising operations. The organism causing Q fever, *Coxiella burnetii*, (a Risk Group 3 agent requiring BSL-3- level protection and handling procedures) also occurs in livestock

animals. Coxiella burnetti organisms are found in huge numbers in birth fluids, especially amniotic fluid, placenta (up to 10^{12}/g), and fetal membranes of parturient ewes, goats, or cows (Stocker, 1955). Valley Fever in is commonly contracted in California as a result of breathing airborne dust containing *Coccidioides immitis*, a Risk Group 3 fungus readily found in soil throughout most of the Central Valley. Hantavirus is can be found in disused buildings containing wild mice feces. Plague is caused by *Yersinia pestis*, which is endemic in rodent populations throughout the Sierra Nevada mountains. The organism that causes rabbit fever, *Francisella tularensis*, derives its name from Tulare County, just one of the counties in California where the organism is prevalent. Thus, a knowledgeable terrorist could collect environmental samples of many Risk Group-2 or Risk Group-3 microorganisms and grow large quantities of them for dissemination without attacking or stealing from a government or private BSL-3 facility. This is clearly different than the analogous risk to the security of high-level radioactive spent fuel rods at a nuclear power plant, as those "source materials" are uniquely concentrated radioisotopes that are not readily obtainable or producible and cannot be "grown" to larger volume from a minute sample.

The most serious ultimate potential impacts of a terrorist act using material stolen from the LLNL BSL-3 facility would be similar to those that could occur should a terrorist collect the same organisms from infected livestock, wild animals or the locations in the environment where they occur naturally. Because these and other pathogenic organisms to be studied in the proposed BSL-3 facility are typically collected from environmental samples in the first place, they are just as accessible to a technically-competent terrorist (or group) as to any legitimate researcher. As such, the proposed action does not measurably add to the avenues already available to a terrorist for obtaining pathogenic materials or measurably increase the likelihood of this type of malicious act. Therefore, the facility is not considered an attractive target for an outside terrorist. Because a malicious individual could already obtain pathogenic material by other methods under the No-Action ("status quo") Alternative, the presence of pathogenic agents in the proposed, highly secured BSL-3 facility would not pose any new or greater risk to human health or the environment from an outside terrorist or terrorists than already accrues without operation of the BSL-3 facility at LLNL.

4.3.3 Covert Theft and Subsequent Release of a Pathogenic Material by an Insider with Access to the Facility

Although not expected to occur due to stringent personnel security and screening programs at LLNL, surreptitious removal of a small vial containing a few milligrams of a select agent, or material swabbed from a vial, could be accomplished by a motivated, technically competent insider with access to the locked storage freezers. Following theft, five essential steps need to be accomplished in order to cause large numbers of human health impacts using the stolen organism:

One must obtain the appropriate strain of the pathogen;
One must know how to handle the organism;
One must know how to grow it in a way that will produce the appropriate characteristics;
One must know how to store the culture and to produce sufficiently large quantities; and
One must know how to prepare and disperse the agent properly.

In addition, the material must be managed in a way that maintains the virulence or infectivity during production, storage, transportation and dispersion. Accomplishing these requirements was difficult even for long-term and well-funded programs in the former Soviet Union and other state-run programs.

Once offsite, the initial stolen swab or sample could be cultured to increase the amount available for use in an attack against the public. As noted above, refining the cultured product to obtain a highly dispersible form of the select agent requires a high degree of technical skill and specialized equipment. However, a dispersible form of *B. anthracis* was distributed through the U.S. Postal Service in 2001. As a result of this attack, 22 people were infected and 5 people died. Assuming a highly technically competent individual (or group) was successful in obtaining pathogenic material, and given general constraints such as access and use of a single biosafety cabinet in a general laboratory setting, it might be possible to grow quantities of dispersible *B. anthracis* similar to those released in 2001 (although it has never been officially confirmed, the New York Times reported in 2002 that the amount in one of the 4 letters was 0.871 grams [Broad and Johnston, 2002]). This material could then be distributed through the U. S. Postal Service in local major cities such as Oakland or San Francisco to the public or elected officials.

Impacts of a Theft and Subsequent Release of a Pathogenic Material. As shown in 2001, dramatic human health impacts and economic disruption can result following the release of pathogenic materials. If a terrorist was able to obtain material from any source, refine the material to a dispersible form, and then disperse it through mechanisms such as the postal service. One could assume that tens of people could be infected and a few unsuspecting or untreated people might die. However, limitless other scenarios could be postulated involving greater amounts, different agents and different pathways such as air, water or food. Some scenarios could have greater consequences (e.g., use of larger quantities), and some of which would have lesser consequences (e.g., agent dilution and partial or complete destruction upon release to air, water, or food environments as the transport mechanism). Taken to extremes, one can even postulate scenarios with catastrophic implications. (SNL/LLNL, 2006)

Since the 2001 letter attacks, emergency response systems have been put into place to respond to a release of biological agents in the U.S. Postal Service and other means that might be used for dispersal. The Postal Service has implemented anthrax-related engineering controls and work practices that reduce the potential for an undetected re-aerosolization event. In other areas, BioWatch, a system designed to detect and locate an aerosol release of a bio-threat organism quickly and accurately enough for an effective response, is now deployed in major cities nationwide under the auspices of the U.S. Department of Homeland Security (DHS). BioWatch laboratories, including LLNL, are part of the Laboratory Response Network operated by the CDC. The continuing LLNL research support to these already-vital National Security programs/systems is one of the reasons the DOE BSL-3 facility at LLNL was proposed; it is considered essential to national defense programs administered by DHS.

Personnel and Inventory Security Measures to Counter Theft of Pathogenic Materials. In addition to physical security measures described above, and as specified in 42 CFR Part 73, persons possessing, using, or transferring select agents and toxins must first:

- successfully pass the Department of Justice Security Risk Assessment;
- be authorized by the HHS Secretary or APHIS administrator; and
- be registered with the CDC.

In addition to these federal requirements, UC also requires that personnel having access to select agents and toxins must enroll in and be approved by the LLNL Select Agent Human Reliability Program (SAHRP). SAHRP is a security reliability program that selects, trains, certifies, and monitors individuals whose work requires unescorted access to select agents and toxins. Personnel in the SAHRP are screened for physical, mental and personality disorders potentially affecting their judgment and reliability, alcohol abuse, use of illegal drugs or the abuse of legal drugs or other substances, or any other condition or circumstances that may be a security concern. In addition to SAHRP approval, personnel must be verified by Laboratory management and approved by the Responsible Official (RO) as having received the appropriate education, training, and experience for access to select agents. (As by 42 CFR Part 73, the RO is the person charged with ensuring compliance with the applicable regulations.) Access to select agents in the BSL-3 facility would be limited to a very small number (generally less than 10) of qualified and cleared employees.

CDC regulations require extensive documentation of activities involving select agents. Only personnel on LLNL's CDC registration are allowed to handle the agents. All access to select agent handling areas would be recorded. Records would be kept every time an individual enters or leaves an area with select agent samples, regardless of how brief a time or how often they do so. Freezers will have logs to record access, transfer, and use of the stored select agents. To satisfy the requirements of 42 CFR Part 73, LLNL's Responsible Official (RO) must ensure that detailed records of information necessary to give a complete accounting of all activities related to select agents or toxins access and operations are maintained. The RO reviews the inventory at least annually.

4.3.4 Overall Risk Assessment

The M & O contract for LLNL, DOE directives, and federal law require that LLNL protect the laboratory and the public against a broad range of terrorist threats and other hostile acts that may cause unacceptable impacts on national security or on the health and safety of employees, the public, or the environment. A multi-level security strategy is used, with measures applied site-wide and at the facility and personnel levels.

Across the site, extensive security measures are in place to detect and repel intrusions consistent with LLNL's mission as a nuclear weapons laboratory. The Biological Risk and Threat Assessment developed for the BSL-3 facility examined the potential vulnerabilities of the facility and its planned operations, and identified additional measures to mitigate risks. This assessment guided the development and implementation of multi-layered and robust security programs

specifically designed to mitigate threats to select agents at the facility. Personnel security policies and practices have been implemented for work with pathogenic agents at LLNL. By denying access to insiders whose backgrounds suggest they are at risk for engaging in unreliable, untrustworthy, or disloyal behavior, these measures provide an additional safeguard against the loss of pathogenic materials.

When these measures are considered together, the probability of a successful terrorist attack at the LLNL BSL-3 facility has been minimized to an extent commensurate with the potential threat. A direct assault of the facility is highly unlikely to succeed, and would have impacts bounded by the catastrophic events already evaluated in Section 4.2. Because pathogenic agents are already available in nature and at other, less secure locations, the risk of an outside terrorist acquiring pathogenic material is not significantly increased by having pathogenic material at LLNL (one of the most secure facilities in the nation). And while the theft of pathogenic materials by an insider from any bio research facility could have very serious consequences, this scenario is not expected to occur at LLNL due to human reliability programs, security procedures, and management controls at the facility and the laboratory.

NNSA believes that the potential for terrorist activity targeting the proposed BSL-3 facility does not result in measurable impacts to human health or the environment. As stated in section 1.3, operation of the facility would support NNSA's mission to "develop, demonstrate and deliver technologies and systems to improve domestic defense capabilities and, ultimately, to save lives in the event of a chemical or biological attack." The work that would be conducted in the biodefense field at the BSL-3 facility would focus on providing both the basic bioscience and the tools necessary to present bioterrorism. Work would be conducted on topics such as detection of biowarfare threats, human and microbial forensics research and applications, and presymptomatic disease detection. LLNL could use this information to develop advanced detection systems to provide early warning, identify populations at risk and contaminated areas, and facilitate prompt treatment. Researchers at the facility would attempt to develop DNA signatures and biological forensics technologies to identify infectious agents, their geographical origin, and initial sources of infection. Similar approaches are applied to human forensics, and are used in both law enforcement and intelligence-gathering activities.

4.4 REMODEL/UPGRADE ALTERNATIVE

Construction: This alternative would mainly be disruptive to the other workers in the building being remodeled or upgraded. The first step would be deconstruction of the identified laboratory. The laboratory room would first be stripped to the bare walls, floor and ceiling. Ducting, plumbing and electrical work would be done next, then new walls would be installed that could be made seamless. This work would be noisy, but periodic exceedance of the OSHA standard would be infrequent, depending upon the specific task. This activity could interrupt research in adjacent laboratories due to the additional dust, vibration, and the effect on electrical or "plumbed" service being periodically shut off. The most difficult task would be air-balancing of the BSC and the effects of activities in the adjacent laboratories.

Operations. The effects of operation would be the same as for the Proposed Action.

Decontamination and Decommissioning. The effects of D&D would be the same as for the Proposed Action.

4.5 CONSTRUCT ON-SITE ALTERNATIVE

Site Preparation and Construction. The difference between this alternative and the Proposed Action is the time it would take to construct the facility at the proposed LLNL site. This alternative would mainly be more disruptive to workers in the adjacent buildings for a longer time (many months).

Operations. The effects of operation would be the same as for the Proposed Action.

Decontamination and Decommissioning. The effects of D&D would be the same as for the Proposed Action.

4.6 ENVIRONMENTAL CONSEQUENCES OF THE NO ACTION ALTERNATIVE

Under this alternative, LLNL would continue contracting with other laboratories for services or laboratory space for the work proposed for the BSL-3 laboratory. This would represent no change in the level of operations at LLNL, even though mission requirements can be expected to continue to grow. There would be no change from the current conditions with respect to human health, ecological resources, transportation, waste management, utilities and infrastructure, noise, geology, soils, seismicity, visual resources, or air quality.

While not considered a "resource area" for analysis of impacts, continuing problems with the quality and security of data produced by outside laboratories could adversely affect the ability of LLNL to conduct high-quality, efficient research on BSL-3 organisms and may additionally adversely affect NNSA's security mission capabilities.

5.0 CUMULATIVE EFFECTS

Cumulative effects on the environment result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes them. These effects can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7). This section considers the cumulative effects resulting from the implementation of the Proposed Action and reasonably foreseeable future actions in the Building 360 Complex Area and adjacent lands.

Readers of this document should note that since this EA was originally issued, DOE has issued the *Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* (SWEIS, DOE/EIS-0348, DOE/EIS-0236-S3, DOE 2005). This document contains an extensive discussion of the cumulative effects of LLNL operations, which includes this facility.

LLNL Operations at the Building 360 Complex Area. No new types of operations and very few, if any, new personnel would be introduced into LLNL as a result of the Proposed Action. Land use within the Building 360 Complex Area would remain unchanged. Local traffic congestion would be unaffected by the Proposed Action since there would be no net increase expected in the number of workers for the Complex Area.

Due to the small size of the proposed facility the projected quantities of water, wastewater, and energy consumption would be insignificant relative to that used by LLNL. All workers in the proposed facility would likely be relocated from adjacent buildings and the net increases due to the new facility in these areas would be expected to be very minor.

Parking availability in the Building 360 Complex Area would change from the current configuration due to the effects of removal of parking spaces to erect the proposed new facility. However, since adjacent parking lots are existing and readily available, the Proposed Action would not significantly alter the general employee parking space availability at LLNL.

The overall visual quality within the Building 360 Complex Area would not change significantly because the new construction is in the middle of and directly adjacent to several older buildings. The minor negative effects on viewsheds of LLNL-area development and the slightly increased lighting in the night sky would be considered a minor regional effect. The Proposed Action is not expected to be a major contributor to this effect; the building would be one-story and would therefore not be visible above the building outlines of nearby structures. Additionally, the parking area and the BSL-3 facility would require little nighttime lighting and those lights required would be designed to shine downward toward the parking lot and ground surfaces.

Implementing the Proposed Action would generate noise primarily during the daytime hours during initial construction activities and during D&D. This noise generation would be mostly confined to the immediate Building 360 Complex Area and would be mostly heard only by the involved workers.

Alameda County, the City of Livermore, and LLNL have historically been in a non-attainment area for air quality with regards to criteria pollutants; but, visibility has always been excellent. Implementation of the Proposed Action is expected to have an insignificant impact on the overall air quality of the valley.

As stated in Table 3-1 (Section 3.2), there would be no Environmental Justice issues associated with the proposed facility since there would be no disproportionately higher adverse human health or environmental effects on low income or minority populations.

6.0 AGENCIES AND PERSONS CONSULTED

In the process of preparing material for this EA, DOE had discussions with various federal agencies and organizations including the CDC, NIH, General Services Agency (GSA), U.S. Department of the Army (DA), Utah Department of Environmental Quality, Colorado State University, and Lawrence Livermore National Laboratory. These contacts were made to gain an understanding about their respective experiences with BSL-3 laboratories and the operational and accident history of their own operations.

No project-specific consultation with the U.S. Fish and Wildlife Service was conducted in compliance with the *Endangered Species Act (ESA)*, as the Proposed Action and alternatives would not be expected to affect either individuals of threatened or endangered species or their critical habitat. Recent sitewide consultations under Section 7 of the ESA were conducted by the DOE in 1997 and 1998 concerning maintenance activities at LLNL. No consultation with the State Historic Preservation Office was conducted in compliance with the *National Historic Preservation Act* (16 U.S.C. § 470, 36 CFR 800.5), as the Proposed Action and alternatives would not be expected to affect any cultural resource.

7.0 REFERENCES

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APPENDIX A: CDC GUIDANCE AND INFORMATION ON MICROORGANISMS

A.1 CDC Biosafety Level Criteria

The information in this appendix is taken from a Centers for Disease Control and Prevention (CDC) document which establishes the criteria for each Biosafety Level (BSL) of operation. This document, "Biosafety in Microbiological and Biomedical Laboratories" (CDC 1999), also known as the BMBL, presents the CDC and NIH recommendations and describes the combinations of standard and special microbiological practices, safety equipment, and facilities for Biosafety Level 1-4 laboratories. The BMBL "guidelines are now accepted as the international 'gold standard' for safely conducting microbiological research." (BMBL Dedication, CDC 1999)

References to page numbers and appendices are for that document. References to the laboratory director should be interpreted as meaning the manager of the proposed BSL-3 facility. The following is excerpted from Section III of the BMBL, pages 17 through 36. References made within the following text to appendices refer to the BMBL document, not to the appendices of the EA.

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Laboratory Biosafety Level Criteria

The essential elements of the four biosafety levels for activities involving infectious microorganisms and laboratory animals are summarized in Tables of this section and Section IV (see pages 52 and 75). The levels are designated in ascending order, by degree of protection provided to personnel, the environment, and the community.

Biosafety Level 1 (BSL-1)

Biosafety Level 1 is suitable for work involving well-characterized agents not known to consistently cause disease in healthy adult humans, and of minimal potential hazard to laboratory personnel and the environment. The laboratory is not necessarily separated from the general traffic patterns in the building. Work is generally conducted on open bench tops using standard microbiological practices. Special containment equipment or facility design is neither required nor generally used. Laboratory personnel have specific training in the procedures conducted in the laboratory and are supervised by a scientist with general training in microbiology or a related science.

The following standard and special practices, safety equipment and facilities apply to agents assigned to Biosafety Level 1:

A. *Standard Microbiological Practices*

1. Access to the laboratory is limited or restricted at the discretion of the laboratory director when experiments or work with cultures and specimens are in progress.

2. Persons wash their hands after they handle viable materials, after removing gloves, and before leaving the laboratory.

3. Eating, drinking, smoking, handling contact lenses, applying cosmetics, and storing food for hum an use are not permitted in the work areas. Persons who wear contact lenses in laboratories should also wear goggles or a face shield. Food is stored outside the work area in cabinets or refrigerators designated and used for this purpose only.

4. Mouth pipetting is prohibited; mechanical pipetting devices are used.

5. Policies for the safe handling of sharps are instituted.

6. All procedures are performed carefully to minimize the creation of splashes or aerosols.

7. Work surfaces are decontaminated at least once a day and after any spill of viable material.

8. All cultures, stocks, and other regulated wastes are de-contaminated before disposal by an approved decontamination method such as autoclaving. Materials to be decontaminated outside of the immediate laboratory are to be placed in a durable, leakproof container and closed for transport from the laboratory. Materials to be decontaminated outside of the immediate laboratory are pack-aged in accordance with applicable local, state, and federal regulations before removal from the facility.

9. A biohazard sign may be posted at the entrance to the laboratory whenever infectious agents are present. The sign may include the name of the agent(s) in use and the name and phone number of the investigator.

10. An insect and rodent control program is in effect (see Appendix G).

B. *Special Practices* None

C. *Safety Equipment (Primary Barriers)*

1. Special containment devices or equipment such as a biological safety cabinet are generally not required for manipulations of agents assigned to Biosafety Level 1.

2. It is recommended that laboratory coats, gowns, or uniforms be worn to prevent contamination or soiling of street clothes.

3. Gloves should be worn if the skin on the hands is broken or if a rash is present. Alternatives to powdered latex gloves should be available.

4. Protective eyewear should be worn for conduct of procedures in which splashes of microorganisms or other hazardous materials is anticipated.

D. *Laboratory Facilities (Secondary Barriers)*

1. Laboratories should have doors for access control.

2. Each laboratory contains a sink for hand washing.

3. The laboratory is designed so that it can be easily cleaned. Carpets and rugs in laboratories are not appropriate.

4. Bench tops are impervious to water and are resistant to moderate heat and the organic solvents, acids, alkalis, and chemicals used to decontaminate the work surface and equipment.

5. Laboratory furniture is capable of supporting anticipated loading and uses. Spaces between benches, cabinets, and equipment are accessible for cleaning.

6. If the laboratory has windows that open to the exterior, they are fitted with fly screens.

Biosafety Level 2 (BSL-2)

Biosafety Level 2 is similar to Biosafety Level 1 and is suitable for work involving agents of moderate potential hazard to personnel and the environment. It differs from BSL-1 in that (1) laboratory personnel have specific training in handling pathogenic agents and are directed by competent scientists; (2) access to the laboratory is limited when work is being conducted; (3) extreme precautions are taken with contaminated sharp items; and (4) certain procedures in which infectious aerosols or splashes may be created are conducted in biological safety cabinets or other physical containment equipment.

The following standard and special practices, safety equipment, and facilities apply to agents assigned to Biosafety Level 2:

A. Standard Microbiological Practices

1. Access to the laboratory is limited or restricted at the discretion of the laboratory director when experiments are in progress.

2. Persons wash their hands after they handle viable materials, after removing gloves, and before leaving the laboratory.

3. Eating, drinking, smoking, handling contact lenses, and applying cosmetics are not permitted in the work areas. Food is stored outside the work area in cabinets or refrigerators designated for this purpose only.

4. Mouth pipetting is prohibited; mechanical pipetting devices are used.

5. Policies for the safe handling of sharps are instituted.

6. All procedures are performed carefully to minimize the creation of splashes or aerosols.

7. Work surfaces are decontaminated on completion of work or at the end of the day and after any spill or splash of viable material with disinfectants that are effective against the agents of concern.

8. All cultures, stocks, and other regulated wastes are decontaminated before disposal by an approved decontamination method such as autoclaving. Materials to be decontaminated outside of the immediate laboratory are placed in a durable, leakproof container and closed for transport from the laboratory. Materials to be decontaminated off-site from the facility are packaged in accordance with applicable local, state, and federal regulations, before removal from the facility.

9. An insect and rodent control program is in effect (see Appendix G).

B. Special Practices

1. Access to the laboratory is limited or restricted by the laboratory director when work with infectious agents is in progress. In general, persons who are at increased risk of acquiring infection, or for whom infection may have serious consequences, are not allowed in the laboratory or animal rooms. For example, persons who are immunocompromised or immunosuppressed may be at increased risk of acquiring infections. The laboratory director has the final responsibility for assessing each circumstance and determining who may enter or work in the laboratory or animal room.

2. The laboratory director establishes policies and procedures whereby only persons who have been advised of the potential hazards and meet specific entry requirements (e .g., immunization) may enter the laboratory.

3. A biohazard sign must be posted on the entrance to the laboratory when etiologic agents are in use. Appropriate information to be posted includes the agent(s) in use, the biosafety level, the required immunizations, the investigator's name and telephone number, any personal protective equipment that must be worn in the laboratory, and any procedures required for exiting the laboratory.

4. Laboratory personnel receive appropriate immunizations or tests for the agents handled or potentially present in the laboratory (e.g., hepatitis B vaccine or TB skin testing).

5. When appropriate, considering the agent(s) handled, baseline serum samples for laboratory and other at-risk personnel are collected and stored. Additional serum specimens may be collected periodically, depending on the agents handled or the function of the facility.

6. Biosafety procedures are incorporated into standard operating procedures or in a biosafety manual adopted or prepared specifically for the laboratory by the laboratory director. Personnel are advised of special hazards and are required to read and follow instructions on practices and procedures.

7. The laboratory director ensures that laboratory and support personnel receive appropriate training on the potential hazards associated with the work involved, the necessary precautions to prevent exposures, and the exposure evaluation procedures. Personnel receive annual updates or additional training as necessary for procedural or policy changes.

8. A high degree of precaution must always be taken with any contaminated sharp items, including needles and syringes, slides, pipettes, capillary tubes, and scalpels.

    a. Needles and syringes or other sharp instruments should be restricted in the laboratory for use only when there is no alternative, such as parenteral injection, phlebotomy, or aspiration of fluids from laboratory animals and diaphragm bottles. Plastic ware should be substituted for glassware whenever possible.

    b. Only needle-locking syringes or disposable syringe-needle units (i.e., needle is integral to the syringe) are used for injection or aspiration of infectious materials. Used disposable needles must not be bent, sheared, broken, recapped, removed from disposable syringes, or otherwise manipulated by hand before disposal; rather, they must be carefully placed in conveniently located puncture-resistant containers used for sharps disposal. Non-disposable sharps must be placed in a hard-walled container for transport to a processing area for decontamination, preferably by autoclaving.

    c. Syringes which re-sheathe the needle, needleless systems, and other safety devices are used when appropriate.

    d. Broken glassware must not be handled directly by hand, but must be removed by mechanical means such as a brush and dustpan, tongs, or forceps. Containers of contaminated needles, sharp equipment, and

broken glass are decontaminated before disposal, according to any local, state, or federal regulations.

9. Cultures, tissues, specimens of body fluids, or potentially infectious wastes are placed in a container with a cover that prevents leakage during collection, handling, processing, storage, transport, or shipping.

10. Laboratory equipment and work surfaces should be de-contaminated with an effective disinfectant on a routine basis, after work with infectious materials is finished, and especially after overt spills, splashes, or other contamination by infectious materials. Contaminated equipment must be decontaminated according to any local, state, or federal regulations before it is sent for repair or maintenance or pack aged for transport in accordance with applicable local, state, or federal regulations, before removal from the facility.

11. Spills and accidents that result in overt exposures to infectious materials are immediately reported to the laboratory director. Medical evaluation, surveillance, and treatment are provided as appropriate and written records are maintained.

12. Animals not involved in the work being performed are not permitted in the lab.

Safety Equipment (Primary Barriers)

1. Properly maintained biological safety cabinets, preferably Class II, or other appropriate personal protective equipment or physical containment devices are used whenever:

    a. Procedures with a potential for creating infectious aerosols or splashes are conducted. These may include centrifuging, grinding, blending, vigorous shaking or mixing, sonic disruption, opening containers of infectious materials whose internal pressures may be different from ambient pressures, inoculating animals intranasally, and harvesting infected tissues from animals or embryonate eggs.

    b. High concentrations or large volumes of infectious agents are used. Such materials may be centrifuged in the open laboratory if sealed rotor heads or centrifuge safety cups are used, and if these rotors or safety cups are opened only in a biological safety cabinet.

2. Face protection (goggles, mask, face shield or other splatter guard) is used for anticipated splashes or sprays of infectious or other hazardous materials to the face when the microorganisms must be manipulated outside the BSC.

3. Protective laboratory coats, gowns, smocks, or uniforms designated for lab use are worn while in the laboratory. This protective clothing is removed and left in the laboratory before leaving for non-laboratory areas (e.g., cafeteria, library,

administrative offices). All protective clothing is either disposed of in the laboratory or laundered by the institution; it should never be taken home by personnel.

4. Gloves are worn when hands may contact potentially infectious materials, contaminated surfaces or equipment. Wearing two pairs of gloves may be appropriate. Gloves are disposed of when overtly contaminated, and removed when work with infectious materials is completed or when the integrity of the glove is compromised. Disposable gloves are not washed, reused, or used for touching "clean" surfaces (keyboards, telephones, etc.), and they should not be worn outside the lab. Alternatives to powdered latex gloves should be available. Hands are washed following removal of gloves.

D. *Laboratory Facilities* (Secondary Barriers)

1. Provide lockable doors for facilities that house restricted agents (as defined in 42 CFR 72.6).

2. Consider locating new laboratories away from public areas.

3. Each laboratory contains a sink for handwashing.

4. The laboratory is designed so that it can be easily cleaned. Carpets and rugs in laboratories are inappropriate.

5. Bench tops are impervious to water and are resistant to moderate heat and the organic solvents, acids, alkalis, and chemicals used to decontaminate the work surfaces and equipment.

6. Laboratory furniture is capable of supporting anticipated loading and uses. Spaces between benches, cabinets, and equipment are accessible for cleaning. Chairs and other furniture used in laboratory work should be covered with a non-fabric material that can be easily decontaminated.

7. Install biological safety cabinets in such a manner that fluctuations of the room supply and exhaust air do not cause the biological safety cabinets to operate outside their parameters for containment. Locate biological safety cabinets away from doors, from windows that can be opened, from heavily traveled laboratory areas, and from other potentially disruptive equipment so as to maintain the biological safety cabinets' air flow parameters for containment.

8. An eyewash station is readily available.

9. Illumination is adequate for all activities, avoiding reflections and glare that could impede vision.

10. There are no specific ventilation requirements. However, planning of new facilities should consider mechanical ventilation systems that provide an inward flow of air without recirculation to spaces outside of the laboratory. If the laboratory has windows that open to the exterior, they are fitted with fly screens.

Biosafety Level 3 (BSL-3)

Biosafety Level 3 is applicable to clinical, diagnostic, teaching, research, or production facilities in which work is done with indigenous or exotic agents which may cause serious or potentially lethal disease as a result of exposure by the inhalation route. Laboratory personnel have specific training in handling pathogenic and potentially lethal agents, and are supervised by competent scientists who are experienced in working with these agents.

All procedures involving the manipulation of infectious materials are conducted within biological safety cabinets or other physical containment devices, or by personnel wearing appropriate personal protective clothing and equipment. The laboratory has special engineering and design features.

It is recognized, however, that some existing facilities may not have all the facility features recommended for Biosafety Level 3 (i.e., double-door access zone and sealed penetrations). In this circumstance, an acceptable level of safety for the conduct of routine procedures, (e.g., diagnostic procedures involving the propagation of an agent for identification, typing, susceptibility testing, etc.), may be achieved in a Biosafety Level 2 facility, providing 1) the exhaust air from the laboratory room is discharged to the outdoors, 2) the ventilation to the laboratory is balanced to provide directional airflow into the room, 3) access to the laboratory is restricted when work is in progress, and 4) the recommended Standard Microbiological Practices, Special Practices, and Safety Equipment for Biosafety Level 3 are rigorously followed. The decision to implement this modification of Biosafety Level 3 recommendations should be made only by the laboratory director.

The following standard and special safety practices, equipment and facilities apply to agents assigned to Biosafety Level 3:

A. *Standard Microbiological Practices*

1. Access to the laboratory is limited or restricted at the discretion of the laboratory director when experiments are in progress.

2. Persons wash their hands after handling infectious materials, after removing gloves, and when they leave the laboratory.

3. Eating, drinking, smoking, handling contact lenses, and applying cosmetics are not permitted in the laboratory. Persons who wear con tact lenses in laboratories should also wear goggles or a face shield. Food is stored out-side the work area in cabinets or refrigerators designated for this purpose only.

4. Mouth pipetting is prohibited; mechanical pipetting devices are used.

5. Policies for the safe handling of sharps are instituted.

6. All procedures are performed carefully to minimize the creation of aerosols.

7. Work surfaces are decontaminated at least once a day and after any spill of viable material.

8. All cultures, stocks, and other regulated wastes are decontaminated before disposal by an approved decontamination method, such as autoclaving. Materials to be decontaminated outside of the immediate laboratory are placed in a durable, leakproof container and closed for transport from the laboratory. Infectious waste from BSL-3 laboratories should be decontaminated before removal for off-site disposal.

9. An insect and rodent control program is in effect (see Appendix G).

B. *Special Practices*

1. Laboratory doors are kept closed when experiments are in progress.

2. The laboratory director controls access to the laboratory and restricts access to persons whose presence is required for program or support purposes. Persons who are at increased risk of acquiring infection or for whom infection may have serious consequences are not allowed in the laboratory or animal rooms. For example, persons who are immunocompromised or immunosuppressed may be at risk of acquiring infections. The director has the final responsibility for assessing each circumstance and determining who may enter or work in the laboratory. No minors should be allowed in the laboratory.

3. The laboratory director establishes policies and procedures whereby only persons who have been advised of the potential biohazard, who meet any specific entry requirements (e.g., immunization), and who comply with all entry and exit procedures, enter the laboratory or animal rooms.

4. When infectious materials or infected animals are present in the laboratory or containment module, a hazard warning sign, incorporating the universal biohazard symbol, is posted on all laboratory and animal room access doors. The hazard warning sign identifies the agent, lists the name and telephone number of the laboratory director or other responsible person(s), and indicates any special requirements for entering the laboratory, such as the need for immunizations, respirators, or other personal protective measures.

5. Laboratory personnel receive the appropriate immunizations or tests for the agents handled or potentially present in the laboratory (e.g., hepatitis B vaccine or TB skin testing), and periodic testing as recommended for the agent being handled.

6. Baseline serum samples are collected as appropriate and stored for all laboratory and other at-risk personnel. Additional serum specimens may be periodically collected, depending on the agents handled or the function of the laboratory.

7. A biosafety manual specific to the laboratory is prepared or adopted by the laboratory director and biosafety precautions are incorporated into standard operating procedures. Personnel are advised of special hazards and are required to read and follow instructions on practices and procedures.

8. Laboratory and support personnel receive appropriate training on the potential hazards associated with the work involved, the necessary precautions to prevent exposures, and the exposure evaluation procedures. Personnel receive annual updates or additional training as necessary for procedural changes.

9. The laboratory director is responsible for ensuring that, before working with organisms at Biosafety Level 3, all personnel demonstrate proficiency in standard microbiological practices and techniques, and in the practices and operations specific to the laboratory facility. This might include prior experience in handling human pathogens or cell cultures, or a specific training program provided by the laboratory director or other competent scientist proficient in safe microbiological practices and techniques.

10. A high degree of precaution must always be taken with any contaminated sharp items, including needles and syringes, slides, pipettes, capillary tubes, and scalpels.

    a. Needles and syringes or other sharp instruments should be restricted in the laboratory for use only when there is no alternative, such as parenteral injection, phlebotomy, or aspiration of fluids from laboratory animals and diaphragm bottles. Plastic-ware should be substituted for glassware whenever possible.

    b. Only needle-locking syringes or disposable syringe-needle units (i.e., needle is integral to the syringe) are used for injection or aspiration of infectious materials. Used disposable needles must not be bent, sheared, broken, recapped, removed from disposable syringes, or otherwise manipulated by hand before disposal; rather, they must be carefully placed in conveniently located puncture-resistant containers used for sharps disposal. Non-disposable sharps must be placed in a hard-walled container for transport to a processing area for decontamination, preferably by autoclaving.

c. Syringes which re-sheathe the needle, needleless systems, and other safe devices are used when appropriate.

d. Broken glassware must not be handled directly by hand, but must be removed by mechanical means such as a brush and dustpan, tongs, or forceps. Containers of contaminated needles, sharp equipment, and broken glass should be decontaminated before disposal, and disposed of according to any local, state, or federal regulations.

11. All open manipulations involving infectious materials are conducted in biological safety cabinets or other physical containment devices within the containment module. No work in open vessels is conducted on the open bench. Clean-up is facilitated by using plastic-backed paper toweling on non-perforated work surfaces within biological safety cabinets.

12. Laboratory equipment and work surfaces should be decontaminated routinely with an effective disinfectant, after work with infectious materials is finished, and especially after overt spills, splashes, or other contamination with infectious materials.

    a. Spills of infectious materials are decontaminated, contained and cleaned up by appropriate professional staff, or others properly trained and equipped to work with concentrated infectious material. Spill procedures are developed and posted.

    b. Contaminated equipment must be decontaminated before removal from the facility for repair or maintenance or packaging for transport, in accordance with applicable local, state, or federal regulations.

13. Cultures, tissues, specimens of body fluids, or wastes are placed in a container that prevents leakage during collection, handling, processing, storage, transport, or shipping.

14. All potentially contaminated waste materials (e.g., gloves, lab coats, etc.) from laboratories are decontaminated before disposal or reuse.

15. Spills and accidents that result in overt or potential exposures to infectious materials are immediately reported to the laboratory director. Appropriate medical evaluation, surveillance, and treatment are provided and written records are maintained.

16. Animals and plants not related to the work being conducted are not permitted in the laboratory.

C. *Safety Equipment* (Primary Barriers)

1. Protective laboratory clothing such as solid-front or wrap-around gowns, scrub suits, or coveralls are worn by workers when in the laboratory. Protective clothing is not worn outside the laboratory. Reusable clothing is decontaminated before being laundered. Clothing is changed when overtly contaminated.

2. Gloves must be worn when handling infectious materials, infected animals, and when handling contaminated equipment.

3. Frequent changing of gloves accompanied by hand washing is recommended. Disposable gloves are not reused.

4. All manipulations of infectious materials, necropsy of infected animals, harvesting of tissues or fluids from infected animals or embryonate eggs, etc., are conducted in a Class II or Class III biological safety cabinet (see Appendix A).

5. When a procedure or process cannot be conducted within a biological safety cabinet, then appropriate combinations of personal protective equipment (e.g., respirators, face shields) and physical containment devices (e.g., centrifuge safety cups or sealed rotors) are used.

6. Respiratory and face protection are used when in rooms containing infected animals.

D. *Laboratory Facilities* (Secondary Barriers)

1. The laboratory is separated from areas that are open to unrestricted traffic flow within the building, and access to the laboratory is restricted. Passage through a series of two self-closing doors is the basic requirement for entry into the laboratory from access corridors. Doors are lockable (see Appendix F). A clothes change room may be included in the passageway.

2. Each laboratory room contains a sink for handwashing. The sink is hands-free or automatically operated and is located near the room exit door.

3. The interior surfaces of walls, floors, and ceilings of areas where BSL-3 agents are handled are constructed for easy cleaning and decontamination. Seams, if present, must be sealed. Walls, ceilings, and floors should be smooth, impermeable to liquids and resistant to the chemicals and disinfectants normally used in the laboratory. Floors should be monolithic and slip-resistant. Consideration should be given to the use of coved floor coverings. Penetrations in floors, walls, and ceiling surfaces are sealed. Openings such as around ducts and the spaces between doors and frames are capable of being sealed to facilitate decontamination.

4. Bench tops are impervious to water and are resistant to moderate heat and the organic solvents, acids, alkalis, and those chemicals used to decontaminate the work surfaces and equipment.

5. Laboratory furniture is capable of supporting anticipated loading and uses. Spaces between benches, cabinets, and equipment are accessible for cleaning. Chairs and other furniture used in laboratory work should be covered with a non-fabric material that can be easily decontaminated.

6. All windows in the laboratory are closed and sealed.

7. A method for decontaminating all laboratory wastes is available in the facility and utilized, preferably within the laboratory (i.e., autoclave, chemical disinfection, incineration, or other approved decontamination method). Consideration should be given to means of decontaminating equipment. If waste is transported out of the laboratory, it should be properly sealed and not transported in public corridors.

8. Biological safety cabinets are required and are located away from doors, from room supply louvers, and from heavily-traveled laboratory areas.

9. A ducted exhaust air ventilation system is provided. This system creates directional airflow which draws air into the laboratory from "clean" areas and toward "contaminated" areas. The exhaust air is not recirculated to any other area of the building. Filtration and other treatments of the exhaust air are not required, but may be considered based on site requirements, and specific agent manipulations and use conditions. The outside exhaust must be dispersed away from occupied areas and air intakes, or the exhaust must be HEPA-filtered. Laboratory personnel must verify that the direction of the airflow (into the laboratory) is proper. It is recommended that a visual monitoring device that indicates and confirms directional inward airflow be provided at the laboratory entry. Consideration should be given to installing an HVAC control system to prevent sustained positive pressurization of the laboratory. Audible alarms should be considered to notify personnel of HVAC system failure.

10. HEPA-filtered exhaust air from a Class II biologic al safety cabinet can be recirculated into the laboratory if the cabinet is tested and certified at least annually. When exhaust air from Class II safety cabinets is to be discharged to the outside through the building exhaust air system, the cabinets must be connected in a manner that avoids any interference with the air balance of the cabinets or the building exhaust system (e.g., an air gap between the cabinet exhaust and the exhaust duct). When Class III biological safety cabinets are used they should be directly connected to the exhaust system. If the Class III cabinets are connected to the supply system, it is done in a manner that prevents positive pressurization of the cabinets (see Appendix A).

11. Continuous flow centrifuges or other equipment that may produce aerosols are contained in devices that exhaust air through HEPA filters before discharge into the laboratory. These HEPA systems are tested at least annually. Alternatively, the exhaust from such equipment may be vented to the outside if it is dispersed away from occupied areas and air intakes.

12. Vacuum lines are protected with liquid disinfectant traps and HEPA filters, or their equivalent. Filters must be replaced as needed. An alternative is to use portable vacuum pumps (also properly protected with traps and filters).

13. An eyewash station is readily available inside the laboratory.

14. Illumination is adequate for all activities, avoiding reflections and glare that could impede vision.

15. The Biosafety Level 3 facility design and operational procedures must be documented. The facility must be tested for verification that the design and operational parameters have been met prior to operation. Facilities should be re-verified, at least annually, against these procedures as modified by operational experience.

16. Additional environmental protection (e.g., personnel showers, HEPA filtration of exhaust air, containment of other piped services and the provision of effluent decontamination) should be considered if recommended by the agent summary statement, as determined by risk assessment, the site conditions, or other applicable federal, state, or local regulations.

A.2 CDC FACILITY REGISTRATION FOR TRANSFER OR RECEIPT OF SELECT AGENTS

The Regulation. Title 42 CFR Part 72.6 (Additional Requirements for Facilities Transferring or Receiving Select Agents) stems from the "Antiterrorism and Effective Death Penalty Act of 1996" (50 U.S.C. § 2301) which requires the Secretary of Health and Human Services to regulate the transfer of certain biological agents ("select agents") harmful to humans. The CDC is responsible to the Secretary for the management of the LR/SAT Program.

Background. *The Antiterrorism and Effective Death Penalty Act* of 1996, enacted on April 24, 1996, established new provisions to regulate transfer of hazardous agents and required HHS to issue rules to implement these provisions. The final rule was published in the Federal Register on October 24, 1996 and will become effective April 15, 1997. To comply with the final rule, commercial suppliers of select agents, as well as Government agencies, universities, research institutions, individuals, and private companies that transfer or obtain these agents, must register with the CDC. The rule also authorizes CDC to inspect those facilities seeking registration to determine whether the applicant facility meets the appropriate BSL requirements. In return for the certification and inspection, facilities are responsible for a site registration fee. This notice lays out those fees and provides technical clarification of related matters in the regulation.

Definitions. A facility is defined in 42 CFR 72.6(j) "as any individual or Government Agency, university, corporation, company, partnership, society, association, firm, or other legal entity located at a single geographic site that may transfer or receive through any means a select agent subject to this part." For the purpose of assessing the site registration fees, facilities are broken down into three categories, small, medium, and large, depending upon the size of the facility, the number of personnel working in the facility, and the amount of work done in the facility. A small facility has one laboratory area including a BSC and supporting supplies and equipment, or one room housing one or more animals (animal room) doing work with one select agent, or group of closely related select agents, at one BSL, by one principal investigator and his/her support staff. If the one laboratory area is used by more than one principal investigator or for more than one select agent or group of closely related select agents, the facility is a medium facility, which has laboratory areas and may have animal rooms that total between two and five rooms. All laboratories must be under the supervision of one responsible facility official and must be located in the same single geographic site. These laboratories shall be used by no more than five principal investigators and their support staffs, for work on no more than five select agents/groups of closely related select agents during the 3-year registration period. If more than five principal investigators work in the laboratories or more than five select agents (or groups of closely related select agents) are used, the facility is a large facility. A large facility has laboratory areas and may have animal rooms that total more than five rooms. All laboratories must be under the supervision of one responsible facility official and must be located in the same single geographic site. Any facility working with select agents at BSL-4, whether small, medium or large, is assessed an additional fee. In addition, any facility that makes more than 50 select agent transfers per year, whether small, medium or large, is assessed an additional fee.

ADDITIONAL INFORMATION AND CLARIFICATION FROM CDC
(www.cdc.gov/od/0hs/irsat/addinfo.htm)

Overview: CDC has published regulations regarding access, use and transfer of select agents for research purposes. These regulations are designed to ensure these infectious agents and toxins are shipped only to institutions or individuals equipped to handle them appropriately and only to those who have legitimate reasons to use them, as well as to implement a system whereby scientists and researchers involved in legitimate research may continue transferring and receiving these agents without undue burdens.

The regulation includes six components:

1. A list of biological agents ("select agents") that have the potential to pose a severe threat to public health and safety. This list includes approximately 40 viruses, bacteria, rickettsia, fungi, and toxins whose transfer in the United States is controlled due to their capacity for causing substantial harm to human health.

2. Registration of facilities transferring these agents. Organizations that transfer or obtain these agents must register with the Secretary of HHS by providing sufficient information that the facility meets BSL requirements for working with the particular biological agent. Registered facilities will be issued a unique registration number to be used to validate all requests for transfer of these agents.

3. Process to document successful transfer of agents. The regulation requires both the shipping and receiving parties to complete an approved transfer form, which includes information on both parties, the agent being transferred, and the proposed use of the agent.

4. Verification procedures, including audit, quality control, and accountability mechanisms. Each facility shipping or receiving a select agent must have a "responsible facility official." This official must sign each request, certifying that the requestor of the agent is officially affiliated with the facility and that the laboratory meets guidelines for working with the requested agent. The "responsible facility official" sending the agent is required to verify that the receiving facility holds a currently valid registration number.

5. Agent disposal requirements. Facilities must have procedures in place for the appropriate disposal of select agents.

6. Research and clinical exemptions. Certain vaccine strains of select agents are exempt from the list of selected infectious agents. Transfer of clinical specimens for diagnostic, reference, or verification purposes is also exempt. Certain toxins, if used for research purposes, are exempt. Clinical laboratories certified under the Clinical Laboratory Improvement Amendments of 1988, which utilize these select agents for diagnostic, reference, verification or proficiency testing purposes, are exempt.

FACILITY REGISTRATION - SECONDARY SITES

Under the following conditions a secondary site could be covered under a single registration:

- The Responsible Facility Official is the same person at both facilities and would be available.
- The secondary facility meets the requirements set forth in 72.6 section "(j) Definitions" Facility", "... located at a single geographic site..." (e.g. same mailing address).
- Only personnel from the facility transport the select agent between the primary and secondary site.

If these conditions cannot be met, than the secondary site would have to register separately.

DESIGNATION OF AN ALTERNATE "RESPONSIBLE FACILITY OFFICIAL"

For the purposes of this regulation, the CDC recognizes a single person as the responsible facility official. The CDC realizes that this may not be practical in certain cases. As such, the CDC recommends that the responsible facility official designate one or more alternates and provide to the CDCs office those names in case there would be a need to verify an EA-101, the CDC would have the designated alternates on file. The designated alternate responsible facility official must also meet the requirements set forth in section "(j) Definitions" for "Responsible facility official" as follows:

"Responsible facility official means an official authorized to transfer and receive select agents covered by this part on behalf of the transferor's and/or requestor's facility. This person should be either a safety officer, a senior management official of the facility, or both. The responsible facility official should not be an individual who actually transfers or receives an agent at the facility."

ATTENUATED STRAINS AND REQUESTS FOR EXEMPTIONS

The following statement is from the preamble of 42 CFR 72.6: *"CDC has determined that it is premature to issue blanket exemptions of attenuated, avirulent, or less pathogenic strains of agents on the restricted list at this time. Attenuated strains of select agents approved for human vaccination purposes by FDA or other recognized national or international organizations will be exempt. All other attenuated, avirulent, or less pathogenic strains will not be exempt at this time."*

The CDC interprets this to apply to veterinary vaccination purposes as well. Therefore, if the attenuated strain of the select agent that LLNL would be working with has been approved by FDA or USDA for vaccination purposes, or has received an Investigational New Drug license with supporting documentation of safety in humans, then the CDC would consider this strain to

be exempt from this regulation. If the strain of the select agent LLNL would be working with does not meet the above criteria, then it would still considered a select agent and would not be exempt from the regulation. In this case, LLNL may apply for an exemption as described in Appendix A of Part 72.6, under the section "Additional Exemptions." Individuals seeking such an exemption should submit a request to CDC that specifies the agent or strain to be exempted and explains why such an exemption should be granted. A committee of experts would be convened to review the merits of the request. The proposed exemption would be published in the Federal Register to inform the public and solicit comment. Pending the completion of this process and its outcome, use of the agent must be in compliance with 42 CFR Part 72.6.

A.3: BACKGROUND INFORMATION ON UNDERSTANDING INFECTIOUS MICROORGANISMS AND THE LLNL PROPOSED ACTION MICROORGANISMS

Terminology and Lists of Microorganisms

There are a number of terms used in this document that pertain to infectious microorganisms and these are defined in either footnotes as they are presented in the text. These include, biological agents, select agents, etiologic agents, biological warfare agents, and infectious agents. The terminology is often dependant upon the Federal Agency using the term and the Government regulation. For example, "select agent" is a CDC term defined as "a microorganism (virus, bacterium, rickettsia) or toxin…including genetically modified organisms" that can be found in Appendix A of 42 CFR 72. That CFR, however, is titled *Interstate Shipment of Etiologic Agents* and has another table in it (Table 72.3) listing "etiologic agents" as a "viable microorganism or its toxin which causes, or may cause, human disease." There are additional infectious microorganism lists or rankings that are proposed for codification (e.g., 49 CFR 171-178).

Risk Associated with Infectious Agents

A literature search identified three sources of information ranking infectious agents by risk category. These are from the CDC (CDC 2000a), the NIH (NIH 2001), and a summary compendium that includes an earlier version of the NIH ranking from the American Biological Safety Association (ABSA) (ABSA 1998). The microorganism list from the ABSA summary was used as a starting point for creating the tables at the end of Appendix A. The literature search found this listing as the most complete and available from a reliable source. It does not contain all the microorganisms discussed or listed in the CDC BMBL (CDC 1999), nor does the BMBL refer to all the microorganisms listed in the ABSA list. Therefore, those preparing risk assessments should refer to both documents for relevant information. However, as a compendium of possible infectious organisms that might be handled in a microbiological laboratory, it is more than adequate. The tables at the end of Appendix A include some additional microorganisms from the newest CDC (2000a) and NIH (2001) sources. The following subsections briefly describe the three information sources.

CDC 2000 Ranking. The CDC ranking was described in the Johns Hopkins University's *Biodefense Quarterly* (JH 1999), as follows: "On June 3-4, 1999, the Centers for Disease Control and Prevention (CDC) convened a panel of experts in medicine and public health, military intelligence and law enforcement, and security for the purpose of identifying biological agents considered to be of greatest potential concern." The outgrowth of this meeting and subsequent interagency discussion resulted in a CDC *Morbidity and Mortality Weekly Report* (MMWR) that presented the panels recommendations for "critical biological agents" (CDC 2000a). The mandate of this panel was to identify the critical biological agents associated with bioterrorism, the resulting analysis focused on the relative risk between infectious agents that might be of concern.

The CDC segregated the list of agents they deemed most problematic into three categories. Category A included organisms that pose the highest risk. These can be easily disseminated or

transmitted person-to-person, cause high mortality (i.e., death) with potential for major public health impact, and require special action for public health preparedness. Category A includes:

- *Variola major* (smallpox)
- *Bacillus anthracis* (anthrax)
- *Yersinia pestis* (plague)
- *Clostridium botulinum* toxin (botulism)
- *Francisella tularensis* (tularaemia)
- filoviruses (Ebola hemorrhagic fever and Marburg fever)
- arenaviruses (Lassa fever, and Junin or Argentine hemorrhagic fever and related viruses)

The second category, Category B, includes microorganisms that are moderately easy to disseminate, have moderate morbidity (i.e., ability to cause disease) and low mortality, but require enhanced disease surveillance. Category B includes:

- *Coxiella burnetti (*Q fever)
- *Brucella spp.* (brucellosis)
- *Burkholderia mallei (*glanders)
- alphaviruses (Venezuelan encephalomyelitis and eastern and western equine encephalomyelitis)
- ricin toxin
- epsilon toxin (from *Clostridium perfringens*)
- *Staphylococcus* enterotoxin B

A subset of Category B includes the food- and water-borne pathogens:

- *Salmonella* species
- *Shigella dysenteriae*
- *Escherichia coli* O 157:H7
- *Vibrio cholerae*
- *Cryptosporidium parvum*

The last and lowest risk category, Category C, includes emerging pathogens that could be engineered for mass dissemination because of availability, ease of production and dissemination, and the potential for high morbidity and mortality and consequent major health impact. These include:

- Nipah virus
- hantaviruses
- tick-borne hemorrhagic fever viruses
- tick-borne encephalitis viruses
- yellow fever
- multi-drug resistant tuberculosis

The NIH 2001 Ranking. The risk group ranking provided by NIH "is based on the potential effect of a biological agent on a healthy human adult and does not account for instances in which an individual may have increased susceptibility to such agents, e.g., pre-existing diseases, medications, compromised immunity, pregnancy or breast feeding (which may increase exposure of infants to some agents)." This ranking is known as the *Classification of Human Etiologic Agents on the Basis of Hazard* and is included in Appendix B of the *NIH Guidelines: Recombinant DNA and Gene Transfer; Guidelines for Research Involving Recombinant DNA Molecules* (NIH 2001). Agents are classified into four risk groups (RG):

- RG1 includes agents that are not associated with disease in health human adults
- RG2 includes agents that are associated with human disease which is rarely serious and for which preventive or therapeutic interventions are *often* available
- RG3 includes agents that are associated with serious or lethal human disease for which preventive or therapeutic interventions *may* be available
- RG4 includes agents that are likely to cause serious or lethal human disease for which preventive or therapeutic interventions are *not usually* available

The ABSA 1998 Ranking Table. The ABSA "Risk Group Classification for Infectious Agents" (ABSA 1998) was developed on the basis of relative risk. The factors that were taken into consideration were the: pathogenicity of the organism, mode of transmission and host range, availability of effective preventive measures (for example, vaccines), availability of effective treatment (such as antibiotics), and other factors.

The intent of the ranking table is to provide risk information for the research community as part of their biosafety risk assessments. The ABSA tables include four risk-group spreadsheets prepared in Adobe™ portable document format (pdf) that are downloadable from the world-wide-web (http://www.absa.org/riskgroups/). These tables provide information on infectious bacteria, viruses, fungi, and parasites (ABSA 1998). The bacteria table includes Rickettsia, and the virus table includes prions. The ranking information associated with listed microorganisms on these tables reflect the combined sources of information from the European Economic Community directives, the NIH Guidelines on Recombinant DNA, the Canadian Laboratory Biosafety Guidelines, and the CDCs BMBL. These tables are not included their entirety in this EA due to their large size.

LLNL Proposed Action Microorganisms. LLNL envisions that the proposed laboratory facility could handle any of the bacterial or viral infectious agents listed in the BSL-3 category by CDC in Section VII of the BMBL (CDC 1999) or future editions and revisions of that guidance. In addition, the proposed laboratories could handle other bacterial or viral infectious organisms not specifically or currently regulated by CDC or other Federal agencies such as those shown in the tables at the end of Appendix A. Only by prior approval of the LLNL Institutional Biosafety Committee (IBC), and after a risk analysis is conducted, would any infectious agent be considered for use in the proposed laboratories. Current plans are for these laboratories to handle live microorganisms or their DNA, RNA[1], proteins[2], or attenuated organisms[3] in their vegetative forms[4].

[1] RNA or ribonucleic acid is similar and complementary to DNA in that it transcribes the encoded chromosomal information to create proteins. In certain viruses they take the place of DNA.

LLNL has an immediate interest in any organism or toxin identified as a "select agent" by the CDC. Also of interest are Dengue virus, West Nile fever virus, and Wheat rust (*Tilletia spp*. fungi). The tables at the end of this appendix include all of the select agents and many additional microorganisms.

These microorganisms could be processed a number of ways, for example:

- Selective culturing[5]
- Sample amplification[6]
- Chemical separation of parts (e.g., DNA, RNA, protein expression)
- Centrifugation[7]
- Freezing
- Decontamination by autoclaving[8]
- Decontamination by chemical disinfection

[2] Proteins are building blocks of cells and are used for support, storage, transport of substances, and defense against invaders.
[3] Attenuatedorganisms that have been deactivated by various means so that they have very limited growth potential or pathogenicity.
[4] A vegetative form is one that is capable of actively growing.
[5] Selective culturing uses nutrients and environmental controls to enhance the growth of some microorganisms relative to others which might also be present.
[6] Amplification is the process to rapidly and significantly increase the number of microorganisms in a sample.
[7] Centrifugation is the process of spinning a sample at a high rate of revolution to cause a separation of materials based upon their density.
[8] Autoclaving is the process of using steam under pressure for a sufficient time to produce sterilization of materials.

Table A-1. Bacterial Microorganisms and Their Safety Classification

Genus[1]	Species[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Acinetobacter	*spp.*				
Acinetobacter	*baumannii*				2
Acinetobacter	*lwoffi*				
Actinobacillus	*actinomycetem-comiana*				2 implied
Actinobacillus	*spp.*				2
Actinomadura	*madurae*				
Actinomadura	*pelletieri*				
Actinomyces	*bovis*				
Actinomyces	*gerencseriae*				
Actinomyces	*israelii*				
Actinomyces	*naeslundii*				
Actinomyces	*pyogenes*				2
Actinomyces	*spp.*				
Aeromonas	*hydrophilia*				2
Aeromonas	*punctata*				
Aeromonas	*spp.*				
Afpia	*spp.*				
Amycolata	*autotrophica*				2
Arachnia	*propionica*				
Arcanobacterium	*haemolyticum*				2
Archanobacterium	*equi*				
Arizona	*hinshawii*				2
Bacillus	*anthracis*	✸	2/3 (I/E)	A	2
Bacillus	*cereus*				
Bacillus	*subtilis*				1
Bacillus	*licheniformis*				1
Bacillus	*thuringiensis*				
Bacteroides	*fragilis*				
Bacteroides	*spp.*				
Bartonella	*bacilliformis*				3 implied
Bartonella	*elizabethae*				3 implied
Bartonella	*spp.*				3

[1] Basic genus and specie list is from ABSA 1998 with some additions.
[2] Select agent list is from 42 CFR 72
[3] Biosafety Level is from CDC 1999 - all organisms shown require import or transfer permit from CDC
[4] Risk Grouping from CDC 2000a
[5] NIH Risk Groups (RG) are from NIH 2001
RG 1 not associated with disease in healthy human adults
RG 2 associated with human disease that is rarely serious and prophylactic intervention ***often*** available
RG 3 associated with human disease that is serious or lethal and prophylactic intervention ***may be*** available
RG 4 associated with human disease that is serious or lethal and prophylactic intervention ***not usually*** available
I/E Requires import and/or export permit from CDC and/or Deparment of Commerce or I/E
AP - animal pathogen
* activities with high droplet or aerosol production potential
✸ applicable organism

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Bartonella	*henselae*				2
Bartonella	*quintana*				2
Bartonella	*vinsonii*				2
Bordetella	*spp.*				2
Bordetella	*bronchiseptica*				2 implied
Bordetella	*parapertussis*				2 implied
Bordetella	*pertussis*		2		2
Borrelia	*burgdorferi*				2
Borrelia	*duttoni*				
Borrelia	*recurrentis*				2
Borrelia	*spp.*				
Borrelia	*vincenti*				
Brucella	*abortus*	✸	3 (I/E)	B	3
Brucella	*canis*	✸	3 (I/E)	B	3
Brucella	*melitensis*	✸	3 (I/E)	B	3
Brucella	*ovis*			B	3 implied
Brucella	*spp.* (except *B. ovis*)		3 (I/E)	B	3
Brucella	*suis*	✸	3 (I/E)	B	3
Burkholderia	*spp.*				
Burkholderia	*mallei*	✸	2/3* implied (I/E)	B	3
Burkholderia	*pseudomallei*	✸	2/3* (I/E)		3
Calymmatobacterium	*granulomatis*				
Campylobacter	*coli*		2		2
Campylobacter	*fetus* (*ssp. fetus*)		2		2
Campylobacter	*jejuni*		2		2
Campylobacter	*laridis*				
Campylobacter	*spp.*		2 implied		
Campylobacter	*sputorum*				
Capnocytophaga	*spp.*				
Cardiobacterum	*hominis*				
Chlamydia	*pneumoniae*		2/3*		2
Chlamydia	*psittaci*		2/3*		2

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Chlamydia	*spp.* (*C. pneumoniae*)		2/3* implied		3
Chlamydia	*trachomatis*		2/3*		2
Citrobacter	*spp.*				
Clostridium	*botulinum*	✸	2/3*	A	2
Clostridium	*chauvoei*				2
Clostridium	*difficile*				
Clostridium	*equi*				
Clostridium	*haemolyticum*				2
Clostridium	*histolyticum*				2
Clostridium	*novyi*				2
Clostridium	*perfringens*			B	
Clostridium	*septicum*				2
Clostridium	*sordelli*				
Clostridium	*spp.*				
Clostridium	*tetani*		2		2
Corynebacterium	*bovis*				
Corynebacterium	*diphtheriae*		2		2
Corynebacterium	*matruchotii*				
Corynebacterium	*minutissimum*				
Corynebacterium	*pseudotuberculosis*				2
Corynebacterium	*renale*				2
Corynebacterium	*spp.*				
Corynebacterium	*ulcerans*				
Coxiella	*burnetii*	✸	3 (I/E)	B	3
Dermatophilus	*congolensis*				2
Edwardsiella	*tarda*				2
Eikenella	*corrodens*				
Enterobacter	*aerogenes/cloacae*				
Enterobacter	*spp.*				
Enterococcus	*spp.*				
Erlichia	*sennetsu*				
Erlichia	*spp.*				
Erysipelothrix	*rhusiopathiae*				2

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Erysipelothrix	*spp.*				
Escherichia	*coli* (pathogenic strains)		2	B	2
Escherichia	*coli K12* (genetically crippled)				1
Flavobacterium	*meningosepticum*				
Flavobacterium	*spp.*				
Fluoribacter	*bozemanae*				
Francisella	*novocida*				
Francisella	*tularensis* (Type A)	✸	2/3	A	3
Francisella	*tularensis* (Type B)	✸	2/3	A	3
Fusobacterium	*necrophorum*				
Fusobacterium	*spp.*				
Gardnerella	*vaginalis*				
Haemophilus	*ducreyi*				2
Haemophilus	*influenzae*				2
Haemophilus	*spp.*				
Hartmanella	*spp.*				
Helicobacter	*pylori*		2		2
Herellea	*vaginicola*				
Kingella	*kingae*				
Klebsiella	*oxytoca*				1
Klebsiella	*pneumoniae*				2
Klebsiella	*spp.*				2
Lactobacillus	*spp.*				
Legionella	*pneumophila*		2/3*		2
Legionella	*spp.*		2/3*		2
Legionella	*like organisms*		2/3*		
Leptospira	*interrogans*		2 (I/E)		2
Listeria	*ivanovii*		2 implied (I/E)		2 implied
Listeria	*monocytogenes*		2 (I/E)		2 implied
Listeria	*spp.*		2 implied (I/E)		2
Mima	*polymorpha*				
Moraxella	*spp.*				2
Morganella	*morganii*				

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Mycobacterium	*africanum*			C	2 implied
Mycobacterium	*asiaticum*		2		2
Mycobacterium	*avium-intracelluare*		2		2
Mycobacterium	*bovis*		2/3 (I/E)	C	3
Mycobacterium	*chelonei*		2		2
Mycobacterium	*fortuitum*		2		2
Mycobacterium	*kansasii*		2		2
Mycobacterium	*leprae*		2		2
Mycobacterium	*malmoense*		2		2
Mycobacterium	*marinum*		2		2
Mycobacterium	*microti*				2 implied
Mycobacterium	*paratuberculosis*		2		2
Mycobacterium	*scrofulaceum*		2		2
Mycobacterium	*simiae*		2		2
Mycobacterium	*spp.* (except *M. tuberculosis* complex)		2		
Mycobacterium	*szulgai*		2		2
Mycobacterium	*tuberculosis*		3	C	3
Mycobacterium	*ulcerans*		2		2
Mycobacterium	*xenopi*		2		2
Mycoplasma	*hominis*				2 implied
Mycoplasma	*mycoides*				Restricted AP
Mycoplasma	*pneumoniae*				2 implied
Mycoplasma	*agalactiae*				Restricted AP
Mycoplasma	*spp. (except M. mycoides* & *M. agalactiae)*				2
Neisseria	*gonorrhoeae*		2/3*		2
Neisseria	*meningitidis*		2/3*		2
Neisseria	*spp.*		2/3* implied		
Nocardia	*asteroides*				2
Nocardia	*brasiliensis*				2
Nocardia	*caviae*				

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Nocardia	*farcinica*				
Nocardia	*nova*				
Nocardia	*spp.*				
Nocardia	*transvalensis*				2
Nocarida	*otitidis-caviarum*				2
Pasteurella	*haemolytica*				
Pasteurella	*multocida*				3
Pasteurella	*pneumotropica*				
Pasteurella	*spp. (virulent strains)*				3
Peptostreptococcus	*anaerobius*				
Plesiomonas	*shigelloides*				
Porphyromonas	*spp.*				
Prevotella	*spp.*				
Proteus	*mirabilis*				
Proteus	*penneri*				
Proteus	*spp.*				
Proteus	*vulgaris*				
Providencia	*alcalifaciens*				
Providencia	*rettgeri*				
Providencia	*spp.*				
Pseudomonas	*aeruginosa*				
Pseudomonas	*spp.*				
Rhodococcus	*equi*				2
Rickettsia	*(vole)*				
Rickettsia	*akari*		2/3 (I/E)		3
Rickettsia	*australis*		2/3 (I/E)		3
Rickettsia	*canada*				3
Rickettsia	*conorii*		2/3 (I/E)		3
Rickettsia	*japonicum*		2/3 (I/E)		
Rickettsia	*montana*				
Rickettsia	*mooseri*		2/3 (I/E)		3
Rickettsia	*parkeri*				
Rickettsia	*prowazekii*	✸	2/3 (I/E)		3

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Rickettsia	*rhipicephali*				
Rickettsia	*rickettsii*	✸	2/3 (I/E)		3
Rickettsia	*sennetsu*				
Rickettsia	*sibirica*		2/3 (I/E)		3
Rickettsia	*spp.*				
Rickettsia	*tsutsugamushi*		2/3 (I/E)		3
Rickettsia	*typhi (mooseri)*		2/3 (I/E)		3
Salmonella	*arizonae*		2	B	2
Salmonella	*cholerasuis*		2	B	2
Salmonella	*enteritidis*		2	B	2
Salmonella	*gallinarum-pullorum*		2	B	2
Salmonella	*meleagridis*		2	B	2
Salmonella	*paratyphi* (Type A, B, C)		2	B	2
Salmonella	*spp.*		2	B	2 implied
Salmonella	*typhi*		2/3* (I/E)	B	2
Salmonella	*typhimurium*		2	B	2
Serpulina	*spp.*				
Serratia	*marcescens*				
Serretia	*liquefaciens*				
Shigella	*boydii*		2 (I/E) implied		2
Shigella	*dysenteriae* (Type 1)		2 (I/E) implied	B	2
Shigella	*flexneri*		2 (I/E)		2
Shigella	*sonnei*		2 (I/E) implied		2
Shigella	*spp.*		2 (I/E)		2 implied
Sphaerophorus	*necrophorus*				2
Staphylococcus	*aureus*			B	2
Staphylococcus	*epidermidis*			B	
Streptobacillus	*moniliformis*				2
Streptobacillus	*spp.*				
Streptococcus	*agalactiae*				2 implied
Streptococcus	*pneumoniae*				2
Streptococcus	*pyogenes*				2
Streptococcus	*spp.*				2

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Streptococcus	*suis*				
Treponema	*carateum*				2
Treponema	*pallidum*		2		2
Treponema	*pertenue*				
Treponema	*spp.*				
Treponema	*vincentii*				
Ureaplasma	*urealyticum*				
Vibrio	*cholerae*		2 (I/E)	B	2
Vibrio	*parahaemolyticus*		2 (I/E)		2
Vibrio	*spp.*		2 (I/E) implied		2 implied
Vibrio	*vulnificus*				2
Yersinia	*enterocolitica*				2
Yersinia	*pestis*	✸	2/3* (I/E)	A	3
Yersinia	*pseudotuberculosis*				
Yersinia	*spp.* (except *Y. pestis*)				

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RG 4 associated with human disease that is serious or lethal and prophylactic intervention ***not usually*** available
I/E Requires import and/or export permit from CDC and/or Deparment of Commerce or I/E
AP - animal pathogen
* activities with high droplet or aerosol production potential
✸ applicable organism

Table A-2. Viral Microorganisms and Their Safety Classifications

Viral Group[1]	Name[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Adenoviridae	Adenovirus (human, all types)				2
Arenaviruses	Flexal	✸			3
Arenaviruses	Guanarito	✸	4 (E)	A	4
Arenaviruses	Junin virus	✸	V2 (E), 3/4 (E)	A	V3, 4
Arenaviruses	Lassa fever virus	✸	4 (E)	A	4
Arenaviruses	Lymphocytic choriomeningitis (neurotropic virus)		2/3* (E)	A	3
Arenaviruses	Lymphocytic choriomeningitis (non-neurotropic virus)		2/3* (E)		2
Arenaviruses	Machupo virus	✸	4 (E)	A	4
Arenaviruses	Mopeia virus (and other Tacaribe viruses)		3		BMBL
Arenaviruses	Sabia	✸	4 (E)	A	4
Arenaviruses	Tacaribe complex		2		2
Astroviridae	Astroviridae				
Bunyaviridae	Bunyaviridae (others known to be pathogenic)				
Bunyaviridae/ Bunyavirus Group	Bunyamwera virus		2		2
Bunyaviridae/ Bunyavirus Group	Bunyavirus				
Bunyaviridae/ Bunyavirus Group	California encephalitis virus		2		BMBL
Bunyaviridae/ Bunyavirus Group	Oropouche virus		3		BMBL
Bunyaviridae/ Bunyavirus Group	Tensaw virus		2		BMBL
Bunyaviridae/ Hantaviruses	Black Creek Canal	✸	2/3 implied (E)	C	3
Bunyaviridae/ Hantaviruses	El Moro Canyon	✸	2/3 implied (E)	C	3
Bunyaviridae/ Hantaviruses	Hantaan (Korean haemorrhagic fever)	✸	2/3 (E)	C	3
Bunyaviridae/ Hantaviruses	Hantaviruses (others known)	✸	2/3* (E)	C	3
Bunyaviridae/ Hantaviruses	Prospect Hill virus	✸	2/3 implied (E)	C	3
Bunyaviridae/ Hantaviruses	Puumala virus	✸	2/3 (E)	C	3
Bunyaviridae/ Hantaviruses	Seoul virus	✸	2/3 (E)	C	3
Bunyaviridae/ Hantaviruses	Sin nombre virus	✸	2/3 (E)	C	3
Bunyaviridae/ Nairovirus	Nairobi Sheep Disease		3 (I), R		BMBL
Bunyaviridae/ Nairoviruses	Congo Crimean haemorrhagic fever (Tick-borne encephalitis virus)	✸	4 (E)	C	4
Bunyaviridae/ Nairoviruses	Hazara virus		2		BMBL
Bunyaviridae/ Phleboviruses	Rift Valley Fever	✸	V2 (E), 3 (I/E)		V2, 3
Bunyaviridae/ Phleboviruses	Sandfly fever virus		2		BMBL
Bunyaviridae/ Phleboviruses	Toscana virus		2		BMBL
Bunyaviridae/ Phleboviruses	Zinga (See Rift Valley Fever)		V2 (E), 3 (E)		
Calciviridae	Calciviridae (others known)				2
Calciviridae	Hepatitis E virus		2		2
Calciviridae	Norwalk virus				2
Coronaviridae	Coronavirus				2
Filoviridae	Ebola virus	✸	4 (E)	A	4
Filoviridae	Marburg virus	✸	4 (E)	A	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Absettarov (Tick-borne encephalitis virus)	✸	3/4 (E)	C	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Central European Tick-borne encephalitis virus	✸	4 (E)	C	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Dengue virus		2		2

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Viral Group[1]	Name[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Hanzalova (Tick-borne encephalitis virus)	*	3/4 (E)	C	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Hypr (Tick-borne encephalitis virus)	*	3/4 (E)	C	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Kokobera		2		BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Kumlinge (Tick-borne encephalitis virus)	*	3/4 (E)	C	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Kunjin		2		BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Kyasanur Forest (Tick-borne encephalitis virus)	*	4 (E)	C	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Looping ill (Tick-borne encephalitis virus)	*	3 (I)	C	BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Murray Valley encephalitis (Australian encephalitis)		3		BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Omsk (hemorrhagic fever), (Tick-borne encephalitis virus)	*	4 (E)	C	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Powassan		3		BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Rocio		3		BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Russian spring-summer encephalitis (Tick-borne encephalitis virus)	*	4 (E)	C	4
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Sammarez Reef		3		BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	St. Louis encephalitis		3		3
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Tick-borne	*		C	BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Wesselsbron virus		3 (I)		BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	West Nile fever virus		3 (E)		BMBL
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Yellow fever virus (vaccine strain 17D)		V2 (E)		2
Flaviviridae/ Flavivirus (Grp B Arbovirus)	Yellow fever virus (wild type)	*	3 (E)	C	3
Flaviviridae/Flavivirus (Grp B Arbovirus)	Japanese B encephalitis		3 (E)		3
Flaviviridae/Flavivirus (Grp B Arbovirus)	Japanese encephalitis, Nakayama		3 (E)		BMBL
Flavivirus	Flaviviruses (others known to be pathogenic)				BMBL
Hepadnaviridae	Hepatitis B virus		2		2
Hepadnaviridae	Hepatitis D (Delta) virus (b)		2		2
Herpesviridae	Herpesviruses (unassigned, HHV 7, HHV8)		2 implied		BMBL
Herpesviridae	Human B lympho-tropic virus				2 (types 6 and 7)
Herpesviridae	Rhadinovirus (except H.ateles,H. saimiri)				
Herpesviridae / Gamma-herpesvirinae	Gammaherpes				
Herpesviridae/ Alphaherpesviridae	Pseudorabies virus				
Herpesviridae/ Alpha-herpesviridae	Herpes simplex viruses		2		2 (types 1 and 2)
Herpesviridae/ Alpha-herpesviridae	Herpesvirus simiae (B virus)		2/3/4		4
Herpesviridae/ Alpha-herpesviridae	Herpesvirus zoster (Varicella)		2		2
Herpesviridae/ Animal virus vector	Herpesvirus saimiri (Genus Rhadinovirus)		2 implied		1
Herpesviridae/ Animal virus vector	Marek's disease virus				1
Herpesviridae/ Animal virus vector	Murine cytomegalovirus				1
Herpesviridae/ Animal virus vector	Thetalymphocryptovirus				

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Herpesviridae/ Betaherpesviridae	Cytomegalovirus (CMV) (Genus Lymphocryptovirus)		2		2
Herpesviridae/ Gamma-herpesviridae	Epstein-Barr virus (EBV)		2		2
Herpesviridae/ Rhadinovirus	Herpes saimiri				1
Herpesviridae/ Rhadinovirus	Herpesvirus ateles				1
Herpesviridae/ Rhadinovirus	Rhadinovirus (except H. ateles and H. saimiri)				BMBL
Orthomyxoviridae	Influenza virus (Types A-C)		2 (I)		2
Orthomyxoviridae	Influenza virus (vaccine strain)		1		BMBL
Orthomyxoviridae	Orthomyxoviridae (Tick-borne encephalitis virus)	*	4	C	BMBL
Orthopoxvirus	Ectromelia (mousepox)				
Papovaviridae	Papillomaviruses (human)				2
Papovaviridae	Polyomavirus (BK and JC viruses)				1
Papovaviridae/ Animal virus vector	Simian virus 40 (SV40)				1
Papovavirus/ Animal virus vector	Shope papilloma virus				1
Papovavirus/Animal virus vector	Bovine papilloma virus				1
Paramyxoviridae	Subsclerosing pancencephalitis				
Paramyxoviridae/ Morbillivirus	Hendra and Hendra-like viruses		3+/4 (I/E)		4
Paramyxoviridae/ Morbillivirus	Measles virus				2
Paramyxoviridae/ Morbillivirus	Morbillivirus (except Rinderpest)				
Paramyxoviridae/ Paramyxovirus	Mumps virus				2
Paramyxoviridae/ Paramyxovirus	Newcastle Disease virus				2
Paramyxoviridae/ Paramyxovirus	Parainfluenza virus (Type 3, SF4 strain)				
Paramyxoviridae/ Paramyxovirus	Parainfluenza viruses				2 (Types 1-4)
Paramyxoviridae/ Pneumovirus	Respiratory syncytial virus				2
Paramyxoviruses/ Parainfluenza viruses	Sendai virus (murine parainfluenza virus type 1)				
Parvoviridae	Parvovirus (human)				2 (B19)
Picornaviridae	Acute haemorrhagic conjunctivitis virus (AHC)				
Picornaviridae	Aphthovirus				
Picornaviridae	Cardiovirus				
Picornaviridae/ Rhinoviruses	Rhinovirus				2
Picornoviridae/ Enterovirus	Coxsackie				2 (Types A and B)
Picornoviridae/ Enterovirus	Echoviruses				2
Picornoviridae/ Enterovirus	Entero				
Picornoviridae/ Enterovirus	Polioviruses		2/3		2
Picornoviridae/ Hepatovirus	Hepatitis A virus (human enterovirus type 72)		2		2
Poxviridae	Alastrim		2 implied (E)		R
Poxviridae	Buffalopox virus: 2 viruses (1a vaccinia variant)		2 implied (E)		2
Poxviridae	Camel pox virus		2 implied (E)		2
Poxviridae	Cowpox virus		2 (E)		2
Poxviridae	Elephantpox virus (variant of cowpox)		2 (E)		2
Poxviridae	Milker's node virus		2 implied (E)		2

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Table A-2. Viral Microorganisms and Their Safety Classifications

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Poxviridae	Molluscum contagiosum virus		2 implied (E)		2
Poxviridae	Paravaccinia virus		2 implied (E)		2
Poxviridae	Rabbitpox virus (vaccinia variant)		2 (E)		2
Poxviridae	Tanapox		2 (E)		2
Poxviridae	Variola (major and minor) virus	✸	R	A	R
Poxviridae	Whitepox (Variola)		R	A	R
Poxviridae	Yabapox virus (Tana and Yaba)		2 (E)		
Poxviridae/ Orthopoxvirus	Monkeypox virus		2 (E)		3
Poxviridae/ Orthopoxvirus	Orthopoxviruses (other pathogenic, not in RG 2 or 4)		2 implied (E)		2
Poxviridae/ Orthopoxvirus	Vaccinia virus		2 (E)		2
Poxviridae/ Parapoxvirus	Orf virus		2 implied		2
Reoviridae	Coltiviruses				2 (incl. Colorado Tick Fever)
Reoviridae	Orbiviruses				2
Reoviridae	Reoviruses				2
Reoviridae	Rotavirus (human)				2
Retroviridae	Lentivirinae (except HIV-1 and HI)		2/3* implied		
Retroviridae	Simian sarcoma virus (SSV-1)		2/3* implied		
Retroviridae/ Lentiviridae	Human Immunodeficiency virus (HIV Types 1 and 2, Oncornavirus C)		2/3*		3 (Types 1 and 2)
Retroviridae/ Lentiviridae	Simian immunodeficiency virus		2/3*		3
Retroviridae/ Oncovirinae	Oncornavirus B		2/3* implied		
Retroviridae/ Oncovirinae	Oncornavirus C (except HTLV I and II)		2/3* implied		
Retroviridae/ Oncovirinae/ Genus Oncornavirus C	Human T-cell lymphotropic viruses (HTLV)		2/3* implied		3 (Types 1 and 2)
Rhabdoviridae	Flanders-Hart Park virus (see Zinsser, pg 777)		2		BMBL
Rhabdoviridae	Hart Park virus (see Zinsser, pg 777)		2		BMBL
Rhabdoviridae	Vesicular stomatitis virus		2/3 (I/E) some R		2 (lab adapted strains), 3
Rhabdoviridae/ Lyssavirus	Rabies virus		2 /3*		2
Togaviridae/ Alphavirus (Grp A Arbovirus)	Alphaviruses (others known)				
Togaviridae/ Alphavirus (Grp A Arbovirus)	Barmah Forest		2		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Bebaru virus		2		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Chikungunya virus		V2 (E), 3 (E)		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Eastern equine encephalomyelitis (EEE)	✸	2 (I)	B	2
Togaviridae/ Alphavirus (Grp A Arbovirus)	Everglade virus		3		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Mayaro virus		3		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Mucambo virus		3		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Ndumu		3		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	O'Nyong-Nyong virus		2		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Ross River virus		2		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Semliki Forest virus		3		3
Togaviridae/ Alphavirus (Grp A Arbovirus)	Sindbis virus		2		BMBL

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Togaviridae/ Alphavirus (Grp A Arbovirus)	Tonate virus		3/4 (E), some R		BMBL
Togaviridae/ Alphavirus (Grp A Arbovirus)	Venezuelan equine encephalomyelitis		V2 (E), 3 (I/E)	B	V2, 3
Togaviridae/ Alphavirus (Grp A Arbovirus)	Western equine encephalomyelitis		2 (I)	B	2
Togaviridae/ Pestivirus (Canada)	Hepatitis C		2		2
Togaviridae/ Rubivirus	Rubivirus (Rubella)				2
Toroviridae	Toroviridae				
Unclassified viruses	Hepatitis (bloodborne viruses not yet identified)		2 implied		2 implied
Unconventional agents, prions	Bovine spongiform encephalopathy (BSE)		2* (I)		
Unconventional agents, prions	Chronic wasting disease (CWD)		2		
Unconventional agents, prions	Creutzfeldt-Jacob disese		3		3
Unconventional agents, prions	Exotic ungulate encephalopathy (EUE)		2		
Unconventional agents, prions	Feline spongiform encephalopathy (FSE)		2		
Unconventional agents, prions	Gatal familial insomnia (FFI)		3		
Unconventional agents, prions	Gerstmann-Straussler-Scheinker syndrome		3*		3 implied
Unconventional agents, prions	Kuru		3*		3
Unconventional agents, prions	Scrapie		2* implied		
Unconventional agents, prions	Transmissible mink encephalopathy (TME)		2		
Viral vector/Animal retrovirus	Avian leukosis virus (ALV)				1
Viral vector/Animal retrovirus	Avian sarcoma virus				1
Viral vector/Animal retrovirus	Bovine immunodeficiency virus (BIV)				
Viral vector/Animal retrovirus	Bovine leukemia virus (BLV)				1
Viral vector/Animal retrovirus	Feline leukemia virus (FeLV)				1
Viral vector/Animal retrovirus	Feline sarcoma virus (FeSV)				1
Viral vector/Animal retrovirus	Gibbon leukemia virus (GaLV)				1
Viral vector/Animal retrovirus	Mason-Pfizer monkey virus				1
Viral vector/Animal retrovirus	Mouse mammary tumor virus				1
Viral vector/Animal retrovirus	Murine leukemia virus				1
Viral vector/Animal retrovirus	Murine sarcoma virus				1
Viral vector/Animal retrovirus	Rat leukemia virus				1
Viral vector/Animal virus	Baculovirus				
Viral vector/Animal virus	Chick embryo lethal orphan (CELO)				
Viral vector/Animal virus	Dog sarcoma				
Viral vector/Animal virus	Guinea pig herpes				
Viral vector/Animal virus	Hamster leukemia				
Viral vector/Animal virus	Lucke (frog) virus				
X-Arboviruses	Aino		3		BMBL
X-Arboviruses	Akabane		3		BMBL
X-Arboviruses	Araguari		3		BMBL
X-Arboviruses	Batama		2		BMBL
X-Arboviruses	Batken		3		BMBL
X-Arboviruses	Bhanja		3		BMBL
X-Arboviruses	Bimbo		3		BMBL
X-Arboviruses	Bluetongue		2 (E)		BMBL
X-Arboviruses	Bobaya		3		BMBL

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X-Arboviruses	Bobia		3		BMBL
X-Arboviruses	Buenaventura		3		BMBL
X-Arboviruses	Cabassou		3		BMBL
X-Arboviruses	Cache valley		2		BMBL
X-Arboviruses	Chim		3		BMBL
X-Arboviruses	Cocal		3		BMBL
X-Arboviruses	Dhori		3		BMBL
X-Arboviruses	Dugbe		3		BMBL
X-Arboviruses	Ganjam (E permit)				
X-Arboviruses	Garba		3		BMBL
X-Arboviruses	Germiston		3		BMBL
X-Arboviruses	Getah		3		BMBL
X-Arboviruses	Gordil		3		BMBL
X-Arboviruses	Guaratuba		2		BMBL
X-Arboviruses	Ibaraki		3		BMBL
X-Arboviruses	Inhangapi		3		BMBL
X-Arboviruses	Inini		3		BMBL
X-Arboviruses	Israel Turkey Mening.		3		BMBL
X-Arboviruses	Issyk-Kul		3		BMBL
X-Arboviruses	Itaituba		3		BMBL
X-Arboviruses	Kairi		3		BMBL
X-Arboviruses	Khasan		3		BMBL
X-Arboviruses	Koutango		3		BMBL
X-Arboviruses	Kyzylagach		3		BMBL
X-Arboviruses	LaCrosse virus		2		BMBL
X-Arboviruses	Langat virus		2		BMBL
X-Arboviruses	Middelburg		3		BMBL
X-Arboviruses	Nariva, Negishi		3		BMBL
X-Arboviruses	New Minto		3		BMBL
X-Arboviruses	Nodamura		3		BMBL
X-Arboviruses	Northway		3		BMBL
X-Arboviruses	Ouango		3		BMBL
X-Arboviruses	Oubangui		3		BMBL
X-Arboviruses	Paramushir		3		BMBL
X-Arboviruses	Piry		3 (I)		BMBL
X-Arboviruses	Razdan		3		BMBL
X-Arboviruses	Rochambeau		3		BMBL
X-Arboviruses	Sagiyama		3		BMBL
X-Arboviruses	Salanga		3		BMBL
X-Arboviruses	Santa Rosa		3		BMBL
X-Arboviruses	Saumarex Reef		3		BMBL
X-Arboviruses	Sepik		3		BMBL
X-Arboviruses	Slovakia		3		BMBL
X-Arboviruses	Spondweni		3		BMBL
X-Arboviruses	Tamdy		3		BMBL
X-Arboviruses	Telok Forest		3		BMBL
X-Arboviruses	Tlacotalpan		3		BMBL
X-Arboviruses	Tocio				BMBL
X-Arboviruses	Turlock virus		2		BMBL
	Nipah virus			C	
	Hemorrhagic fever agents and viruses undefined				4

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Table A-3. Fungi and their Safety Classifications

Genus[1]	Species[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Absidia	*corymbifera*				
Absidia	*ramosa*				
Ajellomyces	*capsulatus*				
Ajellomyces	*dermatitidis*				
Aspergillus	*flavus*				
Aspergillus	*fumigatus*				
Aspergillus	*spp*				
Blastomyces	*dermatitidis*		2		2
Candida	*albicans*				
Candida	*spp*				
Cladosporium	*bantianum*		2		2
Cladosporium	*carrionii*				
Cladosporium	*trichoides*		2		2 (Xylo-hypha)
Claduphialopora	*bantians*		2		
Coccidioides	*immitis*		2, 3 arthro-conidia; cont. soil		3 (soil, sporul. cultures)
Cryptococcus	*neoformans*		2		2
Dactylaria	*gallopava*		2		2 (Ochro-conis)
Dermatophilus	*congolensis*				
Emmonsia	*parva*				
Epidermophyton	*floccosum*		2, implied		2, implied
Epidermophyton	*spp*		2		2
Exophiala	*dermatitidis*		2 (Wan-giella)		2 (Wan-giella)
Filobasidiella	*bacillispora*				
Filobasidiella	*neoformans*				
Fonsecaea	*compacta*				
Fonsecaea	*pedrosoi*		2		2
Geotrichum	*spp*				
Histoplasma	*capsulatum*		3 (capsulatum)		3 (capsulatum and duboisii)
Histoplasma	*farcinimosum*				
Histoplasma	*spp.*				
Loboa	*lobai*				
Madurella	*grisea*				
Madurella	*mycetomatis*				
Microsporum	*spp*		2		2
Mucor	*spp*				
Neotestudina	*rosatii*				

[1] Basic genus and specie list is from ABSA 1998 with some additions.

[2] Select agent list is from 42 CFR 72

[3] Biosafety Level is from CDC 1999 - all organisms shown require import or transfer permit from CDC

[4] Risk Grouping from CDC 2000a

[5] NIH Risk Groups (RG) are from NIH 2001
RG 1 not associated with disease in healthy human adults
RG 2 associated with human disease that is rarely serious and prophylactic intervention often available
RG 3 associated with human disease that is serious or lethal and prophylactic intervention may be available
RG 4 associated with human disease that is serious or lethal and prophylactic intervention not usually available

Table A-3. Fungi and their Safety Classifications

Genus[1]	Species[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Ochroconis	*gallopavum*		2		
Paracoccidioides	*brasiliensis*				2
Penicillium	*marneffei*		2		2
Phialophora	*compacta*				
Phialophora	*pedrosoi*				
Ramichlorisium	*mackenzieim*		2		
Rhinocladiella	*compacta*				
Rhinocladiella	*pedrosoi*				
Rhizopus	*cohnii*				
Rhizopus	*microspous*				
Sporothrix	*schenckii*		2		2
Stachybotrus	*atra*		2		
Trichophyton	*rubrum*		2, implied		2, implied
Trichophyton	*spp*		2		2
Trichosporon	*spp*				
Xylohypha	*bantania*				
Zymonema	*dermatitidis*				

[1] Basic genus and specie list is from ABSA 1998 with some additions.

[2] Select agent list is from 42 CFR 72

[3] Biosafety Level is from CDC 1999 - all organisms shown require import or transfer permit from CDC

[4] Risk Grouping from CDC 2000a

[5] NIH Risk Groups (RG) are from NIH 2001
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RG 4 associated with human disease that is serious or lethal and prophylactic intervention not usually available

Table A-4. Parasites and Their Safety Classification

Genus[1]	Species[1]	Group[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Acanthamoeba	*castellani*	Protozoa		2		
Acanthamoeba	*spp*	Protozoa		2		
Acanthocheilonema	*spp*	Helminth, Nematode				
Ancylostoma	*duodenale*	Helminth, Nematode		2 implied		2
Ancylostoma	*spp*	Helminth, Nematode		2 implied		2
Ancylstoma	*ceylanicum*	Helminth, Nematode		2 implied		2
Angiostrongylus	*cantonensis*	Helminth, Nematode				
Angiostrongylus	*costaricensis*	Helminth, Nematode				
Angiostrongylus	*spp*	Helminth, Nematode				
Ascaris	*lumbricoides*	Helminth, Nematode		2 implied		2
Ascaris	*spp*	Helminth, Nematode		2		2
Ascaris	*suum*	Helminth, Nematode		2 implied		2
Babesia	*divergens*	Protozoa		2 implied		2
Babesia	*microti*	Protozoa		2 implied		2
Babesia	*spp*	Protozoa		2		2
Balamuthia	*spp.*	Protozoa		2		
Balantidium	*coli*	Protozoa				
Balantidium	*spp*	Protozoa				
Brugia	*malayi*	Helminth, Nematode		2 implied		2
Brugia	*pahangi*	Helminth, Nematode		2 implied		2
Brugia	*spp*	Helminth, Nematode		2 implied		2
Brugia	*timori*	Helminth, Nematode				2
Capillaria	*philippinensis*	Helminth, Nematode				

[1] Basic genus and specie list is from ABSA 1998 with some additions.

[2] Select agent list is from 42 CFR 72

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Table A-4. Parasites and Their Safety Classification

Genus[1]	Species[1]	Group[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Capillaria	*spp*	Helminth, Nematode				
Clonorchis	*sinensis*	Helminth, Trematode				
Clonorchis	*spp*	Helminth, Trematode				
Clonorchis	*viverrini*	Helminth, Trematode				
Coccidia	*spp*	Protozoa		2		2
Cyclospora	*cayetanensis*					
Cryptosporidium	*parvum*	Protozoa		2 implied		2
Cryptosporidium	*spp*	Protozoa		2		2
Cysticercus	*cellulosae*	Helminth, Cestode larva		2		2
Cysticercus	*spp*	Helminth, Cestode		2		2
Dicrocoelium	*spp*	Helminths, Trematode				
Dipetalonema	*perstans*	Helminth, Nematode				
Dipetalonema	*spp*	Helminth, Nematode				
Dipetalonema	*streptocerca*	Helminth, Nematode				
Diphyllobothrium	*latum*	Helminth, Cestode				
Diphyllobothrium	*spp*	Helminth, Cestode				
Dipylidium	*spp*	Helminth, Cestoda				
Dracunculus	*medinensis*	Helminth, Nematode				
Dracunculus	*spp*	Helminth, Nematode				
Echinococcus	*granulosis*	Helminth, Cestode		2 implied		2
Echinococcus	*multilocularis*	Helminth, Cestode		2 implied		2

[1] Basic genus and specie list is from ABSA 1998 with some additions.

[2] Select agent list is from 42 CFR 72

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Table A-4. Parasites and Their Safety Classification

Genus[1]	Species[1]	Group[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Echinococcus	*spp*	Helminth, Cestode		2		2
Echinococcus	*vogeli*	Helminth, Cestode		2 implied		2
Entamoeba	*histolytica*	Protozoa		2		2
Enterobius	*spp*	Helminth, Nematode		2		2
Fasciola	*gigantica*	Helminth, Trematode		2 implied		2
Fasciola	*Hepatica*	Helminth, Trematode		2 implied		2
Fasciola	*spp*	Helminth, Trematode		2 (metacercariae)		2
Fasciolopsis	*buski*	Helminth, Trematode				
Fasciolopsis	*spp*	Helminth, Trematode				
Giardia	*lamblia*	Protozoa		2 implied		2
Giardia	*spp*	Protozoa		2		2
Hartmanella	*spp*	Protozoa				
Heterophyes	*spp*	Helminth, Trematode		2		2
Hymenolepis	*diminuta*	Helminth, Cestode				2
Hymenolepis	*nana*	Helminth, Cestode		2		2
Hymenolepis	*spp*	Helminth, Cestode		2		2
Isospora	*spp*	Protozoa		2 implied, Coccidia		2
Leishmania	*braziliensis*	Protozoa		2 implied		2
Leishmania	*donovani*	Protozoa		2 implied		2
Leishmania	*ethiopica*	Protozoa		2 implied		2
Leishmania	*major*	Protozoa		2 implied		2
Leishmania	*mexicana*	Protozoa		2 implied		2
Leishmania	*peruviania*	Protozoa		2 implied		2
Leishmania	*spp.*	Protozoa		2		2
Leishmania	*tropica*	Protozoa		2 implied		2

[1] Basic genus and specie list is from ABSA 1998 with some additions.

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Table A-4. Parasites and Their Safety Classification

Genus[1]	Species[1]	Group[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Linguatula	*spp*	Arthropod				
Loa	*loa*	Helminth, Nematode		2 implied		2
Loa	*spp*	Helminth, Nematode		2 implied		2
Macracanthorhynchus	*spp*	Acanthocephala				
Mansonella	*ozzardi*	Helminth, Nematode				
Mansonella	*perstans*	Helminth, Nematode				
Microsporidium	*spp.*	Protozoa		2 implied		2
Naegleria	*fowleri*	Protozoa		2		2
Naegleria	*gruberi*	Protozoa		1		1
Naegleria	*spp*	Protozoa		2		1 or 2
Necator	*americanus*	Helminth, Nematode		2		2
Necator	*spp*	Helminth, Nematode		2		2
Onchocerca	*spp*	Helminth, Nematode		2 implied		2
Onchocerca	*volvulus*	Helminth, Nematode		2 implied		2
Opisthorchis	*felineus*	Helminth, Trematode				
Opisthorchis	*spp*	Helminth, Trematode				
Paragonimus	*spp*	Helminth, Trematode				
Paragonimus	*westermanii*	Helminth, Trematode				
Piroplasma	*spp*	Protozoa				
Plasmodium	*cynomologi*	Protozoa		2		2
Plasmodium	*falciparum*	Protozoa		2 implied		2
Plasmodium	*malariae*	Protozoa		2 implied		2
Plasmodium	*ovale*	PRotozoa		2 implied		2
Plasmodium	*simian parasites*	Protozoa		2 implied		2
Plasmodium	*spp*	Protozoa		2		2

[1] Basic genus and specie list is from ABSA 1998 with some additions.

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Table A-4. Parasites and Their Safety Classification

Genus[1]	Species[1]	Group[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Plasmodium	*vivax*	Protozoa		2 implied		2
Pneumocystis	*carinii*	Protozoa				
Sarcocystis	*spp*	Protozoa		2		2
Sarcocystis	*sui hominis*	Helminth, Cestode larva		2 implied		
Schistosoma	*haematobium*	Helminth, Trematode		2 implied		2
Schistosoma	*intercalatum*	Helminth, Trematode		2 implied		2
Schistosoma	*japonicum*	Helminth, Trematode		2 implied		2
Schistosoma	*mansoni*	Helminth, Trematode		2 implied		2
Schistosoma	*mekongi*	Helminth, Trematode		2 implied		2
Schistosoma	*spp*	Helminth, Trematode		2		2
Strongyloides	*spp*	Helminth, Nematode		2		2
Strongyloides	*stercoralis*	Helminth, Nematode		2 implied		2
Taenia	*saginata*	Helminth, Cestode				
Taenia	*solium*	Helminth, Cestode		2		2
Taenia	*spp*	Helminth, Cestode				2
Toxascaris	*spp*	Helminth, Nematode				
Toxocara	*canis*	Helminth, Nematode				2
Toxocara	*spp*	Helminth, Nematode				2
Toxoplasma	*gondii*	Protozoa		2 implied		2
Toxoplasma	*spp*	Protozoa		2		2
Trichinella	*spiralis*	Helminth, Nematode				2
Trichomonas	*vaginalis*	Protozoa				

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Table A-4. Parasites and Their Safety Classification

Genus[1]	Species[1]	Group[1]	Select Agents[2]	CDC Biosafety Level[3]	CDC Risk Group[4]	NIH Risk Group[5]
Trichostrongylus	*spp*	Helminth, Nematode				
Trichuris	*trichiura*	Helminth, Nematode				
Trypanosoma	*brucei brucei*	Protozoa		2 implied		2
Trypanosoma	*brucei gambiense*	Protozoa		2 implied		2
Trypanosoma	*brucei rhodensiense*	Protozoa		2 implied		2
Trypanosoma	*cruzi*	Protozoa		2 implied		2
Trypanosoma	*spp*	Protozoa		2		2
Wuchereria	*bancroftii*	Helminth, Nematode		2 implied		2
Wuchereria	*spp*	Helminth, Nematode		2		2

[1] Basic genus and specie list is from ABSA 1998 with some additions.

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[3] Biosafety Level is from CDC 1999 - all organisms shown require import or transfer permit from CDC

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APPENDIX B: ABNORMAL EVENTS INFORMATION

B.1 Potential Risk to Workers -- Laboratory-Acquired Infection

B.2 Potential Risk to Non-Workers from Contact with Biosafety Laboratory Workers

B.3 Accidents

Information derived for the accident analysis comes from publicly available literature with much of the data coming from the U.S. Army due to its premier role in the United States biological defense program which has been in existence for decades. This program, the U.S. Army Biological Defense Research Program (BDRP), is a research, development, test and evaluation (RDT&E) program conducted by the U.S. Department of Defense (DoD), with the Department of the Army (DA) serving as the executive agent. This program is conducted in accordance with 32 CFR 627 and under that scope (32 CFR 627.3) applies to all elements of the Army to include its contractors and subcontractors who use, produce, store, handle, or ship etiologic agents in support of the BDRP regardless of the source of the agent(s). This regulation essentially codifies the guidance of the CDC in its BMBL document (CDC 1999). This DA program has management responsibility for (1) the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), which is the lead laboratory in medical defense against biological warfare threats; (2) the U.S. Army Chemical Research, Development, and Engineering Command (CRDEC), which manages and conducts research, development, and engineering activities to provide non-medical defense against biological warfare threats; and (3) the U.S. Army Dugway Proving Ground (DPG), which is a major range and test facility supporting all DoD components and housing the Baker Laboratory Complex.

B.1 Potential Risk to Workers -- Laboratory-Acquired Infection

The potential for acquiring an infectious disease while working in a microbiological laboratory is significantly less than the occupational – related risks for healthcare workers. Indeed, the risk is very small if the appropriate microbiological facilities and containment devices are available, correct procedures and techniques are used, and adequate protective barriers are in place. These cautionary measures are needed because the quantities of microorganisms necessary for an infectious dose can be as little as one organism (Sewell 1995). Below, the historical perspective shows that in the early 1900s laboratory-acquired infections were common and pervasive throughout medical care facilities and laboratories. However, control of infection in laboratories has achieved a high level of sophistication to the point where virtually no reports of infection occur in biosafety laboratories in the United States today.

Historical Perspective In the last half of the 20th century the observations of physicians Oliver Wendell Holmes and Ignaz Semmelweis showed there was a connection between healthcare workers not washing their hands and patients acquiring certain diseases (Noskin and Peterson 2001). This started the concept of infection control which has subsequently driven equipment and facility design as well as the development of standardized procedures (CDC 1999; Collins and Kennedy 1999; Fleming et al. 1995; and Sewell 1995).

Since the early 1900s, various individuals conducted surveys or reported the connection between healthcare and laboratory workers contracting infectious diseases (CDC 1999; Collins 2000; Collins and Kennedy 1999; Pike 1979, 1976; Pike et al. 1965; Sewell 1995; and Sulkin and Pike 1951, 1949). The data they present are essentially published anecdotal reports, selected outbreaks with a specific microorganism, retrospective questionnaire-based surveys, and information presented at meetings related to laboratory-acquired infections and biosafety (Sewell 1995). These reports did result in the recognition that at least one primary route of transmission was aerosol, which in turn led to the development of the BSC. The consequence of using BSCs in laboratories was the later shift in focus from bacteria and rickettsia to viruses as the chief laboratory-associated infections. This is because the BSCs significantly reduced aerosol-induced infections to laboratory workers which were largely bacteria and rickettsia while the viruses are bloodborne and transmitted through contact (Sewell 1995).

During 1949 to 1974, the results of 3,921 infection reports were published in Health Laboratory Science journal (Pike 1976). As expected, bacterial infections were predominant with 1,669 cases (42.5 percent), followed by viral with 1,049 (26.7 percent), rickettsial with 573 (14.6 percent), fungal with 353 (9 percent), chlamydial with 128 (3.3 percent), parasitic with 115 (2.9 percent), and unspecified cases with 34 reports (0.9 percent). The bacterial infections were caused by various *Brucella* species, *Salmonella typhi, Franciscella tularensis,* and *Mycobacterium tuberculosis*. Also, 90 viral infections were described with 36 percent caused by the hepatitus virus and Venezuelan equine encephalitis (VEE) virus. The rickettsial infections were due largely to *Coxiella burnetii* (Q fever) and the fungal infections were mostly due to *Histoplasma capsulatum* and *Coccidioides immitis*. It was noted in these reports that after 1955, the total number and frequency of bacterial, chlamydial, and rickettsial infections declined dramatically (Pike 1976).

Since the 1970s, when CDC issued their *Classification of Etiologic Agents on the Basis of Hazard*, (CDC 1974), which was essentially equivalent to the *NIH Guidelines for Research Involving Recombinant DNA* (NIH 2001), there has been both a reduction in surveys and analysis while reports of laboratory-acquired infection dropped in the United States. The BSLs and procedures established by the HHS, Public Health Service, CDC, and NIH in their BMBL document (now in its fourth edition [CDC 1999]) have been commonly accepted by most laboratories since the 1980s and are required to be implemented by those handling select agents covered under 42 CFR 72. The knowledge, the techniques, and the equipment to prevent most laboratory infections are available (Pike 1979). There is some indication that this is true when one reviews the admittedly anecdotal literature from more recent periods. "Some laboratory-acquired infections are now history (Collins and Kennedy 1999). For example, since 1991…no new reports have been found of tularaemia, plague, leptospirosis, cholera and typhoid fever, nor of the many rarer viral infections." A recent bibliographic database (Collins 2000) starting with reports at the turn of the century and covering up through August 7, 2000, reveals substantial reductions of laboratory-acquired infections reported in the 1990s. There is a particularly notable lack of reported cases in the literature relating to laboratory-acquired infections in the United States during the last ten years.

The experience of the U.S. Army at their BDRP facilities over several decades provides further insight to the potential for laboratory-acquired infection. The DA program underwent a programmatic NEPA evaluation in 1989, the *Final Programmatic Environmental Impact Statement Biological Defense Research Program* (PEIS) (DA 1989). Since 1976, there have been no occurrences of overt disease in laboratory workers handling infectious organisms within the DA BSL-3 facilities, although in 1980, one focal infection with *F. tularensis* occurred at the site of a puncture wound (DA 1989)." There were also no deaths since 1964 (DA 1989). The PEIS (DA 1989) also estimated laboratory-acquired infection rates for its USAMRIID facility for different biocontainment levels (roughly equivalent to the CDC BSL levels) over different periods of time. For their BSL-3 equivalent laboratory operations from 1960 to 1962 they estimated there were six laboratory-acquired infections for a rate of 2 per million man-hours worked. For its BSL-4 equivalent laboratory operations from 1960 to 1969, DA estimated seven laboratory-acquired infections for a rate of 1 per million man-hours worked. These infections included subclinical infections and mild illnesses where hospitalization was not required (DA 1989).

Overall, the PEIS estimated the rate of public infection from USAMRIID as less than 0.001 per 1,000,000 person-years and the risk of death to a laboratory worker (for the "Defensive Research Period" 1970 to 1989) as 0.005 per 1,000,000 person-years (DA 1989). For the "Offensive or Weapons Period" (1954 to 1964) the values were about 5 orders of magnitude higher.

Routes of Exposure. The recognized routes of exposure for laboratory workers to contract infectious diseases is ingestion, inoculation, contamination of skin and mucous membranes, and inhalation (Sewell 1995). Today, many of these routes have limited potential because of facility design, equipment, and procedures. For example, some of the ingestion pathways are from mouth pipetting, contamination of articles or fingers placed in mouth, and consumption of food in the workplace. Due to the common acceptance of standard microbiological practices (CDC 1999) none of these should occur now. The primary routes of exposure remain inoculation

which occurs largely from the accidental needlestick, and inhalation from the numerous laboratory procedures which generate aerosols (Sewell 1995). Procedures which produce aerosols include, spontaneous discharge from a microbiological loop, the streaking of media, preparing microscopic slides, cooling a loop in culture media, and heating a loop in an open flame. Other devices often found in microbiological laboratories that can produce aerosols are centrifuges, blenders, homogenizers, shakers, sonicators, and mixers.

Small-Animal Handling. Small animals (rodents) used in research and development laboratories may host a variety of bacterial, viral, fungal and parasitic pathogens. However, it is possible to be virtually free of these pathogens if the laboratory adheres strictly to standard operating procedures (SOPs), maintains a high standard of quality for anything that enters the rodent facility (feed, bedding materials, and the animals themselves), utilizes rodent housing that allows for high standards of cleanliness for caging and ventilation, and overall containment design of the rodent facility.

One of the main risks to animal handlers and researchers comes from rodent allergens. Workers who are in regular contact with the rodents may develop sensitivities to them. Multiple independent studies have shown that about 21 percent of laboratory animal workers have laboratory animal allergy (LAA) (Fleming and Hunt, 2000). This may result in significant morbidity leading to reduced productivity and health care requirements. Immune responses to the allergens cause mucous production, swelling, and inflammation. The most common symptom is allergic rhinoconjunctivitis which results in nasal congestion, clear nasal discharge, sneezing, and itchy watery eyes. Skin reactions occur in about 40 percent of affected workers. These manifest as contact urticaria hives or eczema, a chronic itchy rash (Fleming and Hunt, 2000). Another immunologic respiratory disease which is less common is hypersensitivity pneumonitis resulting in acute flu-like symptoms to coughing and shortness of breath to an insidious wasting illness (Bascom 1996).

For mice (*Mus musculus*) there are three allergens: Mus m 1 (prealbumin) [hair, dander, and urine], Mus m 2 [hair and dander], and albumin [urine]. For rats (*Rattus norvegicus*) there are two allergens: Rat n 1A (pre-albumin) and Rat n 1 B (euglobulin) [hair, dander, urine, serum or saliva]. Highest exposures are to cage changers, room cleaners, and animal feeders. Allergen concentrations are higher with increased animal density and decreased relative humidity.

Workers with preexisting allergies or asthma are at increased risk of developing LAA (Fleming and Hunt, 2000). As expected animal handlers and caretakers develop allergic symptoms more frequently than those who do not work in direct contact, or put another way increased exposure correlates with increased symptom development. Animal cage technicians receive the highest exposure to allergens. For example, rat caretaking results in: cage cleaning mean allergen levels of 21 ng/m^3 (for rats) and maximum of 310 ng/m^3; handling 12 ng/m^3; surgery and sacrifice 3 ng/m^3 (Bascom 1996). Workers with the specific antibody to the allergen animal protein are 100 percent likely to continue to have allergic disease, and 10 percent would develop occupational asthma (Bascom 1996). Increasing the number of air-exchanges reduces the amount of allergen in the air and hence the worker exposure.

Aside from exposure to allergens, workers may also be exposed to zoonotic diseases. Research animal facilities have experience with *Brucella spp., Francisella tularensis, Mycobacterium tuberculosis, Salmonella spp., Shigella spp., Coxiella burnetii,* and hepatitis A virus, to name a few. Transmission of zoonotic disease in research animals that are naturally infected is rare with the exception of Q-fever and lymphocytic choriomeningitis. Pathogens transmitted by mice have included *Microsporum* and *Trichophyton, Leptospira interrogans, Salmonella spp., Shigella spp.,* and lymphocytic choriomeningitis (an arenavirus) (Bascom 1996).

Risk Associated with Biotoxin Research. There are three possible routes of exposure to these toxins which are inhalation, dermal absorption, and ingestion. Inhalation of bacterial exotoxins in the laboratory environment is very rare, and most are not readily absorbed through the skin (Fleming and Hunt, 2000). The highest likelihood of exposure is through the inadvertent needlestick (discussed earlier in this appendix). There is only one report of botulism associated with the handling of the agent or toxin in the laboratory and this occurred prior to 1950 (Fleming and Hunt, 2000).

Appendix I of the BMBL contains guidelines for work with toxins of biological origin. Work with most toxins can be performed safety in BSL-2 facilities using appropriate containment procedures and equipment unless the physical state of the toxin (e.g., a powder) or the volume requires handling in a BSL-3 laboratory (Fleming and Hunt, 2000). Volatility is not a concern with most toxins although it is recommended that open handling be done in a properly ventilated BSC to contain aerosols inadvertently produced. Inactivation of these toxins on surfaces can be easily accomplished with a 0.1 to 0.5 percent sodium hypochlorite solution, although sodium hydroxide and formalin are also effective. Temperatures in excess of 120^{o}C for a minimum of 20 minutes are also effective at inactivation of most proteinaceous bacterial toxins meaning that autoclaving would inactivate them. Fleming and Hunt (2000) provide guidance on working safely with biological toxins, their storage, personal protective equipment requirements, and means of inactivation.

Transfer of some toxins are exempt under the "select agent" rule (42 CFR 72.6). Those exempt are those used for biomedical research at an LD_{50} for vertebrates of no more than 100-ng/kg body weight. National standard toxins used for biological potency testing as described in 9 CFR 113 are also exempt.

B.2 Potential Risk to Non-Workers from Contact with Biosafety Laboratory Workers

One concern that members of the public may have is the potential for the proposed biosafety laboratory workers to inadvertently transmit diseases to other workers, family members, or the general public. Infectious agents may be transmitted through a variety of direct (communicable from one host to another) and indirect contact with an infected individual. It is by understanding the infectious cycle of the respective microorganism that is possible to identify the potential for transmission and means of mitigation. Some organisms require a vector, such as a flea, tick, or rodent, to transmit the infectious agent from one person to another. Other infectious micro-organisms are directly contagious from one person to another. "Organisms that survive primarily or entirely in the human host and are spread through sexual contact, droplet nuclei, and close physical contact can be readily carried to any part of the world. For example, Acquired Immune Deficiency Syndrome (AIDS), tuberculosis, measles, pertussis, diptheria, and hepatitis B are easily spread…Organisms that have animal hosts, environmental limitations, arthropod vectors, or complicated life cycles become successively more difficult to "transplant"…Epidemics of dengue fever and yellow fever cannot appear in a geographic area unless competent mosquito vectors are present. Schistosomiasis cannot spread in an environment unless a suitable snail intermediate host exists in that region" (Wilson 1995).

The tools to deal with transmission issues are vaccines and drugs, and vector-control methods such as pesticides. Of course, the primary means of defense is to limit all contact with infectious organisms and insure that they are destroyed or inactivated when they are on environmental surface or disposed in waste while still in the laboratory.

Historical Perspective. The literature is confusing with regard to the transmission of infectious agents between laboratory workers and the outside. Unfortunately, some of these infections have been transmitted from those workers to members of their families and to others outside the laboratory (Collins and Kennedy 1999). No specific statistical information was readily available on this subject. The only information specific to this is found in the information from the DA and the CDC.

According to the U.S. Army PEIS for the BDRP, there have never been any occurrences of infections in non-laboratory workers or in the general community arising from organisms handled in its BSL-3- or BSL-4-equivalent facilities associated with the BDRP (DA 1989). Similarly, discussion with the CDC in Atlanta about its BSL-3 and BSL-4 laboratories revealed that they have never had a documented case of a laboratory worker's family members or other members of the public acquiring a disease associated with its laboratory operations (PC 2001a).

B.3 Accidents

Accidents associated with microbiological laboratories are generally thought of in terms of what might be considered routine accidents that have a reasonable probability of occurrence, but a very low consequence. These accidents would be leaking specimen/sample containers, spills involving broken glass or other containers, spillage and breakage in BSCs and centrifuge accidents (Collins and Kennedy 1999). Many of the laboratory-acquired infections may have resulted from these types of routine minor accidents. A literature search and discussions with laboratory regulators (such as the CDC, NIH, and the U.S. Army) revealed no examples of infectious materials released due to catastrophic accidents involving microbiological laboratories. In referring to these events the Army states that "The likelihood of such catastrophic occurrences is too small to be considered as reasonably foreseeable. No such event has occurred in the more than 50 years in which the military has been conducting biological defense activities (DA 1989)."

Historical Perspective. Researchers and preparers of infection incident summaries compiled information on accidents related to laboratory operations and specifically laboratory-acquired infections relating to accidents. In the review of 3,921 laboratory infections reported, 59 percent occurred in research laboratories (Pike 1976). About 70 percent of these resulted from working directly with infectious agents, some involving infectious aerosols (13 percent), and some from accidents (18 percent) (Sewell 1995). Overall, accidents were the second greatest source (initiator) of infections. Seventy percent of them were due to accidental inoculation (over 40 percent) with the remaining due to splashes and spills (about 30 percent). Another potential aerosol-producing accident, centrifuge accidents, results in relatively few laboratory-acquired infections, but a single incident often exposes several individuals (Sewell 1995).

The U.S. Army's extensive experience (DA 1989) can be helpful in evaluating the potential for accidents involving infectious agents. The PEIS states "there have been laboratory accidents that resulted in potential exposures; however, prior immunization or immediate treatment with the appropriate therapy has averted the possible development of clinical disease…(DA 1989). The outstanding safety record (no illness resulting from laboratory exposure to agents or toxins in the last 10 years) at USAMRIID…and DPG…is indicative of how safely research with hazardous infectious organisms can be conducted. They additionally state that there have been no accidents or incidents among laboratory workers, their close associates, or the general community from the biological materials used specifically in the development of rapid diagnosis and detection systems (DA 1989). The Army further noted that during its many years of operations at Fort Detrick, they did not cause a single case of infection in the surrounding community (up through 1989). A more recent case of human glanders did occur there (CDC 2000c) but the individual recovered due to effective treatments.

Accident Scenarios from other NEPA Documents. Various NEPA accident scenarios have been postulated for infectious agents in BSL-3 laboratories (BMI 1993; DA 1989, 1992, 1996). Three of these NEPA documents present accident analyses which are termed as maximum credible events (MCE). The analysis of MCEs are required under the U.S. Army regulations (32 CFR 627). The documents described the MCEs as realistic events that have some probability of occurrence and resulting in maximum potential consequences. Two of these documents are EAs

for relatively small operations (BMI 1993 and DA 1996). The other two are EISs, one for a military installation (DA 1992) and the other a PEIS for the entire U.S. Army BDRP (DA 1989). Each accident approach is described briefly, except for the PEIS accident which is described in more detail.

The first, scenario for a BSL-3 facility in Ohio (BMI 1993), involved an accident that resulted in a release of exotoxin from the common soil pathogen, *Clostridium botulinum*. Three different toxins were planned for use in the facility (botulinum, ricin, and *Staphylococcal* enterotoxin B), but botulinum toxin was chosen because it was determined to be the most toxic of the three. The scenario involved the release of an aerosol equivalent in amount to one of their standard tests in the interior of a Class III BSC followed by release through the cabinet filtration system. The BSC exhausts through two HEPA filters in series with each removing 99.97 percent of the aerosol. The EA analysis also considered an accident relating to microorganism handling in which the organisms were not contained within a BSC as not being a credible accident since the only open culture handling, including packaging and un-packaging, is done inside their BSCs. They similarly discounted fire, explosion, loss of ventilation control, airplane crash, earthquake, and flooding as also not being credible events to initiate accidents. They determined that there was no effect on humans due to the release which was several orders of magnitude lower than the no-effect dose (BMI 1993).

The second EA involves the Armed Forces Institute of Pathology (AFIP) at Fort Detrick in Frederick, MD (DA 1996). This facility handles primarily *Brucella spp*. bacteria, which are normally transmitted by direct contact with the secretions of body fluids, aborted fetuses of infected animals, and by ingesting contaminated meat. *Brucella* is virulent (readily able to cause disease) and the infective dose can result from less than 10 microorganisms (DA 1996). While not explicitly stated, an accident analysis was not performed for the EA since the anecdotal information suggests there should be no reasonable probability of an accident event. Only one presumptive case of Brucellosis infection is identified in a worker (blood test suggested exposure but culturing could not prove the presence of the organism) but did not result in development of the disease. No incidence of secondary transmission of disease to those outside of the AFIP laboratory has been reported (DA 1996).

The third NEPA document is the EIS for the Life Sciences Test Facility at the Dugway Proving Grounds (DA 1992). This document reviewed accident scenarios and identified those considered by the DA to be reasonably foreseeable. The review covered two intentional release scenarios, ten accidental release scenarios, and six unexpected external event scenarios. The only scenario determined to be reasonably foreseeable was laboratory-acquired infection. This facility is also part of the Army's BDRP and is also discussed in the PEIS.

In the fourth NEPA document the DA considered an MCE analogous to a "worst case analysis" in Appendix A9 of the PEIS (DA 1989). However, the PEIS states:

"It has been determined that releases of aerosols of biological materials from facilities performing BDRP studies under appropriate containment conditions are not reasonably foreseeable. Catastrophic events, such as an airplane crash directly on a facility, have been perceived as a potential cause of aerosol release; however, it has been determined that the

probabilities of such events are too small to be considered reasonably foreseeable and/or the quantity of organisms on hand are too low to be of any risk from such an event…For the purpose of perspective and information, this appendix also presents estimates of the extent of potential impacts, under various conditions, resulting from the accidental releases of biological aerosols from the primary BDRP facilities. The findings are presented even though the event or series of events are not considered to be reasonably foreseeable. These estimates support the determination that such events would be noncatastrophic. Since the estimates show impact would occur only within the primary site boundaries…or within a few meters for other sites, they are not of catastrophic dimensions. The estimates also respond to the reasonable public interest in what might happen if the unforeseeable does occur and in whether the public would be at risk. The conclusion reached is that they are not."

The MCE bioagent accident from the PEIS (DA 1989), Appendix A9 is presented as follows:

Initial conditions:

- A typical BSL-3 equivalent laboratory exists at USAMRIID and is designed to exceed CDC guidelines.
- A centrifuge, the key piece of equipment in this scenario, is in a room and not in a BSC.
- The size of the room is 1,080 ft^3 (30,240 liters), but since the room is under negative pressure and air flow is continuous, the volume of the duct from the room leading to the filter is also included (608 ft^3 or 17,024 liters) for a total volume of 1,688 ft^3 (47, 264 liters).
- The BSL-3 equivalent laboratory centrifuge room exhausts air via two filters in series, which are conservatively estimated to have 95 percent particulate removal efficiency, and air then exits through a roof stack.
- The only microorganism handled in the laboratory is a Rickettsial organism, *Coxiella burnetii*, which causes Q-fever, this organism is hardy and withstands laboratory manipulation with little or no loss in viability, is highly stable in aerosols and dies at a rate of about one percent per minute over a wide range of humidities (30 to 85 percent relative humidity) and temperature (0 to 30 ^oC). It is extremely infectious in a small particle aerosol.
- A single worker is working with one liter of *Coxiella burnetii* slurry.
- The worker places 165milliliters of slurry into each of six 250-milliliter polypropylene centrifuge tubes AND fails to insert O-rings or tighten the centrifuge caps which are screw-on.

Accident scenario:

The centrifuge is turned on at 10,000 revolutions per minute for 30 minutes

- All six tubes leak;
  - *Some slurry leaks into the rotor.*
  - *Some slurry leaks into centrifuge compartment.*

- *Most of the slurry remains in the tubes.*
- *Most of the slurry that leaked into covered rotor is not aerosoloized (99 percent).*
- *Only a fraction of the slurry that leaked into the centrifuge cabinet is aerosolized and 90 percent of that settles as droplets inside the chamber.*

- A few minutes after the centrifuge stops, the worker opens the centrifuge and reaches in to remove the rotor;

  - *He notices leak.*
  - *He gets assistance of two co-workers to help him manage the spill.*
  - *Four more workers enter the laboratory not knowing of the accident.*
  - *All seven workers may have been exposed to a dose of organisms sufficient to cause infection in unimmunized individuals.*

- The slurry is thixotropic (much like egg white) but due to centrifuging has a reduced viscosity (20 to 25 centipoise) containing about 20 percent dry solids.

- The percent aerosol recovery (aerosol efficiency is defined as the number of infectious doses of *Coxiella burnetii* rendered airborne in a one- to five-micron particle size) representing the maximum infectivity for man is determined to conservatively be 0.1 percent.

Result to the Workers:

- The accident immediately produces 9.9×10^9 airborne human infective doses at a 50 percent rate for contracting the disease (HID_{50}) contained in a 3x3x3-foot area above and around the centrifuge (756 liters).
- There are 1.3×10^3 HID_{50} per liter of air in the seconds after the lid was opened.
- The centrifuge operator, excited by the accident, was breathing 15 liters of air per minute and was in the confined aerosol for no more than 5 minutes and could have inhaled about 100,000 HID_{50}.
- The two co-workers coming to the operator's assistance were exposed to only a slightly less dose than the centrifuge operator.
- The other four workers were exposed for less than 1 minute to the aerosol after it was dispersed in the room and are unlikely to have been exposed to more than 100 to 300 HID_{50}.

Result to the General Population and Surrounding Environment:

The result to the general public was evaluated using a simple Gaussian plume-dispersion air model. In this type of model the downwind distance that a given concentration of microorganisms would travel is a direct function of the emission rate and an inverse function of the lateral and vertical dispersion and wind speed. Higher rates of emission result in greater downwind distances for a given concentration. Similarly, lower lateral dispersion, vertical dispersion, or wind speed result in greater downwind concentrations. Downwind concentration

is decreased as a consequence of environmental degradation (e.g., from oxygen and ultraviolet light). Modeling assumptions used were:

- The maximum number of aerosolized infectious doses presented to the filters is 9.9×10^5 HID_{50}.
- After passing the 95% efficient filters the accident releases 5×10^4 infectious doses.
- The release is a daytime event since that is when the work is done.
- The breathing rate is 15 L/min.
- The lung retention of respirable particles is determined to be one-half or less of the intake.
- A Pasquill stability class D is used which "is the most stable one which can occur during the day."
- The mixing layer depth is 100 m for stable conditions.
- Lateral and vertical dispersion coefficients used are 9.02 m and 6.5 m, respectively. (Chosen for open level-terrain which is more conservative)
- The wind speed is 4.5 mph.
- The quantity of human infective doses, by simple Gaussian plume dispersion models, is expected to be dissipated to:
  - *Less than 1 HID_{50} in 1 liter (L) of air at a distance of less than 2 m from the stack,*
  - *Less than 0.1 HID_{50} in 1 L of air at a distance of 16 m from the stack, and*
  - *Less than 0.01 HID_{50} in 1 L of air at a distance of 38 m from the stack.*

Of the rickettsial agents, *Coxiella burnetii* probably represents the greatest risk of laboratory infection, according to the CDC. The organism is highly infectious and remarkably resistant to drying and environmental conditions. The infectious dose of virulent Phase I organisms in laboratory animals has been calculated to be as small as a single organism. The estimated HID (25-50) (inhalation) for Q fever is 10 organisms…Q fever is the second most commonly reported laboratory associated-infection (CDC 1999). The CDC and the WHO identify Q fever as a disease most commonly contracted occupationally by those working with livestock handling and processing, and those in laboratory and veterinary practice (CDC 2001b; WHO 1999).

Men who were previously vaccinated and then exposed to aerosols of 150 or 150,000 infectious doses of virulent *Coxiella burnetii* did not consistently become ill (Benenson 1959). Therefore, since the centrifuge operator would have been vaccinated as a requirement of employment, it is questionable whether he would contract the illness. Antibiotic treatment (doxycycline), soon after exposure, significantly decreases the chances of developing symptoms of the disease (Benenson 1959).

The DA conclusion for its MCE showed that the only worker to conceivably contract the illness as a consequence of the accident would be the centrifuge worker, and even that individual would likely not become ill.

APPENDIX C: **Public Comments on the EA**

C.1 Response to Public Comment Letters/Email Messages

In response to a September 16, 2003 lawsuit filed in Federal District Court challenging the adequacy of the 2002 EA, the Court ruled that the EA was adequate. In response to an October 2006 appeal by the Plaintiffs, the Ninth Circuit concluded that while DOE did take a hard look at identified environmental concerns and that its decision was fully informed and well-considered, the DOE did not consider whether the threat of potential terrorist activity necessitates the preparation of an environmental impact statement and thus remanded the matter to the DOE. In response to this ruling and new DOE guidance, DOE has revised the 2002 EA to consider the potential impacts of terrorist activity. The revised Draft Environmental Assessment (EA) was made available for public comment from May 11, 2007 to June 11, 2007. Over 80 comment responses were received from residents of 8 different states and the District of Columbia.

For this document, the public comment appendix from the 2002 EA has been supplemented to include a summary of additional public comments that provided new information pertinent to the proposed action or expressed concerns that were not previously responded to in the original document. Letters and emails providing comments on the Revised EA are included in Section C.2.

1. NEPA COMPLIANCE: DOCUMENTATION/REVIEW LEVEL.

Several commenters expressed the opinion that a BSL-3 facility at LLNL would allow for experiments with a broad spectrum of biotoxins and biological materials/agents. They believed that this would be a new program for DOE and LLNL that, if inadequately analyzed before proceeding, could endanger the workers and the community. Commenters indicated that the draft EA provided only boilerplate assertions that the risks would be negligible, and relies on adherence to procedures, some of which DOE laboratories have not followed in the past according to the commenters. Consequently, they believe that a further environmental review in the form of a project-specific Environmental Impact Statement (EIS) should be conducted. Some of the same commenters were of the opinion that the proposed project represents an integrated new program area for the DOE, and as such, a Programmatic EIS (PEIS) should be prepared to review the effects of undertaking work in this “new” mission area. Several commenters expressed the opinion that the purpose and need for the proposed action at LLNL is without precedent, and the commenters called for a complete NEPA review (PEIS) of the NNSA Chemical and Biological National Security Program (CBNP) which some referred to as the “Chemical and Biological Nonproliferation Program.”

One commenter expressed the opinion that "… analysis of terrorist risk at a BSL-3 facility is far too significant to be performed using an interim guidance, which does not include the full requirements and which may be changed in the final guidance. DOE/NNSA must withdraw this revised EA and release a second revision of the EA for public review following the finalized guidance."

Several commenters noted that NNSA withdrew the EA for the BSL-3 facility at the Los Alamos National Laboratory (LANL) and is currently preparing an Environmental Impact Statement. Commenters suggested that since NNSA is preparing an EIS for the LANL BSL-3, NNSA should prepare an EIS for the LLNL BSL-3.

Response

LLNL has been a national focus of bioscience research for almost four decades. Bioscience researchers at LLNL already safely conduct research at BSL-1 and BSL-2 levels in disease susceptibility, prevention, diagnosis, treatment, and rehabilitation and in support of National Institutes of Health (NIH), DOE, and NNSA mission requirements, LLNL already works on research aimed at detection and identification of biological warfare agents. The Biology and Biotechnology Research Program (BBRP) at LLNL also contributes to a number of high-profile national-level efforts in both health-related bioscience research and in developing defenses against the potential use of biological-warfare agents against either our civilian population or military forces. This work involves close cooperation with other national laboratories, DOE, and other agencies (e.g., health, military, and law enforcement). Currently, research conducted at the existing LLNL BSL-2 laboratories involves anthrax (Bacillus anthracis) and plague (Yersinia pestis). This research includes supporting development of tests for quick identification of plague based on a DNA signature and the development of decontamination reagents. Operation of a BSL-3 facility would not constitute a new or unique role for LLNL, would not be inconsistent with existing DOE mission work, and would not be unique or without precedent.

The EA analysis considered effects relating to human health, ecological resources, air quality, noise, waste management, soils, geology, and seismology. Effects to these resource areas were minor in nature. Human health effects are expected to be no different from those at other U.S. Centers for Disease Control and Prevention (CDC)-registered laboratories operated according to CDC and NIH guidelines. Those laboratories experience very infrequent worker accidents with minor or no consequences to workers and members of the public. Socioeconomics, visual resources, transportation, utilities and infrastructure, cultural resources, environmental justice, and environmental restoration resources were identified as being unaffected by the construction and operation of the BSL-3 facility; or as being minimally affected and inherently mitigated by the project design; or as being minimally affected and temporary and intermittent in nature. Because the potential effects of the project are not significant in terms of context and intensity, the NNSA has concluded that the potential project effects do not require preparation of a project-specific EIS.

When considering the issue of preparing a programmatic NEPA analysis, a Federal agency must determine whether the program in question meets the Council on Environmental Quality (CEQ's) NEPA Implementing Regulations (40 CFR 1508.18(b)(3)) definition of a major federal action, which includes the: "Adoption of programs, such as a group of concerted actions to implement a specific policy or plan; systematic and connected agency decisions allocating agency resources to implement a specific statutory program or executive directive." These regulations also address when an agency must prepare a programmatic analysis, including the analysis of cumulative effects. A programmatic analysis is necessary where the proposals for federal action "are related to each other closely enough to be, in effect, a single course of

action." Additionally, the CEQ regulations speak to the scope of NEPA EISs (40 CFR 1508.25(a)(1)) and to connected actions such as those that "automatically trigger other actions which may require EISs"; "cannot or will not proceed unless other actions are taken previously or simultaneously"; or "are interdependent parts of a larger action and depend on the larger action for their jurisdiction". DOE and NNSA conduct biological research at various facilities across the DOE complex of national security laboratories and other research institutions. This research began in the late 1940s when the DOE's predecessor agency recognized the need for obtaining information about the effects of radiation on humans and other biota. As an outgrowth of this research, many individual studies and research projects have been conducted over the years both for the benefit of DOE (and its predecessor agencies) and as "work-for-others" projects with sponsors from the private sector and other Federal agencies. Each of DOE's facilities has developed specialized areas of focus and expertise and on some occasions have contributed their expertise to performing portions of work that has been pulled together to answer complex questions or reach complex goals, such as work performed recently to map the human genome. At this time, the NNSA believes that these research efforts consist of projects too diverse and discrete to constitute either a "major Federal action" or activities sufficiently "systematic and connected" so as to require a programmatic NEPA analysis, especially an EIS. Not only are the research projects diverse, they are discrete and independent in nature. They are separately operated and approval of one project does not insure the approval of other similar projects. Success in one project area does not invariably affect the variety or direction of NNSA's research, in as much as NNSA's research program is largely reactive, designed to respond to the needs of NNSA, DOE, and other user groups and consumers. While DOE responded to the 1996 Congressional passage of the Defense Against Weapons of Mass Destruction Act, which authorized the DOE to establish a Chemical and Biological Weapons Nonproliferation Program (now known as the Chemical and Biological National Security Program), its research has continued to build upon existing research expertise present at its various research institutes. DOE and NNSA have not expanded their research such that their projects are concerted or systematic and connected. Mere commonality of objectives is insufficient under the CEQ's NEPA Implementing Regulations to constitute a "major Federal action" requiring NEPA compliance in the form of a programmatic NEPA analysis. While NNSA's biological research projects all pertain to biota and are ultimately directed toward the support of NNSA's national security mission, these rudimentary similarities are not sufficient to bind the universe of research projects conducted by DOE and NNSA into a "program" as this is identified by the CEQ's NEPA Implementing Regulations (40 CFR 1508.18(b)(3)). NNSA is therefore of the opinion that no programmatic NEPA analysis is necessary at this time for biological research conducted at its facilities and this EA is sufficient to meet NNSA's NEPA compliance requirements with regard to the construction and operation of the proposed BSL-3 facility at LLNL.

On December 1, 2006, the DOE Office of NEPA Policy and Compliance issued a memorandum on the subject "Need to Consider Intentional Destructive Acts in NEPA Documents". This document provided guidance on the need to analyze intentional destructive acts in NEPA documents. The document states "While … further guidance is in preparation, DOE NEPA practitioners should immediately implement the guidance in this notice to explicitly consider the potential impacts of intentional destructive acts in NEPA documents…". It is therefore

appropriate and consistent with the intent of the memorandum to develop this EA using the guidance provided by that document.

The "Notice of Intent To Prepare an Environmental Impact Statement for the Operation of a Biosafety Level 3 Facility at Los Alamos National Laboratory" from the Federal Register (Vol. 70, No. 228, November 29, 2005) explains NNSAs basis for determining that an EIS should be prepared for the LANL facility. In 2002, prior to constructing the facility, NNSA analyzed the project pursuant to NEPA and determined that an EA appropriate level of review. An EA was prepared and a Finding of No Significant Impact (FONSI) for the construction and operation of the facility was issued. After completion of the NEPA process and facility construction, NNSA identified new information concerning the BSL–3 Facility. NNSA determined that it was necessary to conduct additional seismic analysis of the location of the building on fill material on the sloping side of a canyon. Therefore, in early 2004, NNSA withdrew the portion of the FONSI that dealt with the operation of the BSL–3 Facility, and announced that it would prepare a supplemental EA on its proposal to operate the facility. In January 2005, NNSA published a Notice of Intent to prepare a Supplemental Site-wide Environmental Impact Statement (S–SWEIS) for the continued operation of LANL. The notice stated that if a FONSI for operation of the BSL–3 Facility could not be issued, the analyses of the potential impacts of operating this facility would be included in the S– SWEIS. NNSA then decided to prepare a new Site-wide EIS for LANL (SWEIS) rather than to supplement the 1999 SWEIS instead of a S-SWEIS. The Federal government, and in particular the intelligence community, was concerned that any delays in the schedule for the SWEIS could further delay a decision on whether to operate this critical homeland security facility. Because of these events, NNSA decided that preparation of an EIS was appropriate for operation of the LANL BSL–3 Facility and that this analysis should be conducted separately from the new SWEIS. This decision is not pertinent to the NNSA determination that an EA is the appropriate level of NEPA documentation for the LLNL BSL-3 Facility.

2. SAFETY OF LABORATORY OPERATIONS

Several commenters expressed the general opinion that LLNL has a history of leaks, spills, fires, explosions and accidents. They indicated that this information concerning operational history is relevant but is not included in the draft EA on DOE's response to build and operate a BSL-3 facility. Commenters also stated that the CDC is more qualified than LLNL and they should be handling the BSL-3 research. Commenters expressed the opinion that issues of safety of lab operations are especially important in light of the February 2001 DOE Office of Inspector General (IG) report entitled "Inspection of Department of Energy Activities Involving Biological Select Agents." Some commenters also felt that it is "a huge leap between BSL-2 and 3 facilities" and that "safety measures and procedures… are vastly different, as are the risks." Another commenter stated in reference to the IBC that "there is no indication whether there will be a process to guarantee full public scrutiny of committee deliberations."

Comments on the Revised Draft EA did not express any new concerns or provide information that was new and pertinent to the safety of laboratory operations. However, DOE received additional comments after the public comment period regarding the laboratory-acquired

infections. In response, additional information discussing laboratory-acquired infections since 2002 was provided in Section 4.2.2.2 "Analysis of Abnormal Events and Accidents for Facility Operation".

Response

Since it was founded in 1952, LLNL has been managed by the University of California. While mistakes, accidents, leaks, and spills will inevitably occur, LLNL is committed to providing employees and the community with a safe and healthy environment. LLNL has had an infrequent history of incidents and none has resulted in a significant impact to the public or the environment. In 2000, DOE's Integrated Safety Management System (ISMS) was implemented at LLNL, resulting in better safety practices and greater safety awareness. A DOE Verification Team inspected safety procedures at 25 facilities across the Laboratory, reviewed over 700 supporting documents, and determined that LLNL effectively implemented ISMS. The response to comment 11 (Waste Disposal) below discusses LLNL's compliance with permit limits for discharges into the sanitary sewer (between 99 and 100 percent compliance from 1996 to 2000) and LLNL's record of inspections for compliance with the California Medical Waste Management Act. As discussed in Section 4.1.2 of the Draft EA, LLNL has operated BSL-1- and BSL-2-equivalent laboratories for the last 20 years without any infections associated with their operations and no unintentional releases to the environment or to the public.

The CDC, which is part of the Department of Health and Human Services, provides guidelines for the operation of BSL-3 facilities, registers facilities that will access, use and transfer select agents, and then periodically inspects these facilities during operation. The CDC through the Antiterrorism and Effective Death Penalty Act of 1966 (See Appendix A-2) controls the transfer and receipt of select agents. As described in Appendix A-1, each successive CDC-defined biosafety level builds upon the previous level practices, safety equipment (primary barriers), and facility requirements (secondary barriers). These practices go, for example, from limited access to controlled access, decontamination of only "needed waste" to all waste, and defining medical surveillance requirements to requiring specific baseline serum. Safety equipment requirements for BSL-2 and BSL-3 laboratories are the same, except that in a BSL-2 facility the biosafety cabinets (BSC) are required only for manipulations of agents that cause splashes or aerosols of infectious materials. In a BSL-3 facility all open manipulations are conducted in a BSC. BSL-3 laboratories within facilities need physical separation of areas, self-closing double-door access, and controls on ventilation systems that do not permit air recirculation and have negative airflow into BSL-3 laboratories. BSL-2 laboratories do not have these requirements. Therefore, the engineering controls built into a BSL-3 facility are significant, but there is not a huge technological difference between a BSL-2 facility and a BSL-3 facility. LLNL institutionally uses the same types of facility controls in its other facilities.

CDC laboratories perform work that is different from the research work performed at LLNL. The CDC contracts with DOE and NNSA facilities, as well as with other government and private facilities (due to their capabilities), to perform much of its needed research work, rather than duplicating the research expertise of these agencies within the Department of Health and Human Services. While it is the opinion of some commenters that only the CDC should perform this work, this is neither cost effective nor practical. (Safety measures are discussed further under the response to comment topic 5).

The IG report cited by the commenters (DOE/IG-0492 dated February 2001) states at the beginning of the Observations and Conclusions Section: "We found no evidence that the Department's current biological select agent activities have adversely impacted the safety and health of DOE and contractor employees or the public". The IG observed that the Department had not developed and implemented policies and procedures that establish clear roles and responsibilities for the conduct of activities involving biological select agents and select agent materials. Additionally, the IG stated their opinion that the Department had not ensured that DOE laboratories, including those managed by the NNSA, follow "best practices" for the operation of these facilities. The concluding section of the IG Report, "Inspector Comments", contains the statement: "We believe the corrective actions identified by the Department are responsive to our recommendations." By the date of issuance of the IG report in February 2001, the DOE had already corrected identified problems associated with its management of facilities at which biological select agent work is conducted. At the time of the IG inspection, LLNL had already incorporated the provisions of the CDC/NIH Guidelines into its work standards for operation of its BSL-2-level facilities and was compliant with its provisions. The IG report had no adverse findings with regard to LLNL activities involving operation with biological select agents. DOEs operating contract with the University of California (UC) also requires that LLNL implement the CDC/NIH Guidelines through their Work Smart Standards and their ES&H Manual.

The currently established Institutional Biosafety Committee (IBC) will have authority over approving projects conducted at the proposed BSL-3 facility at LLNL, as it does for current BSL-1 and BSL-2 operations at LLNL. (The role of the IBC is discussed further under the response to comment topic 4 below.) NNSA will maintain strict adherence to the CDC and NIH guidelines for operating a facility of this nature. DOE oversight actions would also continue to be responsive to the recommendations made by the IG report.

(Additional responses related to safety are discussed under comment topic 5 and security measures are addressed in comment topic 7 below.)

3. DEFENSIVE- VS. OFFENSIVE-ORIENTED RESEARCH

Several commenters expressed their concerns about siting a BSL-3 facility at a nuclear weapons design lab. The commenters questioned how the DOE would prove that this new work with bio-agents is defensive and would not be used in the future for the manufacture of biological weaponry. The commenters expressed their opinions that the proposed culture of some organisms (*Brucella spp., Coccidiodes immitis*) suggests the potential development of agents that could aid U.S. offensive military operations. Commenters also expressed concerns about collocating a BSL-3 facility close to the existing LLNL Environmental Microbial Biotechnology Facility (EMBF), suggesting that it implied existence of future operation of an offensive biological weapons program at LLNL. The commenters were of the opinion that, since the EMBF is a biological fermentor with a capacity in excess of 1500 liters, the facility could be used for industrial-scale production of biological select agents with weapons applications. Commenters cited the proposed production of up to one liter of biological agent at the BSL-3

facility as excessive for defensive research purposes, suggesting that gram or sub-gram quantities of any agent are sufficient for such research. The proposed rodent aerosol challenge tests prompted commenters to infer that this would necessitate weaponization of agents and could pose increased dangers to workers and the public. It was the commenters' opinion that the Draft EA failed to address the risks posed by the aerosolizing, or as the commenter alleges: "weaponization." Another commenter stated that the proposed facility is not a small facility based upon CDC definitions (42CFR72.6(j)). One commenter expressed the opinion that, in addition to a Programmatic NEPA review of DOE's biological warfare defense research, a Nonproliferation Impact review should be conducted.

Commenters expressed similar concerns about the Revised Draft EA. Several commenters noted that other NNSA documentation describing the BSL-3 Facility list storage capacities of up to 25,000 2 ml vials and expressed a concern that the total capacity of the facility is therefore 100 liters of biological material.

In other commenter's opinions, the Revised Draft EA should include a Nonproliferation Impact Review that includes public participation because "This open process is critical because intent really is the biggest differentiating factor between defensive and offensive biological research."

Response

NNSA acknowledges that many people are opposed to the research, development, and testing of nuclear weapons, weapons research, and testing using live microorganisms. However, Congress directs DOE and NNSA with regards to the missions, and work performed at their facilities must support congressionally mandated missions. Similarly, the Department of Defense (DoD) must respond to its Congressionally assigned missions. Departmental mission support activities have necessitated biological research projects in the past, and this requirement will likely continue into the future for elements of both departments. As discussed in the response to comment topic 1 above, defensive biological research is ongoing at LLNL, is performed in support of DOE and NNSA mission requirements, and would not be inconsistent with existing DOE mission work.

NNSA also acknowledges that certain individuals might see the proposed BSL-3 facility as adding to the perception that the U.S. plans to prepare bioweapons for development of an offensive capability. However, the U.S. is a signatory to the Biological and Toxins Weapons Convention Treaty and has agreed that this nation shall not perform the actual development and production of bioweapons. Additionally, all such U.S. offensive capabilities were destroyed and offensive-oriented research was halted after the 1969 Presidential decision. Nonetheless, if the U.S. were indeed now planning a major departure in its 33-year-old policy on offensive capabilities, such work would require a facility with different functional capability and of a larger size than the proposed three-laboratory room BSL-3 facility. The microbiological research sample preparation equipment being proposed for the LLNL BSL-3 laboratory would not be the correct type needed to support a bioweapons production facility. Unlike the proposed BSL-3 facility at LLNL, a bioweapons production laboratory would require much more floor space to accommodate a sizeable worker staff and multiple pieces of specialized equipment. DOE does not now, and does not propose to, conduct research or engage in preparation or production of biological materials or toxins for potentially offensive use or purposes at LLNL and it would not be allowed under the Biological Weapons Convention.

It is true that a number of organisms that could potentially be used in research at the proposed BSL-3 facility, including the organisms mentioned by the commenter, could have offensive uses. But research currently being conducted by LLNL and proposed research in a BSL-3 facility would be for defensive purposes. For example, work conducted at LLNL by the Biology and Biotechnology Research Program (BBRP) in 2001 was focused on two areas: advanced detection systems to provide early warning of an attack; to identify the populations at risk, contaminated areas, and facilitate prompt treatment; and to develop DNA signatures and biological forensics technologies to identify the agent, its geographical origin, and/or the initial source of infection. Work in the proposed BSL-3 facility is limited to quantities less than 10 liters (working with over10 liters of culture quantities defines the NIH threshold for a "large-scale research or production" facility). The proposed BSL-3 facility and its operation would be limited to less than 1 liter of cultured microorganisms as the maximum quantity handled in any BSL-3 laboratory room at any point in time. Some research that the proposed facility would conduct requires growth media of up to "liter-size" quantities in order to have sufficient material from which to extract enough genetic material to conduct certain types of genetic research such as that involving messenger RNA. Additionally, organisms such as Coccidiodes immitis, already being investigated by LLNL, are locally important (Valley fever or San Joaquin fever) and research on this is public health related and extremely important to California and the nation at large. DOE believes that work conducted in the facility will not lead to proliferation of offensive biological weapons capabilities and that the EA makes it clear that the proposed facility is not designed as a production facility for offensive research or weapons production. With regard to the additional need for a "Nonproliferation Impact Review" the NNSA is of the opinion that none is required. While NNSA will ensure that the proposed facility would comply with the BWC there is no formal process requiring a "Nonproliferation Impact Review" per se and therefore none would be implemented by the NNSA.

There is no affiliation between the EMBF's 1500-liter fermentor and the proposed BSL-3 facility. The EMBF was established for the investigation, development, and growth of microorganisms that have environmental remediation applications. The facility can also be used for other biotechnological studies, such as the production of microbial pharmaceuticals and food additives. However, the facility is not suited for activities involving pathogenic organisms. BSL-3 facility protocols and engineering and design requirements in conformance with CDC guidance are quite stringent (CDC Biosafety Level Criteria are included in Appendix A-1 to this EA). The EMBF is <u>not designed</u> to meet these BSL-3 criteria, is not being proposed for operation at the BSL-3 level, and would not be easy to retrofit to meet these criteria. Also, as noted earlier, all biological work conducted at LLNL must be reviewed by the Laboratory Biosafety Operations Committee (LBOC) and, when involving pathogenic organisms specifically, reviewed and approved by the IBC. Work that is not in conformance with federal regulations, CDC/NIH Guidelines, DOE Orders, and LLNL directives cannot be performed because it would not be approved by the IBC and would not be in conformance with provisions of the U.C. contract with DOE.

The term "weaponization" in reference to biological agents can be broadly defined as "the design, and production and storage in large quantity, of biological agents and their delivery systems for military purposes." This is not being done at LLNL, and is <u>not</u> a part of a DOE

proposal. Aerosol challenges do not imply "weaponization". An aerosol challenge is the method used to test a rodent by inhalation. The route of pathogen exposure affects the timing for onset of symptoms and it is the inhalation pathway that is one of the quickest. Aerosol challenge allows for testing of detection assays, treatment regimens, and medical intervention approaches as a consequence of inhalation exposures to pathogens. Nebulizers used for challenging test animals are frequently employed in private industry, including in the research and development of cosmetic products. The research proposed for the BSL-3 facility would involve growing and culturing agents, and in some cases challenging rodents by means of administering agents with a nebulizer. Again, no technology is being proposed, developed, or adapted at LLNL for the purpose of "weaponizing" agents.

LLNL has no intention, and would be prohibited under Title 18 of the U.S.C., of developing or producing biological materials for weapons use, often referred to in the media as "weaponizing". The prohibition against developing or producing biological agents for weapons is taken seriously at Livermore. All proposed research with pathogens, even non-select agents, regardless of the specific biological laboratory to be used is reviewed and evaluated in a multi-step process that ultimately requires directorate-level approval. This process is designed with checks and balances to ensure that scientific research is conducted legally, securely, within the staff's and the respective facilities' technical capabilities, and above all, as safely as possible. Conducting microbiological and toxin research at LLNL furthers the Biological and Toxin Weapons Convention (BTWC) goal of ensuring the security of potential biological weapon source material. The proposed LLNL facility would be one of the most secure BSL-3 facilities in the United States, and many times more secure that similar commercial facilities existing currently in the Bay Area or anywhere else in the world.

Because of the potential asymmetrical biological weapons threat, the United States is allowed, under the BTWC and U.S. Law, to conduct defensive bona fide *scientific research with potential biological weapon pathogens known as "select agents". This research would include what is known as "basic research" that could, for example, investigate the genetic linkage between Bacillus anthrasis (BA) and its "nearest neighbors" (e.g., B. cereus and B. thuringiensis) or examine genetic anomalies in the BA so-called "sub-specie" variants know as the Sterne and Vollum strains. Other research could, for example, process vegetative and spore cells to evaluate processes which might affect detection equipment's ability to identify genetic or chemical "markers" necessary to confirm the presence of microbial pathogens or toxins. Procedures or processes used to conduct this scientific research are the same or similar to those commonly used throughout biosafety laboratories in the government, public and private sectors. None of this research constitutes developing or producing biological materials for weapons use.*

Furthermore, LLNL has a major role in the CDC's Laboratory Response Network (LRN) to provide the highest level of analytical sophistication for purposes of identification and confirmation during disease outbreaks or bioterrorist attacks from suspected select agents. LLNL may also need to support other government agencies to provide forensic analysis to track down those suspected of perpetrating bioterrorist acts. Being able to accurately identify genetic or chemical attributes of microbial cells and toxins may be a crucial step in determining protective measures such as medical prophylaxis. As with the research that supports it, this capability would not constitute developing or producing biological materials for weapons.

The characterization of the potential inventory in the BSL-3 by several commenters is in error. LLNL has no plans to have 100 liters of a slurry of biological agents in any single laboratory at any one time. Most research involves a few milliliters of material in growth solution. LLNL plans to store samples of biological agents, including select agents, in small vials, most of which are 2 ml. The facility limit is 25,000 vials, so the maximum volume of the vials is closer to 50 liters, not 100 liters. Typically, less than 2 ml of sample is stored in any vial so the aggregate total volume of all samples would be significantly less than 50 liters. These vials are stored in -80 degree freezers in three separate laboratories in frozen form, not as aggregate liquid slurry. As noted above, only 1 liter would be handled in any laboratory at any one time.

The DOE does not operate a national biological research program. Individual research efforts are managed at DOE sites on behalf of non-DOE sponsors as "Work for Others". The DOE has established a Biosurity Executive Team, a national level working group, to recommend the establishment of biosurity-related policies, regulations, requirements, and standards. This comment will be forwarded to the Chairman of that group for consideration.

4. COMPLIANCE WITH BIOLOGICAL WEAPONS CONVENTION

A commenter expressed concern that the proposed work would undermine the Biological Weapons Convention and be viewed with suspicion by the world community. Additionally, the commenter remarked that the draft EA gives no indication of how BWC compliance would be instituted. Several commenters were of the opinion that the draft EA does not provide a process to guarantee public scrutiny of the LLNL biosafety committee deliberations and decision making.

Several commenters reiterated concerns that research in this facility could be construed as violation of the Biological and Toxin Weapons Convention since it is located in a secure weapons laboratory and oversight by the Institutional Biosafety Committee (IBC) is less than "transparent".

Response
U.S. participation in the Biological Weapons Convention is discussed under topic 3 above.

The proposed BSL-3 facility would be operated according to all guidance and requirements established by such agencies as the CDC, NIH, USDA, DOE and LLNL. Specific guidance references are detailed in Section 2.1.2 of this EA. NIH guidelines require that an IBC be appointed by an institution to provide local and institutional oversight and approval of potentially hazardous lines of biological research (NIH 2001). Section IV-B-2 of the NIH guidelines establishes procedures that the IBC shall follow in its role of review and approval responsibility. These guidelines include review and approval of applications, proposals, and activities; and making available to the public, upon request, all IBC meeting minutes and any documents submitted to or received from funding agencies that those agencies must make available to the public. As detailed in this EA and in the NIH guidelines, at least two members of the IBC are not affiliated with LLNL and they represent the interest of the surrounding

community with respect to health and protection of the environment. These IBC members may be officials of state or local public health or environmental protection agencies, members of other local governmental bodies, or persons active in medical, occupational health, or environmental concerns of the community. Since the IBC is ultimately responsible for ensuring that research conducted at, or sponsored by, LLNL is in compliance with applicable guidelines or regulations, this ensures that the public will be involved in approval of BSL-3 research and review of safety and compliance protocol as it does now for certain BSL-2-level projects. It is possible that some specific project information will be subject to DOE security and classification restrictions, and will consequently not be made available to the public. All proposed microbiological research projects at LLNL, even projects with classified portions, will undergo review and approval by the IBC.

The IBC was established at LLNL in 1991 to ensure compliance with recognized guidelines and regulations concerning research with recombinant DNA or human, animal, and plant pathogens. In 1998, the IBC registered LLNL under the Laboratory Registration and Select Agent Transfer Program of CDC. As currently practiced at LLNL, the IBC must approve all research in the cited subject areas prior to commencement. Details regarding the procedures for choosing committee members and other IBC functions are not within the scope of this environmental review.

5. PUBLIC HEALTH AND SAFETY, AND WORKER SAFETY ISSUES

Comments regarding the issue of public health and safety ranged from general opposition to a BSL-3 facility at LLNL to specific concerns about the potential for accidents and the implementation of procedural safeguards. One commenter remarked that there was no evidence that LLNL conducted a preliminary hazards analysis for the proposed facility and another commenter stated that it was inappropriate to allow biological warfare agent research so close to a major population center. Commenters also expressed the opinion that anticipated work with genetically modified organisms would pose unique or unknown risks to the general public, emergency personnel, and regional medical workers. Commenters expressed concern about how LLNL would respond in the event of an accident at the BSL-3 and how the lab would notify the public and provide information on emergency response actions during an accident.

One commenter remarked that the Draft EA failed to address the effect that a release or exposure could have on the way a region functions. The commenter cited the anthrax attacks of 2001 as an example of the difficulties of determining the nature and extent of a hazard and the potential for entire facilities to close down, despite a relatively small number of casualties. One commenter stated an opinion that the immunization status of laboratory workers represents critical information that should be available to all employees of LLNL and residents of the area.

Comments on the Revised draft EA expressed concern that it does not adequately analyze the health impacts of a release of the the BSL-3 facility's total inventory of up to 100 liters or 25,000 different samples of pathogens.

Response

A Preliminary Authorization Basis Document (analogous to a preliminary hazard analysis) would be completed and approved by NNSA prior to the facility being constructed. A Final Authorization Basis Document (analogous to a final hazard analysis) will be completed and approved by NNSA prior to the facility becoming operational. As for emergency response, the scope and extent of emergency planning and preparedness at LLNL are based on, and commensurate with, the hazards and potential consequences associated with a facility and its operation. The Laboratory uses an emergency management system (known as the Incident Command System) that is capable of responding to and mitigating the consequences resulting from operational emergencies. Under this system LLNL coordinates with Livermore Police and Fire Departments who in turn notify the public during emergencies. The emergency management system also incorporates provisions and procedures for dialogue with and involvement of local area law enforcement, fire, emergency response agencies if necessary. Emergency response procedures are documented in the LLNL Environment, Safety & Health (ES&H) Manual. The requirements in the ES&H Manual are based on the Work Smart Standards (WSS) identified for the specific work and associated hazards and LLNL best practices that management has determined are requirements. The WSS set was derived from statutes, regulations, DOE Orders, and national and internally developed consensus standards. The ES&H Manual also describes the implementation of the ES&H management commitments made in the Laboratory's Integrated Safety Management System Description. Adherence to the requirements and processes described in the ES&H Manual ensures that safety documents across the Laboratory are developed and updated in a consistent manner.

NNSA is confident that the proposed BSL-3 facility at LLNL can be operated safely and securely.

The day-to-day functions of the proposed BSL-3 facility, and potential increase in the number of biological material shipments to and from the proposed BSL-3 facility do not portend a significant increase in the possibility of human health risks to workers or the public beyond those related to LLNL's current ongoing, routine, BSL-2-level activities.

The safe operation of over 250 BSL-3 facilities within the U.S. substantiates the analysis presented in this EA with regards to this issue. There are on the order of 40 BSL-3 facilities currently operating under the control of the University of California. Several of these are nearby at the UC San Francisco and UC Davis campuses. Representatives of the CDC are authorized to periodically inspect all BSL-3 facilities. When operational, CDC and NNSA would regularly inspect the BSL-3 facility at LLNL.

In reference to the immunization status of workers at LLNL, the information would be made available to proper authorities, such as the CDC. The immunization status of individual workers is part of their personal medical records and, as such, cannot be released to the general public. However, to reiterate from the EA (Section 2.1.2, Operations, pg 18), "Workers would be offered appropriate immunizations for the microorganisms being handled." Information about what immunizations are being offered to BSL-3 laboratory workers would be available from the regular meeting minute records of the IBC, as that pertains to controlling risk associated with proposed research. In the event of unusual epidemiological occurrences involving

communicable diseases, information about the medical condition of affected workers would be made readily available to CDC and other authorized public health officials.

As explained in Appendix C, section 3, the facility will not have 100 liters of pathogens available for release. It will likely take years, if ever, to approach the facility's 25,000 sample-vial physical storage limit. Also as stated earlier, volumetrically this accounts for less than 50 liters of material in a frozen state. Pathogens in the BSL-3 facility that are in liquid or slurry form would account for much less than the facility's 10-liter limit because of each individual BSL-3 laboratory's 1-liter liquid-slurry culture limit. This would be further reduced because each BSL-3 laboratory would not normally process volumes even close to the 1-liter restriction. Therefore, the release potential is consistent with the analysis of this EA.

6. ACCIDENT ANALYSIS

Several commenters expressed the opinion that the Draft EA lacks a comprehensive analysis of earthquakes, and should address local and regional fault zones. Commenters called for a more thorough analysis of release possibilities and outcomes from seismic risks, as well as other natural disasters. One commenter expressed concern about the vulnerability of a prefabricated building versus that of a conventionally constructed building.

Several commenters pointed out that a 50-mile radius around LLNL embraces more than 7 million people as opposed to the 1.3 million stated in the Draft EA. Given the density and proximity of nearby populations, the commenters were of the opinion that the Draft EA lacked appropriate modeling for accidental releases. Commenters questioned the appropriateness of using accident scenario data related to operation of the U.S. Army Biological Defense Research Program (BDPR) or that of the existing BSL-2 labs operated by LLNL. The commenters stated that the U.S. Army has a long history of operating a BSL-3 facility, and neither DOE nor LLNL has comparable experience.

Commenters expressed the opinion that the Draft EA understated the potential risks of worker exposure, as well as subsequent potential risks of off-site transmission of diseases. Further, several commenters remarked that the process of aerosolizing agents could substantially increase the risk of release and exposure, especially in light of the quantity (up to one liter) of medium containing pathogens that would be permitted. Commenters were of the opinion that the Draft EA does not address the potential for failure of filter systems and called for a more complete analysis of the potential for HEPA filter failure. These commenters alleged that DOE has a poor record of maintenance with regard to operating HEPA filters in some of its nuclear facilities. Further, the commenters state that the Draft EA makes claims for the protective qualities of HEPA filters that exceed the documented record, citing DOE reports that the efficiency of HEPA filters for capture of particles in the 0.1 micron size range is less than the efficiency for the 0.3 micron-sized particles discussed in the Draft EA.

Commenters on the Revised Draft EA reiterated many of the opinions stated above regarding accident analysis. Commenters stated that that "new research by the USGS has determined there is a 62% chance that one or more magnitude 6.7 earthquakes will occur in the area within the

next 30 years", and "Other studies predict a quake with MM 10 shaking in the Livermore area (which is very violent – the scale is 1 to 10)." One commenter expressed an opinion that the maximum ground surface acceleration at return intervals of 500 and 1,000 years could be much greater that the values presented in the Draft EA of 0.38 g, and 0.65 g, respectively, and significant surface displacement is also possible. One commenter also cites the Parkfield Earthquake of 2004 which produced two recorded ground acceleration values of 1.13g and 1.31g as "evidence" that the evaluation of seismic hazards at the Livermore Site is in error. Many commenters noted that the BSL-3 Facility is located in the Bay Area which has a population of 7 million.

Commenters expressed concern regarding the testing and maintenance of HEPA filters and their potential for failure. One commenter claimed that "HEPA filters at LLNL are flimsy, weak, fiberglass, paper and glue structures mounted in wood or metal frames that can fail completely when wet, plugged, hot and over pressured from fires, explosions, blowers and even severe storms." and "even under optimal conditions, HEPA filters are unable to effectively contain all bio-agents measuring between 0.03 and 0.3 micrometers."

Response

The BSL-3 facility would incorporate design considerations for the occurrence of natural phenomena as appropriate for the LLNL site. The facility would be designed to the latest Performance Category 2 (PC-2) requirements of DOE Standard 1020-2002. Specifically, the seismic design would conform to the 2000 International Building Code, Seismic Use Group III, Criteria 2/3, MCE Ground Motion with an Importance Factor of 1.5. It would be operated under the requirements of LLNL ES&H Manual, Volume II, Part 10, Supplement 27.02, Earthquakes. According to Supplement 27.02, all structures over 5 feet in height must be seismically secured. Furthermore, incompatible materials must be segregated to mitigate spills that could cause chemical or biological releases, as well as fires or explosions due to chemical incompatibility.

Based on the 2002 seismic hazard evaluation for LLNL by J. B. Savy and W. Foxall, a 1.0g ground acceleration has a mean annual exceedance probability of $2x\ 10^{-4}$ (5000yr return interval). The probability that this (or a greater) ground motion will be experienced during the operational life of the BSL-3 facility (30yrs) is approximately 0.6%. To put this into perspective, the ground motion levels typically used for the design of standard buildings have a 10% exceedance probability over the presumed 50 year life of the facility (500 year return interval event) and an equivalent 5% exceedance probability over the life of high-hazard/toxic/critical facilities (1000 year return interval event). In NNSA's opinion, a 5% exceedance probability over the life of the BSL-3 facility would represent an acceleration level that may "reasonably" be expected to occur. For the BSL-3 facility, the ground motions used for design from the 2000 International Building Code (IBC), Seismic Use Group III, are 0.69g peak ground acceleration and 1.73g maximum spectral acceleration (a 1250 year return interval event), and would have an approximately 2.5% chance of being equaled or exceeded during its 30 year operational life. The "Maximum Considered Earthquake Ground Motions" specified for use in the 2000 IBC have been characterized by the Building Seismic Safety Council, as "the maximum level of earthquake ground shaking that is considered as reasonable to design structures to resist" (FEMA 303, 1997 edition, "NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures", Part 2- Commentary).

The Parkfield Earthquake of 2004 produced two recorded ground acceleration values of 1.13g and 1.31g. However, accelerations in this range (and higher), at similar epicentral distances and from similar magnitude events are in fact included in the 2002 probabilistic seismic hazard analysis for LLNL by Savy and Foxall, and by the USGS in the determination of Maximum Considered Earthquake events, but have a low probability of occurring at LLNL. The 2002 seismic hazard study for LLNL indicates a mean estimate for a 1.31g ground motion occurring at the LLNL Site of approximately $5x10^{-5}$ annual probability of exceedance (an approximately 20,000yr return interval event). As such, this represents a level of conservatism in excess of that required for the seismic design of nuclear power plants (10,000 year return interval per ASCE 43-05 "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities"). Furthermore, the occurrence of a single event on a distant fault system (approximately 180 miles from LLNL) should not form the basis for seismic design decisions at the Livermore Site.

There is no "recent history" of earthquakes in the area of LLNL producing ground motions at LLNL anywhere near this level observed for the Parkfield earthquake, which was a non-event for the Livermore site as it was approximately 180 miles distant. The 1989 Loma Prieta earthquake produced recorded ground accelerations at LLNL having a maximum value of approximately 0.15g. The maximum historic earthquake on the Greenville Fault (M5.8) occurred on January 24, 1980 (D.W. Carpenter, et al, August 1984)[1] and produced ground accelerations of approximately 0.3g at LLNL.

In NNSA's opinion, the Greenville Fault poses a "significant" but not "extreme" hazard to the Livermore site, and is not "easily" capable of producing severe earthquakes capable of serious damage to the proposed BSL-3 facility within its projected life, as the commenter suggests. The 2003 USGS Open-File Report 03-214 on "Earthquake Probabilities in the San Francisco Bay Region" gives only a 3% mean probability that the Greenville Fault will produce a major, damaging earthquake ($M \geq 6.7$) during the next 30 years, which in DOE's opinion does not rise to the level of an "extreme" earthquake hazard. The expected magnitude from a rupture of the entire length of either one or both segments of the Greenville faults is about 7 to 7.1. Such events are expected to produce Peak Ground Acceleration (PGA) values of about 0.5g at sites very close to the fault. Larger amplitudes are possible but not likely. For example, the attenuation model of Abrahamson and Silva (1997) predicts that there is less than a 10% chance of a ground motion as severe as 1g (PGA) even if a magnitude as large as 7 occurs on the Greenville fault. In any case, the earthquake hazard posed by the Greenville Fault, as well as other faults, is incorporated into the design parameters used for this facility.

The surface rupture that occurred during the 1980 Greenville earthquake did not occur within the LLNL site and surface rupture within the LLNL site would not be expected to occur in the event of future earthquakes. Studies to identify active faults in the vicinity of LLNL are described in Carpenter et al. (1984). These included literature reviews, photographic analyses, geologic mapping, shallow and deep borings, excavation of pits and trenches, and soil dating. The objective of these studies was to identify physical properties (e.g., location, length, dip) of the tectonic faults in the vicinity of LLNL, and to determine the likelihood of current seismic activity.

[1] May not be in the Revised EA

The result of these studies was that "No evidence of slip was found in all of the investigations for active faulting (within the last 300,000 years) within the LLNL Site", J.F. Scheimer, et al. (May 1991). Furthermore, the proposed location of the BSL-3 facility does not fall within the requirements of the Alquist-Priolo Special Studies Zones Act of 1972 which required the State Geologist to "delineate appropriately wide special studies zones to encompass all potentially and recently active traces of the San Andreas, Calaveras, Hayward, and San Jacinto Faults, and other faults, or segments thereof, as he deems sufficiently active and well-defined as to constitute a potential hazard to structures from surface faulting or fault creep."

The "activeness" of a fault is typically described in terms of earthquake recurrence relationships which express the expected number of earthquakes per year having magnitudes greater than some minimum value, and less than some maximum value. Recurrence relationships for fault sources are a function of long-term geologic slip rates, not number of aftershocks. The Greenville Fault has been assigned a slip rate of 2±1mm/yr in the USGS Open-File Report 03-214. This is a relatively low slip rate indicative of a low rate of fault activity as compared, for example, to the San Andreas Fault which has been assigned a slip rate of 17±4mm/yr to 24±3mm/yr (depending on segment) in the same report. This is a much higher slip rate and consistent with the greater level of seismic activity on the San Andreas Fault.

The description of potential damage to the BSL-3 Facility as a result of an earthquake is taken from FEMA 303 "1997 Edition, "NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, Part 2- Commentary", for buildings designed in accordance with the requirements for Group III structures subjected to the Design Ground Motion. Additionally, the seismic design provisions inherent in the 2000 IBC are intended to provide a margin of safety against the occurrence of larger, less probable earthquakes. As a minimum, a margin of about 1.5 times the design earthquake ground motion is provided. In other words, "if a structure experiences a level of ground motion 1.5 times the design level, the structure should have a low likelihood of collapse. This margin is dependent on the structure type, detailing requirements, etc., but the 1.5 factor is a conservative judgment appropriate for structures designed in accordance with the code provisions. Also, the Parkfield Earthquake report states that the damage experienced as a result of this earthquake, was only "minor nonstructural damage" (e.g., cracking of stucco and drywall, collapse of wood pile, broken windows, fallen bookcases, the separation of a timber canopy from a house, and a portion of an unreinforced masonry parapet wall collapsed). These were built with brittle materials (e.g. stucco and drywall). Structures that were designed or retrofitted for earthquakes showed minor to no damage. A masonry chimney that had been retrofitted by strapping it to the house showed no damage. Local bridges showed minor to no damage and were open with immediate occupancy post event. Buildings such as the BSL-3, with structural steel framing and bracing would have had negligible structural damage due to such an earthquake.

Personnel injuries at LLNL following the January 24, 1980 earthquake consisted primarily of lacerations, sprains, bruises, back problems, and other minor conditions that were treated by first aid. One employee suffered a heart attack while riding a bicycle an hour or so after the earthquake, and was treated at Livermore's Valley Memorial Hospital. Property damage at LLNL (initially estimated to be up to $10 million dollars) was actually less. No bricks fell from chimneys at LLNL as there were no brick chimneys at the Lab, and little damage was done to the

water lines. After the earthquake, main gas valves were closed and the main lines pressurized and checked for leaks. No leaks were found in the main system, although some leaks were found in building systems and were repaired.

Ground accelerations can be and often are amplified within the overlying building structure. This amplification effect is accounted for in the use of the 2000 International Building Code, Seismic Use Group III design criteria, which incorporates a design response spectrum having a spectral amplification factor of 2.5. It should be pointed out that the example given from the Geomatrix report is exceptionally conservative. A two percent damping level in a structure experiencing ground accelerations of 0.9g is unrealistically low. There is a wealth of data that shows that structures experiencing strong ground motion develop damping levels well in excess of two percent. A damping value of five to seven percent would be much more appropriate (and still conservative) for the BSL-3 structure at a 0.9g ground acceleration level. Increased damping would significantly reduce the maximum spectral accelerations experienced by the structure. For example, the maximum spectral acceleration of the Newmark-Hall median spectrum (NUREG CR-0098), anchored at a peak ground acceleration of 0.9g, at two percent, five percent, and seven percent of critical damping is 2.47g, 1.91g, and 1.70g respectively.

The BSL-3 facility is a safe facility, appropriately designed to withstand the effects of earthquakes, and the DOE Standards and Guides used to establish the Performance Category-2 design level for the BSL-3 facility were appropriately followed. The 2000 IBC Seismic Use Group III criteria is the appropriate design criteria for this facility per DOE Standard 1020-2002, and includes criteria for the design of facilities that house substances deemed to be hazardous to the public if they are released. The 2000 IBC utilizes ground motions for design that include the contributions to the site from all relevant earthquake sources, conservative factors of safety, and prescribed detailing requirements for ductility (toughness), to ensure the seismic safety of this facility in the event of a major earthquake. Additionally, the seismic design provisions inherent in the 2000 IBC are intended to provide a margin of safety against the occurrence of larger, less probable earthquakes. Based on these considerations, we believe the chance of any release of pathogens due to seismic activity to be exceptionally low.

In order to obtain a significant margin of safety a peak wind gust of 91 mph would be used as the design wind load, although it is an extremely unlikely event. Flooding is not a design consideration at the LLNL site, per the DOE's Final Environmental Impact Statement and Environmental Impact Report for the Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore [DOE, 1992]. Prefabricated modular units, if used for the proposed BSL-3 facility, would be required to be constructed to standards equal to those for a permanent on-site constructed facility, including earthquake and ground motion standards.

The 2000 U.S. Census reports that Alameda County has a population of approximately 1.4 million people (Health Resources and Human Services [HRSA] 2000). The 2000 LLNL Environmental Report (LLNL 2001b) states that there are 6.9 million residents within an 80-km (approximately 50-miles) radius of the LLNL site. The EA will be changed to add the population of the 50-mile radius from LLNL.

The U.S. Army has been doing biological defense work for years, operating under the same safety protocol and CDC and NIH-developed guidelines as would be applicable at the proposed LLNL BSL-3 facility. This EA describes the Army's extensive experience working with hazardous infectious organisms and references their outstanding safety record to provide a perspective on the adequacy of following these guidelines in the safe operation of its facilities. The DOE has also been involved in biological defense research at LLNL and other facilities for years and has extensive BSL-2 facility experience. The BLS-2 laboratory staff at these facilities have safely handled many of the same agents that are proposed for handling in BSL-3 facilities. Highly trained individuals would operate the laboratory with modern equipment and in accordance with established nationally recognized guidelines and comprehensive oversight. Since 2000, LLNL researchers have safely worked with a number of strains of anthrax and plague at the BSL-2 level. The work has been conducted safely and in full compliance with all applicable security, health, and other administrative requirements and guidelines. NNSA is confident that DOE and LLNL have comprehensive and appropriate experience and trained personnel to safely operate the BSL-3 facility, and that potential risks to workers and non-workers have been adequately addressed in this EA.

The accident analysis scenario presented in the EA addresses the potential effects associated with an accident in which potential highly infectious cells would be disbursed into the environment from the proposed facility during its operation. Analysis of historical data related to the operation of other similar federal and industrial facilities shows that a significant release beyond the facility building is extremely unlikely to occur. The only releases that are probable would be contained within the building, which is a facility specifically designed for decontamination. Any accidental releases, if they occurred, would impact only a small area of the lab, which could easily be decontaminated. The likelihood of a wide area, city or population, effect should be considered improbable. The nature of the agents, dose/response potential, dispersion, the limited quantities involved, and the design of the building and safety protocols preclude a large-scale or widespread release potential. As described in the Draft EA, human pathogens for which there is no immunization or medical treatment available would not be handled in the proposed BSL-3 laboratory, in accordance with Biosafety in Microbiological and Biomedical Laboratories (BMBL) guidelines.

In June 1999, LLNL imposed lifespan limits on HEPA filters, found in UCRL-AR-133354 Rev 1, "HEPA Filter and In-place Leak Testing Standard", of 10 years from date of manufacture if the filter is in a dry location or five years from date of manufacture or testing if it is where the filter could become wet, such as during a fire suppression system discharge. The HEPA filter installation proposed for the LLNL BSL-3 facility would be in accordance with accepted good practice for biological safety as specified in the nationally accepted criteria for biological safety, the Centers for Disease Control and Prevention/National Institutes of Health, Biosafety in Microbiological and Biomedical Laboratories (CDC 1999). Testing of HEPA filters in biological safety cabinets is part of the BSC certification and would be done in accordance with the National Sanitation Foundation (NSF International) Standard 49 as noted by the CDC (CDC 2000b). Performance testing of the HEPA filters would be conducted by NSF-accredited field certifiers.

NNSA acknowledged in the LLNL Supplement Analysis for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore (March 1999, DOE/EIS-0157-SA-01) the issue of reduced removal efficiency of HEPA filters for particles in the size range from 0.1 micron to 0.3 microns. The study which provided this information was from a dissertation written by Ronald C. Scripsick (Los Alamos National Laboratory Report, LA-12797-T, 1994). Even though the most penetrating particle size in his study was slightly smaller than the HEPA filter "most penetrating design point" of 0.3 microns, his results still showed a 99.97% removal efficiency or higher in the range from 0.148 to 0.196 microns. These removal efficiencies are higher than the removal efficiencies used for the accident scenario in this EA and therefore the scenario conclusions are unaffected by recognizing a smaller most penetrating particle size.

HEPA filters on the building HVAC exhaust system are not required by the CDC for biosafety level 3 laboratories. However, LLNL has installed these HEPA filters as an additional measure of protection. Besides HEPA filters on the BSCs, the building exhaust system has three sets of HEPA filters. Each set has two HEPA filters in series. Two sets are in use at any time, with the third available as standby. The facility control system monitors pressure differential across the prefilters and the facility HEPA filters. If the exhaust fans are unable to maintain a constant static pressure across the HEPA filters at a specified set point, the supply fan and the exhaust fans will shut down, and all bubble tight dampers will be closed. Building alarms would be activated and building staff would respond to shift exhaust to the unused HEPA filter set. During this response time, the second HEPA filter would remain intact. Therefore, the failure of one of the HEPA filters would not result in loss of containment. In the extremely unlikely event that both building HEPA filters failed, all BSL-3 laboratory activities would be suspended, materials placed in "safe mode," and the HVAC system would be shut down until the situation could be corrected. This would ensure that no pathogens could be released from the facility.

NNSA does not believe research conducted in the LLNL BSL-3 facility presents either a new or undue risk to the population of the San Francisco Bay Area or California, in general. As noted in the previous response to comments, BSL-3 laboratories currently operate in many other Bay Area locations and throughout California. BSL-3 laboratories are commonly located in these and other urban areas such as Atlanta, Georgia, Fredrick, Maryland, and Galveston, Texas. Even though work is performed in these laboratories with indigenous or exotic agents that may cause serious or potentially lethal disease through inhalation route exposure, just as would be performed at LLNL, these facilities do not pose any undue risk to the surrounding communities. As noted in the EA, NNSA is not aware of any incidents in the San Francisco Bay Area, California, or elsewhere in the United States of infectious materials released from catastrophic accidents at microbiological laboratories. No such event has occurred in the more than 50 years in which the military has been conducting biological defense research activities (DA 1989).

7. THREAT OF TERRORIST ATTACK/SABOTAGE

Commenters expressed a general opinion that the Draft EA does not adequately address external or internal security issues, citing that no security analysis is included in the document. Concerns included the potential for unauthorized access, the potential for removal of biological agents by a

BSL-3 worker or other person, and the potential for a deliberate release of biological agents and subsequent risk to the surrounding community.

Commenters stated that the Draft EA does not address the possibility of terrorist attack, and in light of the September 11, 2001 events and anthrax mailings, consideration of terrorism and internal threats must be included in the NEPA analysis for the BSL-3 facility. One commenter stated an opinion that LLNL already represents a terrorist target and the addition of a BSL-3 facility, which the world may believe is for offensive research purposes, will exacerbate the threat of terrorism.

Commenters expressed many concerns regarding the adequacy of the terrorist assessment in the Revised Draft EA. Commenters expressed their opinion that the Ninth District Court ruling requires a full modeling of a release following a terrorist act and also a discussion of the public response measures. Several commenters doubted whether biological materials would be destroyed in a fire. Commenters expressed doubt about whether a terrorist would obtain biological materials from environmental samples if these materials were available in the concentrated or "milled" form they claim would be present in the BSL-3 facility. The adequacy of the building to withstand a terrorist attack and the competence of the security force were questioned by many commenters. One commenter doubted the EA's claim that stolen bioagents would not pose a serious risk to human health and safety citing the Anthrax Letter attacks in 2001. Another commenter questioned whether bleach would be kept in the same location as biological agents. In one commenter's opinion, freezers may pose a different type of environmental consequence and must be analyzed separately. One commenter expressed concerns that genetically modified organisms would have increased risk and survivability if there was an accidental release. Many commenters doubted the Revised Draft EAs assertion that the a release from the BSL-3 facility would pose a risk no greater than that posed from births of infected wild and domestic animals.

Many commenters stated their opinion that detailed evaluations of the consequences of terrorist acts must be conducted regardless of their probability of occurrence. Commenters suggest that it is possible to determine a general threat level for the facility. One commenter questioned why only three scenario's were chosen for evaluation. One commenter expressed concern that the "security concerns" prompting NNSA's removal of plutonium from LLNL should be considered in the EA. Many commenters expressed concern that locating a biological research facility at a nuclear weapons facility increased the likelihood of a terrorist attack.

In one commenter's opinion the Revised Draft EA "shirks genuine consideration of the impacts of terrorism by suggesting that because there are other BSL-3s in the U.S., the LLNL BSl-3 will not contribute much to an increased likelihood of an act of terrorism". The commenter compares this to a situation in which the Nuclear Regulatory Commission would avoid an in-depth review of the Diablo Canyon permitting action on the basis that there are other nuclear power plants in the country and so Diablo Canyon does not add much to the numeric likelihood of a terrorist attack.

Response

As stated in the EA, physical security and safeguards would be based upon a security analysis conducted during the appropriate project planning stage. As in all facilities managed at LLNL,

access is limited to only authorized DOE-badged personnel or under DOE-approved escort procedures. Safeguards would also be consistent with CDC/NIH guidelines. It would be imprudent to describe the specific security protocols in a public NEPA document as the commenter suggests. This is due in part to the relative high-security of the overall LLNL operations, and also to the limited and synoptic availability of significant quantities of viable pathogens due to the facility being focused on genetic research (on the parts of the microorganisms). Added to this is the extremely limited potential for a release of microorganisms from the multiple levels of bio-containment within the building. The level of security at LLNL and the uncertainty of available and viable microorganisms would preclude it from being a desirable or likely target for removal or theft of biological agents.

Historically, there have been at least two reasons why the potential results of terrorist attacks are not typically included in NEPA analyses. The first reason is that NEPA accident risk analysis is done for "reasonably foreseeable" accident events. While terrorist events are possible, these are not reasonably foreseeable accident events in the sense that a probability of occurrence could be determined for a NEPA analysis. This is not to say that NNSA does not evaluate possible terrorist actions and work to mitigate them. On the contrary, NNSA continuously strives to assess and remove potential threat opportunities. Secondly, regardless of the initiating event (whether naturally occurring, human-error, or malicious intent), the NEPA accident analysis scenarios presented in NEPA documents are generally bounding events for releases into the environment from the proposed facility.

Terrorist attacks come under the realm of security and therefore are appropriately evaluated in a separate risk assessment. That risk assessment would determine what security measures would be taken to protect the facility. This assessment document and its details are not available for public review since this would defeat the purpose by making all security measures public knowledge. Terrorists could then use this information to better plan for future attacks—something that no one wishes to facilitate.

NNSA believes that although a direct attack on the BSL-3 facility is possible using a commercial jet or a private aircraft, the result would be a fire that would destroy biological agents rather than dispersing them, and therefore it is not necessary to model such a release. An aircraft crashing into the proposed BSL-3 laboratory (the facility) could have different potential consequences depending on the scenario conditions, but would regardless result in the death of uncontained microorganisms. The range of conditions would be bounded by whether the aircraft were a larger-size jet or a much smaller propeller-driven aircraft. The former aircraft's size would demolish the facility and surrounding buildings on impact while the smaller plane might only cause a breach of containment. Fire would be a highly probable consequence under both conditions for reasons explained below. As will also be described, microorganisms whether vegetative cells or spores could not endure the temperatures of any fire resulting from these circumstances.

A large jet aircraft crashing into this facility would have the same result on impact regardless if the fuel tanks were full or nearly empty. Due to the plane's wingspan it would be almost impossible to not involve other surrounding buildings in the impact unless the plane approached from a nearly vertical angle. With fuel tanks full an aircraft impacting this facility would totally

demolish the structure (and surrounding buildings) in a conflagration nearly-reminiscent of the plane crashes into the World Trade Center towers or the Pentagon. The same aircraft crashing with fuel nearly exhausted would still break into flames due to ignition of fuel-vapor explosive gases released at impact. The only differences would be the amount of jet fuel burning at the impact site and the time it might take to extinguish the fire. Jet A fuel (>99% kerosene) would be the primary source of flammable material, but combustible materials from the plane and the building floors would become a secondary source. "Open pool" burning of kerosene produces temperatures approaching 1000 ^{o}C.

Alternatively, it would be possible to address the same conditions for a crash of a small aircraft fueled by aviation gasoline (Avgas). The difference with the Avgas (almost exclusively 100 Octane gasolines) is that it is even more ignitable than the jet fuel because of its physical and chemical properties. As noted on an Avgas Material Safety Data Sheet (MSDS) "this material is extremely flammable and can be ignited by heat, sparks, flames, or other sources of ignition" (Conoco Phillips, 23-May-2007). For example, Avgas has a much lower flash point, the lowest temperature at which a flammable vapor/air mixture exists at the surface above the fuel. The flashpoint for Avgas is <u>less than</u> -35 ^{o}F (-37 ^{o}C) while that of Jet A fuel is 100-150 ^{o}F (38-66 ^{o}C). While this crash wouldn't necessarily demolish the facility it would produce a fire. Flame temperature for gasoline (i.e., petrol) in an "open pool" fire (0.3 m diameter) is 1026 ^{o}C. (Drysdale, table 5.4, p. 165)

Fire or flames generate a great amount of heat at temperatures measured in the hundreds of degrees Celsius (^{o}C) (Drysdale, 1998). Heat is lethal to all microorganisms and each has its own particular heat tolerance. Microbiologists have long recognized that bacterial spores are the most resistant life form, and therefore it would be expected that spores would be the most heat tolerant. In fact, the effectiveness of sterilization (the killing of all life forms) is measured by the ability to kill bacterial spores. Each microbial species (and form, vegetative cell and spore) has a thermal death time, or the time necessary for killing it at a given temperature. Each species also has a thermal death point, or the temperature at which it dies in a given time. These parameters are experimentally determined and used by the food processing industry to evaluate the microbial inactivation of foods. As expected, spores require higher temperatures and longer time periods for inactivation (US FDA, 2002). As the temperature is increased the amount of time necessary to sterilize with dry heat is decreased. Whitney et al. (2003) showed, for example, that Bacillus anthracis spores were sterilized with a dry heat in >90 minutes at 140 ^{o}C, 10 minutes at 160 ^{o}C, 2 minutes at 180 ^{o}C, 1 minute at 190 ^{o}C, and 30 seconds at 200 ^{o}C. Higher temperatures would significantly reduce the sterilization time even farther.

Because of their heat resistanc, microorganisms like Coxiella burnetii burnetii that form spore-like protective structures are killed at higher than normal pasteurization temperatures (63 ^{o}C for 30 minutes, or 72 ^{o}C for 15 seconds) (FDA, 2007). Mycobacterium paratuberculosis also demonstrates this heat resistance (62 ^{o}C for 14 minutes, and 71 ^{o}C for 78 seconds). However, neither would survive as long as bacterial spores in dry heat.

In all cases, virtually the entire inventory of pathogens in the BSL-3 facility would be contained in 2-mL double-containment plastic vials maintained in padlocked freezer/refrigerators. The vast majority of pathogen material not in freezer/refrigerators would be in other types of double-

walled containment. This would include, for example, incubators and centrifuges. The only instances of single or non-containment would occur in the biosafety cabinets (BSCs) where potential aerosol releases would be captured by the BSC airflow and filtration system. Pathogen-inoculated animals would be held in quarantine cages in cage racks with HEPA filtration. Single or non-contained pathogen materials would be in liquid or solid (e.g., agar media) form and not dried or powdered. Temperatures of only a few hundred degrees Celsius for seconds or a few short minutes would be all that is necessary to destroy these microbial materials. The minimum temperatures of a fire following any aircraft crash into these buildings would exceed that and for a much longer time.

LLNL would not have large quantities of "milled" concentrated biological agents as suggested by commenters, and would not have any overly-specialized equipment for delivering biological materials. LLNL has no intention, and would be prohibited under Title 18 of the U.S.C, of developing or producing biological materials for weapons use, often referred to in the media as "weaponizing". LLNL would not use the process of "milling", which commenters imply is a technique used to "weaponize" a biological agent. Research will include creating small volumes of liquid slurries that would be introduced as aerosol droplets into the lungs of mice using a nebulizer, which is a bench-scale device used to create an aerosol spray. Except during very brief intervals of mouse exposure, aerosolized material would not be present in the facility. Since nebulizers are common pieces of lab equipment and are commercially available, there would be no specialized equipment present in the facility that would be attractive to a terrorist, particularly since other commercially available equipment could also be used to create a similar, inhalable fine mist. The biological materials in the slurry or in sample vials are collected from growth media in very small amounts and are not considered to be highly concentrated. Accordingly, biological materials and equipment in the BSL-3 facility would have none of the characteristics that commenters claim would make them more attractive to a terrorist than similar materials found in other, less secure locations or in nature.

NNSA acknowledges that spores of organisms such as anthrax can survive in soils for extended periods of time. In fact, anthrax spores occur naturally in soils such as those in the Livermore area and the surrounding Altamont hills. Spores are known to survive for decades, as one commenter suggests. However, the presence of naturally occurring anthrax spores in local soils has not resulted in adverse health impacts. This reinforces NNSA's conclusion that the few spores present in a sample that survive after an accidental release from the BSL-3 facility would not pose a significant human health risk.

As stated in the Revised EA, NNSA considers the probability of a successful terrorist attack at the LLNL BSL-3 facility to be minimized to an extent commensurate with the potential threat. However, the Revised EA does include a discussion of consequences of terrorist acts, however unlikely. NNSA acknowledges in the EA) that, as with the Anthrax Letters of 2001, serious consequences and perhaps fatalities could occur following covert theft of select agents, modification and subsequent release in a setting that would result in human exposures. Because the potential release scenarios are limitless, there is no rationale for evaluating any specific scenario. NNSA does not believe that other scenarios that cause a significant breach in containment would result in a release of biological agents that would pose adverse health effects or require modeling.

The commenters do not provide any information to support their assertion that an insider could covertly obtain large amounts of "ready-to-use" biological agents. The analysis in the EA assumes that only a small amount of material would be obtained covertly by an employee since the employee would not want the theft to be discovered. An employee with unrestricted access could remove larger quantities of material. However, stealing larger quantities would defeat the covert nature of the theft since large numbers of missing material would not go unnoticed. Also, samples are stored in -80 degree freezers in 2 ml vials, not large amounts of "ready-to-use", aerosolized pathogens, as suggested by commenters. For these reasons, the EA assumes that covert theft would involve very small quantities of material that would require additional growth and preparation before they could be dispersed.

NNSA acknowledges in the Revised EA that theft of a select agent by an insider is within the realm of possibility. For this reason, LLNL has instituted programs to ensure that insiders whose backgrounds suggest they are at risk for engaging in unreliable, untrustworthy, or disloyal behavior are not allowed access to select agents. As stated in the Revised EA, only personnel on LLNL's CDC registration are allowed to handle these agents. In addition, UC also requires that personnel having access to select agents and toxins must enroll in and be approved by the LLNL Select Agent Human Reliability Program as described in the Revised EA. NNSA believes the personnel security policies and practices implemented for work with pathogenic agents at LLNL adequately protects against the covert theft of biological materials by employees.

The foremost mission of the LLNL Protective Force is to deal with possible terrorism scenarios. The Protective Force has developed plans, procedures and training to counter scenarios identified in the Biological Risk and Threat Assessment (BRTA) and has conducted several emergency drills in the BSL-3 Facility with facility staff. Recent evaluations by NNSA have found that the biological select agent and toxin research program at LLNL effectively implements emergency management and security programs in a manner that is commensurate with the risk. This includes the performance of the Protective Force. Accordingly, NNSA believes the physical security of the BSL-3 Facility provides appropriate protection against terrorist acts. The details of the Protective Force tactics and training are not appropriate for discussion in a public document. Revealing the measures in place could negatively impact the effectiveness of their procedures by providing terrorist information to better plan attacks. Also, as noted above in the response to comments on the original EA, LLNL is prohibited by law from discussing the details of the structural features or other physical precautions that have been taken to mitigate potential concerns identified in the BRTA.

Routine procedures for work with biological agents in biosafety cabinets require the presence of bleach to disinfect equipment and surfaces at the completion of work. Spilled bleach spreading in the BSC would kill any spilled biological agents. Bleach is not stored in the -80 degree freezers and would not kill any materials spilled from those freezers in such an attack. However, biological material frozen at -80 degrees is not in a dispersible form.

Regarding storage of biological materials in freezers, NSSA is unaware of any scenario involving a freezer that would be worse than other scenarios already analyzed in the Draft EA. Material stored in vials in -80 degree freezers is very non-dispersible even in the event of a

breach of one of the freezers. The commenter did not provide any additional information about how an accident involving a freezer would be any different or worse than other postulated accidents.

In regards to the comment comparing the LLNL BSL-3 and the Diablo Canyon Nuclear Plant, there are marked difference between the two situations that, in NNSA's opinion, render them distinct and different cases. Security is at a high level at all commercial nuclear plants in the United States. There is virtually no difference between the security at Diablo Canyon and any of the other 100 plus nuclear plants currently in operation. Security at the over 1300+ BSL-3 facilities in the United States, on the other hand, can vary widely between institutions. Since the BSL-3 Facility at Livermore is one of the most highly secure facilities anywhere in the world, NNSA believes the likelihood of direct attack is low. Also fuel in a form suitable for nuclear reactors is not found in nature as are the organisms to be studied in the BSL-3 facility. As such, there are a wide variety of potential natural sources for pathogens, as opposed to the very small number of sources for nuclear materials.

Commenters expressed the opinion that releases from the BSL-3 facility following catastrophic loss of containment cannot be compared to releases commonly observed during births in domestic herds of sheep, cattle and goats. NNSA believes that this comparison actually overstates the potential risk. NNSA directs commenters to a representative study published in the CDC "Emerging Infectious Diseases" publication titled "Wind in November, Q fever in December" (CDC, 2004). This study demonstrates human exposure from naturally occurring sources, in particular, Q fever transmission from animal reservoirs to humans by the inhalation of infected aerosols created during lambing season. C. burnetii does not form spores, but does form a spore-like small cell variant (SCV). Regions containing farms where outdoor birthing is common are considered a "potent source" of the C. burnetii SCV, according to this study, and windborne generation of aerosols is higher during the dry season. Persons living downwind from an extensive sheep-rearing area were shown to have an incidence of Q fever 5.4 times higher than that of a near-by urban area (CDC, 2004). Seventy three (73) cases of acute Q fever were diagnosed in a three-year period in this study area (however, even during this large outbreak, there were no fatalities) . As the EA notes, this is because concentrations of C burnetii organisms occur in birth fluids up to 10^{12}/g and birth products are left on the ground where they form a source of aerosols. By comparison, concentrations of organisms in samples in the BSL-3 Facility would normally be 10^{8}/ml and would not exceed 10^{10}/ml. Also, the samples would be in a frozen, non-dispersible form. As this example demonstrates, impacts of a release from the BSL-3 Facility following a catastrophic breach of containment would be less than those observed to occur downwind from areas with domestic livestock herds or other areas where these organisms occur naturally.

Reference: CDC 2004
"Wind in November, Q fever in December"
Hervé Tissot-Dupont, Marie-Antoinette Amadei,† Meyer Nezri,† and Didier Raoult**
Emerging Infectious Diseases
Vol 10, No. 7, July 2004
National Center for Infectious Diseases
Centers for DiseaseControl and Prevention

1600 Clifton Road, Mailstop D61,
Atlanta, GA 30333, USA.
http://www.cdc.gov/ncidod/eid/vol10no7/pdfs/Vol10No7.pdf

As noted on page 19, "Before any infectious microorganisms would be handled in the BSL-3 laboratories, the IBC and the researcher, in accordance with CDC guidance, would perform a risk analysis. LLNL occupational medicine and the local medical community would be informed of the microorganisms to be handled in the BSL-3 laboratories and would be aware of the methods of identification and control of associated diseases." This risk assessment and it's associated medical community awareness component is considered adequately protective by CDC prior to conduct of work with genetically modified materials.

LLNL implements security measures at LLNL for all programs, including the Superblock, commensurate with the threat. However, plutonium and highly enriched uranium are also managed by NNSA at multiple other sites in the NNSA weapons complex. Due to cost of security, NNSA has decided to consolidate these materials in fewer locations. This a cost-based decision that does not imply there is a level of security risk at LLNL that would warrant removal of biological materials.

Many commenters imply that co-location of biological research and nuclear research on the same site increases the likelihood that a terrorist act would occur because of the potential for a terrorist to obtain both nuclear and biological materials. Commenters do not suggest a scenario in which a terrorist would either try to destroy or breach both nuclear and biological facilities at the same time, or obtain both nuclear and biological materials. As stated in the revised Revised EA, NNSA considers the probability of either a direct attack on the BSL-3 Facility or a theft of biological materials to be very low. This assessment takes into consideration the co-location of the BSL-3 Facility with numerous other research facilities, including nuclear facilities.

8. TRANSPORTATION SAFETY

One commenter expressed concern about the safety of biological material shipments, especially traveling through the USPS, to and from the facility. The commenter stated that the EA does not adequately analyze the possibility of a shipment of pathogens being intercepted.

Comments on the Revised Draft EA received during the public comment period did not express any new concerns or provide information that was new and pertinent to transportation safety. However, DOE received additional comments after the public comment period regarding the shipping incident discussed in Section 4.2.2.3 of the EA, "Transportation Accident". In response, additional information about this incident was provided in Section 4.2.2.3.

Response
The volume of shipments of microorganisms into the proposed BSL-3 facility would increase when the facility first begins its operation, then would taper off to levels that are only marginally higher than are experienced today in support of existing and ongoing LLNL bioscience and health technology research. Shipments out of the facility would also represent only a slight increase over existing levels of biological shipments. Both incoming and outgoing shipments are

typically of milliliter- or micro liter-size samples packaged inside several layers of containment, per Department of Transportation (DOT) shipping requirements. The packaged samples are shipped via federal and commercial or private couriers and are tracked in accordance with nationally-accepted DOT and CDC requirements. Any increase in incidence of shipping accidents due to the incremental increase in the number of shipments to and from LLNL as a result of implementing the proposed BSL-3 facility would be negligible given the volume of mail and packages transported by these transport services. Similarly, any increase in vulnerability of biological agent shipments to terrorist seizure resulting from the incremental increase in shipments to or from LLNL would be negligible given the volume of mail and packages transported by these national-scale operations.

The EA notes that the shipment of samples to and from LLNL would involve materials packaged in accordance with DOT standards. The packaging required by DOT has already undergone extensive drop, crush, and other accident-condition testing, before DOT determined the safe and appropriate transport and packaging requirements for these types of samples. Using DOT standards for packaging and/or using couriers that transport the shipments according to DOT requirements does not result in an obligation by DOE to perform a unique NEPA review for transport of its materials through common carriers. Transportation of microbiological samples to and from various points around the country and around the world, when performed according to DOT standards for packaging and shipment, should result in no human health or environmental effects to the carriers themselves or to the public along the routes. Federal and commercial carriers have been transporting appropriately packaged biological samples for many years both before, during, and after the recent anthrax-contaminated letters were mailed. Hospitals, laboratories, schools, universities, and teaching facilities engage in the transport of biological samples in large numbers every day. Any increase in the risk of accident or terrorist attack because of shipments associated with the proposed BSL-3 facility at LLNL would be negligible.

9. PURPOSE AND NEED

A commenter expressed the opinion that the proposed action is not sufficiently justified in the "purpose and need" secton of the Draft EA. The commenter suggested that the DOE should look comprehensively at existing BSL-3 facilities and capabilities, so as not to duplicate capabilities by constructing a BSL-3 facility at LLNL. For example, the commenter questioned why the Draft EA did not discuss in more detail the option to conduct all the necessary BSL-3-level work at a BSL-3 facility currently used by LLNL (such as the CDC facility in Fort Collins) for its current projects. Additionally, commenters were of the opinion that the DOE is required to analyze whether the proposed Los Alamos National Laboratory (LANL) BSL-3 facility would provide an alternative to construction of the proposed facility at LLNL. Commenters questioned why it is necessary to have two BSL-3 facilities under the jurisdiction of the DOE, when BSL-3-level research could be done at one facility.

Comments on the Revised Draft EA did not express any new concerns or provide information that was new and pertinent to the purpose and need for the EA.

Response
LLNL conducts its own specific research, including understanding genetic and biochemical causes of disease, projects for countering biological terrorism, bioengineering research, and developing and applying computational biology capabilities. Many of these are unique to LLNL. Currently, DOE and NNSA research projects requiring BSL-3 sample preparation are contracted to universities or private sector laboratories. This procedure has increasingly become difficult and represents a barrier to continued efficient research for several reasons. Government and private sector projects requiring BSL-3-level facilities are on the rise, resulting in the existing laboratories being unable to accept as much outside work such as that represented by NNSA's/DOE's projects. Information security also needs to be carefully considered, since information associated with some samples requires a very high degree of physical security, which is not uniformly available through the use of contractor facilities. Additionally, scheduling difficulties at contract laboratories could seriously limit or compromise timely research projects. Quality assurance documentation, including chain of custody issues related to federal projects, are also essential to verifying data and interpreting results. It is critical to the research being conducted that the quality and security of samples not be compromised. If the DOE hopes to further the Nation's ability to detect and isolate microorganisms and treat victims of bioterrorism, enhanced capabilities are necessary at the location-centers for such research. For the reasons described above, the integrity of the research dictates that the BSL-3 facilities be under the direction of DOE, and the individual National Laboratory. It is not possible to continue conduct of all the BSL-3-level research in a timely, efficient, cost-effective, or security-controlled manner at another laboratory.

Although construction of the LANL BSL-3 facility recently began, it is not operational and won't be until it has met all readiness requirements. In addition, the research currently conducted at LLNL is different from that at LANL, and it is likely that each facility will continue to have separate areas of expertise. LLNL and LANL staff members would continue to collaborate on technical matters relating to their separate research and development efforts, as they have been doing in the past. For these reasons, DOE and NNSA believe that it is not duplicative to have two BSL-3 facilities under the jurisdiction of the DOE.

10. Adequacy of Alternatives Analysis

A commenter expressed the opinion that the discussion of alternatives in the Draft EA is deficient, stressing that a careful analysis of alternatives is essential due to the risks of placing such a laboratory in a densely populated urban area. According to the commenter, the EA addresses only various ways to construct a BSL-3 facility at LLNL but does not compare other possibilities for accomplishing the mission, such as using other existing facilities, using government facilities to be constructed in the near future, or constructing a BSL-3 facility at another DOE site.

One commenter claimed that the EA did not evaluate the consequences of the "No-action" alternative with respect to terrorist acts.

Response
The Draft EA presents a discussion of three different alternatives for construction and operation of a BSL-3 Facility at another National Security Laboratory or at the other locations at the Livermore Site or at Site 300 (Sections 2.5 through 2.5.3). The discussion of these alternative indicates that they do not meet the NNSA's purpose and need. Accordingly, these alternatives were not analyzed further in the EA.

The response to topic 5 above reviews the accident scenario and potential for risk to the local community. The response to topic 9 above addresses the need for a BSL-3 facility under the jurisdiction of DOE at LLNL, and discusses why the use of existing facilities located off-site (including potential BSL-3 facilities at other DOE sites) does not meet this need.

The Revised Draft EA did consider the impacts associated with a terrorist act under the "No-action" alternative. As noted on pages 63 and 64 of the Revised Draft EA, terrorist acts are possible under the No-action alternative, as evidenced by the 2001 Anthrax Letters. In NNSA's opinion, the proposed action does not measurably add to the avenues already available to a terrorist for obtaining pathogenic materials or measurably increase the likelihood of this type of malicious act. As stated on page 63, "Because a malicious individual could already obtain pathogenic material by other methods under the No-Action ("status quo") Alternative, the presence of pathogenic agents in the proposed, highly secured BSL-3 facility would not pose any new or greater risk to human health or the environment from an outside terrorist or terrorists than already accrues without operation of the BSL-3 facility at LLNL"

11. WASTE DISPOSAL

Commenters stated that although the Draft EA indicates that the proposed facility would direct 10,000 gallons of wastewater to the city sewage system, the EA does not adequately describe a monitoring system for the wastewater. Commenters questioned how LLNL would detect a "release" and how it would be prevented from being released into the city sewage treatment. The commenters expressed the opinion that since LLNL has had releases of toxic metals, radionuclides, and hazardous materials, a more thorough analysis of these issues should be undertaken.

One commenter remarked that the Draft EA was not clear on whether liquid waste materials generated from laboratory operations would be discharged directly to the sanitary sewer or first to retention tanks. The commenter points out that page 34 in the Draft EA states that liquid waste from the proposed facility operations would be discharged to a retention tank system, but page 45 states that there would be no retention tanks. The commenter also noted that discharge of waste from improperly characterized retention tanks to the sewer system has been a problem in the past at LLNL with radioactive and hazardous wastes, and suggested that discharge of toxins or pathogens to the sewer system is a possibility.

Similar comments were also raised concerning solid waste disposal. Commenters raised concerns about which area landfills would be used for non-hazardous solid waste and what analytical methods LLNL would employ to ensure that hazardous and infectious agents are not sent to the landfills.

Comments on the Revised Draft EA did not express any new concerns or provide information that was new and pertinent to waste disposal.

Response

As described in the LLNL Environmental Report 2000 (LLNL 2001b) made widely available to the public, LLNL achieved greater than 99% compliance with Livermore Water Reclamation Plant (LWRP) permit limits covering discharges into the sanitary sewer during 2000. During 2000, only three notices of violation were written (two for metals and one for cyanide) and no sewer releases exceeded discharge limits for radioactive materials. LLNL achieved between 99 percent and 100 percent compliance with permit discharge limits for 1996 through 2000.

All LLNL medical waste management operations comply with the California Medical Waste Management Act, which establishes a comprehensive program for regulating the management, transport, and treatment of medical wastes that contain substances that may potentially infect humans. In September 2000, an Alameda County Department of Environmental Health (ACDEH) inspection of the Biology and Biotechnology Research Program (BBRP) found no compliance issues or violations (LLNL 2001b). The Annual LLNL Environmental Reports for 1997-1999 state that inspections of LLNL's medical waste generator and treatment facilities also resulted in no compliance issues or violations. In 1996 the Alameda County Environmental Health Services Inspector issued only one report of violation for storage of medical waste (cotton swabs, bandages, and gauze pads) longer than 7days above 0^{o} C. Immediately after the violation was received, a LLNL self-assessment of medical waste compliance was conducted, additional training was provided, and revised medical-waste management procedures were implemented.

Sanitary liquid waste would be generated from the proposed BSL-3 facility from research activities and from toilets, showers, and sinks. Soluble or liquid waste material generated from laboratory operations are expected to be about 3 gallons per week and would be treated with disinfectants prior to disposal in the laboratory sinks. As stated in the EA, no discharge limits currently exist for infectious materials that are commonly discharged by healthcare and veterinary facilities and laboratories or homes. However, liquid waste generated from the proposed BSL-3 operations would be discharged to a retention tank system for characterization and disinfection as needed prior to discharge to the sanitary sewer system. The incorrect statement on page 45 (no retention tanks) of the Draft EA has been removed. Discharge guidelines, monitoring, and applicable regulatory requirements and restrictions are described in Section 3.3.5 of the EA.

As described in Section 2.1.2 of the EA, all waste generated in the laboratories of the BSL-3 facility (including sample packaging, culture materials, petri dishes, personal protective equipment, and associated process wastes) would leave the laboratories only after decontamination in the autoclave and/or after being chemically sterilized. Waste sterilization

and quality assurance procedures for the autoclave are detailed in the EA. Live pathogen agents are not sent to landfills. No toxic metals, hazardous wastes, radiological waste, or hazardous chemical waste would be generated by the facility. Solid waste generated from the proposed facility would be sent to area landfills in the same manner as other BBRP and LLNL-produced solid waste. Any biological shipments sent from LLNL to other researchers or the CDC are decontaminated prior to shipment, as described in the EA.

12. TIMELINE FOR THE BSL-3 FACILITY

Commenters expressed the opinion that the timeline for construction of the LLNL BSL-3 facility, stated in the Draft EA as "…estimated to start in FY 2002 and take approximately 6 months to complete", indicates that the DOE is not serious about a good-faith NEPA review nor public involvement in decision-making. The commenter states that the 6-month construction period suggests that DOE has already decided to use a prefabricated building and the construction timeframe indicates a foregone conclusion and not a decision that is dependant on the NEPA review process.

Comments on the Revised Draft EA did not express any new concerns or provide information that was new and pertinent to the timeline for the BSL-3 facility.

Response
The proposed action in the Draft EA (a permanent modular unit constructed off-site and assembled on-site) is clearly described as the preferred alternative. CEQ and DOE NEPA regulations call for an EA to describe the Agency's preferred alternative, but this does not suggest that DOE has chosen this alternative, begun implementation of the alternative, or in any other way predetermined the results of the NEPA review process. The same is true for the projected construction schedule noted in the proposed action in the Draft EA. The dates and completion schedule outlined in the Draft EA were proposed schedules for the preferred alternative provided for illustrative purposes for the preferred alternative. Revised projected schedules for project completion are included in the Final EA.

13. OVERSIGHT

Commenter's expressed concern that NNSA does not provide adequate oversight for BSL-3 activities. Commenter's provided quotes from what they claim is the July 2005 IG Report 0695, including: "We concluded that there was insufficient organization, coordination, and direction in the Department's biological select agent activities. Specifically, the Department's activities lacked sufficient Federal oversight, consistent policy, and standardized implementing procedures, resulting in the potential for greater risk to workers and possibly others from exposure to biological select agents and select agent material maintained by the Department." Commenters request that NNSA describe how this report has been responded to and what is happening now regarding NNSA's efforts to coordinate select agent programs.

Response
The quotes are from the February 2001 IG report "Inspection of Department of Energy Activities Involving Biological Select Agents", and not from the July, 2005 IG Report 0695 as cited by the commenter. The July 2005 IG report included only 2 recommendations:

1. *An enduring entity should be created and empowered to coordinate biological select agent activities and issues across the DOE complex; and,*

2. *The Department should develop a corporate strategy for the establishment of biosafety level laboratories, to include determining the number and location of BSL-3 facilities, coordinating future construction funding, ensuring that work is not duplicated, and addressing associated safety and security issues.*

The DOE has concurred with both of these recommendations. As a fist step, a Biosurity Executive Team has been established. The charter of this Team is to recommend the establishment of biosurety-related policies, regulations, requirements, and standards. To address the second recommendation, the NNSA and the Office of Science have both committed to developing a corporate strategy for the establishment of biosafety level laboratories. However, it is beyond the scope of this document to review the potential impacts of a nationwide DOE Program.

14. PUBLIC COMMENT PERIOD AND PUBLIC HEARINGS

Commenters expressed their concern that DOE/NNSA has not given the public adequate time or opportunity to respond to the revised EA and requested the public comment period be extended for at least 45 additional days. In addition, commenters requested that DOE/NNSA hold public comment hearings in the impacted communities during the extended public comment period. Commenters claim that most area residents and other interested members of the public were not aware of the public comment period and that it was not widely publicized by the NNSA or LLNL.

Response
The DOE believes the extent of public participation opportunities for the Draft Revised Final EA has been appropriate and consistent with Federal regulations and DOE Policy.

The revised document was made available for a 30 day comment period beginning April 11 and ending May 11, 2007. The document was made available for review at the public libraries in Livermore and Tracy, at the public reading room at the LLNL site, and on the web at www-envirinfo.llnl.gov. A press release was issued announcing the availability of the document at the start of the comment period. This resulted in the information being communicated to the public through a variety of media. For example, the San Francisco Chronicle published an article on April 12, 2007 discussing the draft document. This article was made available on line and included links to the document. The Tracy Press published an article on April 13, 2007 and included the story on its website with a link to the document. The Tri-Valley Herald also published an article on April 12, 2007, and the Livermore Independent on April 19, 2007. A

local Television station, KTVU, reported on the availability of the document. In addition, the availability of the document was announced on the websites of several local public interest groups.

No comments received were excluded from the record. All comments were accepted even if they were received after the 30 day period.

This is the second opportunity for the public to comment on the substance of the document. The draft document was a revision of a previous document which had been publicly available for over 4 years. The revised document included only approximately 13 pages of new or revised text as compared to the previous version.

The DOE/NNSA believes the comment period was very successful. Over 80 comment responses were received from residents of 8 different states and the District of Columbia.

C.2 Public Comment Letters/Email Messages Received on Revised EA

Table C-2 lists all the public comments received for this Revised EA. Many were form-type email and letter submissions (identified by an asterisk in the first column on the table). Following the table are the letters and emails submitted. Only one of the form-type emails is shown. Comments previously received on the original 2002 EA have been left out to reduce the length of this appendix.

TABLE C-2. LIST OF PUBLIC COMMENT LETTERS/EMAIL MESSAGES RECEIVED ON THE REVISED EA

Email/ Letter	Name	E-mail Address	Address
Email	John Ahlquist	john.ahlquist@sbcglobal.net	1625 Geary Road, Walnut Creek, CA 94597
Email*	David Anderson	davea@ssl.berkeley.edu	1627 Blake Street, Berkeley, CA 94703
Email*	Rebecca Barker	wecandoit@planet-save.com	24559 Alessandro Blvd., Moreno Valley, CA 92553
Email*	Maya Be	mayabels@hotmail.com	545 SW 155th Street, Burien, WA 98166
Email*	Marilyn Becker	becker3049@yahoo.com	Oakland, CA 94602
Email*	Thad Binkley		4132 Cristobal Way, Pleasanton, CA 94566
Email*	Jeffrey Birnbaum	jeffb@sopris.net	44 Sibley Road, Santa Fe, NM
Email*	Meg Carter	sea_of_galilee@sbcglobal.net	Oakland, CA 94610
Email*	Urs Cipolat	cipolat@yahoo.com	Oakland, CA 94611
Email	Jay Coghlan, Scott Kovac & John Witham, Nuclear Watch of NM	john@nukewatch.org	551 West Cordova Road #808, Santa Fe, NM 87505
Email	Chelsea Collonge, Nevada Desert Experience	chelseavc@gmail.com	
Email	Robert R. Curry		436 14th Street, Suite 1300, Oakland, CA 94612
Email	Mary Davis, PhD., Yggdasil, a project of Earth Island Institute	yggdrasili@yahoo.com	P.O. Box 910476, Lexington, KY 40591-0476
Email*	Debi De Respini	dderespini@flexoprint.com	Tracy, CA
Email	Martha Dragovich	mp4ever@mac.com	
Email*	Stephanie Ericson	sericson@sbcglobal.net	8301 Mulberry Place, Dublin, CA 94568
Email	Arpad Fekete	arpadfekete@hotmail.com	777 Polaris Way, Livermore, CA 94550
Email*	Arpad Fekete		777 Polaris Way, Livermore, CA 94550
Email*	Vivian Fekete		777 Polaris Way, Livermore, CA 94550
Email*	Craig Fiels	cofiels@santafenm.gov	110½ Barcelona Street, Santa Fe, NM 87504
Email*	Michael Flynn	rmflynn79@gmail.com	2263 Park Blvd, Apt A, Oakland, CA 94606
Letter*	JoAnn Frisch		852 Sungold Circle, Livermore, CA 94551
Letter*	Sue Gibbons		928 Hough Avenue, Lafayette, CA 94549
Email	Robert M. Gould, Physicians for Social Responsibility	rmgould1@yahoo.com	311 Douglass Street, San Francisco, CA 94114
Email	Janet Greenwald, Citizens for Alternatives to Radioactive Dumping	contactus@cardnm.org	202 Harvard SE, Albuquerque, NM 87106
Email*	Karen Hadden, Peace Action Texas	karen@seedcoalition.org	1801 Westlake Drive #209, Austin, TX 78746
Email	Edward Hammond, The Sunshine Project		P.O. Box 41987, Austin, TX 78704
Email*	Barry Hatfield	barryhat@cybermesa.com	929 Placito Chaco, Santa Fe, NM 97505
Email	George & Louise Heath	LHeath5445@aol.com	5445 Kathy Way, Livermore, CA 94550
Email*	George & Louise Heath	LHeath5445@aol.com	5445 Kathy Way, Livermore, CA 94550
Email*	Karen Heikkala	kheikkala@sbcglobal.net	502 Arbor Lane, Austin, TX 78745
Email*	Marcia & Ricardo Hofer	hofermr@sbcglobal.net	Oakland, CA 94618
Email*	Phyllis Jardine		4132 Cristobal Way, Pleasanton, CA 94550
Email*	Stephan S. Kelly		484 Lake Park Avenue #458, Oakland, CA 94610
Email	Marylia Kelley & Loulena Miles, Tri-Valley CAREs	loulena@trivallycares.org	2582 Old First Street, Livermore, CA 94551
Email	Daniel Kendrick	daniel@nowwatchthis.com	4274 Fairlands Drive, Pleasanton, CA 94588
Letter	Beverly King		645 N. Livermore Street, #8, Livermore, CA 94551

TABLE C-2. LIST OF PUBLIC COMMENT LETTERS/EMAIL MESSAGES RECEIVED ON THE REVISED EA

Email/ Letter	Name	E-mail Address	Address
Email*	Beverly King		645 N. Livermore Street, #8, Livermore, CA 94551
Email*	Grace Laland		1611 Cove Camp Road, Williams, OR 97544
Email*	Matthew Liebman, Esq.	mliebman@stanfordalumni.org	301 W. 2nd Street #416, Santa Ana, CA 92701
Email*	Marvin Lewis	marvlewis@juno.com	3133 Fairfield Street, Philadelphia, PA 19136
Letter*	Kris Lindsey		9285 Miners Crossing, Loomis, CA 95650
Email	Nicole Lucchesi	nikki@soundwavestudios.com	
Email*	Rita Maran	ritam@calmail.berkeley.edu	1326 Shattuck Avenue, Berkeley, CA 94709
Email	Kalliroi Matsakis, Concerned Citizens for Nuclear Safety	kmatsakis@nuclearactive.org	107 Cienega Street, Santa Fe, NM 87501
Email	Matthew McKinzie, PhD., Natural Resources Defense Council	mmcKinzie@nrdc.org	1200 New York Ave., N.W., Suite 400, Washington, DC
Email	Penelope McMullen, SL, Loretto Community	pmsl@cybermesa.com	113 Camino Santiago, Santa Fe, NM 87501
Email*	Betty Miles		1316 St. Mary Drive, Livermore, CA 94550
Email*	Del Miles		1316 St. Mary Drive, Livermore, CA 94550
Email	Loulena Miles & Marylia Kelley, Tri-Valley CAREs	loulena@trivallycares.org	2582 Old First Street, Livermore, CA 94551
Email	Yvonne Miles	RedMiles@aol.com	2715 Almondridge Drive, Antioch, CA 94509
Email*	Virginia J. Miller	vjmopus@cybermesa.com	125 Calle Don Jose, Santa Fe, NM 87501
Email*	Patricia Ann Moore, MSW	tmyoga@jps.net	23 Diamond Drive, Livermore, CA 94550
Email*	Rebecca Mullaney	bubbleylove@hotmail.com	San Rafael, CA 94901
Email*	Nicole Nicodemus	atema@sbcglobal.net	1926 Woolsey Street, Berkeley, CA 94703
Email*	Cathe Norman		7986 Driftwood Way, Pleasanton, CA 94588
Email*	Frederick R. Norman		7986 Driftwood Way, Pleasanton, CA 94588
Email*	Carleigh O'Donnell	cmo@umail.ucsb.edu	6641 Abrego Road, Goleta, CA 93117
Email*	Tatiana Perez	etatianaperez@yahoo.com	2453 34th Avenue, Apt #4, Oakland, CA 94601
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Email	Martha Priebat	mammadoc@earthlink.net	
Email*	Carolina Purvis	carolinap@sbcglobal.net	Danville, CA
Email	Megan R. Radmore	megan_renee79@yahoo.com	
Email*	Kai Sawyer	lorax.kai@gmail.com	606 Cayuga, Santa Cruz, CA 95062
Email*	Joseph Schoorl	toygunsthatspark@gmail.com	
Email*	Eric Schultz	ericrobertschultz@gmail.com	San Francisco, CA 94123
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Email	Virginia Sharkey	v.sharkey@sbcglobal.net	157B North Star Drive, Santa Rosa, CA 95407
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Email*	Shannyn Sollitt	networks@networkearth.org	P.O. Box 9509, Santa Fe, NM 87504
Email*	Ramsey Sprague	rsprague@tarrantgreens.org	7114 Forestview Drive, Arlington, TX 76016
Email*	Steve Steckler	SSteckler@aol.com	Silver Spring, MD
Email	Peter M. Strauss, PM Strauss & Associates	petestrauss1@comcast.net	
Email	Janis Turner	jkturner2001@yahoo.com	749 Hazel Street, Livermore, CA 94550
Email*	David Ulansey, PhD.	davidu@well.com	2214 Durant Avenue #3, Berkeley, CA 94704
Email	Elizabeth West	ewest@cybermesa.com	
Email	Stephan C. Volker, Tri-Valley CAREs	svolker@volkerlaw.com	436 14th Street, Suite 1300, Oakland, CA 94612
Email	Dr. Mark Wheelis, Section of Microbiology/CBS	mlwheelis@ucdavis.edu	University of California, 1 Shields Avenue, Davis, CA 95616
Email*	Vicki Wolf	vicki@vickiwolf.com	2408 Riverside Farms Road, Austin, TX 78741
Email*	Walter I. Zeichner	walter@walterzeichner.com	P.O. Box 327, Cazadero, CA 95421

* Form-type letter or email

1625 Geary Road
Walnut Creek, CA 94597
April 20, 2007

Mr. Samuel Brinker
NEPA Document Manager
US Department of Energy
Livermore Site Office
M/S L-293
PO Box 808
Livermore, CA 94551

Dear Mr. Brinker:

In response to the April 11, 2007 call for public comments on the Environmental Assessment for the Biosafety Level 3 [BSL-3] Facility at the Livermore National Laboratory [LLNL], I have the following comments.

For background:

1. BSL-3 facilities are found throughout the nation at medical centers, universities, bio-tech companies, and government and research institutions. I know of 40 such laboratories in California and suspect there are many more. BSL-3 level facilities are found in many other places in the world. I just read of security concerns at 30 such facilities in Denmark.
2. In the United States there are 335 laboratories registered to handle "select agents" by the Centers for Disease Control with 245 of them being authorized to use live anthrax.
3. The LLNL BSL-3 laboratory has passed the rigorous certification process by the independent certification contractor World BioHazTec. In addition it has undergone numerous reviews by the University of California and the National Nuclear Security Administration [NNSA]. I suspect it is one of the best evaluated BSL-3 laboratories in the nation.
4. I suspect security at the LLNL BSL-3 facility is among the best in the nation. For example, I doubt that many BSL-3 facilities require badge checks to get on site with armed guards wearing Kevlar vests manning the guard posts. I doubt than many BSL-3 facilities could have an armed response from such security guards within several minutes of an alarm. Certainly you wouldn't have this kind of response at a university or medical center or even likely a bio-tech facility. It is likely that the background security checks are much more rigorous at LLNL than any of the other aforementioned institutions.

It is unfortunate that this facility is not already open. In the universe of BSL-3 laboratories it is one of the safest and most secure. The lawsuits that have impeded its progress were prompted by those who tend to oppose any defense activities at LLNL through the tactic of alarming the

public through misinformation. The terms of all lawsuits have been satisfied and it's time to move on.

The original Finding of No Significant Impact [FONSI] was correct. I urge you to promptly issue the updated FONSI and rapidly authorize operations in the LLNL BSL-3 facility so that bio-defense research can start and hopefully lead to better national biosecurity. I challenge the NNSA to have the necessary reviews and documentation completed in time so that the facility can start operations by June 1, 2007.

Thank you for this opportunity to comment.

Sincerely,

A. John Ahlquist

A. John Ahlquist

-----Original Message-----
From: David Anderson [mailto:davea@ssl.berkeley.edu]
Sent: Wednesday, May 09, 2007 12:46 PM
To: Brinker, Samuel
Subject: Opposition to proposed facility

To whom it may concern:

The community doesn't want your bio-warfare-lab! Here is what we want:

* The Department of Energy (DOE) should hold a public hearing so that the public can learn more about this plan and provide oral comments. So far, the number of public hearings that DOE has held on this important issue is ZERO.

* The 30-day written comment period (which ends May 11, 2007) is too short. Most area residents and other interested members of the public don't know about the comment period. It has not been widely publicized by the Department of Energy or Livermore Lab. Therefore, people are being deprived of their right to comment.

* The written comment deadline should be extended for a minimum of one additional month (to June 11). And, a public hearing (see above) should occur within the extended public comment deadline.

We oppose a bio-warfare research facility at the Livermore Lab main site because:

* Advanced biodefense research (i.e., with bio-warfare agents like live anthrax and plague) should not be collocated with nuclear weapons research. If the U.S.
mixes "bugs and bombs," it could complicate enforcement of the Biological Weapons Convention, the international treaty banning bio-weapons.

* Livermore Lab sits within a 50-mile radius of seven million people. This highly populated area is not an appropriate place to conduct experiments with some of the deadliest agents known.

* Livermore Lab is located near active earthquake fault lines. The BSL-3 is a portable building that was brought to Livermore Lab on a truck. This BSL-3 should not be operated in a seismically active area. The revised Environmental Assessment states that new research by the USGS has determined there is a 62% chance that one or more magnitude 6.7 earthquakes will occur in the area within the next 30 years. Other studies predict a quake with MM 10 shaking in the Livermore area (which

is very violent - the scale is 1 to 10). The revised EA briefly mentions these key facts, but does not fully account for them in conducting its hazard analysis.

* The revised Environmental Assessment does not do an adequate job of analyzing potential terrorist threats. For example, it too optimistically assumes that most bio-agents would be destroyed in a terrorist attack, and therefore not many would escape into the environment and pose a hazard to workers and the community.

* The revised Environmental Assessment does not analyze the environmental and health impacts of a release of the BSL-3's total inventory of up to 100 liters of bio-warfare agents. In fact, the revised EA fails to even disclose that other Livermore Lab and Department of Energy documents state the BSL-3 facility will house up 25,000 different samples of pathogens adding up to a total of 100 liters of bioagents at a time. Therefore, the hazard level posed by the Livermore Lab BSL-3 is far, far greater than the revised EA considers.

* The revised Environmental Assessment suggests that a potential terrorist would rather try to find dangerous pathogens in nature than attempt to steal them in larger, more concentrated quantities from the Livermore Lab BSL-3. That assumption is absurd.

-- David Anderson
1627 Blake St.
Berkeley, CA 94703

nuclear watch new mexico

May 11, 2007

Samuel Brinker
National Environmental Policy Act Document Manager
U.S. Department of Energy
National Nuclear Security Administration,
Livermore Site Office
M/S L-293
P.O. Box 808
Livermore, CA 94551-0808
samuel.brinker@oak.doe.gov
Fax: (925) 423-5650.

Dear Mr. Brinker,

Nuclear Watch New Mexico (NukeWatch) submits the following comments on the Draft Revised Environmental Assessment (EA) for The Proposed Biological Safety Level (BSL)-3 Laboratory at Lawrence Livermore National Laboratory (LLNL) (DOE/EA-1442R). Our Comments are in three parts: 1) General comments on the revised EA; 2) Specific comments on the revised EA; and 3) Our comments on the original draft dated September 7, 2002. We include our original comments in this revised EA because NNSA failed to include them in the legal record for the original EA, despite the fact that the NNSA Document Manager for the LLNL BSL-3 EA acknowledged receipt of our comments.

General Comments

This revised EA is a result of two Ninth Circuit Court decisions. In its October 16, 2006 decision on Tri-Valley CARES v. Department of Energy, to which Nuclear Watch is co-plaintiff, the Court ruled "Concerning the DOE's conclusion that consideration of the effects of a terrorist attack is not required in its Environmental Assessment, we recently held to the contrary in San Luis Obispo Mothers for Peace v. Nuclear Regulatory Commission, 449 F.3d 101 6 (9th Cir. 2006). In Mothers for Peace, we held that an Environmental Assessment that does not consider the possibility of a terrorist attack is inadequate. Id. At 1035. Similarly here, we remand for the DOE to consider whether the threat of terrorist activity necessitates the preparation of an Environmental Impact Statement."

Subsequently, DOE issued Department-wide guidance on December 1, 2006 entitled "Need to Consider Intentional Destructive Acts in NEPA Documents." We note first that DOE should do the right thing and issue final guidance (the final BSL-3 EA should state when), especially given the many NEPA processes, from nation-wide programmatic environmental impact statements to site-specific environmental assessments, that are now currently scheduled. In any event, the interim guidance states that, "DOE National Environmental Policy Act (NEPA) documents, including environmental impact statements (EISs) and environmental assessments (EAs),

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should explicitly address potential environmental consequences of intentional destructive acts (i.e., acts of sabotage or terrorism)."

This revised Environmental Assessment, which is DOE's first NEPA document that responds to the Ninth Circuit Order and new DOE guidance, does a miserable job of analyzing intentional destructive acts. This does not bode well for all future DOE NEPA processes. We respectfully suggest that DOE could possibly save itself considerable trouble in the future by correcting the deficiencies in this revised EA so that it can be a useful model for future analyses of Intentional Destructive Acts in all future DOE NEPA processes.

This revised EA spends too much time analyzing the possibility and probability of intentional destructive acts and dismissing them and not enough time addressing the potentially all too real environmental consequences of intentional destructive acts. When the environmental consequences are looked at, they are done in a superficial way. For example, it too optimistically assumes that nearly all bioagents would be destroyed in a terrorist attack, and therefore too few would escape into the environment and pose a hazard to workers and the community. It makes this assumption without explaining any specific input parameters, such as velocity or weight. Because of these reasons, we believe that this revised EA should be withdrawn until the final guidance from DOE is released. This EA is obviously struggling from lack of guidance.

This revised EA references the U.S. Department of Energy's "Environmental Assessment for The Proposed Construction and Operation of a Biosafety Level 3 Facility at Los Alamos National Laboratory, Los Alamos, New Mexico," U.S. Department of Energy, National Nuclear Security Administration, Office of Los Alamos Site Operations, DOE/EA-1364 (February 26, 2002). This Los Alamos EA was withdrawn by NNSA in January 2004. NNSA should not rely upon this Los Alamos EA for both the original and the revised LLNL BSL-3 EA. The EA for the BSL-3 at Los Alamos was withdrawn because NNSA decided that a full EIS was needed. The full LANL BSL-3 EIS is due to be released in the summer of 2007 and renders the original LANL BSL-3 EA invalid. Please remove all references to the withdrawn LANL EA from this LLNL EA.

Moreover, in time NNSA agreed to prepare a more comprehensive environmental impact statement (EIS) for the LANL BSL-3. We submit that the same should be done for the LLNL BSL-3 given the Los Alamos example and the Ninth Circuit remand that DOE should consider an EIS. Additional reasons for an EIS are increasing indications of potentially greater seismic risks than previously acknowledged and the fact that the original and revised LLNL EA fails to disclose the true amounts of "Material at Risk" upon which risk calculations are predicated.

Advanced biodefense research (i.e., with bio-warfare agents like live anthrax and plague) should not be collocated with nuclear weapons research. If the U.S. mixes "bugs and bombs," it could complicate enforcement of the Biological Weapons Convention, the international treaty banning bioweapons. Please analyze the impacts of locating the biodefense research facility at a location other than at the Livermore Lab main site. The final EA should fully justify why DHS should not, or cannot, fulfill its needs at a non-nuclear weapons location. We formally state that we are not against enhanced national defenses against potential bioterrorism, which are regrettably necessary in today's world. However, we most seriously question whether a secret nuclear weapons site is an appropriate location for many reasons, foremost amongst them the possibly adverse international example it could set. Moreover, in light of the October 2001 anthrax attacks, we seriously question the ongoing proliferation of and increasing access to bioweapons agents. We hope to see those agents tightly controlled at a few consolidated sites, and again assert that DOE nuclear weapons sites are not suitable candidates.

The revised Environmental Assessment suggests that a potential terrorist would rather try to find dangerous pathogens in nature than attempt to steal them in larger, more concentrated quantities from the Livermore Lab BSL-3. Clearly the advantage of a person or persons with destructive intent that would want to obtain bio-

agents from the Lab is that these agents are pure, concentrated and in some cases already weaponized as an aerosol. Clearly the advantage is that they are pure, concentrated and in some cases already weaponized as an aerosol. These are exactly the steps one would need a biolab to perform. So it would be reasonable to try to obtain them after this work is already done at a lab.

Livermore Lab sits within a 50-mile radius of seven million people. This highly populated area is not an appropriate place to conduct experiments with some of the deadliest agents known. Please analyze the beneficial impacts of locating the biodefense research facility at a less populated area.

The revised Environmental Assessment does not analyze the environmental and health impacts of a release of the BSL-3's total inventory of up to 100 liters of bio-warfare agents. In fact, the revised EA fails to even disclose that other Livermore Lab and Department of Energy documents state the BSL-3 facility will house up 25,000 different samples of pathogens adding up to a total of 100 liters of bioagents at a time. Therefore, the hazard level posed by the Livermore Lab BSL-3 is far, far greater than the revised EA considers. All potential impacts should be calculated form the total amount of true Materials at Risk that could result from any catastrophic event, be it seismic or Intentional Destructive Acts.

Experiments will genetically modify bio-agents and aerosolize them (spray them) onto testing animals inside of special cabinets. The risks posed by genetically modified pathogens have never undergone a broad independent assessment. The lab will infect a maximum of 100 animals at a time, namely mice, rats and guinea pigs. Scientists and policy makers are concerned that genetic modifications could accidentally or intentionally create super-strains that have no known treatment or cure ultimately resulting in bio-weapons of the future. The environmental study conducted by the LLNL did not study the hazards of genetic modification.

The Department of Energy (DOE) should hold a public hearing so that the public can learn more about this plan and provide oral comments. So far, the number of public hearings that DOE has held on this important issue is ZERO. Please provide the opportunity for a public hearing and oral comment on the proposed LLNL BSL-3.

The 30-day written comment period (which ends May 11, 2007) is too short. Most area residents and other interested members of the public don't know about the comment period. It has not been widely publicized by the Department of Energy or Livermore Lab. Therefore, people are being deprived of their right to comment. The written comment deadline should be extended for a minimum of one additional month (to June 11). And, a public hearing (see above) should occur within the extended public comment deadline.

According to the DOE IG, the NNSA, a semi-autonomous agency within DOE, has made the decision to proceed with BSL-3 facilities at eight of its sites. Clearly, the potential risks are significant, given that theft of minute quantities can cause great public harm. In accordance with NEPA responsibilities and statutes, NNSA should and must prepare a Programmatic Environmental Impact Statement (PEIS) that collectively analyzes the cumulative impacts of its proposed BSL-3 facilities, with the Department of Homeland Security (DHS) as a cooperating agency. There is established precedence in that the U.S. Army completed an April 1989 final programmatic environmental impact statement on its Biological Defense Research Program. We believe that the NNSA and DHS as coordinating agency is under the same NEPA obligation to complete a PEIS, and should proceed to do so without delay. The LLNL BSL-3 EA should explain in detail the NNSA's and DHS' failure thus far to complete a PEIS, and how a continuing failure to do so would be justified.

Specific Comments
(Quotes from the revised LLNL BSL-3 revised EA are in italics.)

In response to this ruling and the guidance, NNSA has revised the 2002 EA to consider the potential impacts of terrorist activity. (Pg. ii)
Where is the final guidance? This revised EA should be withdrawn and re-revised when the final guidance is released.

Also since 2002, the proposed building has been constructed and all facility-related equipment installed. As such, NNSA acknowledges that the impacts related to construction that are discussed in this document have already occurred; these impacts were analyzed in the 2002 EA and considered in issuing the Finding of No Significant Impact (FONSI). (Pg. ii)
Please explain how the impacts of construction estimated in the 2002 EA compare to the actual impacts.

In accordance with the Ninth Circuit is remand, NNSA has reviewed the threat to the facility from terrorists and the potential environmental effects that might derive from various terrorist acts against the facility. Three terrorist acts were considered: 1) a terrorist attack resulting in facility damage; 2) a theft of pathogenic agent by a terrorist from outside of LLNL; 3) a theft of pathogenic agent by an insider. (Pg. v)
Why were these three terrorist acts chosen? Why only three?

NNSA believes that the probability of a successful terrorist attack on the BSL-3 facility is so uncertain that the possibility of such an event cannot be accurately quantified. (Pg. v)
DOE's interim guidance does not mention analyzing the probability of a terrorist act. This EA must analyze the consequences of accidents, not probability of accidents.

The EA concludes that the systems and technologies in the proposed facility would likely reduce the probability and consequence of a bio-terrorist act against the public in general. (Pg. v)
This is not the point. The idea that this BSL-3 may be making the world a safer place, or not, is not the purpose of this EA, or any EA.

Other minor changes have been made if guiding regulations or DOE policies have been updated since 2002. (Pg. v)
What are these?

The building would not be constructed over a known geologic fault or vertical displacement of a fault line, nor would it be sited within 50 feet of such a condition. (Pg. 11)

Accident scenarios usually envisioned for DOE facilities would normally be seen to exacerbate or enhance a release or spread of the hazardous materials, but for the BSL-3 facility would potentially render these materials innocuous (heat, fire, sunlight, and wind). These would be avoided when working with microorganisms and would usually result in microorganisms being killed. Consequently, catastrophic events such as earthquake, fire, explosions and airplane crashes, normally considered as initiating events in DOE radiological or chemical accident analyses, were viewed as having the potential to actually reduce the consequences of microbiological material releases. (Pg.52)
The use of the words "normally," "potentially," and "usually" is instructive. One of the key jobs of federal agencies under NEPA and under the DOE interim guidance is to analyze the risks of worse case scenarios and to analyze the explicit environmental consequences, which in this case should include physical breeches of facility containment and the prolonged loss of freezing capabilities. In a seemingly contradiction to the above categorical assertion, this revised EA notes how Coxiella burnetii (Q fever) is highly infectious and at the same time "remarkably resistant to drying and environmental conditions." (Pg. 54). This possible contradiction needs to be better explained to the public. The EIS must disclose all types and forms of microorganisms and infectious agents that might be present and the related risks of

handling each.

Moreover, the LLNL BSL-3 specifically acknowledges at page 23 that "some spores could be present in samples." Would there be spore forms of anthrax present at the facility, forms that are known to persistently survive in the open environment for decades at a time? There are also forms of tuberculosis in which the pathogens are known to survive in the open environment for extended periods of time. Would possible genetic modifications of pathogens and infectious agents at this BSL-3 facility possibly enhance their survival in the open environment? We find the 2002 environmental assessment's general assertion that catastrophic events would only serve to mitigate the risk to be far too quaint and self-serving. The risks of containment breeches need to be rigorously analyzed for all forms and types of pathogens and infectious agents that may be handled. It is not enough to simply wave away the potential risks by stating in effect that catastrophic events can only serve to lessen the threat.

Concerning the accident scenarios themselves, first, all risk analyses in the 2002 environmental assessment were essentially predicated upon the amounts of pathogens or infectious agents present during handling processes, an order of magnitude or more below what may actually be present at the facility. Risk analyses must be based on the total amount of inventory (which should be disclosed in the final EA), including storage. Frozen pathogens or infectious agents can obviously become Materials at Risk in the event of severe events, be they seismic or Intentional Destructive Acts, that cut off the electrical supply for extended periods of time (conceivably can even beyond the immediate diesel supply for emergency backup generators).

4.3 Analysis of Threat of Terrorist Activity

Environmental reviews prepared under CEQ implementing regulations and DOE NEPA regulations require a presentation of the environmental impacts of the proposed action and the alternatives in comparative form, thus defining the issues and providing a clear basis for choice among options by the decision-maker. With regard to intentional malicious acts, the assessment should compare potential impacts of acts by a terrorist that could derive from the proposed action, or that could occur with significantly greater probability as a result of the proposed action, to the potential impacts from those that could already occur if research with pathogenic agents requiring BSL-3 level containment is not conducted at LLNL (the "No Action" alternative). Pg. 57

The environmental effects of intentional destructive acts were not analyzed for the No Action Alternative, so no comparison was made. The environmental effects of intentional destructive acts must be analyzed for the No Action Alternative and a comparison of these effects must be compared to the Proposed Action.

Intentional malevolent acts, such as terrorist acts, do not lend themselves to the type of probability analysis conducted in NEPA documents for accidents (DOE 2002a). (Pg.58)

DOE 2002a refers to U.S. Department of Energy, "Recommendations for Analyzing Accidents under the National Environmental Policy Act", July 2002. This document states, "Analysis of such acts poses a challenge because the potential number of scenarios is limitless and the likelihood of attack is unknowable." (Pg. 20) This is the reason that DOE's interim guidance focuses on the environmental consequences and not on the probability of intentional destructive acts. This EA must do the same.

For a typical NEPA accident analysis, one would attempt to estimate the likelihood of a particular accident scenario. If it was high enough to warrant concern, one would then consider the potential consequences and analyze them accordingly. (Pg. 58)

Because the potential number of scenarios is limitless and the likelihood of attack is unknowable, DOE's interim guidance demands that this EA should examine the environmental consequences and not on the probability of intentional destructive acts. Intentional destructive acts do warrant concern and must be analyzed in detail.

Therefore in dealing with the potential for terrorism and its NEPA implications, NNSA has adopted an approach based on that which is used in designing security systems and protective strategies, where one begins with the assumption that a terrorist act will occur, regardless of the actual probability of such an act. Increasing levels of protective strategies are then put into place to reduce the risk of a successful terrorist attack to an acceptable level, and subsequently the potential for the facility to be an attractive target for terrorism. The conclusions of the NNSA in the analysis that follows reflect the influence of that approach. (Pg. 58)

One could postulate that catastrophic damage to the facility could be accomplished either by air or ground attack or by an individual gaining direct access to the building. (Pg. 58)
The environmental consequences of a ground attack should be analyzed in detail.

The potential impacts of these three scenarios were evaluated, including the potential impact that a successful terrorist attack would have. (Pg. 59)
The impacts of theft and release of pathogens was not explicitly analyzed.

For example, a suicidal plane crash could breach the facility's containment. Depending on the time of day and the type of research underway, a loss of containment could result in a release of pathogenic materials. It is probable that the organic biological material would be destroyed by any resulting fire (DOE 2002b). (Pg. 59)
DOE 2002b refers to the U.S. Department of Energy's "Environmental Assessment for The Proposed Construction and Operation of a Biosafety Level 3 Facility at Los Alamos National Laboratory, Los Alamos, New Mexico," U.S. Department of Energy, National Nuclear Security Administration, Office of Los Alamos Site Operations, DOE/EA-1364 (February 26, 2002). This Los Alamos EA was withdrawn by NNSA in January 2004. NNSA should not rely upon this Los Alamos EA for both the original and the revised LLNL BSL-3 EA. The EA for the BSL-3 at Los Alamos was withdrawn because NNSA decided that a full EIS was needed. The full LANL BSL-3 EIS is due to be released in the summer of 2007 and renders the original LANL BSL-3 EA invalid. Please remove all references to the withdrawn LANL EA from this LLNL EA.
The exact physics and input parameters of the plane crash analyzed must be stated. What type of plane? How much does it weigh? How much fuel was onboard? What was the speed of impact? What was the angle of impact? Was it a direct hit? Changes of any of these parameters would affect any loss of containment. Is NNSA implying that it does not need to mitigate the effects of a plane crash on this BSL-3 facility? NNSA has stated that this facility is a pre-manufactured building. This implies that it is probably a frame structure and not a masonry structure. Does a frame structure offer the best mitigation against a plane crash? A comparison of frame construction vs. masonry must be analyzed.

Similarly, an explosive device delivered by a vehicle or an individual on foot could breach facility containment with a subsequent partial release of the biological material. (Pg. 59)
Please explain in detail why this would only be a partial release. The exact physics and input parameters of the explosion analyzed must be stated. What type of explosive? How much explosive? What is the location of the explosion? Changes of any of these parameters would affect any loss of containment.

Impacts of a Release Following Loss of Containment. *Catastrophic events such as fire, explosions, and airplane crashes, normally considered as initiating events in NNSA radiological or chemical accidents, have the potential to actually reduce the consequences of microbiological material releases due to the heat produced by these events (DOE 2002b). (Pg. 59)*
This quote is a cut and paste from DOE's "Environmental Assessment for The Proposed Construction and Operation of a Biosafety Level 3 Facility at Los Alamos National Laboratory, Los Alamos, New Mexico," U.S. Department of Energy, National Nuclear Security Administration, Office of Los Alamos Site Operations, DOE/ EA-1364 (February 26, 2002). The background reference for this assumption is not stated in DOE 2002b. This Los Alamos EA was withdrawn by NNSA in January 2004. NNSA should not rely upon this Los

Alamos EA for both the original and the revised LLNL BSL-3 EA. The EA for the BSL-3 at Los Alamos was withdrawn because NNSA decided that a full EIS was needed. The full LANL BSL-3 EIS is due to be released in the summer of 2007 and renders the original LANL BSL-3 EA invalid. Please remove all references to the withdrawn LANL EA from this LLNL EA.
Explosions differ from fires or airplane crashes. An explosion could breech containment without a resulting fire and should be analyzed separately. One of the key jobs of federal agencies under NEPA is to analyze the risks of worse case scenarios, which in this case should include physical breeches of facility containment and the prolonged loss of freezing capabilities. It is noted how Coxiella burnetii (Q fever) is highly infectious and at the same time "remarkably resistant to drying and environmental conditions." This possible contradiction needs to be better explained to the public. The EIS must disclose all types and forms of microorganisms and infectious agents that might be present and the related risks of handling each. Would there be spore forms of anthrax present at the facility, forms that are known to persistently survive in the open environment for decades at a time? There are also forms of tuberculosis in which the pathogens are known to survive in the open environment for extended periods of time. Would possible genetic modifications of pathogens and infectious agents at this BSL-3 facility possibly enhance their survival in the open environment? We find the environmental assessment's general assertion that catastrophic events would only serve to mitigate the risk to be far too quaint and self-serving. The risks of containment breeches need to be rigorously analyzed for all forms and types of pathogens and infectious agents that may be handled. It is not enough to simply wave away the potential risks by stating in effect that catastrophic events can only serve to lessen the threat.

The remaining material would be stored in freezers. (Pg. 59)
Freezers may pose a different type of environmental consequence and must be analyzed separately.

An explosion with a subsequent fire would result in a lower risk than without a fire because much of the biological material available for release would likely burn or be killed by heat rather than released to the environment (DOE 2002b). Breach of containment in the absence of an explosion is likely to rupture containers of disinfectant, such as bleach, which would also reduce the amount of viable agent expected to escape the facility following the attack. (Pg. 59)
Will bleach be keep in the freezers? Please explain in detail the physics involved of bleach and pathogens being in the same explosion.

Risk Group 2 and Risk Group 3 agents proposed for use in the facility cause human diseases for which preventive or therapeutic interventions may be available. (Pg. 60)
The environmental consequences of the release of Risk Group 1 agents and the release of Risk Group 2 and 3 agents for which there are no preventive or therapeutic interventions must be analyzed.

In general, considering the current levels of security awareness and response available, it is probable that if a successful terrorist attack on the facility resulted in the release of a biological agent to the environment, the effects of such a release would be localized in time (hours immediately following the terrorist act) and place (downwind from the BSL-3 facility). (Pg. 60)
What is the basis for these statements? Where is the detailed analysis? How many people live downwind? With respect to "localized in time," we again note that bioagents spores could be present in samples.

As noted, exposed individuals could be inoculated to prevent infection or treated to assist in recovery. For example, studies (DA 1989) reported that if a non-immunized person were exposed to defined aerosols of up to 150,000 pathogenic doses of virulent C. burnetii, the disease could be avoided by giving one milliliter of vaccine within 24 hours after exposure and by instituting antibiotic therapy. (Pg. 60)
Are vaccines for every pathogen proposed for this BSL-3 facility available? Are the local hospitals equipped? One of the purposes of this EA must be to consider measures to minimize the consequences of a potential terrorist attack.

Thus, a knowledgeable terrorist could collect environmental samples of many Risk Group-2 or Risk Group-3 microorganisms and grow large quantities of them for dissemination without attacking or stealing from a government or private BSL-3 facility. This is clearly different than the analogous risk to the security of high-level radioactive spent fuel rods at a nuclear power plant, as those "source materials" are uniquely concentrated radioisotopes that are not readily obtainable or producible and cannot be "grown" to larger volume from a minute sample. (Pg. 63)

This whole line of analysis is outside the bounds of explicitly addressing potential environmental consequences of intentional destructive acts required by the DOE interim guidance. As for the rationale for why a person or persons with destructive intent would want to obtain bioagents from the Lab, clearly the advantage is that they are purer, more concentrated and in some cases already semi-weaponized as an aerosol. These are exactly the steps one would need a biolab to perform. So it would be reasonable to try to obtain them after this work is already done at a lab. It is specious for NNSA to repeatedly claim that it would be more attractive to malefactors to collect bioagents from nature (sheep ranches, etc) than it would be to target advanced biolabs for illicit diversion. This claim would be amusing, were it not for the serious unresolved questions directly relevant to national security that remain after the October 2001 anthrax attacks.

And while the theft of pathogenic materials by an insider from any bio research facility could have very serious consequences, this scenario is not expected to occur at LLNL due to human reliability programs, security procedures, and management controls at the facility and the laboratory. (Pg. 66)

These very serious consequences must be analyzed and not so summarily dismissed. "Not expected" is not good enough when the seminal incident that prompted accelerated security concerns, i.e. 9.11, was not "expected" either. We point out that Livermore's sister laboratory Los Alamos, managed by the University of California as well, also has human reliability programs, security procedures, and management controls. Those programs and procedures didn't stop an archivist with a known association with a confessed methamphetamine addict from committing serious security infractions. The future good morale of employees at both labs can be questionable. We add again the unsolved October 2001 anthrax attacks. While the specific source of the anthrax strain used in those attacks remains unknown, it is a possibility that can't be dismissed that it came from the highly secure biological facilities at Ft. Dietrich. Potential "insider jobs" need to be treated with the utmost seriousness and rigor of analysis in order to nearly guarantee their prevention.

5.0 CUMULATIVE EFFECTS

Cumulative effects on the environment result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes them. These effects can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7). This section considers the cumulative effects resulting from the implementation of the Proposed Action and reasonably foreseeable future actions in the Building 360 Complex Area and adjacent lands. Readers of this document should note that since this EA was originally issued, DOE has issued the Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SWEIS, DOE/EIS-0348, DOE/EIS-0236-S3, DOE 2005). This document contains an extensive discussion of the cumulative effects of LLNL operations, which includes this facility.

LLNL Operations at the Building 360 Complex Area. *No new types of operations and very few, if any, new personnel would be introduced into LLNL as a result of the Proposed Action. Land use within the Building 360 Complex Area would remain unchanged. Local traffic congestion would be unaffected by the Proposed Action since there would be no net increase expected in the number of workers for the Complex Area. Pg. 68*

The cumulative effects of the environmental consequences of intentional destructive acts that release biological pathogens and radiological isotopes at the same time must be analyzed for this EA.

The first, scenario for a BSL-3 facility in Ohio (BMI 1993), involved an accident that resulted in a release of exotoxin from the common soil pathogen, Clostridium botulinum. Three different toxins were planned for use in the facility (botulinum, ricin, and Staphylococcal enterotoxin B), but botulinum toxin was chosen because it was determined to be the most toxic of the three. The scenario involved the release of an aerosol equivalent in amount to one of their standard tests in the interior of a Class III BSC followed by release through the cabinet filtration system. The BSC exhausts through two HEPA filters in series with each removing 99.97 percent of the aerosol. The EA analysis also considered an accident relating to microorganism handling in which the organisms were not contained within a BSC as not being a credible accident since the only open culture handling, including packaging and un-packaging, is done inside their BSCs. They similarly discounted fire, explosion, loss of ventilation control, airplane crash, earthquake, and flooding as also not being credible events to initiate accidents. They determined that there was no effect on humans due to the release which was several orders of magnitude lower than the no-effect dose (BMI 1993). (Pg. B-8)

First, in its 2004 report to Congress the Defense Nuclear Facilities Safety Board wrote (page 4-4) "The Board identified many weaknesses in DOE's program for the use of High Efficiency Particulate Air (HEPA) filters in safety applications." Thus, we are skeptical of the DOE's claimed HEPA efficiencies and which DOE needs to better support with updated tests that the Department promised DNFSB would be performed.

Sincerely,

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Scott Kovac
John Witham
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Mon, Sep 9, 2002 10:41 AM

From: Mortensen, Rich <rich.mortensen@Oak.doe.gov>
To: 'Colin King' <colinking@nukewatch.org>
Date: Monday, September 9, 2002 10:34 AM
Subject: RE: NWNM Comments on LLNL BSL-3 EA

Dear Mr. King-

This is to acknowledge receipt of your comments regarding the proposed Biosafety Level 3 facility at Lawrence Livermore National Laboratory. Your concerns will be addressed as we finalize the Environmental Assessment for the facility and you will receive a written response addressing those concerns.

Richard Mortensen

DOE NEPA Document Manager

US DOE, Livermore Site Office, M/S L-293

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Page 1 of 1

nuclear watch new mexico

September 7th, 2002

Mr. Richard Mortensen
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Dear Mr. Mortensen,

Nuclear Watch of New Mexico (NWNM) submits the following comments on the draft Environmental Assessment (EA) (DOE/EA-1442) for The Proposed Biological Safety Level (BSL)-3 Laboratory at Lawrence Livermore National Laboratory (LLNL).[1] NWNM greatly appreciated your consideration of a comment period time extension and then your rapid granting of that extension.

Purpose and Need Factually Misleading

The Purpose and Need for Agency Action is self serving and factually misleads members of the public and decision makers in such a manner that it completely fails to fulfill the National Nuclear Security Administration's (NNSA) obligations under the 1969 National Environmental Policy Act, 42 U.S.C. § 4321, et seq. (NEPA). NWNM asserts that the Purpose and Need for Agency Action is hinged upon "NNSA mission requirements" which have never undergone a NEPA review.[2] Until a complete NEPA review of the NNSA Chemical and Biological National Security Program (CBNP) is conducted, the proposed agency action at LLNL is without justification. The need for a Programmatic Environmental Impact Statement (PEIS) will be addressed further on in these comments. Furthermore, the Draft EA makes the claim that "The importance of work performed for NNSA in bioscience research and development in support of its national security WMD [weapons of mass destruction] non-proliferation mission is increasing."[3] The EA goes on to say that "DOE [Department of Energy] does not currently have under its administrative control within the DOE complex any microbiological laboratory facility capability beyond BSL-2, but BSL-3 laboratories are proposed at Los Alamos National Laboratory."[4,5] The Purpose and Need does not take into account the fact that the DOE willreportedly begin construction of the Los Alamos facility in October 2002. Furthermore, the only significant difference between the LLNL proposed action and the LANL action is LLNL's addition of a 3rd BSL-3 laboratory which will house rodent cages and the capability to conduct aerosol challenges on those rodents.[6] The LLNL Draft EA goes on to claim that "Work at each of the national laboratories is expected to compliment rather than be duplicated at each of three national laboratories."[7] If that is the case, why propose a facility that is in many respects duplicative of the LANL facility? Why not construct a facility with two BSL-3 laboratories, one for aerosol challenges (which does not duplicate capabilities at LANL) and another for non-aerosol related support work? Obviously, LLNL needs to further clarify why the proposed facility does not represent a duplicative action to LANL's action. Should LLNL fail to do, it would not have met the requirements promulgated under NEPA.

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Facility Safety and Security

1. General Comment

NWNM finds the omission of preliminary safety and security plans and procedures as part of the NEPA review process a grave oversight. While we recognize that such documents are "living" and subject to change, preliminary plans should be included in the NEPA discussion for the very reason that LLNL will use these non-existent documents as basis for the determination of the Finding of No Significant Impact (FONSI). Basing a FONSI on non-existent safety plans avoids the "hard look" at socio-environmental impacts that NEPA requires. Furthermore, there is no evidence that LLNL has conducted a preliminary hazards analysis (PHA) for the proposed facility. Because of the precedence of the proposed facility, the omission of even a simple PHA is an egregious oversight that puts into question the entire NEPA process for the proposed LLNL action, particularly when these essential documents "would provide the key documentation framework for the operation of the BSL-3 facility."[8] Nor would it suffice for the agency to incorporate by reference, or any other method, the PHA prepared for the EA on the proposed BSL-3 facility at Los Alamos National Laboratory (LANL) because the proposed LLNL facility incorporates a single but substantial difference in facility design. Namely, one laboratory in the proposed LLNL facility is designed for aerosolization challenges and the LANL facility cannot conduct any type of work that would produce anything other than incidental aerosolization.[9,10]

2. Physical Security

The Draft EA states "Physical security of the facility building would be implemented commensurate with the level of work being performed. The facility safeguards would be based upon a security analysis conducted during the project planning stage."[11] The NEPA documentation (a significant aspect of all planning) for a facility such as the proposed, one that will conduct research on biological agents "historically used for bioweapons," should include more than a cursory discussion of the physical security safeguards that would be taken at the facility.[12] Additionally, a recent Congressional study found that the armed guard forces level for LLNL has dropped by 12 percent.[13] How will LLNL addresses these two issues, first that LLNL proposes to hold inventories of biological agents that have bioweapons applications which makes the proposed facility a desirable target for theft or even attack by terrorists (particularly given its proximity to high density populations), and secondly that the armed forces guarding LLNL have decreased over the past decade? This matter requires consideration, and though NWNM does not believe that specific details should be released that could conceivably jeopardize facility security, a general discussion of preliminary security measures must be included in the EA. The Draft EA fails to do this.

3. Catastrophic Events

Terrorism

Nowhere in the LLNL Draft EA is there is discussion of the risks associated with terrorism, or any possible method to mitigate such risks. Traditionally terrorist acts have not been considered as reasonably foreseeable events in DOE NEPA analyses. But in the post 9/11 world, that can no longer be claimed, and DOE and NNSA are themselves reluctantly admitting the security risks their activities face against this emerging threat.[14] As is stated above, the proposed biological agents to be studied at the LLNL BSL-3 facility are those that are historically used for bioweapons. This makes them of great potential interest to terrorists. Furthermore, given the proximity to the large population center of the Bay Area, the proposed LLNL BSL-3 is an even more desirable target for terrorists. Though recognizing that threats such as acts of terrorism are poorly defined, measures

must be taken in order to address the more plausible avenues of attack. A general description of these measures (while at the same time NWNM recognizes the need for caution when describing these measures) MUST be included in the NEPA analysis of this proposed facility. NNSA has fallen into the realm of complete irresponsibility by failing to address this grave danger.

Unlike the NNSA, the U.S. Department of the Army (DA) addresses this issue in a comprehensive manner, even though the DA asserts that the chance of terrorist attack is not "reasonably foreseeable." In its Final Environmental Impact Statement (FEIS) for the Life Sciences Test Facility (LSTF) at Dugway Proving Grounds, Utah, the DA did provide an analysis of the risks associated with terrorism, and discussed how the DA would minimize those risks.[15] The DA states that "The possibility exists that sabotage could be directed at the LSTF with intent to cause a release of biological materials. However, several factors prevent or mitigate the likelihood that a saboteur would gain access to the LSTF." Those factors, in summary, are:

LSTF is a great distance from the patrolled Dugway Proving Ground perimeter,
A manned guardhouse on the road at perimeter entrance,
A second guardhouse is located at the entrance to the technical area that is home to the LSTF,
A personal and vehicle checkpoint,
An intrusion detection system will surround LSTF,
Card reader devices for BSL-2 and BSL-3 areas,
Only 3 people will have direct access to biological material storage area.[16]

Furthermore, as was demonstrated by news headlines on www.msnbc.com, even the formidable security features of DPG can be breached. According to DPG and msnbc.com reports, a single man was able to gain access to the massive chemical weapons storage and disposal sites.

Internal Threats

As more evidence becomes available, it is clear that at least the *bacillus anthracis* used in the October 2001 anthrax attacks was cultured from the U.S. Ames Strain. Furthermore, evidence suggests that the *b. anthracis* was from a U.S. biological defense research laboratory, presumably one operated by the DA. In FEIS for the LSTF, the DA considered both acts of terrorism as well as internal employee sabotage and/or theft.[17] The point here is obvious for the careful reader. The DA considered terrorism and internal sabotage possible threats a decade before terrorists attacked on U.S. soil. Though the DA did not believe that such events were initiating, in terms of NEPA analyses, they did nevertheless provide a fairly detailed discussion of the methods that would be used to mitigate such risks. The DA states that "a disgruntled, emotionally distraught, or disloyal employee theoretically could gain the required confidence of coworkers to obtain and release materials maintained at the LSTF. Of primary public health and environmental concern is the possibility that an employee might secretly remove materials from the facilityand disseminate them in public places or the environment."[18] Clearly the stakes are greater in the post 9/11 world and after the October anthrax attacks, and consideration of both terrorism and internal threats must be considered in LLNL's NEPA analysis for the proposed BSL-3 facility.

Earthquakes

NWNM is not satisfied with the analysis given to the threat of earthquake damage to the facility. The Draft EA makes unsubstantiated claims and uses references (such as the DA) which upon more careful examination do not paint the picture as black and white as the Draft EA makes it out to be. LLNL's Draft EA asserts that "Accident scenarios usually envisioned for DOE facilities would normal-

ly be seen to exacrbate or enhance a release or spread of the hazardous materials, but for the BSL-3 facility would potentially render these materials innocuous (heat, fire, sunlight, and wind). These would be avoided when working with microorganisms and would usually result in microorganisms being killed. Consequently, catastrophic events such as earthquake, fire, explosions and airplane crashes, normally considered as initiating events in DOE radiological or chemical accident analyses, were viewed as having the potential to actually reduce the consequences of microbiological material releases."[19] Though portions of this statement ring true to the DA's findings, such as extreme fire and explosion, coupling this claim with the statement that "The probability of catastrophic events (due to earthquake) is already very low" grossly misrepresents the conclusions that the DA came to in their study of the Dugway Proving Ground (DPG), which is in a very seismically active area.

The DA found that DPG was at risk to a local ground motion at its LSTF of "5.6 to 6.9 on the Richter scale." The DA considered the chances of such an event has a probability of occurring once every 100 years, at a minimum.[20] In its Seismic Risk Analysis, the DA found that the most likely event would be from a distant fault with high attenuation in the direction of the LSTF. The DA stated that "Because the consequences of an LSTF facility failure related to a seismic event would be severe, the design parameters should reflect the worst event regardless of the probability of occurrence." The DA continued by stating that the distant Wasatch Fault has an acceleration attenuated to the site of between 0.35 and 0.45 g associated with a 250 year event and a velocity range between 35 and 45 cm/sec. From the implied Modified Mercalli Intensity Scale, it can be assumed that a velocity range between 0.35 and 0.45 g would result in an event between VIII and IX intensity at the LSTF site. Considerable damage to buildings and even ground cracking may be expected at these intensities." [21,22] These findings prompted the DA to conclude that LSTF must be constructed to the highest seismic building codes.

Arguably, the region surrounding the DPG complex is less seismically active than that surrounding the San Francisco Bay Area. According to a recent study conducted by the U.S. Geological Survey (USGS), the Bay Area has a "70 percent chance of an earthquake of 6.7 or greater" on the Richter scale from 2000 to 2030.**[23]** The Mount Diablo Thrust, Greenville, and Calaveras Faults have a combined probability of 37 percent chance of 6.7 or greater event (including a 9 percent chance of occurrence for unknown or unmapped faults in the region).[24] All these faults run in very near proximity to the LLNL. An event of such a magnitude would be at least a Modified Mercalli Intensity Scale IX, the highest probability considered by the DA. Furthermore, the chances are much greater that events of this magnitude will occur at the LLNL site than the DPG site. In 1980, a 5.9 event occurred on the Greenville fault that caused $10 million worth of damage to the LLNL, according to the USGS.[25] This event registered VII on the Modified Mercalli Intensity Scale, at least a magnitude smaller than the probable event forecasted to occur during the life-cycle of the proposed BSL-3. Yet, this event still caused substantial damage to LLNL and the surrounding region.

Given this evidence, it is inexcusable that LLNL does not provide a thorough seismic risk analysis for its proposed BSL-3 facility. Further, the DA's findings for potential aerosol release are not entirely applicable to the proposed LLNL BSL-3 facility. Though it would require a substantial amount of energy to aerosolize microorganisms in the proposed BSL-3 facility, conceivably an event of 6.7 magnitude (M) or greater could provide that energy. The Draft EA provides no explanation as to why this scenario (certainly a 37 percent chance over a 30 year period is a credible event) was not considered. Given the population density of the LLNL complex and its locale to the city of Livermore, there is a heightened risk of worker and public exposure resulting from a catastrophic event such as a 6.7M or

greater event. Aerosol clouds would not have to travel the great distances that were analyzed in the DA DPG FEIS, thus making it much more likely that the required human infectious dose (HID) would still exist when the aerosol cloud reached members of the populace.

HEPA Filters

Proper HEPA filtration is essential to the safe operation of the proposed LLNL BSL-3 facility. Yet, there is no description of how LLNL will ensure that HEPA filters are installed properly. Proper installation is vital to the effectiveness of HEPA filters. The DOE has been plagued by sloppy HEPA filter installation and maintenance as is evidenced by historical documents. It behooves LLNL to demonstrate an effective plan that will ensure that HEPA filters are installed properly, are functioning as designed, and furthermore, there should be some kind of warning system that would alert the BSL-3 personnel should the HEPA filter bank fail.

Additionally, what is the size range for the proposed microorganisms or related aerosol particles? Reportedly, HEPA filtration efficiency diminishes down to 90 percent when particles are 0.1 micron. Do any of the proposed microorganisms fall within that range?

4. Facility Size

The Draft EA states that "The BSL-3 facility would not be a large-scale research or production facility, which is defined as working with greater than 10 liters of culture quantities."[26] Yet, according to cited Centers for Disease Control (CDC) definitions, the proposed LLNL BSL-3 facility is certainly not a small facility.[27] The LLNL Draft EA states that only 6 workers occupying the facility.[28] How many of these workers would simultaneously act as principle investigators (PI)?

5. Biological Fermentor

What role, if any, will the Environmental Microbial Biotechnology Facility's 1500 liter biological fermentor play in microorganism research at the proposed BSL-3? Given the reportedly close proximity to the proposed BSL-3 facility, this could present a bad international example of U.S. commitment to the Biological and Toxin Weapons Convention. What assurances will LLNL give that this biological fermentor will not be used for industrial scale production of biological select agents or other types of genetically modified microorganisms that have potential weapons applications?

The Need for a Programmatic EIS For the NNSA's Chemical and Biological National Security Program

The National Nuclear Security Administration (NNSA), lead agency for the LLNL BSL-3 Draft EA, has already initiated a well defined program through its Chemical and Biological National Security Program (CBNP). The CBNP was created in 1996 when Congress passed the Defense Against Weapons of Mass Destruction Act, 50 U.S.C. § 2301, et seq. The CBNP is rapidly growing, for example: "Significant progress was made over the past year; partly because program funding was doubled from the FY99 level" [29] and the "CBNP budget increased from $18.5 M in FY 99 to $40.0 M in FY00 and retained that increase for FY01 ($42.1 M)."[30] Nor does the CBNP funding tally appear to capture the total cost for DOE activities with biological select agents. The DOE Office of Inspector General estimates that "the cost in FY 2000 of the Department's biological agent-related activities was in excess of $90 million."[31] In any event, total program funding will no doubt dramatically increase in FY02 following the recent terrorist and anthrax attacks.

This program is not new. As the NNSA states "The CBNP was initiated in 1997" with a clear "mission focus" for which "the development of requirements is a complex challenge involving governmental and non-governmental organizations at national, state and local levels."[32] The NNSA has developed a CBNP Strategic Plan [33] and recognizes that future "*programmatic* challenges" exist.[34] DOE Albuquerque officials have on at least one occasion undertaken "*programmatic* review of pertinent program documents." [35] (Emphases added.) The CBNP is multi-laboratory and spread across the nation. Those facilities identified by the DOE Office of Inspector General as having conducted biological experiments are the Brookhaven, Lawrence Berkeley, Lawrence Livermore, Los Alamos, Sandia-CA, Sandia-NM, Oak Ridge, Pacific Northwest and Idaho Engineering and Environmental National Laboratories.[36] Additionally, "Department laboratories are conducting Work-for-Others programs, Laboratory Directed Research and Development projects, and Cooperative Research and Development Agreement projects involving biological select agents and select agent materials." [37] As further indication of the reach of its potential impacts, the CBNP has already experimented on a large metropolitan and geographical area (Salt Lake City and the Great Salt Lake Basin).[38]

In sum, the CBNP is a large and rapidly growing program to which the NNSA has already committed "irretrievable resources." The program has numerous facilities located across the country that, by virtue of the materials that they work with, can have large potential impacts that could "significantly" affect the "human environment." [39] Yet, in what appears to be a clear violation of the National Environmental Policy Act (NEPA), the CBNP has not undergone public programmatic review. In these comments, NWNM attempts to make clear that that programmatic review is required.

In February 2001 the DOE Office of Inspector General released a report entitled "Inspection of Department of Energy Activities Involving Biological Select Agents." Under RESULTS OF INSPECTIONS, that office concluded:

> [T]he Department's biological select agent activities lacked organization, coordination, and direction. Specifically, the Department's activities lacked appropriate Federal oversight, consistent policy, and standardized implementing procedures, resulting in the potential for greater risk to workers and possibly others from exposure to biological select agents and select agent materials.[40]

As a result of its inspections the DOE IG Office made four primary recommendations to the DOE Under Secretary for Energy, Science, and Environment and the DOE Under Secretary for Nuclear Security [i.e., the NNSA]. The DOE IG Office recommended them to jointly:

> 1. Identify the types and locations of activities being conducted by the Department involving biological select agents and select agent materials.
> 2. Initiate actions to ensure: (a) appropriate federal oversight; (b) consistency in policy; and (c) standardization of implementing procedures for biological select agent activities being conducted by the Department. Actions, for example, could include encouraging more interagency cooperation in this area and, similar to the approach taken by the United States Army, supplementing CDC [Centers for Disease Control and Prevention] guidance regarding activities involving biological select agents and select agent materials to address situations unique to DOE.
> 3. Ensure that required NEPA reviews are conducted prior to the start of biological select agents and select agent materials and revised, as needed, when significant changes occur in the activities.

> 4. Initiate appropriate action to ensure the Department's laboratories, including those managed by the NNSA, receive timely and consistent information regarding CDC guidelines.[41]

The DOE IG report states that the Acting Director of the NNSA Chemical and Biological National Security Program generally concurred with all four recommendations. Specifically on the issue of NEPA compliance, the DOE IG report says that the "Acting Director stated that the Department is *required* to comply with NEPA. He stated that the Department will 'continue to address biological research within individual laboratory annual planning summaries and *otherwise according to Department requirements'* to ensure that that appropriate consideration is given to NEPA compliance *early in the planning process*." [42] (Emphases added.)

On the subject of "otherwise according to Department requirements," DOE NEPA Implementation Regulations, §1021.330, "Programmatic (including Site-wide) NEPA Documents," states:

> (a) When required to support a DOE programmatic decision (40 CFR §1508.18 (b) (3)), DOE shall prepare a programmatic EIS or EA (40 CFR §1502.4). (Emphasis added.)
> (b) A DOE programmatic NEPA document shall be prepared, issued, and circulated in accordance with the requirements for any other NEPA document, as established by the CEQ regulations and this part.

The above referenced 40 CFR §1508.18 (b) (3), "Major Federal action," states

> (b) Federal actions tend to fall within one of the following categories: …
> (3) Adoption of programs, such as a group of concerted actions to implement a specific policy or plan; systematic and connected agency decisions allocating agency resources to implement a specific statutory program or executive directive.

The above referenced 40 CFR §1502.4, "Major Federal actions requiring the preparation of environmental impact statements," states

> (a) Agencies shall make sure the proposal which is the subject of an environmental impact statement is properly defined. Agencies shall use the criteria for scope (§1508.25) to determine which proposal(s) shall be the subject of a particular statement. Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement.
> (b) Environmental impact statements may be prepared, and *are sometimes required, for broad Federal actions such as the adoption of new agency programs* or regulations (§150.18). Agencies shall prepare statements on broad actions so that they are relevant to policy and are timed to coincide with meaningful points in agency planning and decision-making. (Emphasis added.)

The above referenced 40 CFR, §1508.25, "Scope," states

> To determine the scope of environmental impact statements agencies shall consider 3 types of actions, 3 types of alternatives, and 3 types of impacts. They include:
> 1. Connected actions, which means that they are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:…
> (iii) Are interdependent parts of a larger action and depend on the larger action for their justification.

Under "Purpose and Need for Agency Action " the Draft LLNL BSL-3 EA says that "DOE con-

ducts bioscience work at LLNL in support of its national NNSA security and science missions and in support of the CBNP [Chemical and Biological National Security Program] … NNSA needs BSL-3 laboratory capability located at LLNL." Thus, it is self-evident that the proposed LLNL BSL-3 is an interdependent part of a larger federal action, which is the NNSA's Chemical and Biological National Security Program. In turn, the proposed LLNL BSL-3 laboratory depends upon that program for its justification. It is also self-evident that the CBNP is a major federal action that has the potential to significantly affect the human environment. Just because the CBNP is an ongoing program that has not yet been programmatically reviewed under NEPA does not excuse it now from review. As NEPA states: "Actions include the circumstance where the responsible officials fail to act and that failure is reviewable by courts or administrative tribunals under the Administrative Procedures Act or other applicable law as agency action." [43]

The Department of Energy declares that "It is DOE's policy to follow the letter and spirit of NEPA; comply fully with the CEQ [Council on Environmental Quality] regulations; and apply the NEPA review process early in the planning stages for DOE proposals."[44] In contradiction, DOE's NEPA history is replete with major violations and failures to act.[45] Our present concern is further heightened by revelations that the NNSA's Chemical and Biological National Security Program has already arguably violated NEPA procedures at two of its facilities, the Chem-Bio Facility under construction at the Oak Ridge National Laboratory (proposed as a BSL-3 facility but without an environmental assessment) and a facility at Sandia-NM (whose original scope of work had significantly changed without related NEPA review).[46]

DOE was forced by citizens to prepare a Stockpile Stewardship and Management (SSM) PEIS for public review of Departmental proposals to consolidate and revitalize its nuclear weapons complex. That 1996 document said:

> This PEIS has been prepared in accordance with section 102(2)(c) of the *National Environmental Policy Act* (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.), and implemented by regulations promulgated by the Council on Environmental Policy (CEQ) (40 CFR 1500-1508) and DOE regulations (10 CFR 1021). Under NEPA, Federal agencies, such as DOE, that propose major actions that could significantly affect the quality of the human environment are required to prepare an environmental impact statement (EIS) to ensure that environmental information is available to public officials and citizens before actions are taken. *For broad actions*, such as the Stockpile Stewardship and Management Program, *a PEIS is prepared.* [47] (Emphasis added.)

Under the same NEPA requirements it should be noted that the DOE has also prepared a Waste Management PEIS, a Storage and Disposition of Weapons-Usable Fissile Materials PEIS and a Tritium Supply and Recycling PEIS.

From the perspective of required programmatic review under NEPA, Nuclear Watch of New Mexico asserts that there is little difference between the Stockpile Stewardship and Management Program and the Chemical and Biological National Security Program. Both were explicitly new programs involving the significant commitment of irretrievable resources and potentially significantly affecting the human environment. Yet one received programmatic NEPA review and one still has not. We hereby make the claim that the NNSA is required under NEPA to prepare a CBNP PEIS, and the agency should act quickly to do so.

Despite what seem to be clear NEPA requirements, the NNSA may still be loath to undertake a CBNP PEIS. The NNSA should be aware that public comment can be of great direct benefit to the agency. One example is that when DOE prepared a draft Los Alamos National Laboratory (LANL) Site-Wide EIS in 1998, these writers commented that the risk of wildfire was completely omitted (an incredible omission!). DOE subsequently included in the 1999 Final LANL Site-Wide EIS a risk analysis of a model fire that eerily matched the all-too-real Cerro Grande Fire of 2000. As a result, the lab took some fire prevention measures that, among other things, helped to keep the waste dumps and storage areas at Technical Area-54 from burning. In the informal words of the director of the LANL's fire rehabilitation project, the existence of that wildfire risk analysis saved the lab three critical days in determining appropriate emergency response measures while the fire raged. That analysis would not have existed without the NEPA process and related public comment.

Should the NNSA amicably agree to prepare a CBNP PEIS, Nuclear Watch of New Mexico contends that the SSM PEIS can serve as a useful model in a number of ways. First of all, the SSM PEIS provided a forum in which DOE could lay out its rationale and justification for the SSM Program. This is of analogous importance to the CBNP in that one of the major concerns expressed by the public over the proposals DOE has put forth for BSL-3 facilities is the propriety of locating a biological research facility at an institution whose historic mission has been the research and development of deliverable nuclear weapons. At the same time this is an issue that the mere appearance of which can be of international significance. DOE has emphatically and repeatedly denied that its future BSL-3 facilities would ever be used for offensive purposes. A CBNP PEIS would help to lay the programmatic foundation for such assurances. Moreover, a CBNP PEIS could help build public and international confidence through discussion of the international treaty framework governing biological select agents and by institutionalizing transparency measures for the entire program under that framework.

Another way that the SSM PEIS can serve as a useful model is that that document served both as a programmatic review and facility-specific review. This is to suggest that in the course of a CBNP PEIS the NNSA could simultaneously prepare the programmatic review that we believe NEPA clearly requires and still move forward as appropriate in the NEPA process for both the LLNL and LANL BSL-3 facilities.

A CBNP PEIS can also serve to promote needed interagency cooperation. To again quote the DOE IG Office's second recommendation, the NNSA should:

> 2. Initiate actions to ensure: (a) appropriate federal oversight; (b) consistency in policy; and (c) standardization of implementing procedures for biological select agent activities being conducted by the Department. Actions, for example, could include encouraging more interagency cooperation in this area and, similar to the approach taken by the United States Army, supplementing CDC guidance regarding activities involving biological select agents and select agent materials to address situations unique to DOE.

In Nuclear Watch of New Mexico's view, the CDC should be designated as a "cooperating agency" in a CBNP PEIS and not merely as a "supporting agency." As the lead agency in this NEPA process, the NNSA should request that designation.[48] The NNSA should be advised that to have the CDC's active participation in these NEPA processes would undoubtedly go a long ways towards alleviating public concerns over safety and health issues. In addition, given that the CDC is reportedly chronically under-funded, the NNSA should help financially support the CDC in any role that it might play as a cooperating agency.

Again in reference to the DOE IG's second recommendation (specifically to the phrase "similar to the approach taken by the United States Army") it needs to be noted that the U.S. Army prepared and released in April 1989 a Final Programmatic Environmental Impact Statement on its Biological Defense Research Program (BDRP).[49] Under "Description of the BDRP," the Army states that the "objectives of the BDRP are to develop measures for detection, treatment, protection and decontamination of potential biological warfare threat agents."[50] In a broadly similar mission, the "DOE Chemical and Biological National Security Program (CBNP) was initiated in FY1997 to engage the DOE and its laboratories more fully in the development and demonstration of new technologies and systems to improve U.S. domestic preparedness and response capabilities to chemical and biological attacks."[51] Like the Army's program, the NNSA's Chemical and Biological National Security Program is multi-facility across the nation, with the potential for significant impacts on the human environment. The Army found its PEIS "an excellent approach for considering unscheduled, unidentified future implementing actions that may have environmental impact," [52] acknowledged that the "jurisdiction" of its PEIS was "[n]ationwide," [53] and fulfilled its statutory NEPA obligations through the completion of its PEIS. In Nuclear Watch of New Mexico's view the DOE is under the same NEPA obligation to prepare a PEIS on its Chemical and Biological National Security Program, and should proceed to do so without delay.

The NNSA may perhaps argue that the present national security climate following the September 11 and anthrax attacks does not allow for the "luxury" of a programmatic EIS on its Chemical and Biological National Security Program. Even though we too recognize the increasing need for enhanced national defenses against the threat of chemical or biological attack, Nuclear Watch of New Mexico would argue otherwise. Obviously other governmental programs now exist (even present day activities at LLNL) that are addressing current issues. Also obvious is the fact that all federal agencies, even in today's security climate, are still obliged to comply with NEPA. Moreover, as the SSM PEIS illustrates, programmatic review and facility review can still occur simultaneously. Therefore, the preparation of a PEIS is not an insurmountable obstacle to the NNSA's pursuit of a BSL-3 facility at LLNL. Further, we contend that NNSA preparation and completion of a CBNP PEIS, besides meeting legal obligations under NEPA, will serve to improve the program, specific facilities (such as the proposed LLNL BSL-3 facility), interagency cooperation and public relations. We again urge the NNSA to fulfill its NEPA obligations by preparing a programmatic EIS for its Chemical and Biological National Security Program in a timely manner.

-END OF COMMENTS-

Respectfully submitted,

Colin King
Research Director

Jay Coghlan
Director

1 Predecisional Draft Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Lawrence Livermore National Laboratory, Livermore, California, DOE/EA-1442, July, 2002.

2 *Ibid.*, p. 7.

3 *Ibid.*, p. 6.

4 *Ibid.*

5 Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Los Alamos National Laboratory, Los Alamos, New Mexico, DOE/EA-1364, February 26, 2002.

6 LLNL Draft EA, p. 26.

7 *Ibid.*, p. 26.

8 *Ibid.*, p. 18.

9 "Preliminary Hazards Analysis for the Biosafety Level-3 Laboratory at Los Alamos National Laboratory," Los Alamos National Laboratory, LA-UR-01-1337, February 15, 2000.

10 Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Los Alamos National Laboratory, Los Alamos, New Mexico, DOE/EA-1364, February 26, 2002, p. 42.

11 LLNL Draft EA, p. 15.

12 LANL Final EA, p. vii.

13 Security Gaps at Department of Energy Nuclear Weapons Facilities, Representative Edward Markey, United States Congress.

14 "Los Alamos National Laboratory (LANL) agrees with NNSA that the best overall decision to meet the post September 11 challenges for the long-term security of nuclear activities associated with [Technical Area] –18 is to move the CAT I/II [nuclear] materials to the Nevada Test Site's Device Assembly Facility." Personal correspondence from John Browne, Director, LANL to Dr. Everet Beckner, Deputy Administrator, Defense Programs, NNSA, June 28th 2002.

15 The facility reviews in the DA's FEIS is very similar to LLNL's proposed facility. Though the DA designed the facility as a BSL-4, this was done only for added safety and security. The DA states that no BSL-4 work would ever be conducted in this facility, only BSL-3 work. Additionally, the DA facility is designed for small mammal aerosol challenges with the causative agents for anthrax, Q fever, etc, just as the LLNL proposed facility.

16 Final Environmental Impact Statement, Life Sciences Test Facility, Dugway Proving Ground, Utah, Department of the Army, March 1992, p. G-14-5.

17 *Ibid.*, p. A-20.

18 *Ibid.*, p. G-15.

19 Draft EA, p. 47.

20 DA DPG FEIS, p. G-24.

21 *Ibid.*, Appendix III, p. 3.

22 The Modified Mercalli Scale states for:

"Intensity VIII: Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons in motor cars.
Intensity IX: Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse, Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken." *Ibid.*, p. 4.

23 "Earthquake Probabilities in the San Francisco Bay Region: 2000-2030 – A Summary of Findings," Working Group on California Earthquake Probabilities, USGS, Report 99-517, 1999.

24 *Ibid.*

25 USGS Earthquake Hazards Program, North of Livermore Valley, California 1980 01 24 19:00:09.5 UTC, 5.9M, Intensity VII, neic.usgs.gov/neis/eqlists/USA/1980_01_24.html.

26 Draft EA, p. 19.

27 LANL Final EA, BSL-3, p. A2-1.

28 Draft EA, p. 8.

29 CBNP FY00 Annual Report, NNSA Office of Nonproliferation Research and Engineering, p. 1.

30 *Ibid*, p. 45.

From: chelseavc@gmail.com [mailto:chelseavc@gmail.com] **On Behalf Of** Chelsea Collonge, NDE
Sent: Tuesday, May 08, 2007 12:41 PM
To: Brinker, Samuel
Subject: Comment on the BSL-3 lab EA

Hello,
I'm writing to express my opposition to the approval of the BSL-3 level facility at LLNL.
A BSL-3 facility would allow LLNL to experiment with some of the deadliest agents known.
This program could endanger workers and the
entire SF bay 7 million of people because Livermore Lab has a history of leaks, spills, fires, explosions and accidents. Radioactive and
toxic contaminants have found their way from DOE operations at LLNL into the air, groundwater and soil on-site and off-site, and have jeopardized the health of workers and surrounding communities with in 50 mile radius.
The EA needs more analysis of these dangers.
Sincerely,
Chelsea Collonge
Nevada Desert Experience
702-646-4814

TESTIMONY OF ROBERT CURRY, Ph.D.
REGARDING THE REVISED LLNL BSL-3 EA'S
DEFICIENT SEISMIC ANALYSIS

I, Robert R. Curry, declare as follows:

1. I am an Emeritus Professor of Geology at the University of California, Santa Cruz, and am currently Research Director of the Watershed Institute, California State University, Monterey. I am a Registered Geologist in the State of California with over forty years of experience in this field.

2. I received a Ph.D. from U.C. Berkeley in 1967 in Geology and Geophysics, and taught as a Full Professor at U.C. Santa Cruz in the field of Earth Sciences for over twenty years until my retirement in 1994. I continue to advise graduate students in the field of Earth Sciences in the U.C. system, and currently teach courses in this field at California State University, Monterey. My research specialities include Geologic Hazards such as the seismic hazards associated with active earthquake faults.

3. I have authored and edited over one hundred peer-reviewed scholarly papers, including books, monographs and articles published in professional and scientific journals.

4. I have reviewed the Revised Environmental Assessment ("Revised EA") for the proposed construction and operation of a Biosafety Level-3 facility at Lawrence Livermore National Laboratory ("LLNL"), prepared by the United States Department of Energy, National Nuclear Security Administration, dated April, 2007. I reviewed in

particular those pages of the Revised EA which discuss "Geology/Soils/Seismology." (*Id.* at 37-39 and 49-51, and Appendix H to the LLNL Sitewide EIS/2005). I have also conducted a literature search and reviewed a number of widely-available professional studies concerning the seismology of the Livermore region, including its two active fault zones in the immediate vicinity of the Lawrence Livermore National Laboratory, the Greenville Fault, and the Las Positas Fault. I have also participated in a field conference and monitoring study focused on the active faulting in the Livermore area and have revisited the monitoring network frequently over the past 27 years to assess its continuing activity.

5. The Revised EA's discussion of the seismology of the Livermore region (*id.* at 38) concludes that the potential risk posed by active earthquake faults in the vicinity of the Livermore site is as follows:

> Seismic hazard analyses have been performed for the Livermore Site to quantify the hazard. The analyses identify the probability of exceeding a given peak ground acceleration. The 2005 SWEIS describes the maximum horizontal peak ground accelerations at the Livermore Site for return periods of 500 and 1,000 years as 0.38 g, and 0.65 g, respectively. The technical basis for these peak acceleration values is provided in Appendix H of the 2005 Sitewide EIS (DOE 2005).

Revised EA at section 3.3.6, "Geology/Soils/Seismology," p. 38.

6. In my professional judgment, the foregoing description of the seismology of the Livermore Site is demonstrably mistaken. According to widely-available, published data and analysis of the active fault systems in proximity to the Livermore Site, the maximum ground surface acceleration that may reasonably be expected within the life of the proposed BSL-3 laboratory is at least 1.0 g. *See*, e.g., *Preliminary Report on September 28, 2004 Parkfield Earthquake* by Rakesh K. Goel and Charles B. Chadwell of the Department of Civil & Environmental Engineering, Cal Poly State University, San Luis Obispo (October 5, 2004) at p. 3, confirming that "1.13 g and 1.31 g accelerations were recorded" at two recording stations 9.2 and 12 kilometers, respectively, from the epicenter of this Richter magnitude 6.0 earthquake (Attachment 1 hereto).

7. The Revised EA states that "[t]he facility is capable of withstanding the g-force predicted for a return period of 1,000 years without loss of containment or structural integrity . . . . [with] damage to the structural systems . . . expected to be very slight [and with only] . . . minor cracking" to non-structural elements. Revised EA, p. 51. This statement overlooks recent published documentation that shows much greater accelerations for quakes of Richter magnitude 6.0. It also ignores the recent seismic history of this site. On January 24, 1980, a magnitude 5.9 earthquake struck the Livermore area. This earthquake injured 44 people and caused several million dollars in property damage in Livermore and at the Lawrence Livermore Laboratory. Damage

included fallen ceiling tiles, fallen bricks from chimneys, broken gas and water lines, broken windows, and displacement of mobile structures from supporting foundations. At the Ordway Ranch (on Vasco Road, north of Livermore), a brick-and-stone fireplace was displaced from the adjacent wall, as was a smaller fireplace in another room. At the intersection of Interstate 580 and Greenville Road (about 4 kilometers north of the Lawrence Livermore Laboratory), pavement on the overpass dropped about 30 centimeters (approximately 1 foot) and concrete on one abutment cracked and spalled.

8. The Greenville Fault could cause such severe damage in Livermore again. In my professional judgment, the Greenville Fault poses an extreme earthquake hazard for the Livermore Site, and is easily capable of producing severe earthquakes capable of serious structural damage to the proposed BSL-3 facility within its projected life. Further, periodic earthquake swarms have continued at Livermore since the 1980 quake (most recently in February 2004), indicating continuing deformation due to ongoing strain along this fault at depth.

9. The seismic risks posed by the Greenville Fault are not limited to severe ground shaking. They also include surface displacement. The 1980 quake caused extensive surface rupture along the Greenville Fault, located approximately 15 kilometers southeast of Livermore. The surface rupture promulgated by this quake traveled as far north as Interstate Highway 580, and was observed for a distance of about 6 kilometers along the Greenville Fault. Where the fault crosses Vasco Road, right-lateral offset was

as much as 2 centimeters; right-lateral offset of 5-10 millimeters was observed on Laughlin Road extending to the northwest for about 300 meters. I observed this offset in the field in 1980.

10. This major quake was followed by at least 59 aftershocks within the next six days, indicating a very active and unstable fault system. For example, one of these aftershocks, occurring approximately 14 kilometers south of the epicenter of the January 24 quake, occurred on January 27. Six persons were injured at Livermore by flying glass and falling ceiling tiles and supports. Even more severe property damage occurred in the Tassajaro Valley area and at Danville, respectively 17 and 28 kilometers northwest of the epicenter. In the Tassajaro Valley (northeast of Livermore), about fifty houses sustained damage, including a toppled chimney, broken windows, and walls separated from ceilings. In Danville, one brick chimney was broken off at the roofline, a stone wall was demolished, and walls, ceilings, sidewalks and patios were cracked.

11. The Revised EA's conclusion (*id.* at p. 51) that the "maximum ground surface acceleration for the LLNL Site" expected over the next one thousand years is only "0.73 g" is contrary to extensive empirical data. For example, it is contradicted by the recent history of earthquakes in Northern California. The Richter magnitude 6.0 Parkfield quake of 2004 generated ground accelerations of 1.31 g at a distance of 12 kilometers from the epicenter, as documented in the report by Goel and Chadwell that I attach to this Testimony. The Greenville, Los Positas and Mt. Diablo Faults located near

Livermore are all capable of producing a quake with a Richter magnitude roughly equivalent to the 6.0 magnitude Parkfield quake.

12. In my professional judgment, given the potentially severe consequences to public health and safety from a release of the pathogens proposed to be used in the BSL-3 facility at Livermore, it would be imprudent to employ design criteria assuming less than a 1.3 g peak horizontal ground acceleration at this location. Furthermore, because these peak accelerations within the ground may be amplified by the overlying structures, actual local acceleration of these structures may exceed 2.0 g where certain frequencies are amplified. For example, according to studies conducted by Geomatrix Consultants in 1991, spectral acceleration of up to 2.5 g is expected in structures experiencing only two percent damping over Soil Type 2 during a ground acceleration event of 0.9 g at the Livermore Site.

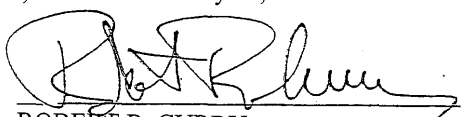
13. The Revised EA's discussion of "Abnormal Events and Accidents for Facility Operation" (*id.* at 50-51) repeats the same erroneous information, stating that "[t]he maximum horizontal peak ground accelerations at the Livermore Site for varying return periods of 500 and 1,000 [years] [are] 0.38 g and 0.65 g, respectively." As noted above, the maximum acceleration at this site for these return intervals is at least 1.31 g.

14. The revised EA's statement that seismic activity would not occasion any releases of pathogens, because "damage to the structural systems from a [maximum] horizontal peak ground acceleration of 0.73 g is expected to be very slight," is wrong for

several reasons. Revised EA at 51. This conclusion is incorrect because this site is subject to ground acceleration in excess of 1.0 g during the projected life of the facility. Additionally, this statement fails to take into account the potential for *surface rupture* as occurred extensively during the quakes on the nearby Greenville Fault in 1980 as I noted above. The Las Positas Fault located adjacent to the Livermore Site is also capable of causing surface displacement including subsidence which could crack foundations and trigger structural failure as occurred during the 1980 quake on the Greenville Fault.

15. For the above reasons, I conclude that the Revised EA fails to disclose adequately the Livermore Site's potential for significant structural damage due to foreseeable seismic events. Such damage could cause the release of pathogens proposed to be used within this BSL-3 facility. In my professional judgment, the Revised EA masks a significant risk to public health and safety posed by operation of this facility.

I declare under penalty of perjury that the foregoing facts are true of my personal knowledge based on review of relevant and reliable scientific literature, that the conclusions expressed above reflect my best professional judgment, and that this declaration was executed in Soquel, California on May 11, 2007.



ROBERT R. CURRY

PRELIMINARY REPORT ON SEPTEMBER 28, 2004 PARKFIELD EARTHQUAKE

By
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A strong earthquake of magnitude 6.0 (M_w) struck the Central Coast of California at 10:15:24 AM PST (17:15:24 UTC) on Tuesday, September 28, 2004. The epicenter (Figure 1) was 11 km (7 mile) SSE of Parkfield, at a depth of approximately 8 km (5 mile). The main shock was followed by a strong aftershock of magnitude 5.0 roughly four minutes later. As expected, numerous smaller aftershocks continue to strike to epicentral region. At the time of this report, no injuries have been reported and the damage is light, mostly limited to nonstructural damage. This preliminary report presents basic information on the epicenter location, intensity of shaking, and performance of structures in the epicentral region.

Epicenter Location and Shaking Intensity

The epicenter of the earthquake was 11 km (7 mile) SSE of Parkfield. Early analysis by the USGS and UC Berkeley indicate that the event had a strike-slip mechanism and most likely occurred on the San Andreas Fault. The fault appears to have ruptured primarily in the north-west direction as evident from the pattern of aftershocks (Figure 2). Strong shaking during this event lasted for about 10 seconds in the epicentral region. This earthquake is the seventh in a series of repeating earthquakes on this stretch of the fault. The previous events were in 1857, 1881, 1901, 1922, 1934, and 1966. The previous two earthquakes ruptured the opposite direction from NW to SE along this section[1].

Figure 3 shows the instrumental shaking intensity map for the 2004 Parkfield earthquake. The instrumental intensity was about VI in the epicentral region, which corresponds to strongly-felt shaking but light damage. The instrumental intensity in the Paso Robles, Templeton, Atascadero region was about V. Note that this region experienced significant structural and nonstructural damage during the magnitude 6.5 San Simeon earthquake that struck the Central California on December 23, 2003. Figure 4 shows the contours of peak ground accelerations (PGA) made available at the CISN[2] site shortly after the earthquake. As more information on recorded motions becomes available, it is expected that the information in Figures 3 and 4 will be updated.

[1] Source: http://www.cisn.org/special/evt.04.09.28/
[2] http://www.cisn.org/shakemap/nc/shake/51147892/pga.html

ATTACHMENT 1

September 28, 2004 Parkfield Earthquake

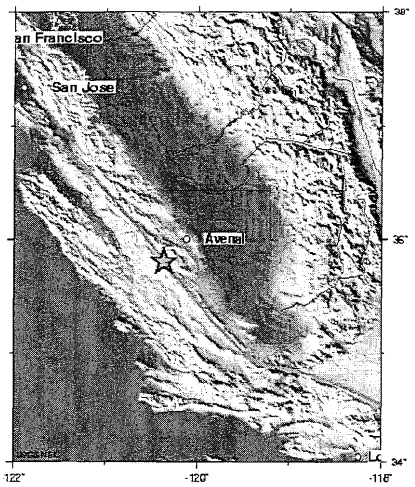

Figure 1. Epicentral location of the September 28, 2004 Parkfield earthquake[3].

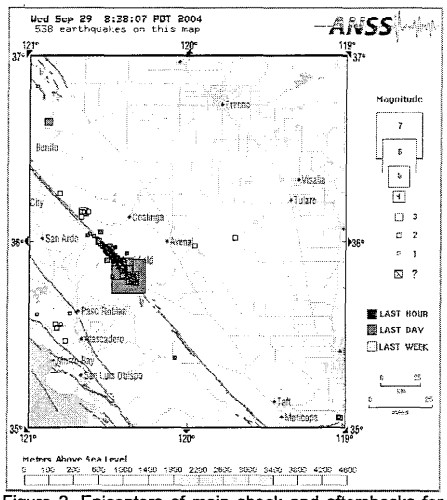

Figure 2. Epicenters of main shock and aftershocks for the September 28, 2004 Parkfield earthquake[4].

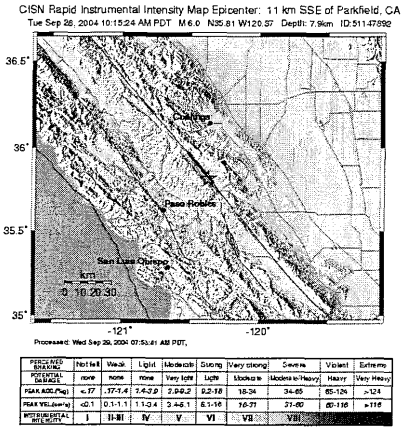

Figure 3. Intensity map (CISN).

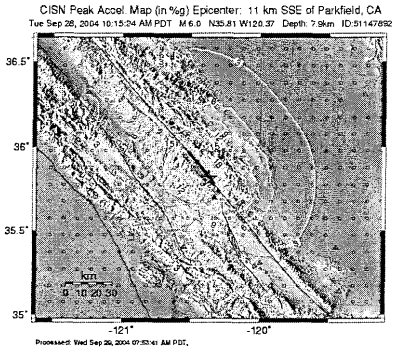

Figure 4. Peak ground acceleration map (CISN).

[3] Adapted from USGS NEIC website: http://neic.usgs.gov/neis/bulletin/neic_nybg.html
[4] Adapted from ANSS website: http://quake.wr.usgs.gov/recenteqs/FaultMaps/120-36.htm

Recorded Motions

Due to active seismic history of the epicentral region, the Parkfield area is heavily instrumented by both the California Strong Motion Program (CSMIP) and the United States Geological Survey (USGS). However, very few recording stations in this area possess modern digital technology with automated communication capability. The CSMIP is trying to recover data from analogue recording instruments and has made the recorded ground acceleration traces available online[5]. A list of the recording stations close to the epicenter available at the time of this report is shown in Table 1. Note that the data from these stations, with the exception of Parkfield – Cholame 5W, was available in analogue form – traces of the accelerations histories in the east-west, vertical, and north-south directions – at the time of this report.

The early reports indicate that the fault rupture propagated north-east of the epicenter. The conventional wisdom would, therefore, suggest that the ground motions should be stronger north of the epicenter compared to south of the epicenter. However, recorded motions indicate an strong shaking both south and north of the epicenter: 0.84g, 0.82g, 0.61g, and 0.82g acceleration was recorded at Parkfield–Stone Corral 1E (7.8 km south-east), Parkfield-Fault Zone 1 (8.8 km south), Parkfield-Cholame 2W (Sta 2) (12 km south-west), and Parkfield Cholame 3E (12 km south-east), respectively; 1.13g and 1.31g accelerations were recorded at Parkfield-Fault Zone 11 (9.2 km north-east) and Parkfield-Fault Zone 14 (12 km north), respectively. At the time of this report, reasons for this pattern of PGA distribution are being investigated.

At the time of preparing this preliminary report, digital information on the recorded ground motions was available from one ground site: Cholame Station 5W, which is about 13 km from the epicenter. At this station, the recorded PGA value in the east-west, north-south, and vertical direction are 0.25g, 0.23g, and 0.17g, respectively (Figure 5). The horizontal acceleration records contain noticeable pulses that appear to be consistent with past observations on near-fault acceleration recordings. Similar pulses are visible in traces of accelerations at several other recording stations listed in Table 1.

Linear elastic response spectra (5% damping) for the three components of the acceleration at the Cholame 5W station are shown in Figure 6. Also included for comparison is the elastic design spectrum (R = 1) for UBC-97 without near-source factors and for a stiff-soil site condition. This figure clearly shows that the response spectrum in the east-west direction, the predominant fault-normal direction, is higher than the response spectrum in the north-south direction, the fault-parallel direction, for periods up to about 0.75 sec. This observation is consistent with the expectation in near-fault zones that fault-normal ground motion is stronger than fault-parallel motion. For this station, the linear elastic response spectra in both horizontal directions are lower than the UBC-97 elastic design spectrum. For other recording stations with more intense ground shaking, however, such a conclusion may not be valid.

In addition to free-field recordings, motions were recorded on a Caltrans bridge. This bridge is located on Highway 46, roughly 11 km south of the epicenter and 150 m west of the San Andreas Fault. The recorded shaking at the abutment was 0.67g, with shaking recorded on the deck near the east abutment of 1.05g. This bridge was immediately operational after the earthquake. The high accelerations at the east abutment appear to be due to pounding between the deck and the abutment.

[5] http://www.quake.ca.gov/cisn-edc/IQR/Parkfield_28Sep2004/iqr_dist.htm

Table 1. Recording stations and peak ground accelerations within 15 km of the epicenter[6].

Station Name	Station No./ID	Network	Dist. (km)	PGA (g)	
				NS	EW
Parkfield - Gold Hill 1W	36415	CGS	0.5	0.15	0.16
Parkfield - Gold Hill 2W	36416	CGS	1.6	0.28	0.17
Parkfield - Fault Zone 4	36414	CGS	3.0	0.12	0.13
Parkfield - Fault Zone 3	36408	CGS	3.9	0.41	0.38
Parkfield - Gold Hill 2E	36421	CGS	3.9	0.23	0.17
Parkfield - Gold Hill 3W	36420	CGS	4.0	0.45	0.85
Parkfield - Fault Zone 6	36454	CGS	6.4	0.22	0.18
Parkfield - Fault Zone 7	36431	CGS	6.8	0.25	0.24
Parkfield - Fault Zone 8	36449	CGS	7.0	0.51	0.63
Parkfield - Gold Hill 3E	36439	CGS	7.1	0.11	0.21
Parkfield - Gold Hill 4W	36433	CGS	7.1	0.40	0.43
Parkfield - Stone Corral 1E	36419	CGS	7.8	0.84	0.73
Parkfield - Stone Corral 2E	36422	CGS	8.3	0.20	0.19
Parkfield - Fault Zone 1	36407	CGS	8.8	0.82	0.59
Parkfield - Fault Zone 11	36453	CGS	9.2	1.13	0.57
Parkfield - Fault Zone 9	36443	CGS	9.6	0.10	0.16
Parkfield - Stone Corral 3E	36437	CGS	9.6	0.23	0.20
Parkfield - Elementary School	36531	CGS	10	0.29	0.23
Parkfield - Gold Hill 5W	36434	CGS	10	0.19	0.25
Parkfield - Fault Zone 12	36138	CGS	10	0.31	0.27
Parkfield - Cholame 1E	36452	CGS	11	0.37	0.45
Parkfield - Cholame 2W (Sta 2)	36228	CGS	12	0.37	0.61
Parkfield - Cholame 3W	36410	CGS	12	0.58	0.34
Parkfield - Cholame 3E	36450	CGS	12	0.82	0.53
Parkfield - Cholame 4W	36411	CGS	12	0.52	0.58
Parkfield - Cholame 2E	36230	CGS	12	0.51	0.48
Parkfield - Fault Zone 14	36456	CGS	12	0.59	1.31
Parkfield - Cholame 4AW	36412	CGS	13	0.29	0.30
Parkfield - Cholame 5W (Sta 5)	36227	CGS	13	0.23	0.25
Parkfield - Gold Hill 6W	36432	CGS	14	0.10	0.11
Parkfield - Cholame 6W	36451	CGS	14	0.39	0.24
Parkfield - Fault Zone 15	36445	CGS	15	0.23	0.15

[6] Information for CISN (10/5/04)

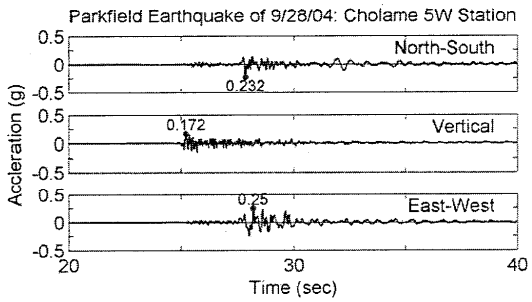

Figure 5. Ground accelerations recorded at the Cholame 5W Station during the Parkfield earthquake of September 28, 2004 (Data from CISN).

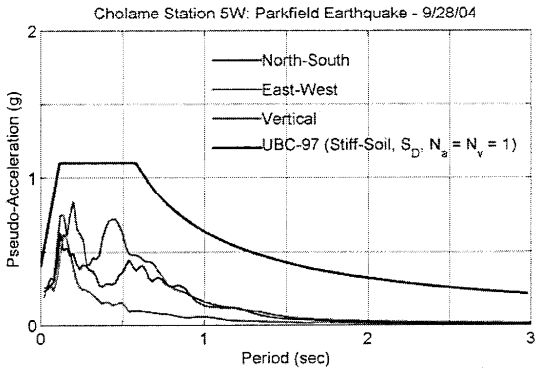

Figure 6. 5%-damped elastic response spectrum for three components of ground accelerations recorded at the Cholame 5W Station during the Parkfield earthquake of September 28, 2004, and the UBC-97 design spectrum for stiff-soil with near-source factors equal to 1 (Data from CISN).

Structural Performance

Consistent with a moderate-size earthquake in California, the damage, overall, was mostly nonstructural. The area of Parkfield is rural and sparsely populated with approximately 37 local inhabitants (Figure 7). The building stock of Parkfield consists primarily of low rise, single family, timber construction with wood and stucco facades.

Overall, minor nonstructural damage was observed to local residences through drywall cracking, stucco cracking, a collapsed un-reinforced masonry parapet wall, broken windows, and fallen bookcases. There were reports from local residents of two chimneys that suffered moderate damage but these were not confirmed by the investigators at the time of this report.

Local bridges showed minor to no damage and were open with immediate occupancy post event. The bridge located at the intersection of Cholame Road and Parkfield-Coalinga Road (Figure 8) in Parkfield, which crosses the San Andreas Fault, did show approximately 4 cm of separation between the approach slab and abutments that was quickly filled with asphalt by the bridge maintenance crew.

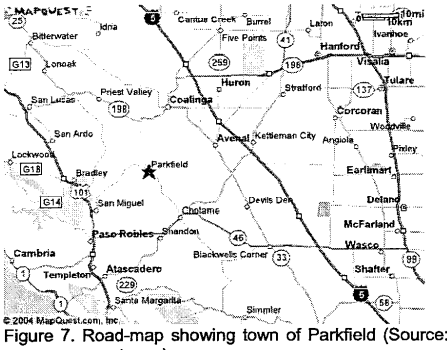

Figure 7. Road-map showing town of Parkfield (Source: www.mapquest.com).

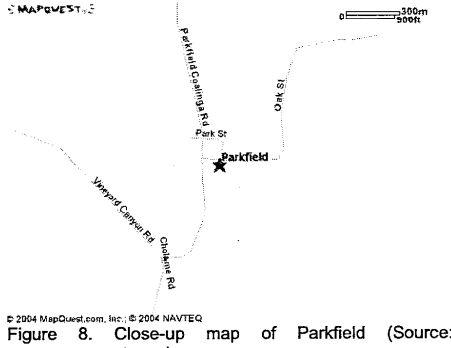

Figure 8. Close-up map of Parkfield (Source: www.mapquest.com).

Typical Building Performance

There was no noted damage to the Parkfield Café and the Parkfield Inn, two major structures in central area of the town. However, there were reports of minor structural and significant nonstructural damage to residential buildings in the area. The damage pattern described next for two residences located on Parkfield Coalinga Road (Figure 8) roughly 7 and 5 km north of Parkfield is typical of what has been reported in the epicentral region.

The first residence is a two-story timber building constructed originally in the late 1800's with a substantial addition constructed in the 1930's. The house is located less than 0.5 km from the San Andreas Fault. The strongest shaking at this location occurred in the fault-normal, east-west direction, as evident by fallen stacks of firewood in the east-west direction (Figure 9). Significant cracking was observed in the plaster (stucco finish) throughout the house but primarily in the east-west direction (Figure 10). As expected, separation also occurred between the older and newer portions of the residence (Figure 11). Although shaking at the site caused significant cracking in the stucco, the masonry chimney of the house did not show any signs of distress (Figure 12). This is due to retrofit of the chimney by strapping it at several levels to the house (Figure 13).

The second home was constructed in the 1950's but had undergone several renovations and upgrades in recent times. This house is located immediately adjacent to the San Andreas Fault that runs through the backyard. The damage in the residence predominately was nonstructural but substantial. The home suffered extensive drywall cracking (Figure 14) and other content damage (Figures 15 and 16). Outside, a timber canopy separated from the house and was dangerously leaning (Figure 17) and a portion of the unreinforced masonry parapet wall collapsed (Figure 18).

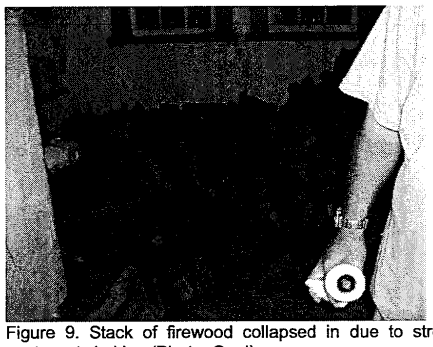

Figure 9. Stack of firewood collapsed in due to strong east-west shaking (Photo: Goel).

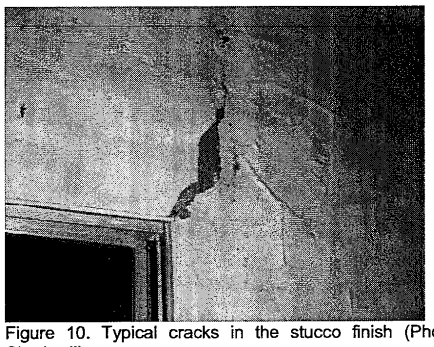

Figure 10. Typical cracks in the stucco finish (Photo: Chadwell).

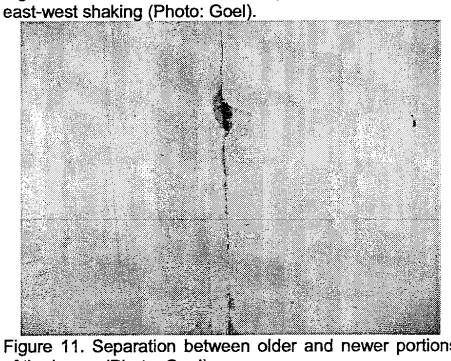

Figure 11. Separation between older and newer portions of the house (Photo: Goel).

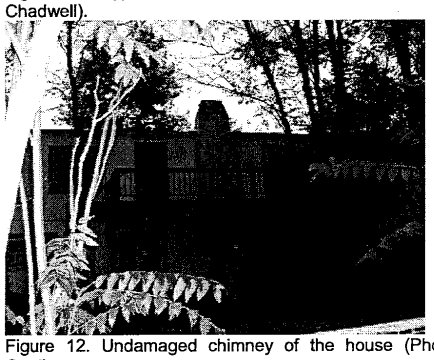

Figure 12. Undamaged chimney of the house (Photo: Goel).

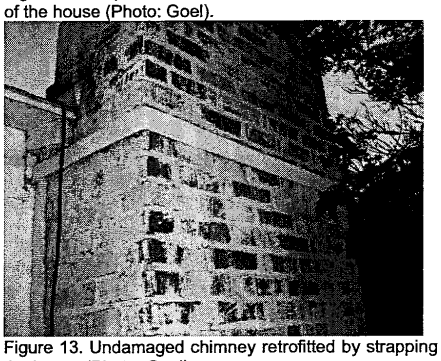

Figure 13. Undamaged chimney retrofitted by strapping to the house (Photo: Goel).

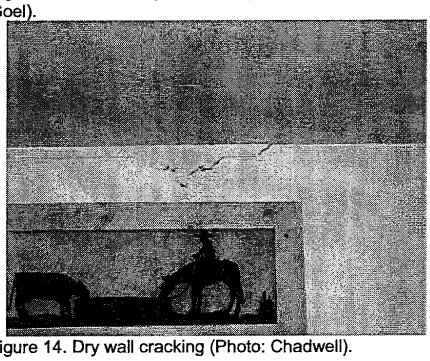

Figure 14. Dry wall cracking (Photo: Chadwell).

Figure 15. Damage to contents of the entertainment center (Photo: Chadwell).

Figure 16. Damage to office area of the house (Photo: Goel).

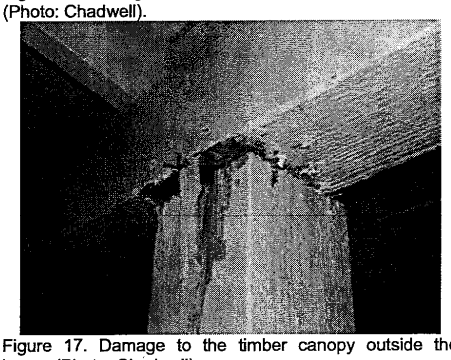

Figure 17. Damage to the timber canopy outside the house (Photo: Chadwell).

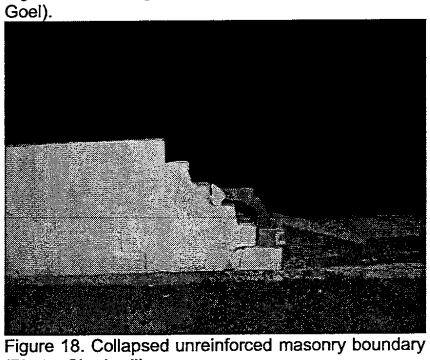

Figure 18. Collapsed unreinforced masonry boundary wall (Photo: Chadwell).

Bridge Performance

Two bridges were investigated in the reconnaissance. The first bridge, located approximately 8 km south of Parkfield, is typical of many bridges in the area: multi-span, steel riveted viaduct bridge with a concrete steel composite roadway. This bridge showed no signs of distress. There was evidence of ground shaking from surface cracking found surrounding the pile extensions (Figure 19) and some signs of minor distress apparent from fresh peeling of paint at the girder-column joint (Figure 20).

The second bridge investigated is located at the intersection of Cholame Road and Parkfield-Coalinga Road (Figure 8) in Parkfield and crosses the San Andreas Fault (Figure 21). This bridge had apparently undergone a recent retrofit and performed adequately. The minor distress to the bridge included roughly 4 cm separation between the approach slab and the bridge deck, which was filled up quickly by the bridge maintenance crew (Figure 22). Below the deck level, the concrete bent caps had minor shear cracking through the knee joints (Figure 23 and 24) as well as evidence of the flexural cracking at the top of the pile extension (Figure 25). The pile extensions at the ground level also exhibited noticeable movement (Figure 26). In addition, there was evidence of recent motion (approximately 4 cm) in the bridge bearings supporting the superstructure. Angle iron apparently installed in an effort to restrain transverse motion of the superstructure at the bearings was knocked free (Figures 27 and 28).

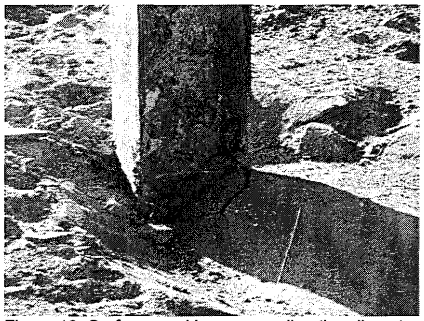

Figure 19. Surface cracking surrounding the pile extension (Photo: Chadwell).

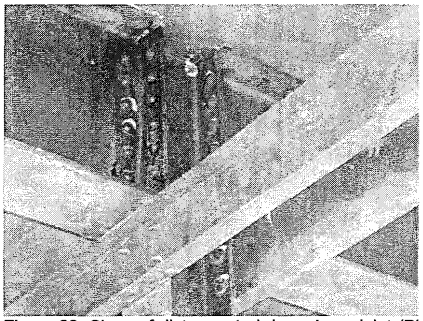

Figure 20. Signs of distress at girder-column joint (Photo: Goel).

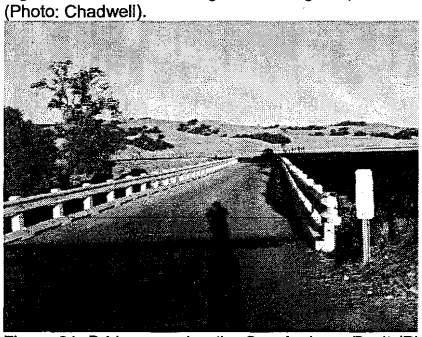

Figure 21. Bridge crossing the San Andreas Fault (Photo: Goel).

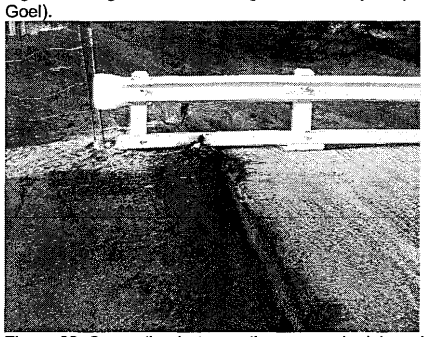

Figure 22. Separation between the approach slab and the bridge deck (Photo: Chadwell).

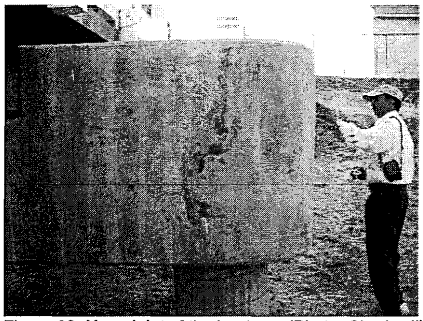

Figure 23. Knee-joint of the bent cap (Photo: Chadwell).

Figure 24. Fresh shear cracks in the knee joint of the bent cap (Photo: Goel).

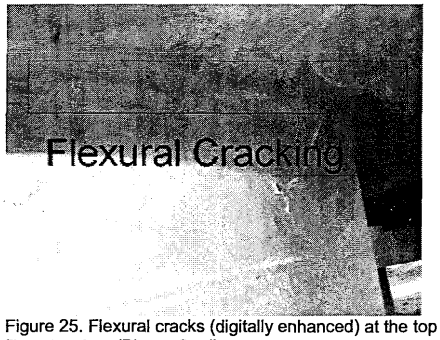

Figure 25. Flexural cracks (digitally enhanced) at the top of file extension (Photo: Goel).

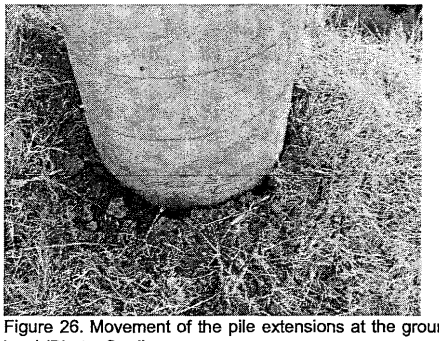

Figure 26. Movement of the pile extensions at the ground level (Photo: Goel).

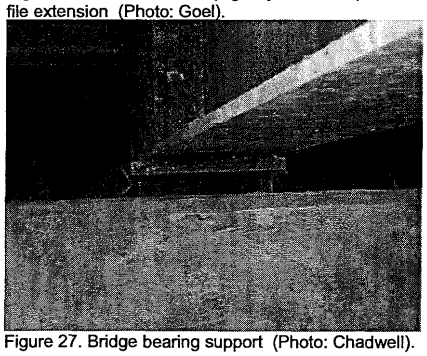

Figure 27. Bridge bearing support (Photo: Chadwell).

Figure 28. Movement at the bridge bearing (Photo: Chadwell).

From: Mary Davis [mailto:yggdrasili@yahoo.com]
Sent: Thursday, May 10, 2007 5:53 AM
To: Brinker, Samuel
Subject: Comments BSL-3 at Livermore

To:
Samuel Brinker,
National Environmental Policy Act Document Manager
U.S. Department of Energy,
National Nuclear Security Administration,
Livermore Site Office, M/S L-293,
P.O. Box 808, Livermore, CA 94551-0808

I am writing to oppose operation of a bio-warfare research facility, level 3, at the Livermore site.

The Livermore Laboratory should not be used for bio-warfare research. It is unconsciounable to manipulate deadly biological agents in such a heavily populated area as Livermore. The site is near a seismic fault line. Furthermore, it is wrong to carry out work on nuclear weapons and biological weapons at the same site, in part because the combination will complicate monitoring of the facility.

The revised Environmental Assessment does not adequately evaluate the danger posed vy the pathogens themselves or by a possible terrorist attack on the laboratory.

Apart from problems with the site itself, experimentation on biological agents by the United States, even if only for defensive purposes, is likely to lead to a biological-weapons arms race, because other countries cannot be certain that our intentions are defensive only. It is well known that research in defensive use of agents can be applied to offensive use of these agents. An arms race in biological weapons would potentially harm rather than help the United States. Therefore, operation of the Livermore facility would put a huge population at risk for no demonstrably useful purpose.

The Department of Energy should hold a public hearing to allow oral comments on its proposal and also should extend the deadline for written comments.

Please reply to this e-mail to let me know that my comments have been received and will be recorded.

Sincerely,
Mary Davis PhD
Yggdasil, a project of Earth Island Institute
POB 910476, Lexington, KY 40591-0476

Please send me an electronic copy of the revised final Environmental Assessment at this address yggdrasili@yahoo.com

-----Original Message-----
From: Peter Dragovich [mailto:mp4ever@mac.com]
Sent: Wednesday, May 16, 2007 11:40 AM
To: Brinker, Samuel
Subject: BSL 3

Dear Mr. Brinker,

I, and many concerned citizens, are appalled that there have no public hearings regarding the proposed biowarfare agent research facility (BSL-3) intended to be placed in Livermore, California. It is imperative that the Department of Energy (DOE) hold a public hearing so that the public can learn more about this plan and provide oral comments. So far, the number of public hearings that DOE has held on this important issue is ZERO.

Unfortunately the 30-day written comment period (which ended May 11, 2007) was too short. Most area residents and other interested members of the public didn't know about the comment period. It was not been widely publicized by the Department of Energy or Livermore Lab. Therefore, people are being deprived of their right to comment.

Therefore I am requesting the written comment deadline should be extended for a minimum of one additional month (to June 11). And, a public hearing should occur within the extended public comment deadline.

Sincerely,

Martha Dragovich

From: arpad fekete [mailto:arpadfekete@hotmail.com]
Sent: Friday, May 04, 2007 7:31 PM
To: Brinker, Samuel
Subject: Livermore Lab

To whom it may concern,

Dear Madam or Sir,

My name is Arpad Fekete ,I'm a resident of Livermore.
I would like to react to the news that the US Goverment
wants to locate dangerous bio agents to the Livermore
Lab. Since the Lab is in the middle of a very populated area,
any kind of accident, disaster or terrorist act could jeopardize
the people's life who live in this enviroment. We have kids I
have two and about twenty thousand children live within
a few miles.If anything bad happened the value of the pro-
perties would become practically zero.
Please, take my argument into consideration and rethink
everything before you decide.

sincerely Arpad Fekete
777 Polaris Way
Livermore,CA 94550

311 Douglass Street
San Francisco, CA 94114
May 11, 2007

Samuel Brinker
National Environmental Policy Act Document Manager
U.S. Department of Energy
National Nuclear Security Administration
Livermore Site Office, M/S L-293
P.O. Box 808
Livermore, CA 94551-0808

email: samuel.brinker@oak.doe.gov

Dear Mr. Brinker,

I am writing on behalf of the SF-Bay Area Chapter of Physicians for Social Responsibility (SFPSR), representing approximately 3,000 physicians and health professionals throughout the SF-Bay Area, to comment on the Revised Environmental Assessment regarding the proposed construction and operation of a Biosafety Level 3 (BSL-3) facility at the Department of Energy(DOE)'s Lawrence Livermore National Laboratory(LLNL). As an organization dedicated to ending the dangers posed by the proliferation of all weapons of mass destruction, including biological weapons, and to the protection of public health, we continue to have a number of major concerns about the plans for establishing a BSL-3 facility at LLNL, and about the planned proliferation of similar operations throughout the DOE complex. As we believe that many of the comments made at the time of our previous submission in September 2002 were inadequately addressed in Appendix C of the recently released draft EA, some of the points that follow will raise similar concerns, updated as necessary.

Need for Programmatic and Project-Specific EIS

The plans for building and operating a BSL-3 facility at LLNL need to be examined in the context of DOE's overall plans to develop a new integrated program through multiple facilities on researching bio-warfare agents, putatively for defensive purposes. We believe that NNSA's contention that "planned research efforts consist of projects too diverse and discrete to require either a `major Federal action' or activities sufficiently 'systematic and connected' so as to require a programmatic NEPA , especially an EIS" amounts to no more than bureaucratic dissembling. SFPSR continues to believe that it is imperative that a Programmatic and Project-Specific EIS be prepared to adequately review the integrated and cumulative effects of undertaking this mission area, particularly as regards potential weapons proliferation and health risks. As such, we believe that the plans for a BSL-3 facility at LLNL need to address the public and environment health impacts of the potential siting of a BSL-3/BSL-4 bio-warfare agent animal research lab proposed for Site 300 in Tracy. In addition, a full analysis of alternatives, which is absent from the draft EA, but central to a PEIS, continues to be warranted.

Proliferation Issues

SFPSR continues to have major concerns about proposed work involving numerous pathogenic organisms, including genetically-modified varieties, that would tend to severely undermine the internationally sanctioned, primary-prevention-based *alternative* to the proliferation of, and dangers posed by biological weapons-—the Biological Weapons Convention (BWC). This is especially disturbing given the continued rejection by the U.S. government of global efforts to develop strong inspection and verification protocols for the BWC that persist through 2007. We continue to believe strongly that since DOE encouraged U.S. government leaders to scuttle the draft international agreement of 2001, the fact that high-level research on biological agents will be performed secretly in weapons facilities such as LLNL will likely be viewed with suspicion by the world community, encouraging a global biological weapons race. In this regard, it remains instructive to recall the September 2001 *New York Times* reports of U.S. plans to work with genetically-modified anthrax, and of the prototype germ warfare facility developed at the Nevada Test Site, that raised widespread concerns about possible U.S. violations of the BWC.

As we noted in our previous comments, the EA states that viable organisms expected to be used "would be, but not limited to the select agents Bacillus anthracis, Yersinia pestis, Clostridium botulinum, Coccidiodes immitis, Brucella spp., Franciscella tularensis, and Rickettsia spp," and that it "is possible that the facility would receive genetically altered microorganisms." Although the EA and subsequent response to comments states that all work with infectious microorganisms must be in strict accordance with the BWC, there is no detailed indication of how such compliance would be instituted, either at LLNL or DOE-wide. Given the universally appreciated ambiguity of much "biodefense" work, as regards offensive potential, it is important that the specific nature of any review process regarding these issues be spelled-out, and made *completely* transparent. Although the draft EA says that a LLNL biosafety committee will review experiments, there is no indication whether there will be a process to guarantee *full* public scrutiny of committee deliberations. In fact, the recent response indicates a major loophole (page C-8) regarding guaranteeing compliance with the BWC when it states: "*It is possible that some specific project information will be subject to DOE security and classification restrictions, and will consequently not be available to the public*."

Thus, in the absence of full transparency, it is difficult to imagine how experiments with the aforementioned organisms, particularly the potentially genetically-altered variety, would not provoke global concerns about offensive capabilities masked as biodefense. Even if the proposed BSL-3 is not being overtly designed as a "production facility for offensive research or weapons production," the very nature of the potential organisms that are being considered for study should indeed require a "Non Proliferation Impact Review" of the sort rejected by the NNSA through the usual circular reasoning endemic in the DOE complex for avoiding responsibility for activities highly threatening to human survival. The typical rationalization (page C-6) offered for justifying ongoing nuclear weapons work, and, in this case, provocative biological experiments as being Congressionally assigned DOE and NNSA missions, period, without regard or accountability for the obvious consequences, remains evocative of what German train conductors could have argued in defense of getting railcars packed with human beings to Auschwitz on time.

Public Health Issues

SFPSR continues to have concerns about the potential for spread of pathogenic organisms to the surrounding community. As noted in previous comments, and not addressed specifically in the recent DOE response, inadvertent exposure to pathogens has been documented, as indicated by the case of the researcher at Fort Detrick who a few years ago came down with a case of glanders, a disease that is considered a potential biowarfare agent. The researcher had spent considerable time in his community before the diagnosis was made, a fact missing in the EA reference. As such, the contention that the "likelihood of a wide area, city or population effect should be considered improbable" is unconvincing, given the multitude of dangerous organisms being considered. There remains considerable potential danger posed by the anticipated work with organisms genetically-modified to increase lethality or confer resistance to countermeasures. This point is underscored by the revelation that in 2003 UC Berkeley researchers accidentally created a "super-strain" of tuberculosis through genetic modification, and the well-publicized creation of a lethal mousepox by other researchers. Only one release in the wake of similar experiments could be disastrous for the millions of people in the SF-Bay Area.

As noted in our comments from 2002, such potential dangers need to be considered in the context of LLNL's well-documented history of leaks, spills, fires, explosions and accidents. In past years, these have included a filter shredding accident that contaminated workers with curium, a chlorine gas leak that forced an evacuation, many inadvertent releases to the sanitary sewer, as well as an explosion that sent one employee to the hospital. Radioactive and toxic contaminants have migrated from DOE
Operations at LLNL into the air, groundwater and soil both on-site and off-site, jeopardized the health of workers and surrounding communities. As we previously argued, this history should be incorporated into the EA; there is no acknowledgement of this legacy in the most recent response from DOE.

The draft EA continues to be complacent regarding the potential impact of earthquakes and other natural disasters. The proposed design wind load of a peak wind gust of 91 mph, regarded as an "extremely unlikely event" seems low given the recent profound hurricane-force winds experienced in Seattle and Vancouver. And the rather blasé explanation that "Flooding is not a design consideration at the LLNL site," per a 1992 DOE EIS for LLNL and Sandia that predates by 15 years the accumulated knowledge of extreme weather events associated with global climate change underscores an institutional resistance to providing maximum protection to a large urban population. As we stated previously, although it is asserted that quakes, fires and other natural disasters may effectively kill airborne agents, this assessment may underestimate the potential survival and distribution of hardy organisms, such as anthrax or fungal spores, not to mention whatever might be bioengineered for such capability, a possibility ignored in the DOE response

SFPSR once again concludes that there are far better, and safer ways to protect our nation, and the world from biological weapons, and all infectious disease, than the development of a national network of facilities conducting ambiguous research with extremely lethal agents. Such facilities, including the proposed one at LLNL will likely encourage increased proliferation of deadly technologies that instead require effective primary prevention. Central to such preventive efforts

should be a national commitment to a significantly strengthened Biological Weapons Convention, that with greatly improved inspection and verification protocols, could serve to protect the global population from all of the dangers associated with rapidly emerging biotechnologies, including the potential development of novel, and increasingly lethal biological weapons.

Respectfully submitted,

Robert M. Gould, MD
President
SF-Bay Area Chapter
Physicians for Social Reponsibility

Phone (W) 408-972-7299
Fax (W) 408-972-6429
rmgould1@yahoo.com

-----Original Message-----
From: contactus@cardnm.org [mailto:contactus@cardnm.org]
Sent: Thursday, May 10, 2007 1:09 PM
To: Brinker, Samuel
Subject:

Dear Mr. Brinker,

My family owns a farm downwind from Los Alamos where my son and daughter-in-law and their young daughter live.

We do not believe that Los Alamos is capable of successfully handling pathogenetic bio sustances. Please look carefully at Los Alamos' safety record before authorizing this project.

We believe that a disparate impact study should be conducted before this project is instituted. There are no health studies of the communities surrounding LANL even though we know that worker health at LANL has not been good and that most of the communities surrounding the Lab are subject to State and Federal Environmental Justice mandates.

All DOE projects should have, as part of their impact statements, an analysis of how the project will be protected from terorists. Perhaps, we could be justified in thinking that terrorism would not take place at a particular time and place before 9/11, but that time has passed. Please supplement your impact statement to include such an analysis.

Sincerely,

Janet Greenwald
Co-coordinator
Citizens for Alternatives
to Radioactive Dumping
202 Harvard SE
Alb. NM 87106

the sunshine project

May 11, 2007

Samuel Brinker
NEPA Document Manager
US Dept of Energy, NNSA
Livermore Site Office
M/S L-293
P.O. Box 808
Livermore, CA 94551-0808

Comment on the Revised Environmental Assessment for the BSL-3 Facility at Lawrence Livermore National Lab

The Sunshine Project is a non-profit non-governmental organization that works to prevent the development and use of biological weapons, avert the use of biotechnology for hostile purposes, and to uphold and strengthen international agreements prohibiting biological warfare.

We advocate for a strengthened and verifiable Biological and Toxin Weapons Convention (BTWC) and monitor research on biological weapons agents and delivery technologies for the purpose of identifying strengthening compliance by the United States and other countries with their commitments as contracting parties to the BTWC.

The Revised Environmental Assessment (EA) for Livermore Lab's BSL-3 is fundamentally flawed and should be redrafted in the form of a more comprehensive EIS. Moreover, the public must be given an opportunity to ask questions or learn more about this plan at a public hearing hosted by the Department of Energy in connection with its NEPA document. Please provide at least 30 more days for public comment and a public meeting at a time early in the process.

<u>New Labs Pose Unexamined Risks</u>

The terrorist and anthrax attacks of 2001 prompted Congress to allocate billions of dollars for construction of new or upgraded biological defense research facilities by agencies including the Department of Health and Human Services, the Department of Defense, the Department of Agriculture, the Department of Homeland Security, and the Department of Energy. These agencies are now in the process of constructing and determining where to site new and expanded research facilities.

The proposed upgrades and new facilities for biodefense research will facilitate access to biological weapons agents and knowledge of their use for a greatly increased number of individuals. Examples of these skills include growing and purifying highly infectious agents in

containment, agent aerosolization (in, for example, challenge tests), and genetic alteration of weapons agents.

A complete list of the number of BSL-3 facilities currently operating in the nation has not been made available by the Federal government. However, it is estimated that there are more than 500 BSL-3 facilities.

There is no need for the facility

The DOE has developed potentially useful biological weapons agent detection equipment and decontamination equipment. However, this work has little need for its own BSL-3 facilities. Many of the agents considered to be a bioterrorism threat can effectively be simulated by benign organisms or simulant organisms that pose much lower levels of risk to people, animals, and the environment. A multitude of facilities for testing detection and decontamination equipment already exist that may be used when justifiable need to do so arises. Using existing facilities is an option should be evaluated.

A BSL-3 biodefense laboratory should not be located near the EMBF

The proposed Lawrence Livermore National Laboratory (LLNL) facility is alarmingly close to the
Environmental Microbial Biotechnology Facility (EMBF), a very large facility designed specifically
for the purpose of "producing very large quantities of microorganisms, including genetically-engineered microorganisms. The EMBF has a fermentation (bioreactor) capacity in excess of 1,600 liters. The EMBF also contains equipment used for the preparation of micro-organisms for release into the environment, in support of the EMBF's mission, as stated on its LLNL web site. The EMBF has already produced biodegrading organisms, a class of organism with offensive bioweapons applications. Furthermore, the director of the EMBF must have a high security clearance.

The co-location of the proposed BSL-3 and the EMBF at LLNL would create what intelligence analysts term a signature (or "footprint") of an offensive biological weapons program capable of the production of weaponized pathogens in quantities sufficient for at least theater scale use A facility with such a signature, located in most other countries of the world, could provoke diplomatic or even military crisis. Discovery of such a facility today, in Iran, could be construed to be proof of Iranian violation of the Biological and Toxin Weapons Convention. Evaluate the feasibility of physically and programmatically segregating this facility from the BSL-3 facility.

Quantities of Pathogens are too large to be Prophylactic

The LLNL EA indicates that laboratory cultures of biological weapons agents may be as large as 1 liter, with a facility limit of 100 liters. *It is extremely difficult to envisage a legitimate prophylactic use for this quantity of pathogen.* For example, the Rickettsia *Coxiella burnetti*, causative agent of Q fever, is among the agents LLNL intends to study at its proposed BSL-3 facility. The human inhalation infectious dose (HID) for *C. burnetti* is considered to be 10

organisms. If LLNL produced cultures of *C. burnetti* in one liter quantities, with an assumed saturated solution of 10^8 organisms per milliliter, the 1 liter culture of *C. burnetti* will have enough organisms to cause 10 billion human infections. Production of gram or sub-gram quantities of any pathogen is sufficient for defensive bioweapons work. The 100 liter limit was only discovered through a Freedom of Information Act request. Please state the limit in the final document and offer a justification for why so many liters are needed.

Research Activities are Questionable: More Info Must be Disclosed

The LLNL Environmental Assessment (EA) indicates that aerosol challenge tests on rodents are planned for the facility. In order for this type of testing to yield useful information for a biological defense program, the challenge agent must be prepared in a manner to simulate warfare conditions and technologies used by potential enemies. In other words, there is a strong inference that the challenge tests will require agent weaponization. Preparing such agents may require specialized equipment. This equipment is not mentioned in the EA. The weaponization of agents poses greater than normal health risks to laboratory workers and the surrounding community because it is designed to render them more infectious and pervasive in an open environment. Please explain whether the agents will be weaponized and generally how the agents will be prepared, manipulated or modified for this testing.

The EA mentions a number of organisms likely to be cultured in the near term. Of these, *Coccidioides immitis* (causative agent of valley fever) and *Brucella spp.* (causative agent of brucellosis) are regarded as incapacitating, rather than lethal, biological weapons and are unusual choices for defensive biological weapons work, particularly at a DOE facility. Both pathogens are treatable and rarely fatal. *Brucella* is only known to have been weaponized by the U.S. and the former Soviet Union. It is thought that *Brucella* was the first agent weaponized by the U.S., which has a long history and extensive knowledge of the agent and the disease that it causes.

Incapacitating agents, particularly those with long incubation periods like *Brucella,* are extremely unlikely to be used against the U.S. A terrorist – or state – posing a biological threat will choose lethal agents over incapacitating ones. Militarily, incapacitating biological agents are far better suited for use to "soften" (weaken) a civilian population or an opponent's military prior to invasion with a large force. Using such a weapons against the United States simply is not practical, nor, since the disease produces only a low level of fatalities and is readily treatable, does it serve the purposes of terrorists.

This Facility is Redundant and Has No Legitimate Purpose

The proposed BSL-3 facilities at LLNL and LANL are particularly redundant and unnecessary. The EAs for both facilities fail to make a compelling case for the Department of Energy's (DOE) need for these facilities. Specifically, the LLNL EA claims "An on-site BSL-3 facility would provide safe and secure manipulation and storage of infectious agents at a time when these issues are imperative to national security." It is accurate to state that biodefense has risen in national

priorities, considering the attacks of 2001, and particularly that they are likely to have been perpetrated or assisted by a current or former US biodefense worker. The EA's justification, however, nonsensically mixes "issues" with "facility." The heightened national interest in biodefense, in itself, is not a justification for facility at LLNL, particularly considering the large number of facilities being constructed elsewhere under programs such as NIAID's. Please describe why this facility is needed above and beyond others and why other existing and planned labs would not be sufficient.

The U.S. biodefense program dwarfs, in size and scope, all other biodefense programs in the world. The U.S. biodefense program poses a real threat to U.S. national security. The emergence of biodefense as a national policy priority signals the need for reconsideration of the wisdom of many U.S. biodefense activities, rather than mindless proliferation of laboratories handling extremely dangerous biological pathogens. With other bioresearch facilities proposed for DOE, a large NIAID and Department of Homeland Security biolaboratory construction program underway, renewed U.S. Department of Agriculture biodefense research, new labs under construction for the Centers for Disease Control and the Environmental Protection Agency, and an expansion of the Department of Defense's efforts, the LLNL and LANL proposals must be carefully weighed not only in terms of the specific risks of the facility, but also in the context of the facilities already available, or soon to become available.

Transparency Must be a Priority

Increasing the transparency of biological research, particularly research involving potential biological weapons agents, is paramount to maintaining international confidence in the objectives and intent of the US biodefense program and averting a biotechnological research race with biological weapons agents. Transparency is also sound public policy that enables citizens to have knowledge of and meaningfully participate in the elaboration of goals and the conduct of research that poses environmental, health, and security risks.

Laws including the Bioterrorism Act of 2002 have generated extreme confusion among research institutions and resulted in the imposition of unacceptable deterioration of transparency and restrictions on public access to information whose release should not be significantly encumbered by federal law, such as records of institutional biosafety committees. Across the United States, the legitimate need to protect a relatively small amount of site-specific information concerning the immediate physical security of select agents is being used to justify an unwarranted and dangerous collapse in the public accountability of research. Common sense and the lab's relationship with other states and local communities dictate that the lab operates on the basis of openness, transparency and maximum disclosure. Institutional Biosafety Committee (IBC) meetings should be open to the public and held in a part of the lab where no security badge is needed. Additionally, safety planning and oversight documents should be made available on the internet.

Accident Reporting

Despite the modest provisions of the Bioterrorism Act and some other rules that require reporting of some adverse laboratory events, the absence of mandatory, comprehensive federal reporting

requirements for all significant accidents and security events remains a national scandal. Concern is heightened by the fact the amount of work with particularly dangerous biological weapons agents is rapidly growing.

The fact that neither the public nor the government has an adequate, much less a comprehensive, account of the incidents that presently occur is not only disturbing for its security implications; but provokes questions about the adequacy of the knowledge base used to develop Biosafety and Biosecurity rules. To make matters worse, there are significant unaddressed disincentives to reporting of accidents because labs may be fearful of losing funding or attracting undesired attention. This situation presents palpable, inadequately-addressed Biosecurity dangers.

We urge a commitment by Livermore Lab to pledge to report all accidents that generally pose health and environmental risks should be disclosed within 2 hours of the time when the agency knew or should have known. Further, regardless of whether it is determined that a health or environmental risk exists, accidents should also be publicly disclosed within 48 hours where any workers are made ill due to infection. Anything less could jeopardize public health and safety.

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Sincerely,

Edward Hammond
Executive Director
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PO Box 41987
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USA

From: LHeath5445@aol.com [mailto:LHeath5445@aol.com]
Sent: Thursday, May 03, 2007 10:09 PM
To: Brinker, Samuel
Subject: opposition to bio-warfare at Livermore Lab

Regardless of the so-called 'convenience' of using the Livermore Lab for bio-warefare research, the floowing two points need to be taken into consideration. When these facts are examined you will see that this is not the place for such activity. Please note:

Livermore Lab sits within a 50-mile radius of seven million people. This highly populated area is not an
appropriate place to conduct experiments with some of the deadliest agents known.

· Livermore Lab is located near active earthquake fault lines. The BSL-3 is a portable building that was
brought to Livermore Lab on a truck. This BSL-3 should not be operated in a seismically active area.
The revised Environmental Assessment states that new research by the USGS has determined there is a
62% chance that one or more magnitude 6.7 earthquakes will occur in the area within the next 30 years.
Other studies predict a quake with MM 10 shaking in the Livermore area (which is very violent – the
scale is 1 to 10). The revised EA briefly mentions these key facts, but does not fully account for them in
conducting its hazard analysis.

Thank you

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Peace Justice Environment since 1983

May 11, 2007

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Comment on the Draft Revised Environmental Assessment for the Biosafety Level Three Facility at the Department of Energy's Lawrence Livermore National Laboratory (DOE/EA-1442R)

Submitted by Tri-Valley CAREs

Tri-Valley CAREs is a non-profit organization founded in 1983 by Livermore area residents to research and conduct public education and advocacy regarding the potential environmental, health and proliferation impacts of the Department of Energy's (DOE) Lawrence Livermore National Laboratory (LLNL).

On behalf of our 5,600 members, Tri-Valley CAREs submits the following public comment concerning the Draft Revised Environmental Assessment (EA) for the proposed Biosafety Level 3 (BSL-3) facility at LLNL.

Since 2002, when both of the nation's classified nuclear weapons design laboratories, Livermore Lab in California and Los Alamos Lab in New Mexico, announced plans to operate advanced biowarfare agent research facilities, Tri-Valley CAREs has closely monitored these proposals. In 2003, Tri-Valley CAREs and Nuclear Watch of New Mexico initiated litigation pursuant to the National Environmental Policy Act (NEPA) to compel comprehensive environmental review at both locations.

Since that time, the DOE has agreed to conduct a full Environmental Impact Statement (EIS) and public hearings before moving forward with a BSL-3 at Los Alamos Lab. Regarding the proposed BSL-3 at Livermore Lab, the 9th Circuit Court of Appeals remanded the Environmental Assessment and its finding of No Significant Impact (FONSI) back to the Department as insufficient -- in large part "to consider whether the threat of terrorist activity necessitates the preparation of an Environmental Impact Statement." As we will note in greater detail below, we believe that NEPA does require a full EIS and public hearings before the Livermore Lab BSL-3 can proceed.

An adequate and comprehensive NEPA review is critical to protect the health and environment of Northern California, where LLNL is located. The immediate 50-mile radius around LLNL includes the metropolitan San Francisco Bay Area to the west and our State's ranching and agricultural heartland, the Central Valley, to its east. More than 7 million people live within this directly affected area.

NEPA requires federal agencies to take a hard look at the potential environmental impacts of projects that may have a significant impact on the environment. The planned BSL-3 facility at LLNL will handle large quantities of some of the deadliest biological agents on earth. If a release occurs, thousands of area residents could be made ill or die from the release -- and mass hysteria could follow.

There is new information since the DOE originally released its EA for the BSL-3 at LLNL in 2002. Some of the new information is incorporated into the Revised EA (albeit followed by insufficient analysis to be meaningful), while other, key information is missing altogether.

Our comments outline some of the environmental impacts posed by this proposed action, including unanalyzed and poorly analyzed security risks. Moreover, our comments propose reasonable alternatives and mitigation measures that, if fully analyzed by DOE and subsequently implemented, would better protect public health and the environment than the currently planned action.

We will also raise questions to prod proper NEPA analysis in order to protect communities downwind and downstream of LLNL, avoid wasting resources (natural and financial) and strengthen the Biological Weapons Convention to prevent the spread of bio-weapons. We submit these comments to encourage more careful consideration of the policy implications of collocating advanced bio-warfare agent research and nuclear weapons research along with the myriad of serious, direct health and environmental hazards posed by operation of this BSL-3 at LLNL.

Need for Extension of Comment Period and Public Hearing

Most area residents were never made aware of the comment period. It has not been widely or adequately publicized by the Department of Energy or by Livermore Lab. Therefore, people are being deprived of their right to comment. The deadline should be extended for at least 30 additional days. And, a public hearing should occur within the extended public comment deadline so that the community will have an opportunity to learn about this important project firsthand.

Moreover the Revised EA itself does not tell people where or when to send comments. Even if people were told where to send comments, the fax machine did not accept comments on May 11, 2007, the comment deadline. This unfortunate situation raises the question of whether the DOE even wants the public to comment, as is contemplated in the NEPA statute.

As you are aware, the purpose of NEPA is to ensure that governmental decision-making is conducted on the basis of sufficient and sound information and in a manner than ensures public participation in this process by incorporating the unique local perspectives of the affected community and enabling community members to learn about the project through public hearings and public documents.

Tri-Valley CAREs has submitted extensive comments on many National Environmental Policy Act documents over its 23 years and has facilitated thoughtful dialogue and informed debate on important environmental issues through administrative processes. It is clear to us that in order to successfully gather thoughtful public input, DOE will need to extend the public comment period and hold a public hearing.

Purpose and Need / Alternatives Analysis is Inadequate And Must be Augmented

Advanced biodefense research (i.e., involving bio-warfare agents and including such activities as genetic modification of bio-warfare agents and aerosolizing them) should not be collocated with nuclear weapons research. Further, locating a BSL-3 facility at LLNL is duplicative of other facilities that are and can continue to be available for use by LLNL researchers, including BSL-3 facilities run by public health agencies that do not pose collocation problems.

In the United States, BSL-3 level biodefense facilities are proliferating at an alarming rate with multiple agencies proposing new projects each year and no overarching national assessment of the capabilities we have, how to best utilize them and what, if any, additional capabilities are needed (and for what purpose). Tens of billions have been allocated for biodefense in the past few years with little oversight or accountability.

In this context, and pursuant to the requirements of NEPA, we urgently insist that DOE conduct an in-depth analysis the purpose and need for the LLNL BSL-3 within the context of federal spending on biodefense laboratories.

Please analyze and describe how LLNL researchers could conduct experiments at existing BSL-3 facilities. In our 2002 comments we requested that DOE analyze how it could better utilize existing BSL-3 facilities run by the Centers for Disease Control and Prevention (CDC) as that agency has a civilian science mission and a history of operating BSL-3s. The DOE response was, essentially, that using other agency labs would be inconvenient.

Since then, the CDC has expanded its BSL-3 facility at Fort Collins, Colorado -- which is often used by LLNL researchers when they require a BSL-3. It has also come to light that LLNL researchers use the BSL-3 facility at the Dugway Proving Ground in Utah, and that facility has also seen extensive expansion since the original 2002 EA. We note that both Colorado and Utah are easily accessible by plane.

The DOE must fully and honestly analyze the option of continuing to utilize other agencies' BSL-3 facilities instead of operating one on-site at LLNL. The DOE's "purpose and need" statement, which is merely repeated on page 8 in the Revised EA, is out of date and insufficient.

You state in the Revised EA that the Department of Energy has no laboratories to handle experiments with BSL-3 or BSL-4 agents. Tri-Valley CAREs questions the need for a facility that is a higher level than BSL-2 for doing a significant percentage of the biodetector validation work underway at LLNL. It is our understanding that surrogate agents can obviate the need for actual testing in many instances, and, as noted above, the then less-frequent need for additional validation could occur at existing facilities offsite.

This combination approach (surrogate agents where possible and other agency facilities when surrogates cannot be used) must also be fully examined by DOE.

Further it is disingenuous for the DOE to only discuss what biolabs exist within its own complex and fail to mention the fact that the Department of Homeland Security (DHS) has biolabs. Page 4 of the Revised EA asserts that “some of DOE’s missions relating to biological security have been transferred to the [DHS].” Some, if not most, of the work slated for the BSL-3 will be done in a “work for others” arrangement for DHS, according to the Revised EA. Thus, the BSL-3s that exist within DHS should be considered as alternatives for

the BSL-3 proposed for LLNL. This option, too, must be fully examined by DOE, including in conjunction with one or both of the other options described above.

Further, there is a question as to what agencies should be completing this NEPA review, DOE alone (the current situation) or DHS or one or more federal agencies. Please spell out the extent that DHS work will be completed in this lab and provide the rationale for why DOE, rather than DHS, is completing this analysis. Please include information about the planned percentages of work (i.e. research in the BSL-3) that will be done by DHS and DOE and the percentages of funding from each agency.

At a minimum, we urge you to bring in these other federal agencies as cooperating agencies so that no duplication of effort, lack of coordination or under-optimized utilization of BSL-3 space occurs with DHS, CDC or the BSL-3 at the Dugway Proving Ground. Please also describe how you will ensure that the work conducted at LLNL will not be duplicative of work at other biodefense laboratories including but not limited to the aforementioned DHS labs, CDC labs and/or DoD facilities like Dugway.

Using existing labs instead of building a new one is an alternative that must be given full, genuine consideration as the NEPA process moves forward.

Inappropriateness of Location

Livermore Lab sits within a 50 mile radius of seven million people. This highly populated area is not an appropriate place to conduct experiments with some of the deadliest agents known, including but not limited to live anthrax, Q fever and plague. Homes and apartment buildings (and little league fields) are built out to the gates of LLNL. Moreover, LLNL itself is a densely crowded 1.3 square mile facility with approximately 10,000 employees. If there were a bioagent release due to any reason, infection and disease could be easily spread among the worker population as workers travel in and out of the very crowded and compact site.

In our detailed comments that follow are numerous, additional examples regarding the inappropriateness of locating this facility at LLNL. They range from the fact that LLNL is a Superfund cleanup site (on EPA's list of worst contaminated locations in the country) to elevated security risks at the LLNL BSL-3 (such as those related to genetic modification of bio-agents and the potential to create disease "superstrains") to problems posed by lack of transparency and collocation of "bugs and bombs."

EIS vs. EA

As noted above, an EIS should be completed on this facility. The BSL-3 facility proposed for Los Alamos National Lab is being studied in a full EIS. DOE, in its Federal Register notice, stated that the preparation of an EIS at Los Alamos Lab was due in part to the need for a more complete seismic analysis than had been done in the EA.

We concur with that DOE decision, and note that in Livermore, the risks of earthquake are much greater than in New Mexico. There are a number of earthquake faults capable of causing damage at the LLNL site. The nearest fault zone, the Las Positas Fault Zone is less than 200 feet from the site boundary (see also "earthquakes" below).

Furthermore, the planned BSL-3 facility at LLNL may be more vulnerable to seismic events because it is not a permanent structure. The LLNL facility is a prefabricated structure that was fabricated by a company that proudly proclaims its ability to put together such a facility in 180 days. The situation warrants a full EIS.

We note too that the LLNL BSL-3 EA was substantially "cut and pasted" from the Los Alamos BSL-3 EA that had been released earlier. Since the DOE has withdrawn its Los Alamos Lab BSL-3 EA and FONSI -- and has opted to complete an EIS process -- shouldn't the DOE stop relying on the SAME analysis the Department decided was not adequate for Los Alamos simply repeated in the LLNL BSL-3 EA. Those sections should be struck and redone.

The Revised EA gives DOE the opportunity to look anew (and with new information) at risks. We are deeply disappointed that DOE has failed to make use of this "second chance" to do it right.

Further, the Revised EA permits the LLNL facility to conduct experiments with any and all BSL-3 agents. This includes scores of potentially deadly pathogens like Q fever, live anthrax, botulism, bubonic plague, tularemia and much, much more. The Revised EA also mentions that the LLNL BSL-3 would be used to genetically modify bio-warfare agents, conduct experiments with prions, and aerosolize pathogens, among other activities not associated with most BSL-3 facilities in the United States.

The Revised EA (and the 2002 EA before it) say that the LLNL BSL-3 would house up to 10 liters of very concentrated bio-agents in solution. Other DOE documents discuss this same BSL-3 as housing up to 100 liters of very concentrated bio-agents in solution, including up to 25,000 discrete samples of potentially deadly pathogens. The DOE must reconcile using different volumes in different documents. One is left to wonder if DOE is providing accurate amounts in the Revised EA. This is no small detail.

The environmental impacts of the facility could be very significant in the event of a release. Even a percentage of 10 liters, released into the environment, could mean thousands of people perishing. Only a minute number of many BSL-3 agents are needed to cause disease and high mortality. Add that to the high population on-site at LLNL and the densely populated residential areas surrounding LLNL. When the impacts could potentially be this great, an EIS is required.

Transportation Security / Terrorism Concerns Must be Addressed

According to the Revised EA, an estimated 60 shipments per month (in and out) will travel by commercial courier. Livermore Lab just had an incident in September, 2005, where it mislabeled and improperly packaged “select agents” (biological organisms that are historically associated with bio-warfare purposes) and shipped them to two offsite laboratories. The incident resulted in a suspension of transfers during a Centers for Disease Control and Prevention investigation. This is mentioned in passing, but not discussed in any depth. Transportation risks should be studied in the context of accidents and intentional diversion.

Security / Terrorism Analysis in the Revised EA is Incomplete and Inadequate

Given the high profile of DOE's nuclear weapons activities at LLNL, its connection to the nation’s nuclear weapons (and weapons policy), the on-site storage of large quantities of plutonium, highly enriched uranium and other radioactive materials at LLNL and the proposed collocation of deadly pathogens in a prefabricated BSL-3, Livermore Lab may soon offer "one-stop shopping" for terrorism.

LLNL's crowded site and proximity to 7 million people (unique in the nuclear weapons complex), taken together with its proposed mixture of deadly pathogens and nuclear materials, will soon offer terrorists (and/or a

disgruntled employee) an increasingly tantalizing target and all the resources necessary to wreak havoc upon society.

Because of the threat of terrorism, the DOE has stated that it plans to remove the weapons usable quantities of plutonium and highly enriched uranium out of Livermore Lab by the end of 2014. (Note the potential that nuclear and biological weapon materials may be together at the LLNL main site for up to 7 years.)

Why was the removal of special nuclear materials out of LLNL (and the security reasons prompting that removal) not considered in the Revised EA. We believe it is relevant. *If DOE is planning to remove the weapons usable quantities of special nuclear material because of security concerns, why move in large quantities of biological weapon agents stating that there are no security concerns?*

In some reasonable scenarios, terrorists and/or disgruntled employees may be preferentially attracted to the availability of highly concentrated, deadly bio-agents in a portable building located outside the higher security "Superblock" at LLNL rather than the nuclear materials located inside the Superblock.

Moreover, the Revised Environmental Assessment does not do an adequate job of analyzing the environmental and health impacts of potential acts of terrorism. For example, it too optimistically assumes that most bio-agents would be destroyed in a terrorist attack, and therefore not many would escape into the environment and pose a hazard. This is more in the category of wishful thinking than reasonable analysis.

The Revised EA suggests that if there were a major breach of the facility then a fire would ensue and eliminate most of the potentially deadly bio-agents (page 59).

Further, the Revised EA postulates that even if the fire it expects doesn't occur – disinfectants would break open and kill off the bio-agents. On page 42 of the Revised EA, it states that “at any one time there would be just a few liters each of chemical disinfectants.” It seems too tenuous of a nexus to assume that fire or a few liters of disinfectants will eliminate most bioagents released in a terrorist attack.

It defies reason that terrorists would automatically trigger a major fire or disinfectant release on the exact spot where the bio-agents / cloud of bio-agents would be released. Other, unanalyzed scenarios that don't involve a conveniently located fire or disinfectant release are possible -- and must be considered.

Furthermore, even in the event the conveniently located fire and/or disinfectant release did take place, it is nonetheless true that some pathogens to be stored and used in the LLNL BSL-3 are very hardy with respect to temperature and significant quantities of them may not be destroyed in the fire but, instead, may be lofted by hot air and dispersed over the population.

Further, some agents to be stored and used in the BSL-3 are not amenable to destruction by the disinfectant that the EA says will kill them.

The scenario in the Revised EA does not specify the quantity of bio-agent released in the scenario, the type of bio-agent (including its form and characteristics), the fraction that might survive, the possible dispersion of the plume (where, what weather pattern is assumed), the minimum number of spores, cells or microorganisms needed to cause disease in humans, the percentage of people that the EA thinks will get treatment vs. the percentage that won't, the percentage of people treated who will sicken and die any way (e.g., chronic Q fever reportedly kills 65% of the sufferers who did receive proper treatment), and other key data.

Without data, it is unclear what assumptions the Revised EA may be piling up -- one on top of the other.

Further the terrorism analysis fails to study practical things in detail such as whether the LLNL BSL-3 facility is structurally resistant to a terrorist attack, whether decontamination procedures are in place if workers or community members are exposed to released bioagents or whether security workers and local emergency management teams are trained and equipped to respond to this type of emergency. Although the Revised EA does say that LLNL spoke with local hospitals – it isn't clear what that actually means.

Please describe in more detail how prepared the hospitals are – which ones have the equipment and training to handle a mass outbreak of bioweapons agents – and the extent of the training given. The Revised EA also makes the dangerous assumption that the security will function seamlessly and that the workers will be pre-screened and well trained.

Reasonable scenarios should be evaluated wherein a fire or disinfectant do not eliminate most or all bio-agents. Evaluate how a plume of bio-agents would spread and potentially affect populations and the environment surrounding LLNL to the west and the Tri-Valley and San Francisco Bay Area. Evaluate also the impact on the Central Valley (while less heavily populated than the metropolitan Bay Area, the impact on the people and the environment may still be substantial). In addition, we note that the LLNL BSL-3 will genetically modify bio-warfare agents. What might the impacts of the release of a "superstrain" be?

In the context of airborne plume migration, we note that following a release of radioactive tritium from the LLNL main site (Building 331), Livermore Lab researchers found evidence of tritium deposition stemming from that accident as far away at Fresno, California -- hundreds of miles away.

Airplane scenario

The Revised EA implausibly concludes that a plane crash into the facility would ***not*** result in a release of greater magnitude than other catastrophic events already considered in the EA. Yet, the catastrophic bounding accident scenario in the EA involves loose caps on a centrifuge.

This is not a hard look or even a meaningfully intelligent look at environmental impacts. A centrifuge accident is a common occurrence in a lab setting and does not bound the range of events that could result in a release.

Further, if a plane hit the building there is a likelihood that agents would be released from more than just "in process" containers. An airplane crash into a portable facility could logically also release pathogens that are in storage there. In this regard we again note that DOE documents outside of the Revised EA say that the LLNL BSL-3 would house up to 100 liters of bio-agents, including 25,000 discrete samples of various pathogens.

If the EA is actually trying to conclude that the BSL-3 storage freezers are plane-crash proof, please so state explicitly. We are not aware that bio-agent storage freezers pass such a test. The certification procedure for airplane hits on freezers should be detailed in the final NEPA document.

The Revised EA goes on to compare an airplane crashing into the LLNL BSL-3 to "lambing season at various local ranches...." This is an insulting comparison, does not pass the "laugh test" and fails to meet the standard of review required by NEPA.

This bio-warfare agent research facility represents a very serious risk to the surrounding community, and, in the event of a rupture in the facility or other catastrophic release, it could threaten the community, the entire Bay Area or the Central Valley.

Theft of Bioagents

The revised EA on theft and subsequent release (page 62) – compares theft of dangerous, deadly biowarfare agents concentrated in solution with the very dispersed bioagent present sometimes in the environment (such as Anthrax) and suggests that terrorists would just as soon cultivate bio-agents obtained from the environment than obtain them from LLNL's BSL-3.

This comparison defies logic. A terrorist may be much more interested in obtaining a milled biowarfare agent or a biowarfare agent concentrated in solution. By stealing from the LLNL BSL-3 a terrorist or disgruntled employee could obtain one trillion cells in solution from the facility (in use at the time) and many, many, many more from the storage locker/fridge in the bio-lab.

Moreover, LLNL may house novel agents and diseases stemming from the fact the LLNL BSL-3 will be engaged in genetic modification experiments involving bio-warfare agents. Too, the LLNL BSL-3 will be aerosolizing bio-agents and infecting up to 100 small animals at a time. This means that the pathogens will be in a form that can be easily dispersed as an aerosol.

These facts make the LLNL BSL-3 a particularly attractive target. Yet, these facts are not considered in the Revised EA.

The threat of theft by a terrorist or of a disgruntled employee is very real. The DOE and Livermore Lab must deal honestly with the risk, not attempt to minimize analysis (actual risk, not the assessment of risk, is what must be minimized). This document is not an honest evaluation.

Terrorist / Disgruntled Employees

The EA assumes on p. 59 that deliberate damage would cause a fire or rupture the containers of disinfectant. However, if the terrorist scenarios are deliberate (and by definition many of the scenarios would be), it's possible (even likely) that the terrorist would not act in a manner that would cause the bio-agents to be destroyed. This assumption in the Revised EA appears to be on the basis of unfounded conjecture. Again, these assumptions are overly optimistic and do not meet the standard for adequate review.

This document should evaluate the ability of the physical structure to withstand various terrorist scenarios. This document should also disclose LLNL's efforts to train and equip its protective force to deal with possible bioterrorism / nuclear terrorism scenarios.

Further, the Revised EA shirks genuine consideration of the impacts of terrorism by suggesting that because there are other BSL-3s in the U.S., the LLNL BSl-3 will not contribute much to an increased likelihood of an act of terrorism.

We wonder if the Nuclear Regulatory Commission, in producing its court-ordered security analysis regarding the Diablo Canyon Nuclear Plant (ordered by the same 9th Circuit Court), will try to dodge in-depth review on the basis that there are other nuclear power plants in the country and so Diablo Canyon does not add much to the numeric likelihood of a terrorist attack. Under this reasoning, NEPA and the 9th Circuit ruling would be gutted.

The issue at hand, under NEPA, is to adequately and completely analyze the impact of a terrorist attack, not to debate likelihood. In the Revised EA, DOE seems to have confused these two very different approaches. In producing a final document, DOE must remedy this situation.

Security Workers

Although the Revised EA paints a picture of security at LLNL that is fool-proof and functions as a well-oiled machine – this is not an accurate picture of security at the Lab. Recent history -- including spy scandals, whistleblower retaliation, DOE Inspector General reports and Government Accountability Office reports outlined below -- suggests that the Revised EA overstates the completeness of security at LLNL.

For instance, Mathew Zipoli, former security police officer at LLNL (and then-Vice-President of the Security Police Officers Association) went public explaining how low the morale was at Livermore Lab among the security forces. He documented that security operations at LLNL were grossly incomplete due to inadequate training and protection of security officers (e.g., lacking needed protective gear), noncompliance with numerous DOE and other requirements, and more. Security forces were not trained to use protective suits and had no detection devices to deal with a chemical attack by intruders, Zipoli stated.

Please specify in the final NEPA document if (and how) security forces are trained to deal with a biological attack and/or release -- and the equipment they have in that event. Have security forces been trained to handle accidental or deliberate on-site release of BSL-3 agents, including but not limited to live anthrax, botulism, Q fever and plague? How will they handle accidental or deliberate releases involving genetically modified biological agents, including so-called superstrains?

The DOE Inspector General report on LLNL security entitled *Inspection of Lawrence Livermore National Laboratory Protective Force and Special Response* Team found that "Livermore's ability to comply with the Site Safeguards and Security Plan is Questionable." (IG Report at 4) The Site Safeguards and Security Plan, a facility master planning document for security, is required by DOE Order 470.1.

"Livermore has consistently had far fewer than the minimum number of security officers required on staff in order to comply with the Site Safeguards and Security Plan. Although the minimum number of SPO-III security officers required to guard LLNL is 81, at times that this investigation was conducted, LLNL had between 43 and 55 certified SPO-III officers available for duty." (IG Report at 7) "Many of those officers are new hires with minimal experience, due to the high attrition rate." (IG Report at 7-8) "During the course of our inspection, we noted several significant issues that could directly impact the effectiveness of the Livermore's Special Response Team. These issues included an increasing attrition rate, and a new hire rate of approximately 50 percent during the past three and one half years." (IG Report at 6)

Please describe the current state of LLNL security forces including how many you have onsite in general, how many are responsible for the bio-lab at any one time, and whether they have the specialized training and/or equipment to handle a bio-related disaster.

Human Reliability Systems

In April, 2007, the DOE approved security clearances for more than three dozen workers over a 13-month period, despite evidence that those employees had used illegal drugs within the year prior to approval. Energy Secretary Samuel Bodman commissioned a task force to examine DOE's personnel security program.

According to Secretary Bodman, the program's existing policies and guidelines are sound and have proven effective over time but they have not been applied consistently. The task force made several recommendations for strengthening the program, including rejecting security clearances for applicants who admit to using illegal drugs within 12 months prior to their clearance request.

This situation is not new. Poor management has plagued the Livermore Lab for a very long time. Reported on February 28, 2003 in the San Jose Mercury News, Linton Brooks, head of NNSA, described the sloppiness of the DOE weapons labs' business practices as "cultural" and "systemic." He criticized the University of California (which managed both LLNL and the Los Alamos Lab) for its detached style of management, saying, "Lax management in one area breeds lax performance in other areas. "

The Revised EA generally outlines methods of establishing human reliability but does not provide a realistic assessment of the myriad of implementation flaws that must be expected. Please analyze a scenario where the human reliability programs do not function maximally and evaluate the environmental impacts that could result.

History of Security Failures

In April, 2003, LLNL top security official William Cleveland resigned in response to accusations from the FBI that he stole classified information and passed it to a Chinese informant over a period of years. Cleveland had been head of LLNL's Security Awareness for Employees program, which identifies foreign intelligence threats, briefs LLNL officials traveling to other countries, and gathers information about espionage, since 1993.

Also in the spring of 2003, there were other serious security incidents at LLNL. In one incident, an LLNL security officer's skeleton keys disappeared from a security cabinet. The keys allowed access to virtually every area and facility at LLNL. Security officials waited three weeks before reporting the incident.

In another incident, a LLNL security officer's access badge disappeared. Six weeks passed before this incident was reported to LLNL officials. The access badge, when used in combination with a numeric punch code, opened approximately 3000 office doors at LLNL.

The GAO performed a review of nuclear site security at various DOE facilities from December 2001 through May 2003. GAO found that DOE's National Nuclear Security Administration (NNSA) had substantial problems with management and oversight on security issues and it lacked clearly defined roles and responsibilities resulting in inconsistent contractor oversight.

The GAO said that DOE contractors fail to analyze security problems consistently, and that corrective actions are developed without fully considering the problems' root causes and risks posed. Furthermore, NNSA is shorthanded and may lack adequate staff to oversee security activities. These security failures are just a sample of many others that have occurred over the past decade.

The possible effects of terrorist attacks or other security failures on Livermore Lab vary widely depending on whether biological agents are involved, what biological agents are involved, what quantities are involved, etc. In addition, at LLNL, nuclear materials could be involved as well. In addition to environmental impacts, the economic and psychological consequences can also be significant. Impacts should be measured in terms of contamination area, health effects, and economic consequences.

The Revised EA must try to quantify the environmental impacts of these acts and cannot avoid an honest assessment by arguing such things as terrorists won't be interested in a BSL-3 because certain bio-agents exist occasionally in nature, or that the maximum credible release scenario involves the loosened caps on a centrifuge inside the BSL-3.

Precedent-Setting Nature of the Revised EA Must be Considered

The adequacy and completeness of the security analysis for the LLNL BSL-3 is important first and foremost because of the severity of the threat and the potentially catastrophic nature of its impacts. Further, the completeness of the review is critical because it will be precedent setting in at least two ways.

1. As mentioned this is the first terrorism / security analysis being conducted pursuant to the 9th Circuit ruling in two cases, (a) litigation brought against the Nuclear Regulatory commission regarding security risks at its Diablo Canyon Nuclear Power Plant and (b) litigation on the adequacy of the EA and FONSI for this BSL-3 (brought by Tri-Valley CAREs and Nuclear Watch of New Mexico). Thus, the inadequate job done by DOE on this Revised EA is likely to reverberate with other federal agencies if it is not appropriately remedied.

2. The LLNL BSL-3 is the first DOE facility to undergo a terrorism / security analysis. Thus, the inadequate job done by DOE in this instance is likely to reverberate with other DOE NEPA reviews. In this regard, we note that DOE has issued only interim guidance for preparation of this type of analysis under NEPA. Perhaps DOE is putting the cart before the horse here -- and this review is so startlingly inadequate in part because there is no final guidance in place. Thus, the DOE should hit the pause button on this process and complete its guidance. Certainly, this Revised EA cries out for guidance. We are concerned, too, that if this inadequate assessment is used by DOE to attempt to justify a new FONSI, that will signal other DOE facilities that the agency is not serious about examining terrorist / security issues.

Bio-Accidents at LLNL That Have Happened in the Existing, Lower-Hazard Facility Could be Severe in the BSL-3

The revised Environmental Assessment did not analyze the environmental and health impacts of a release of 100 liters of bio-warfare agents at one time. In fact, the revised EA failed to even disclose that other Livermore Lab and Department of Energy documents state the BSL-3 will house up 25,000 different samples of pathogens adding up to a total of 100 liters of bio-agents at a time. This is a large amount and the EA should state this number and analyze the environmental impacts of a release of this magnitude.

Although LLNL boasts a perfect record, our investigations found that LLNL had several mishaps in the past with their lower level BSL-1 and BSL-2 facilities, including incidents wherein:

> (1) employees mislabeled bio-wastes, causing hazardous waste personnel to suffer needle puncture,
> (2) employees potentially used and then threw out unattenuated (e.g., live) anthrax with the general trash. The experiments were not supposed to involve unattenuated anthrax at all. And,
> (3) an employee dropped radioactive bio-probes on the floor, left the spill over the weekend, and tracked radioactivity off-site.

On November 3, 2003, Tri-Valley CAREs filed a Freedom of Information Act request for releases and contamination incidents since 1977 at the LLNL Biology and Biotechnology Research program. This was defined programmatically on the LLNL web. The documents we received include but are not limited to:

> • An incident report detailing a series of mishaps in March 1999 with airborne Bacillus anthracis, the causative agent for anthrax. On March 1, 1999, experiments indicated that LLNL was mistakenly conducting experiments with a virulent strain of Bacillus anthracis "obtained from a BBRP colleague." LLNL did not terminate operations with the organism until March 5, 1999. The Institutional biosafety

officer was not notified until March 17. The report's findings include that "The Biomedical Technician did not use engineering controls and mistakenly disposed of contaminated equipment and utensils in the trash." The findings also specify that "Access Control" was not maintained and "cross contamination" with nearby food was possible.

• A final occurrence report detailing an accident in which a LLNL biolab employee sent improperly labeled waste to the LLNL hazardous waste facility. The waste was listed as "99% laboratory trash (with 2-mercaptoethanol, phenol and chloroform)." However, the bag improperly contained "at least two hypodermic needles that were not listed on the label." As a result: "One of the needles penetrated the bag and stuck the technician in his arm."

In 2006, Tri-Valley CAREs obtained a copy of a DOE/NNSA report detailing safety violations and accidents at LLNL including an account of a 2005 radioactive phosphorus spill in the LLNL biology center. In that instance, Lab bio-personnel failed to respond when the accident was reported. No qualified staff person came to examine the contaminated worker or to develop a cleanup plan for the spill. As a result, the worker tracked radioactive material off-site and the bio-building remained in what the DOE/NNSA report called "an unknown state' for several days.

Although it is often claimed that bio-accidents rarely happen in the US, the truth is much less clear. The frequency of accidents is widely disputed and there is not a comprehensive federal reporting system for accidents and releases. In fact, in the last few years there have been several lab-acquired infections and agent releases in biolabs in the US that went undisclosed for months.[1] A more honest history of recent US accidents, releases, and infections should be included in this NEPA analysis including the accidents footnoted below.

In one instance that only became publicly known in the past few weeks, Texas A&M is being investigated after failing to timely report to the Center for Disease Control and Prevention (CDC) that a student researcher was infected with brucellosis in 2006. Brucellosis is an infectious disease caused by the bacteria brucella which is typically transmitted by animals. The student was accidentally infected while cleaning a chamber used to infect mice with aerosolized brucella for research purposes on Feb. 9, 2006. The researcher told Texas A&M officials of the brucellosis diagnosis on April 10 or 11, 2006.

The incident occurred when the researcher was cleaning a chamber that contained aerosolized brucella by climbing partially into it, which Texas A&M officials said was inappropriate lab protocol. Texas A&M officials later concluded that the brucella bacteria likely entered her body via her eyes as a result of this improper procedure.

This type of agent would be permitted to be studied at LLNL. The Texas A&M incident is a case of human error – a type of error that we are concerned is a great risk at LLNL.

More than 400 labs across the country are now using bioweapons for research with about 20,000 people at those facilities, a dramatic rise from years past. With the flood of new researchers entering the field, the chance for error due to inexperience increases.

[1] Fort Detrick researcher exposed to Ebola from pinprick in 2004. Boston University lab workers were exposed to Tularemia in 2000 and again in 2004. Anthrax spores were found strewn outside of lab rooms in Fort Detrick, leaving one worker testing positive for exposure in April 2002. Oakland Children's Hospital improperly received and experimented with virulent anthrax until the FBI intervened in 2004. Foot and Mouth Disease spread to different internal parts of Plum Island facility in 2004. Laboratory-acquired infection almost killed a government microbiologist in Beltsville, Maryland in 2003. Workers at the US Department of Agriculture's (USDA) Food Safety Intervention Technologies Research Unit in Wyndmoor, Pa., fell ill in May 2002. In March, 2000, an USAMRIID worker contracted glanders due to accidental exposure.

Further the accident described above involved an aerosol chamber. A gaseous suspension of fine particles resulting from aerosolization makes these agents far more dangerous in the event of accidental occupational exposure and, in the case of failure of containment, public exposure. The Revised EA should look at the specific hazards of aerosolization for workers and the local community in its accident analysis.

The Revised EA should not rely upon outdated accident modeling. Please make sure that the accident modeling relies upon current, LLNL site specific, and pathogen specific data.

Please describe how the public will be notified in the event of an accidental release or lab worker exposure and/or infection. Additionally, please provide the facility limits for the amount of bio-agents that will be stored inside the facility as a whole and for each room. Also please describe whether (and how) LLNL and/or DOE NNSA will mandate public reporting of security breaches, loss or inability to account for biological materials, and environmental releases.

DOE Has a History of Accidents at LLNL, which are Relevant to Assessing the Hazards of the Proposed Action

LLNL main site groundwater is substantially contaminated with volatile organic compounds (VOCs) such as tricholorethylene, carbon tetrachloride, Freon, chromium and tritium (radioactive hydrogen) above state and federal maximum contaminant levels, also called "action levels."

Soils on site have additionally been contaminated with plutonium above the federal "screening level." There is an off-site contaminated groundwater plume emanating from the LLNL main site. The southwestern edge of that off-site plume includes groundwater underneath neighborhood homes.

Remediation for the above-listed pollution is part of the current and ongoing LLNL main site Superfund cleanup process. That cleanup process has been calculated by LLNL to require about 53 years.

The LLNL main site and surrounding community in Livermore have been subjected to elevated levels of tritium, among other contaminants. This LLNL operating history with radioactive and toxic materials is relevant to the proposed operation of the LLNL BSL-3 because similar incidents could occur with biological agents. LLNL has had numerous releases of tritium over its years of operation, resulting from a variety of factors, including filter failures and employee error, two issues relevant to the planned operation of a BSL-3 at LLNL. The 1991 Report of the Task Group on Operation of DOE Tritium lists the following tritium accidents for LLNL between 1986 and 1991 --
:

- 125 curies, released 12/15/86 due to a failed pump and cryogenic vessel breach;
- 198 curies, released 4/14/87 due to equipment failure and operator error;
- 145 curies, released 1/19/88 unknown cause or stack malfunction;
- 138 curies, released 1/25/88 unknown cause or stack malfunction;
- 653 curies, released 5/15/88 due to unexpected presence of tritium in gases being vented;
- 120 curies, released 8/1/88 unknown cause or stack monitor malfunction;
- 112 curies, released 2/28/89 unknown cause or stack monitor malfunction;
- 329 curies, released 8/22/89 due to improper pressure relief of container.
- 112 curies, released 10/31/89 due to mistaken belief that a palladium bed contained only deuterium and (non-radioactive) hydrogen;

- 144 curies, released 4/2/91 due to improper preparation of a reservoir.

The Report of the Task Group on Operation of DOE Tritium Facilities further states that management failures at LLNL were the direct cause of the "accidental release of tritium on April 2, 1991 and the resultant radiological exposure of facility personnel."

There have been other incidents at LLNL where tritium has been release to the environment. To give but one example, on December 24, 1990, building 292 was contaminated due to freezing weather that caused a flood.

In addition, that freeze resulted in a tritium leak in an underground tank, releasing tritium into the soil. A pine tree in the area was tested and found to be drawing the radioactive water through its roots and transpirating tritium through the needles into the air at concentrations measured at 6 million picocuries of tritium per liter of water. The state and federal maximum contaminant level for tritium in water is 20,000 picocuries per liter. The tritium released from the tank into the soil in this accident also migrated downward, soon thereafter reaching into the groundwater. See Screening Calculations for the Radiological Hazard from Tritiated Water, Tritium Emissions from a Pine Tree Adjacent to Building 292, LLNL.

Deficiencies in safety practices led the Defense Nuclear Facilities Safety Board (DNFSB) to recommend and obtain shut down of all plutonium experiments and machining operations at LLNL's plutonium facility for more than 6 months in 1995, according to testimony from DNFSB officials at a December 6, 1995 public meeting in Livermore. The DNFSB was created by Congress to monitor operations at DOE's defense facilities. DFNSB officials cited deficiencies in safety practices at LLNL including a missed inspection and lack of procedures to ensure that the plutonium facility's ventilation, nuclear accident alarms, fire suppression systems and emergency power were adequately maintained, tested or operated.

After LLNL proclaimed it had resolved the problems cited by DNFSB and reopened its plutonium operations, the DNFSB had to intervene again and obtain a shut down of all daily operations in the LLNL plutonium facility in October 1997. In July of 1997, LLNL had been cited for 15 serious criticality safety violations. A criticality is a runaway nuclear chain reaction. In October, a DNFSB investigation uncovered additional problems at the LLNL plutonium facility. The DNFSB report cites:

- unaddressed fire dangers;
- situations where criticality safety personnel "do not appear to have a presence in the workplace";
- situations where "no supervisor appears to be responsible for work being done by plutonium handlers and technicians";
- planned corrective measures that that do not recognize the actual problems and therefore do not propose to correct them; and
- work permits for handling, moving and packaging nuclear material that contain work description errors and omissions.

In its October 1997 report, the DNFSB further notes an instance where the investigator directly observed an operation involving uranium in which work was performed "without regard to its description in the permits."

The DNFSB published a notice in the federal register citing LLNL with storing plutonium in paint cans and food tins.

In January 2005, the LLNL plutonium facility was again shut down due to systemic safety problems. The DNFSB weekly reports on the shutdown contain numerous violations, including defects in the plutonium facility's equipment, safety management and radiation protection. Various reports stated that glove boxes had

inadequate seismic restraints, cracked ducts containing plutonium dust were not repaired and were instead taped over, inadequate records were maintained so that blueprints of some glove boxes could not be found and the operating history of the workstations, including what materials had been used in them, was lost.

In October 2003, twelve LLNL employees were potentially exposed to plutonium that leaked from a glove box known to have a faulty seal, but used nonetheless. The leak occurred after a routine power outage caused the fan responsible for maintaining negative air flow to stop working. Next, the alarm nearest the glove box failed to sound. However, an alarm positioned outside the door of the room was triggered by the leak. When that alarm went off, it was dismissed as an aberration. Seven plutonium handlers and five security police officers were allowed to enter the plutonium-contaminated room before the release was discovered.

Over a 6-month period in 2004, multiple workers at LLNL were exposed to airborne plutonium particles on at least 3 to 5 separate occasions while packaging plutonium-contaminated wastes. One of the largest fines in LLNL history resulted from the circumstances that led to these exposures. The Lab was cited for having chronic and systemically poor management.

Additionally, plutonium from LLNL has found its way into the Livermore community. Elevated levels of plutonium have been found in off-site air monitors to the east of LLNL and in soils in a City park to the west of LLNL.

Along with plutonium, americium was accidentally released through drains at Livermore Lab and has entered the City's Sewage Treatment Plant. Over a 15-month period in the mid-1990's, Livermore Lab's releases to the City Sewage Treatment Plant violated its permit limit on 14 occasions. These releases included heavy metals and chemical pollutants.

In February 1997, news accounts carried the story of an accident involving a uranium fire at LLNL. The incident involved the ignition of uranium filings in a workstation. A machine shop worker received radioactive contamination on his hair and shoes. Two LLNL fire fighters who responded to the accident received contamination on their gear.

The list above does not purport to be a complete list of accidents at LLNL, but is only a small sampler intended to be instructive as to some of the types of accidents that occur with alarming frequency at LLNL. These and other accidents at LLNL are relevant to the BSL-3 at LLNL because the same sorts of errors and disregard for safety regulations could result in biological agent releases, just as they have resulted in radioactive and toxic releases at LLNL.

HEPA Filter Analysis is Inadequate and Must be Augmented

Most HEPA filters at LLNL are flimsy, weak, fiberglass, paper and glue structures mounted in wood or metal frames that can fail completely when wet, plugged, hot and over pressured from fires, explosions, blowers and even severe storms. According to publicly available documents, HEPA filters have an overall failure rate at DOE facilities of approximately 12%. Even under optimal conditions, HEPA filters are unable to effectively contain all bio-agents measuring between 0.03 and 0.3 micrometers. HEPA filters can be ineffective against the physical characteristics of many bio-agents, such as Rickettsia.

Others have detailed the potential problems with HEPA filters and have called on DOE to conduct a more thorough analysis in its Revised EA. We concur. Please address how LLNL intends to compensate for the inherent weaknesses in the filtration system.

Furthermore, too many of the accident and terrorism scenarios in the Revised EA anticipate perfect functioning of the HEPA filters. The analysis should also disclose the impacts if the scenario involves HEPA failure.

Earthquake Analysis is Inadequate and Must be Augmented

This BSL-3 facility should not be operated in this seismically active area. The Livermore Lab sits less than 200 feet from the Las Positas fault zone and the Greenville fault is nearby. An earthquake in 1980 injured 44 people and cost LLNL many millions in structural damages. In 2004 an LLNL study found that 108 buildings on-site have potential seismic problems. 22 have unacceptable risks and 41 need detailed evaluation.

The Revised Environmental Assessment mentions that new research by the USGS determined there is a 62% chance that one or more magnitude 6.7 earthquake will occur in the area within the next 30 years. Other studies predict a MM 10 shaking (very violent – on a scale of 1 to 10) to occur in the Livermore area. The revised EA mentions these facts, but does not fully account for them in conducting its hazards analysis.

Need for Programmatic Review

Construction of the LLNL and LANL BSL-3 facilities, since they are the first advanced biowarfare research facilities within the Department of Energy, will establish a precedent for future BSL-3s and related biological and chemical agent research facilities at DOE facilities.

DOE has proposed operating advanced biowarfare agent research labs in Livermore, Los Alamos, Oak Ridge and several other sites. DOE's own Inspector General Report 0695 has stated that the biological research activities within the Department of Energy lacked appropriate federal oversight, consistent policy, and standardized implementing procedures, resulting in the potential for greater risks to workers and possibly others.

Quotes from the DOE IG Report, include:

"We concluded that there was insufficient organization, coordination, and direction in the Department's biological select agent activities. Specifically, the Department's activities lacked sufficient Federal oversight, consistent policy, and standardized implementing procedures, resulting in the potential for greater risk to workers and possibly others from exposure to biological select agents and select agent material maintained by the Department." In the observations and conclusions section on page 2 of the IG report.

"Ensure that required NEPA reviews are conducted prior to the start of biological select agent and select agent material activities and revised, as needed, when significant changes occur in the activities." Pg. 25 recommendations section.

"The department responded to this recommendation in saying that "the Department will 'continue to address biological research within individual laboratory annual NEPA planning summaries and otherwise according to Departmental requirements' to ensure that appropriate consideration is given to NEPA compliance early in the planning process." Pg 26 Management comments.

Please describe how this report has been responded to and what is happening now regarding DOE's efforts to coordinate select agent programs. This cries out for a NEPA programmatic review so that each lab will have

clear guidance on its role in the Department's network of laboratories to avoid mismanagement and duplication. An adequate review of cumulative impacts should be conducted.

Further, as stated above, a review of alternatives should be undertaken as to where the best locations would be for bio-work in the DOE complex or whether it would be wiser to have these labs outside the purview of DOE entirely and within the purview of another agency, such as the Centers for Disease Control.

Need for Non-proliferation Analysis / Compliance with International Law

Aerosolization of select agents is potentially a form of weaponizing them. At a minimum, it is a step in the process toward weaponization. So is conducting genetic modifications of bio-warfare agents.

The Biological Weapons Convention (BWC), a treaty ratified by 144 nations including the United States and Russia that came into force in 1972, prohibits the production, stockpiling, development, and use of biological weapons. Article 1 of the Convention permits research on dangerous biological agents and toxins that is "peaceful, prophylactic, or protective" in nature.

However, distinctions between offensive and defensive applications of research on bioterrorism agents are difficult to establish at numerous stages of the research process.

To resolve this dual-use dilemma, in September of 1998, BWC member states began a process of drafting a verification and enforcement protocol to ensure routine declarations of research on biological warfare agents and inspections of declared facilities. Unfortunately, during negotiations in November 2001, the U.S. announced that it would not permit a binding verification agreement to move forward. As a result, international monitoring of biological defense and warfare is unlikely to emerge in the near future.

Livermore Lab and Los Alamos Lab have designed and developed every nuclear weapon in the U.S. arsenal, and LLNL just won the design competition to develop the next new U.S. nuclear warhead. LLNL is known worldwide as a "successful" facility for the design of nuclear weapons of mass destruction. Collocation of an advanced biowarfare agent facility inside LLNL's classified nuclear weapons laboratory presents a whole host of issues that could undermine the Biological Weapons Convention.

First, this type of research is inherently dual use. That is, the "defensive" or "peaceful" bio-weapon research on select agents that will be conducted at LLNL will be virtually indistinguishable from offensive work in the early stages.

Moreover, where defensive programs', methods, training and equipment meet the requirements of offensive programs, the potential for offensive uses for the program in a future crisis is evident. Please address how LLNL will ensure that their work could not be easily adapted for offensive purposes – alleviating the fears of the US public and other nations.

Second, collocation within highly classified facilities may pose unique problems for verification and enforcement of the BWC. It may be extremely difficult for anyone outside of the facility to verify that the program is restricted to defensive purposes. *Please provide a thoughtful analysis of how concerned citizens and countries could verify that the research in the laboratory is limited to purely defensive activities.*

Third, collocation creates a "perception problem", irrespective of whether offensive or defensive work is conducted inside a classified nuclear weapons lab. Other states and groups may perceive that new biological weapons are under production behind closed doors. Please provide an explanation of how LLNL plans to contend with this serious perception problem.

Fourth, collocation creates secrecy problems that undermine efforts to evaluate a state's compliance with the BWC. Please describe how LLNL will ensure that the principles of openness, transparency and public accountability will guide the work conducted at the BSL-3.

Please provide a dedicated section in the Revised EA to address concerns posed by the placement of advanced biowarfare agent research inside secret nuclear weapons laboratories.

NBACC Connections Must be Detailed in the Revised EA

The Department of Homeland Security has inaugurated its National Biodefense Analysis and Countermeasures Center (NBACC) that is headquartered in Fort Detrick, Maryland but has pieces located at DOE, specifically at LLNL.

According to a slide show in February 2004 by LTC George Korch, Science and Technology Directorate at the Department of Homeland Security, NBACC will develop, characterize, produce and weaponize new and genetically engineered biological agents. http://www.cbwtransparency.org/archive/nbacc.pdf

Widespread concern is growing that these activities will not only violate the BWC's restriction on developing and producing agent delivery devices but that they may effectively give the United States a modern offensive biological weapons capability. We know that work at LLNL will intersect with work done for the NBACC.

We don't believe that the US government would stand by while many countries of the world upgraded, expanded and undertook cutting edge "biodefense" research inside their secret military installations. The US should not hold a different measuring stick to our own actions. Overhauling existing labs in military facilities so that they can perform cutting edge genetic research on agents known for their superior weapons capabilities sends the wrong message to the rest of the world.

Although some of this research may well be legitimate and necessary, it should be conducted under the auspices of civilian agencies.

Please consider the following critical analysis of US biodefense work by Ambassador James Leonard, Milton Leitenberg, Richard Spertzel entitled *Biodefense Crossing the Line* in the Environmental Impact Statement and include a copy for public consideration. *http://www.fas.org/irp/threat/cbw/biodefense.pdf*

Ambassador Leonard was the chief U.S. negotiator for the Biological Weapons Convention under President Richard Nixon as Assistant Director of the U.S. Arms Control and Disarmament Agency (ACDA) from 1969 to 1973.

Please provide a dedicated section in the Revised EA to address concerns posed by the placement of advanced biowarfare agent research inside secret US military laboratories.

Lack of Adequate Whistleblower Protection Must be Addressed

There is a serious lack of adequate oversight of LLNL facilities. No independent regulatory agency is responsible for safety at LLNL on a continuing basis. Safety is often a matter of self-regulation (e.g., DOE regulating itself). In this scenario, it is essential for workers to be protected if they report safety or health problems associated with the BSL-3 facility.

A mechanism should be in place to provide all workers with meaningful whistleblower protections. Moreover, all workers should be apprised of criminal laws against developing biological weapons. 18 USC § 175. Workers who suspect that their work is for offensive purposes or is incompatible with international law should be given robust and effective whistleblower protections should they speak up about their concerns.

Because the United States is currently opposed to binding external constraints and oversight of scientists and would prefer to have scientists self-monitor their research through the use of Institutional Biosafety Committees and similar committees, it is essential that scientists working in the biodefense arena be afforded the structure within which they may comfortably speak up about potential misuse of their research activities. It is the Department of Energy's responsibility to provide this structure.

Please state in the Revised EA if such a structure exists and how it will be designed so that the public can be informed about the self-regulation process of the research at LLNL.

18 USC § 175 is the US criminal implementing regulation for the Biological Weapons Convention. It articulates prohibitions with respect to biological weapons. Specifically, it prohibits anyone from knowingly developing, producing, stockpiling, transferring, acquiring, retaining, or possessing any biological agent, toxin, or delivery system for use as a weapon. We are concerned that offensive research could occur, whether sanctioned by any management or not, and prohibitions should be clearly stated and enforced. As you know, the FBI's no. 1 suspect for the anthrax releases that plagued the country in the aftermath of September 11th was a US government scientist. These events can and do happen and preventative measures should be taken.

We want to preemptively foreclose a shallow response to our concerns that "the Biological Weapons Convention prevents the US from developing offensive weapons." Often we hear from federal officials simply that "the US signed and ratified the treaty and therefore there could be no weapons here." The weakness of this response lies in the fact that the language of the BWC is inherently problematic. It allows for bioweapons research so long as it is for prophylactic, protective or other peaceful purposes. This loophole makes the treaty's interpretation one that is "intent based".

We believe that the US must do more than waive a poorly constructed treaty around and say it is in *technical* compliance. Thus, above and beyond the BWC, the US should spare no effort in demonstrating to the rest of the world that it is not engaging in biological research that skirts the treaty. It should do so for the safety of its own citizens. A robust system to ensure transparency should be implemented.

This should be done through maximum transparency efforts. An alternative in the alternatives analysis in the Revised EA, for example, DOE should discuss this problem and should evaluate the possibility of transferring this work to a civilian laboratory where oversight and transparency would be outside of the control of the US nuclear weapons establishment. This would send a message to the rest of the world, one that we could then encourage other nations to mirror.

The Dual Use Dilemma Must be Considered in the Revised EA

The bio-warfare agent research at Livermore Lab is inherently dual-use. Although DOE states that this BSL-3 is purely defensive – there always remains a chance that they could be used for offensive weapons research at some later point. As mentioned above, the "defensive research" at LLNL will be virtually indistinguishable from "offensive research".

With the secrecy of the program, the US aversion to inspection or verification protocols at the Biological Weapons Convention, the opaque nature of the LLNL Institutional Biosafety Committee, and with the lack of independent transparent oversight, its difficult to tell what type of research will be conducted there.

Transparency Issues Must be Addressed in the Revised EA

Biological defense laboratories study organisms categorized by the federal government as potential agents of bio-terrorism. Controversies in biodefense research stem from both the secrecy with which it is associated and the difficulty in distinguishing between its offensive and defensive applications.

Federally-funded research on biological weapons is marred by a history of secrecy and misinformation, most strikingly in the hidden offensive bio-warfare program carried out by the U.S. military from the beginning of the Cold War through the early 1970s.

Over much of the last thirty years, the Department of Defense has provided an annual report to Congress explaining the nature and extent of its biological research program. After this disclosure policy was discontinued in the early 1990s, there has been growing concern about the potential for offensive research in U.S. biodefense laboratories. The DOE going into the bio-warfare agent research business at its classified nuclear weapons labs does nothing to allay that concern.

Institutional Biosafety Committees must be analyzed in greater depth in the EA:

Tri-Valley CAREs is interested in all aspects of the IBC because of the unique responsibility placed upon the IBC by the EA to ensure that the Livermore Lab's biological research programs comply with all applicable laws and regulations to ensure the health and safety of the Livermore community is protected. The community members are the only unaffiliated members mandated to be on the IBC and therefore they have a heightened responsibility to represent the interests of the community. We are seeking to better understand how they receive their position and the role that they play with respect to the Livermore Lab's IBC. The Revised EA must assess these questions.

For example, the Revised EA should discuss how the community members are appointed / nominated or selected for the Institutional Bio-Safety Committee. We understand that all IBC's have community members sitting on them in order to comply with NIH guidelines. If there is a written policy outlining how the Livermore Lab's IBC chooses its community members, please detail this policy. Otherwise, if there is no formalized policy, describe how you select community members for this committee. Is there an application process? Can community members informally request to be on the committee?

Our experience with trying to obtain information about --and attend meetings of -- the LLNL IBC has continually been frustrated by DOE and LLNL. Lack of transparency has been an ongoing problem.

For example, on September 16, 2003, Tri-Valley CAREs submitted a request for Agendas, Decisional Documents, Minutes, Rules / Procedures by which the Institutional Bio-safety Committee (IBC) operates, and a roster and qualifications for all members for the period of January 1, 2001 forward, pursuant to guidelines established by the National Institute of Health (NIH) that require that the IBC provide these records to the public upon request.

The IBC was established by the Director of the Laboratory in 1991, and operates through the Council on Biology and Biotechnology. The IBC functions as a peer review committee, focusing on the safe and legal use of biological materials.

The Department of Energy declined to comply with our request for copies as provided under the NIH Guidelines, and instead instructed Tri-Valley CAREs to submit our request via the California Public Records Act, a process that would require us to pay burdensome fees to obtain the documents.

On September 25, 2003, Tri-Valley CAREs submitted a Freedom of Information Act (FOIA) request for the same information we had requested above. We submitted this FOIA request in order to better understand the role of the IBC because DOE relies so heavily on this body to ensure that "the public will be involved in approval of BSL-3 research and review of safety and compliance protocol[s]."

Five months later we received responsive documents to this request from the DOE on February 13, 2004. These documents included meeting minutes, agendas, a charter, an IBC roster of members and research applications entitled "Notice of Renewals" that had been issued between January 1, 2001 and the present.

After receiving these documents, we contacted the Department of Energy and requested that agendas be sent to our office for future IBC meetings. We were told that the only way to obtain agendas or other documents was to request them through a time-consuming and burdensome Freedom of Information Act request. We were also told that the IBC meetings were not open to the public on account of the difficult nature of members of the public getting into the Livermore Lab site. The IBC's refusal to provide agendas and minutes prospectively, and their refusal to allow members of the public to attend their meetings, prevents Tri-Valley CAREs from participating and thwarts public involvement.

These documents also revealed that there had recently been a dramatic increase in applications for experiments conducted within the biological programs at Livermore Lab and that this increase triggered a need for an integrating review of the programs and a rethinking of the purpose of the IBC itself:

> "There is a cascade of microbiological applications coming from many new parts of LLNL…causing a rethinking of several functions at the Laboratory, including the role of the IBC, the need for an integrating review system for microbiological research, and revisions to the Lab's NEPA approval from DOE." -- IBC Memorandum to IBC Committee Members dated April 11, 2001

The DOE relies upon its Site-Wide Environmental Impact Statements as the NEPA reviews that authorize the Livermore Lab's current bio-programs. These "Site-Wide" studies do not provide enough specific programmatic information about the Biology and Biotechnology Research Program (BBRP) at LLNL. Therefore, the Revised EA must contain the analysis (and, as stated above, a full EIS should be conducted)

The EA must include a detailed analysis of the BBRP, including the role of the IBC, the dangers posed by genetic modification of bio-agents, accident scenarios associated with bio-agents at the lab from earthquakes, fires, transportation, or terrorist threats and without acknowledging the recent significant growth of the bio-

programs at Livermore Lab. The IBC agreed in its memorandum quoted above that the cascade of applications has triggered a need for an integrating review. It has yet to be done.

In summary, the bio-programs at LLNL, collectively called the BBRP, have undergone tremendous recent growth and now include risky experiments such as aerosolization and genetic modification of agents that are highly transmissible and virulent. These changes highlight the need for comprehensive review of these programs pursuant to the National Environmental Policy Act.

Further, we note that, "NIH *has recognized the importance of IBC members "who represent the interest of the surrounding community with respect to health and protection of the environment." (NIH Guidelines, Section IV-B-2-a-(1)). Section IV-B-2-a-(6) of the NIH Guidelines on Recombinant DNA Research encourage IBC's to follow a policy of openness:* When possible and consistent with protection of privacy and proprietary interests, the institution is encouraged to open its Institutional Biosafety Committee meetings to the public.

In October 2003, the National Academy of Sciences recognized this massive growth in US bio-research and issued a report cautioning the U.S. about the hidden dangers of dual-uses of this type of research and lamenting that there were few guidelines in place to prevent the "misuse of the tools, technology, or knowledge base of this research enterprise for offensive military or terrorist purposes." A response to this report calls upon the Institutional Biosafety Committees to ensure that US biodefense work doesn't undermine the BWC.

Please detail how the IBC will ensure that work at LLNL will be transparent, will not weaken or complicate the BWC - and describe the selection process for the IBC members, including scientists and community members.

Conclusion

This comment incorporates all of Tri-Valley CAREs' previous comments on the proposed BSL-3. Moreover, Tri-Valley CAREs requests that all documents cited in our comments be included in the administrative record for the LLNL BSL-3. If DOE cannot locate a document for its record, Tri-Valley CAREs will be happy to assist in that endeavor.

Tri-Valley CAREs also submits these comments under protest of DOE's continuing refusal to extend the public comment period and hold at least one public hearing or meeting. We reiterate that the DOE released the Revised EA with no address, phone or fax number for sending comments and no due date. This crucial information was only available in the DOE press release. The lack of availability of comment submittal information is likely to have a deleterious impact on the public's ability to participate. Too, the DOE did not even take the modest, minimal step of informing those who had commented on the original draft EA that the draft Revised EA was now available for comment. Moreover, the short comment period meant that Tri-Valley CAREs' monthly newsletter, carrying the news of the Revised EA via bulk mail will get to our members too late for them to comment by the advertised due date of May 11, 2007.

Then, as noted, the DOE fax number given in its press release did not operate on May 11 (and may not have operated prior to that day for all we know -- we were alerted by about 13 people on May 11).

We appreciate DOE's consideration of these comments. Should an extension be granted, we would like to submit additional comments.

Sincerely,

Marylia Kelley	Loulena Miles
Executive Director	Staff Attorney

-----Original Message-----
From: daniel@nowwatchthis.com [mailto:daniel@nowwatchthis.com]
Sent: Saturday, May 05, 2007 9:05 PM
To: Brinker, Samuel
Subject: Comments on the proposed BSL-3 at Livermore Lab

Dear Mr. Brinker

I strongly oppose developing a bio-warfare research facility at the Lawrence Livermore Lab. I live near the lab in Pleasanton, and my daughter lives in Livermore.

The deadly agents that are the subject of the proposed research have a sole purpose, which is to kill people in a war. It is ludicrous to keep these in a major urban area.

It is useful to have treaties with other nations to reduce or eliminate nuclear and biological weapons. Putting research for both nuclear and bioligical weapons on the same site will make it hard to obtain treaties for either nuclear or bioligical weapons limitations.

There Livermore Lab should be a national treasure. There are many scientific problems worthy of the attention of the best minds in the world, such as we have at the Livermore lab.

The lab is run by the Department of Energy, not the Deparatment of Defense.
Producing reliable energy for future generations is one of the most important research topics of our time. A solution to this issue could provide more security for our country and any number of weapon.

Please, cancel plans to develop biological weapons in Livermore. Instead, use our resources to bring scientific innovation to our community and nation that promotes peace and prosperity for all of us.

Regards,

Daniel Kendrick
4274 Fairlands Drive
Pleasanton, CA 94588

925.890.8162

Beverly Kirig
645 N. Livermore Ave #5
Livermore CA 94551
May 7, 2007

Samuel Brinker
U.S.D.O.E. N.N.S.A.

The Environmental Assessment (EA) does not adequately address the hazards of a BSL3 in Livermore. The proposed lab needs a complete Environmental Impact Study for the following reasons:

A bio-lab should not be placed in the same facility as a nuclear lab. The dual research of the two potentially lethal experiments is double jeopardy

The lab is in a highly populated area. Whether it be accidental, terrorist caused or natural disaster such as earthquakes, the risk to both the population and the area is beyond contemplation. Besides the pathogens must be transported on highways where risk of accident is always present.

25,000 different samples of pathogens are quietly proposed to be used at the same time. This equal 100 liters which is greater than the EA considers, especially in view of aerolization. The EA acknowledges the "dramatic health impacts" that can result in such releases. Consider the agents being used: Q fever, anthrax, plague, for just starters

The BSL3 is proposed for defensive purposes only. Most of what is done is secret. None would

know if the research being done was for defensive or offensive purposes.

The present revised E a ordered by the court does not adequately address the possibility of a terrorist attack or one by a disgruntled person. In spite of the acknowledged health impacts the report says most pathogen will be destroyed by the blast or the heat that is generated by the blast. The E a assumes terrorists would obtain their pathogens through nature rather than large quantities that an established lab would have. This is absurd.

This is the first time the D O E has included th terrorist threats in an environmental studies. In spite of revision it is inadequate.

The E a fails to have oversight for safety on a continuing basis. Historically this has not worked. Thorough oversight is essential.

The U. S. has treaties with other nations prohibiting W. M. D. We exert enormous pressure on countries we even suspect of developing them. Yet we are set to create both B S L 3 and B S L 4's that have the freedom for any experiments the government chooses. The morality of these labs is highly questionable. We cannot prohibit other countries and persue. W M D's ourselves under cover of "defense." The only legitate research is anti-dotes, not in the B S L proposals. We must keep our trust with the rest of the world to eliminate bioweapons legitimately for the

3

safety of the world.

As a first step a public meeting must be held so that the community can be informed and comments can be made. Then a complete Environmental Impact Study must be prepared. The DOE is preparing one for the proposed BSL3 in Los Alamos. The same should be done here. This BSL3 directly involves our health and our lives which in the name of humanity should not be taken lightly.

Sincerely,

Beverly Krieg

-----Original Message-----
From: Nicole Lucchesi [mailto:nikki@soundwavestudios.com]
Sent: Tuesday, April 24, 2007 7:44 PM
To: Brinker, Samuel
Subject: Letter of opposition to additional labs at Lawrence Livermore

Attn: Samuel Brinker

April 24, 2006

My name is Nicole Lucchesi, I reside in Oakland California and am a full time mother of two young children. It has recently come to my attention, that the Department of Defense in conjunction with the Lawrence Livermore Labs intends to create additional labs for bio- warfare testing and to increase its yield of Depleted Uranium for explosion testing in Tracy. Personally, I find both of these proposed developments abhorrent, and as such, I am compelled to write this letter as a concerned citizen of California and the local community of the SF Bay Area. I submit this letter to be a part of public record as my formal statement that I resolutely oppose such a reality coming to fruition. Because Livermore Lab sits within a 50 mile radius of seven million people, it would be prudent for the Energy Department to be more mindful of the potential disaster which could befall our population in the event that any of these substances could be released into the air, into the water aqueduct nearby, or into the soils which sustain the agriculture of California's Central Valley... With California being one of the top producing Agricultural states of our country, I find it is absolutely insane to allow even the remotest possibility of infecting our food supply with radioactive substances or to endanger our population with genetically engineered viruses that have no cure and can be transmitted through the air.

Housing and testing such substances alone is bothersome enough to me, but to compound this issue even further is the volatility of this region geologically speaking. Given the fact that this region is near active fault lines which have the potential for high magnitude earthquakes, I wonder why such a site as Livermore would even be considered. How accurate is the hazards analysis in regards to the ramifications of high magnitude earthquakes alone? What contingency plans are present which could deal appropriately with the potential devastation if any of such substances the Lawrence Livermore Labs presently houses are leaked or dispersed into surrounding areas? Due to the fact that the US government has demonstrated that it values the secrecy of its commercial and military facilities more highly than the transparency that is needed for

effective international monitoring of compliance with the requirements of the 1972 Biological Weapons Convention, I seriously question the need for further expansion of such facilities. I was informed by Tri Valley Cares, that the initial Environmental Assessment report failed to disclose documents about the volume of pathogens the Lab plans to house.

Although the National Institute of Health requires Institutional Biosafety Committees to make minutes available to the public, I 'm unsure myself how to access such information and wonder how much of the local population even knows they can access such information. Not to mention, I'm not so sure whether the public even knows what occurs at the Labs, or what substances are being tested. Perhaps the public doesn't want to know, but do we as a society wait until the uranium dust has infected and polluted our environment and babies begin to be born deformed, or for a pandemic or outbreak takes over the civilian popluation before such testings would come to a halt? I am already disturbed by the data disclosed by the California EPA reports which provide statistical analysis of the current rates of cancer our population has and will potentially endure based on the amount of pollution we already produce which has poisoned our air, water, and soil. Do we really want to increase the levels of toxicity we already sustain? Do we really want to create new super virus strains that have the potential to infect the human population with no hope for a cure?

It is my hope that those who work in the Defense industry, those who make their living through weapons proliferation, those who work toward creating and testing substances that are designed solely to kill, maim, and poison realize that we are merely harming ourselves and our children, and future generations of humanity... There might come a time, when the substances of this nature which are housed in labs such as at Laurence Livermore cannot be properly stored or contained. What of future generations of humanity, what of our ability to survive when we propagate such an inheritance of poison? The impetus that the current Executive Administration has for global domination and the mechanizations of war, for furthering weapons proliferation and making a living off of war profiteering is beyond disturbing to me and I would surmise a majority of human beings upon this Earth. Proposing more nuclear and other radioactive weaponry to be built and tested even though we have enough bombs to destroy the world over many times is completely begging the question... When will our governmental departments decide enough is enough? How many research and development labs for Defense do we already have in this nation? What is the volume of substances we have at our disposal already to kill, and to poison, and to pollute? It is problematic, to say the least, that people posit that the creation of such labs is for our security, for knowing that such labs exist and continue to create more materials and

technologies only meant to kill, makes me feel much less secure.

I humbly request as a citizen of the world, as a mother and a woman on this planet, that those who make decisions every day that can affect the lives of millions upon millions of beings, to choose more wisely. That those who create proposals that allow for further development of departments whose sole business is for the industrialization of our death, be told NO we have enough thank you! That those who decide whether to move forward with plans to create more chemicals, more viruses, more toxins, re-think our strategies and our priorities as a Nation. Can't we decide to appropriate funds toward more creative endeavors that would be more beneficial to our society in general? Rather than build more facilities to house more weapons, why not utilize the funds to clean up the superfund sites rather than making them even more toxic? I propose that the Energy Department focus it's funding on technologies which would be beneficial to mankind rather than harmful. Rather than manifest more weapons to bolster our Militarized Industrial Complex, rather than to create wars to support our National Utilites Industry- the Energy Department could allocate more funds toward energy efficiency, toward creating technologies that do not pollute, and toward educating the children of our community to be the scientists of tomorrow who can develop better means of producing energy. We need to deal with all the poison we've already amassed from our industrial psychosis, and we really shouldn't be producing more toxicity in superfund environments to support the manifestation of endless hostility and war. We need to shift our focus from this egregious enemy mentality, where we think that we are safer by producing more substances for our death. I'm sure you are aware that society is more prosperous in peace and that doesn't mean that jobs are lost in your respective departments, but rather, the roles would be shifted to something more productive.. It is time that we move away from this collective suicide and allow for scientists to have the opportunity to develop means to utilize energy that is safer not only for the environment, but also safer for the future of mankind. The state of foreign affairs in its current manifestation spells certain doom for us all and we should do all we can as human beings regardless of our jobs or roles in government, in departments such as energy or defense, to promote things that truly make us all safe. Let us create energy systems that wouldn't require our going to other parts of the world to plunder resources, let us truly tackle the present societal system of fuel consumption, and let us heal the ecosystems we have already burdened with endless pollution. I hope all who've read my letter consider this issue more deeply. For bio-weaponry and radioactive substances pose a great threat to us all and the fact that my government creates this a few miles away from where I reside, feels much more threatening to me than any random terrorist

event. Please consider the ramifications of creating more weaponry and testing in California, for the decision could weigh heavily on generations to come... Thank you for your time and for reading my letter.

Sincerely,

Nicole Lucchesi

Concerned Citizens for Nuclear Safety
107 Cienega Street
Santa Fe, NM 87501
(505) 986-1973

May 10, 2007

By email to: samuel.brinker@oak.doe.gov

Samuel Brinker
National Environmental Policy Act Document Manager
U.S. Department of Energy
National Nuclear Security Administration Livermore Site Office, M/S L-293,
P.O. Box 808
Livermore, CA 94551-0808

Re: CCNS Comments to the Draft Revised Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Lawrence Livermore National Laboratory, Livermore, California DOE/EA-1442R

Dear Mr. Brinker,

Concerned Citizens for Nuclear Safety (CCNS), a Santa Fe based research and advocacy non-governmental organization, opposes the opening of a bio-warfare research facility at the Lawrence Livermore National Laboratory (LLNL) main site. The proposed facility poses a great proliferation risk. Transparency is necessary for effective international monitoring of compliance with the requirements of the 1972 Biological Weapons Convention (BWC). Locating biological warfare agent research at a classified nuclear weapons laboratory, such as LLNL, could lead other countries to follow suit causing nearly insurmountable verification problems. If bio-warfare agent research is to be conducted, it must be done only as needed, and only under the auspices of civilian science centers with the greatest care possible taken to protect environmental and public health.

In the alternative, CCNS submits the following comments about the draft Revised Environmental Assessment (EA) for the Bio Safety Level-3 (BSL-3) facility proposed for LLNL, which we find to be inadequate and incomplete.

Need for a full EIS: The Department of Energy (DOE) and National Nuclear Security Administration (NNSA) are preparing a full Environmental Impact

Statement (EIS) for the proposed BSL-3 lab at Los Alamos National Laboratory (LANL). The same must be done for the proposed BSL-3 facility at LLNL.

Insufficient time to comment: DOE/NNSA has not given the public adequate time or opportunity to respond to the revised EA. The 30-day written comment period is too short for meaningful public involvement and must be extended for at least 45 additional days. In addition, DOE/NNSA must hold public comment hearings in the impacted communities during the extended public comment period. Public comment hearings are necessary in order to provide diverse and ample opportunities for meaningful public participation.

Use of an interim guidance: In December 2006, DOE determined that it would require analysis of terrorist risk in all environmental assessments and issued an interim guidance while preparing the final guidance for how such analysis must be preformed. The analysis in the EA is the first analysis of its kind and therefore sets a precedent for future terrorist risk analyses. Living in close proximities to two DOE nuclear weapons facilities, LANL and Sandia National Laboratories, we request that this analysis set a strong precedent for how DOE/NNSA will address terrorist risks for all facilities within the DOE Complex.

In addition, analysis of terrorist risk at a BSL-3 facility is far too significant to be performed using an interim guidance, which does not include the full requirements and which may be changed in the final guidance. DOE/NNSA must withdraw this revised EA and release a second revision of the EA for public review following the finalized guidance.

The December 2006 DOE Memorandum, "Need to Consider Intentional Acts in NEPA Documents" states that the final guidance will address "the appropriate level of detail for analysis, consistent with the 'sliding-scale' principle (e.g., a more detailed threat analysis is appropriate for a special nuclear material management facility, or for a non-nuclear facility with a significant amount of material at risk; a less detailed analysis may be adequate for a proposed office complex)."

This is of particular concern to the public, because the current EA does not provide sufficient detail for the level of risk. The scenarios proposed are briefly sketched without sufficient detail to either indicate that analysis was actually done or allow the public to make meaningful comments about the analysis.

DOE/NNSA must revise the EA to include greater detail and then allow the public to submit comments. In the alternative DOE/NNSA must withdraw the draft EA until it can provide justification for the less detailed analysis.

Reliance on probability of attack to dismiss impacts: The EA describes its approach to the terrorist analysis as "NNSA has adopted an approach based on that which is used in designing security systems and protective strategies, where one begins with the assumption that a terrorist act will occur, regardless of the actual probability of such an act." (58)

In discussion of the possibility that an insider should steal some of the agents, the EA states, "Some scenarios could have greater consequences (e.g., use of larger quantities), and some of which would have lesser consequences (e.g., agent dilution and partial or complete destruction upon release to air, water, or food environments as the transport mechanism). **Taken to extremes, one can even postulate scenarios with catastrophic implications**." (64) Emphasis added.

However, the EA does not thoroughly analyze the postulated scenario with catastrophic implications. Instead, it dismisses the impacts from theft of pathogenic agents due to assumed improbability that such theft would occur:

"2) because pathogenic agents are available in nature and other, less secure locations, operation of the LLNL BSL-3 facility would not make pathogenic agents more readily available to an outside terrorist, or increase the likelihood of an attack by an outside terrorist; and
3) the theft of pathogenic materials by an insider from any bio research facility could have very serious consequences; this scenario is not expected to occur at LLNL due to human reliability programs, security procedures, and management controls at the Facility." (V)

The dismissal of possible consequences due to the low probability of occurrence is contrary to NNSA's own stated approach to this analysis. Given the possible "catastrophic implications," NNSA must perform a detailed analysis of the impact should the agents be released and provide it for public comment and review.

Thank you for considering our comments. Should you have any questions, please contact us at your earliest convenience.

Sincerely,

Joni Arends
Executive Director
jarends@nuclearactive.org

Kalliroi Matsakis
Media Network Director
kmatsakis@nuclearactive.org

Sadaf Cameron
Public Outreach and Education Director
scameron@nuclearactive.org

NATURAL RESOURCES DEFENSE COUNCIL

Matthew McKinzie, Ph.D.
Scientific Consultant, Nuclear Program
Natural Resources Defense Council
1200 New York Ave., N.W.
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Washington, DC 20005

May 11, 2007

Samuel Brinker, National Environmental Policy Act Document Manager
U.S. Department of Energy
National Nuclear Security Administration
Livermore Site Office, M/S L-293, P.O. Box 808
Livermore, CA 94551-0808
email: samuel.brinker@oak.doe.gov
fax: 925-423-5650

Subject: NRDC Comments on the Draft Revised Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Lawrence Livermore National Laboratory (Revised March 2007)

NRDC has reviewed the Biosafety Level-3 Draft Environmental Assessment (Revised March 2007) and found it inadequate, particularly in response to the Ninth Circuit ruling which required the U.S. Department of Energy to review the threat to the LLNL Biosafety Level 3 facility from terrorists and the potential environmental effects that might derive from various terrorist acts against the facility.

The LLNL BSL-3 Draft EA states:
Depending on the time of day and the type of research underway, a loss of containment could result in a release of pathogenic materials. It is probable that the organic biological material would be destroyed by any resulting fire... BSL-3 Draft EA Rev March 07, pg. 59

Risk Group 2 and Risk Group 3 agents proposed for use in the facility cause human diseases for which preventive or therapeutic interventions may be available. Nationally, health care providers have been trained to recognize symptoms of exposures to Risk Group 2 agents (such as anthrax) and Risk Group 3 agents. Local hospitals and health care providers in the Livermore area have been briefed by LLNL medical staff. BSL-3 Draft EA Rev March 07, pg. 60

www.nrdc.org 1200 New York Avenue, NW, Suite 400
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NRDC Comment: The BSL-3 Draft EA (Rev. March '07) inadequately addresses the requirements of the Ninth Circuit Court to analyze the threat of potential terrorist activities. A reasonable analysis of the consequences of a terrorist act at the proposed LLNL BSL-3 facility would: 1) quantitatively define the source term, with respect to form, type and quantity of agent(s) and location(s) in the facility; 2) specify a release fraction or range of release fractions corresponding to the terrorist attack scenario (the BSL-3 Draft EA Rev. March '07 simply states that this number is non-zero); calculate via plume modeling the likely dispersal of agent over time under different weather scenarios; assess the number of infections or range of infections based on the best available residential and daytime population data; and address the capabilities of local and regional first responders, medical care and quantities of vaccines or antibiotics. Such analyses are now being performed on a regular basis by the U.S. government, reflecting an increased investment in modeling and simulation capabilities and training for consequences of Weapons of Mass Destruction (WMD) attacks since the events of September 11, 2001. The Department of Energy and Livermore Labs have resources and expertise to provide quantitative modeling results [for example, see the article "On the Leading Edge of Atmospheric Predictions" in the March 2007 edition of LLNL's *Science and Technology Review*] to understand the most extreme and most likely impacts from a terrorist scenario, but have not presented such results despite the Ninth Circuit's requirement.

The LLNL BSL-3 Draft EA states:
The most serious ultimate potential impacts of a terrorist act using material stolen from the LLNL BSL-3 facility would be similar to those that could occur should a terrorist collect the same organisms from infected livestock, wild animals or the locations in the environment where they occur naturally. Because these and other pathogenic organisms to be studied in the proposed BSL-3 facility are typically collected from environmental samples in the first place, they are just as accessible to a technically-competent terrorist (or group) as to any legitimate researcher. As such, the proposed action does not measurably add to the avenues already available to a terrorist for obtaining pathogenic materials or measurably increase the likelihood of this type of malicious act.BSL-3 Draft EA Rev March 07, pg. 63

NRDC Comment: To date Livermore Labs has not excluded the possibility that weaponized anthrax or weaponized forms of other biological agents from work at the proposed BSL-3 facility, and it is likely that such modified agents will be stored at the BSL-3 facility in order to meet its mission "to reduce the overall probability and consequence of a bio-terrorist act." In addition, the LLNL BSL-3 facility would represent a collection of different kinds of agents, so the comparison to gathering discrete biological agents from distributed sources is inappropriate. Furthermore the quantity of biological weapon agents at the LLNL BSL-3 facility could reasonable be expected to supersede quantities readily collected from animal or plant sources in the field.

The LLNL BSL-3 Draft EA states:
"For malevolent acts, probability data is generally unavailable, since in addition to technical feasibility, one would also need to devise a means for assessing and quantifying as a weighting factor the willful intent of a purpose-driven individual or group. Such factors are

not subject to estimation, and are likely to vary over time." BSL-3 Draft EA Rev March 07, pg. 59

NRDC Comment: Here the Draft EA unreasonably dismisses current approaches to terror threat assessment, as, in a simple example, the United States government national threat level is now generally determined to be "Elevated," or yellow-colored in general, and the U.S. threat level is now "High," or orange-colored, for all domestic and international flights. An "Elevated" threat level is defined by the U.S. Department of Homeland Security (DHS) as one in which there is a significant risk of terrorist attacks. The Homeland Security Advisory System was introduced on March 12, 2002 as "Elevated," and the threat level has been altered 12 times to date, never falling below "Elevated".

In addition, we would like to point out the following general issues with respect to the siting of the BSL-3 facility at the Livermore main site and the inadequacy of the revised Draft EA:

- Advanced biodefense research (i.e., with bio-warfare agents like live anthrax and plague) should not be collocated with nuclear weapons research, thereby setting a precedent which complicates monitoring and enforcement of the Biological Weapons Convention, the international treaty banning bio-weapons.

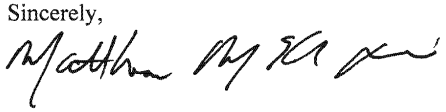
- The revised Environmental Assessment states that new research by the USGS has determined there is a 62% chance that one or more magnitude 6.7 earthquakes will occur in the area within the next 30 years. The BSL-3, a portable building, should not be operated in a seismically active area.

- The Department of Energy (DOE) should hold a public hearing so that stakeholders can learn more about this plan and provide further comments. So far, DOE has failed to hold public hearings on this important matter.

- The 30-day written comment period (which ends May 11, 2007) is too short. Area residents and other interested members of the public need more time to learn of the comment period, gather information and respond.

Livermore Lab sits within a 50-mile radius of seven million people. This highly populated area is not an appropriate place to conduct experiments with some of the deadliest agents known. With respect to this population, the written comment deadline for the BSL-3 Draft EA should be extended for a minimum of one additional month (to June 11) and a public hearing (see above) should occur within the extended public comment deadline.

Sincerely,



Matthew McKinzie, Ph.D.

-----Original Message-----
From: penny mcmullen [mailto:pmsl@cybermesa.com]
Sent: Friday, May 11, 2007 4:25 PM
To: Brinker, Samuel
Subject: LLNL BSL-3 comments

Loretto Community
113 Camino Santiago
Santa Fe, NM 87501
505-983-1251

May 10, 2007

By email to: samuel.brinker@oak.doe.gov

Samuel Brinker
National Environmental Policy Act Document Manager U.S. Department of Energy National Nuclear Security Administration Livermore Site Office, M/S L-293, P.O. Box 808 Livermore, CA 94551-0808

Re: Loretto Comments to the Draft Revised Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Lawrence Livermore National Laboratory, Livermore, California DOE/EA-1442R

Dear Mr. Brinker,

The Sisters of Loretto and Loretto Community strongly oppose a bio-warfare research facility (BSL-3) at the Lawrence Livermore National Lab (LLNL) for the following reasons:

The BSL-3 research is on live biological agents that could be used to make bio-weapons. The stated purpose of this research is to learn how to counteract a serious outbreak in the event of a bio-weapons attack on our nation. Just as we wrote in our comments regarding the BSL-3 facility proposed for the Los Alamos National Lab (LANL), this kind of research should not be conducted at a nuclear weapons research lab. Since this research is basically dealing with diseases that would be the result of such an attack, it should be done at a Center for Disease Control facility or other civilian science center. If the BSL-3 research is conducted at a weapons research facility, it would generate suspicion that the Dept. of Energy's (DOE) real intention is to eventually develop bio-weapons to use against other nations and could thus lead to proliferation of bio-weapons development around the world.

When DOE presented their EA for a BSL-3 Lab at LANL, the Loretto

Community along with many other commentators stated that DOE should be required to prepare a full Environmental Impact Statement (EIS). The DOE is now preparing an EIS for the BSL-3 at LANL. Just as with LANL, an EA is insufficient for LLNL and the DOE and the National Nuclear Security Administration (NNSA) needs to prepare a full EIS for LLNL.

A 30-day comment period is unfairly short. Most area residents and other interested citizens who would have liked to submit a comment have not yet been notified about the comment period because it has not been widely publicized. So the comment period needs to be extended for as long as is needed to adequately publicize the comment period and allow citizens to have meaningful participation in the process, as mandated by law.

The Livermore Lab is in a seismically active area and therefore certainly not suitable for a BSL-3 facility. Some studies predict a level 10 earthquake, the most violent quake on the scale of 1-10. The revised EA does not address how the BSL-3 will sustain such an earthquake, especially if the BSL-3 is to be in a portable building.

The DOE is now required to conduct an analysis of all possible impacts of a terrorist attack. Instead of doing this analysis, the EA dismisses the impacts because the DOE assumes that terrorists would not want to steal live bio-warfare agents. The EA also claims that most bio-warfare agents would be destroyed in a terrorist attack and therefore would not be released into the environment. The EA does not justify this assumption either. The DOE/NNSA needs to conduct a thorough study of all possible effects of all possible scenarios, not just state unsubstantiated assumptions, as well as provide detailed plans for dealing with an accident and with a terrorist intrusion or attack.

The EA does not sufficiently discuss the risks of transporting live agents. The ES states that accidents are reported, and that "Accidents due to transportation of microorganisms are not expected to increase" and that the addition of samples shipped to and from the BSL-3 facility through federal or by commercial or private courier "would not be expected to change the overall incidence of risk of transportation accidents." The EA does not explain why increased transportation of micro-organisms would not logically indicate a probable increase in accidents.

In summary, this draft revised EA is inadequate and incomplete, and DOE/NNSA needs to withdraw this EA and prepare a full EIS with sufficient notification and public comment period for citizens to adequately address the EIS.

Thank you for considering our comments. Please confirm that you received these comments and that they will be included in the record.

Respectfully,

Penelope McMullen, SL
NM Justice and Peace Coordinator
Loretto Community
113 Camino Santiago
Santa Fe, NM 87501

505-983-1251
pmsl@cybermesa.com

From: Loulena Miles [mailto:loulena@trivalleycares.org]
Sent: Monday, May 14, 2007 3:21 PM
To: Brinker, Samuel
Cc: Yuan-Soo Hoo, Camille; Limage, Simon; mayor@ci.livermore.ca.us; ljdietrich@ci.livermore.ca.us; mrleider@ci.livermore.ca.us; jpmarchand@ci.livermore.ca.us; reitter@ci.livermore.ca.us; Richard_Harper@feinstein.senate.gov
Subject: Urgent Need for Extension of Public Comment Period for BSL-3 operations at Livermore Lab

May 14, 2007

Samuel Brinker
National Environmental Policy Act Document Manager
U.S. Department of Energy
National Nuclear Security Administration
Livermore Site Office, M/S L-293
P.O. Box 808
Livermore, CA 94551-0808

RE: Urgent Need for Extension of Public Comment Period for BSL-3 operations at Livermore Lab

Dear Mr. Brinker:

This letter is in regard to the Department of Energy's (DOE) proposal to operate a Biosafety Level 3 laboratory at Livermore Lab. As you are aware, the potential environmental impacts of operating this facility have been presented by the DOE in a Draft Environmental Assessment that was open for public comment from April 11, 2007 to May 11, 2007.

We are alarmed to find that you were out of the office on the final day of the comment period – May 11th, and that your fax machine did not accept faxes on that day. It is evident from the Department of Energy press release that you are the person responsible for taking public comments on this document. Neither you, nor your staff, responded to our many calls and emails alerting you that the fax machine was not accepting comments. We now learn that Livermore Lab employees were moving furniture and may have disconnected the fax machine on the final day of the public comment period.

This is at best a falling down on the job of the DOE, and at worst, an intentional obstruction of the public comment period under the National Environmental Policy Act. Our concerns about the Department's disinterest in meaningful public comment is only buttressed by the Department's denial of repeated requests by the public to hold a hearing where local residents could ask questions and apprise themselves of the facts around this controversial bio-lab.

The public comment process is the heart of the National Environmental Policy Act (NEPA). NEPA requires federal agencies to take a hard look at the potential environmental impacts of

projects that may have a significant impact on the environment. This Environmental Assessment (EA) is a critical document for demonstrating whether the DOE has given sufficient thought to ensuring the safety of the Livermore Valley and surrounding areas. Specifically, this EA has been mandated by court order to analyze the impacts of a terrorist attack. Also contemplated in this document is a catastrophic accident resulting in airborne release of bioagents. The lab will be permitted to handle as much as 100 Liters of bioagents; one teaspoon of some of the permitted agents (like live anthrax) is enough to cause thousands of deaths if released into the air from the facility.

We received a number of contacts from frustrated community members who could not send their comments in by fax. We are even more concerned about the public members who did not contact us and were likely not even aware that their faxes did not go through.

It is our view that the Department has not given due consideration to the importance of public comments since this process began in 2002. Neither the original EA in 2002, nor the revised EA released in April of 2007, included basic contact information for where to send public comments or when – even after we alerted you to this deficiency. And, as mentioned, if a member of the public obtained the fax number for sending comments from the DOE's press release during the most recent comment period, that fax machine was non-operational.

Because of your absence on the most important day of the comment period and a faulty fax machine, it is highly likely that not all members of the public seeking to comment on this document were given an opportunity to do so.

The only fair remedy to this situation is that you re-advertise the public comment period for 30 additional days, hold a public hearing and re-release the document with comment period deadlines and contact information printed in the text of the document itself.

Sincerely,

Loulena Miles
Staff Attorney

Marylia Kelley
Executive Director

cc Livermore Site Office Manager, Camille Yuan-Soo Hoo
City Council of Livermore
Senator Barbara Boxer
Senator Dianne Feinstein
Representative Ellen Tauscher
Representative Jerry McNerney

--

Loulena Miles
Staff Attorney
Tri-Valley CAREs

-Communities Against a Radioactive Environment-
2582 Old First Street
Livermore, CA 94551

(P) (925) 443-7148
(F) (925) 443-0177
www.trivalleycares.org

From: RedMiles@aol.com [mailto:RedMiles@aol.com]
Sent: Thursday, May 10, 2007 4:22 PM
To: Brinker, Samuel
Subject: Bio-Defense

Mr. Brinker:
As a life time citizen of Contra Costa County and Alameda County, I have seen this area grow and change. This is definitely not the place to store or test bio warfare agents or any type of virus for any reason. The Lawrence Livermore Lab is too close to a huge population and therefore, it is foolish to even contemplate the risk!!!

Thank you,
Yvonne Miles
2715 Almondridge Dr
Antioch,CA. 94509

From: Martha Priebat [mailto:mammadoc@earthlink.net]
Sent: Tuesday, May 08, 2007 9:31 PM
To: Brinker, Samuel
Subject: Opposition to BSL3 Lab in Livermore

I am strongly opposed to construction and/or operation of a bio-warfare (BSL-3) laboratory in Livermore on the grounds of Lawrence Livermore Laboratory. First I must tell you that I have grandchildren growing up within a mile of the plutonium building, and therfore also within a mile of the BSL3 Lab. I am afraid of the effect on those children and all the children in Livermore should some small amount of anthrax, plague or another dangerous pathogen accidentally escaping from the BSL3 building. And accidents do happen, as we saw recently when the I580 connector ramp burned. Yes, accidents just will happen.

In addition, LLNL is situated between two active faults, one of which caused damage at the Laboratory about 25 years ago. Earthquakes also happen, whether we like it or not. This portable lab is near the buildings where earthquake damage occurred. What will happen to a portable building in an earthquake? In addition, LLNL is situated within the city limits of Livermore, with a population of approximately 60,000 people live, and within a 50-mile radius where 7 million people live. All this seems to me to be a dandy target for terrorists. And terrorists also happen.

I could continue with this list of my concerns about this thoughtless and near-sighted plan, but my blood pressure is rising as I write.

DO NOT OPERATE this bio-warfare facility in Livermore.

Yours truly
Martha Priebat

From: Megan Radmore [mailto:megan_renee79@yahoo.com]
Sent: Tuesday, April 24, 2007 4:11 PM
To: Brinker, Samuel
Subject: Urgent!

I ABSOLUTELY oppose the opening of the bio-warfare research facility in Livermore, CA. The nearby populace is 7 MILLION! Million with an M. Not to mention this location sits near active fault lines. A public hearing should be held IMMEDIATELY! A comment period until 11 May is not long enough, most residents have no idea about these plans, and THEY SHOULD as the facility will be testing the most dangerous agents known to man!!!

Megan R Radmore

-----Original Message-----
From: ann [mailto:ann@trivalleycares.org]
Sent: Monday, April 23, 2007 4:33 PM
To: Brinker, Samuel
Subject: Comment: Bio-Warfare Agent Research at Livermore Lab

Re: Comment period Bio-Warfare Agent Research at Livermore Lab

Dear Mr. Brinker,

Just as war in no longer a viable international discourse, developing dangerous bio-warfare agents isn't either. The human is still primitive enough, and wary of others different than ourselves, that these dangerous escalations, in the end, will destroy us all, by bankrupting us as taxpayers or just killing us with bacteria, radioactivity or toxic contamination.

I know for a fact that the public is told there is no danger with biowarefare agent research and historical fact tells me accidents, spills, human error, mishap and cover-up are a decades-old, documented fact at Lawrence Livermore National Laboratory when they were given plutonium. Can any honest person believe human life will be without these elements? Yet, we play more and more dangerous games.

This country created the devastating A- and H-bombs. Dwight Eisenhower, due to his lack of understanding of the real dangers, wanted to create something good from this destruction so he gave the world nuclear power plants. If a country has one, they can extract plutonium, so who spread this problem around the world. The U.S. did. What gift hasn't gone wrong in the wrong hands? What country hasn't sought to equal the weapons, and now bio-agents, we develop?

Now, here comes the biowarfare boom and in Livermore alone the biowarfare research agent facility will house 25,000 different samples of pathogens in California, a fertile agricultural area that feeds the entire nation, around seven million of residents or more, near an earthquake fault, inside a super secret nuclear weapons lab. Does anyone at the Department of Energy think about building something for humanity instead playing on the edge of destroying it?

I oppose this BSL-3 lab being housed in a 1,500 foot prefabricated building. I oppose this because the public is deprived of a public hearing. I oppose this lab because those working at this facility aren't even informed of the dangers posed to them and our government plays willie-nille with their lives trying to flummox them by holding back the truth, to lull them into a feeling of safety. I oppose this

lab because the Environmental Assessment failed to disclose many facts so the public and workers are operating on falsehoods.

Shame, for not working to lift the world up.

Ann Seitz
22103 Main Street
Hayward, CA 94541
510-538-5285

From: Virginia Sharkey [mailto:v.sharkey@sbcglobal.net]
Sent: Tuesday, May 08, 2007 10:32 PM
To: Brinker, Samuel
Subject: Proposed BSL3 Livermore

Samuel Brinker
W.S.D.O.E.N.S.A.

Creating a BSL3 in a highly populated area could be a risk to the whole area, including Sonoma County, my home.

The DOE only provided an Environmental Assessment in its proposal. The EA was challenged in court where a revision was ordered. Even the revision is inadequate.

Potential terrorists risks were not thoroughly considered.

Before creating a BSL3 in Livermore a public meeting is in order so citizens can understand the implications and comment on them. Then a full Environmental Impact Study is needed to ensure the safety for any potential danger.

Virginia Sharkey
157B North Star Drive
Santa Rosa, CA 95407

Jacob Smith

14 Allen St.

Amherst, MA 01002

May 10, 2007

By email to: samuel.brinker@oak.doe.gov

Samuel Brinker

National Environmental Policy Act Document Manager

U.S. Department of Energy

National Nuclear Security Administration Livermore Site Office, M/S L-293,

P.O. Box 808

Livermore, CA 94551-0808

Re: The Draft Revised Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Lawrence Livermore National Laboratory, Livermore, California DOE/EA-1442R

Dear Mr. Brinker,

I opposes the opening of a bio-warfare research facility at the Lawrence Livermore National Laboratory (LLNL) main site. The proposed facility poses a great proliferation risk. Transparency is necessary for effective international monitoring of compliance with the requirements of the 1972 Biological Weapons Convention (BWC). Locating biological warfare agent research at a classified nuclear weapons laboratory, such as LLNL, could lead other countries to follow suit causing nearly insurmountable verification problems.

If bio-warfare agent research is to be conducted, it must be done only as needed. In any research program there is always the potential for discoveries to occur that the researchers did not intend to make. I bring in particular to your attention a study done by Australian researches in which a strain of a pathogen was developed that was significantly more dangerous rather than less dangerous as expected (R. J. Jackson et al., "Expression of Mouse Interleukin-4 by a Recombinant Ectromelia Virus Suppresses Cytolytic Lymphomcyte Responses and Overcomes Genetic Resistance to Mousepox," *Journal of Virology*; vol. 75 (2001), pp. 1205-10). The potential impact of a similar discovery on wild populations of animal species used in research must be assessed and

weighed against predicted gains of the research. Bio-warfare agent research must be conducted only under the auspices of civilian science centers with the greatest care possible taken to protect environmental and public health.

In the alternative, I submit the following comments about the draft Revised Environmental Assessment (EA) for the Bio Safety Level-3 (BSL-3) facility proposed for LLNL, which we find to be inadequate and incomplete.

Need for a full EIS: The Department of Energy (DOE) and National Nuclear Security Administration (NNSA) are preparing a full Environmental Impact Statement (EIS) for the proposed BSL-3 lab at Los Alamos National Laboratory (LANL). The same must be done for the proposed BSL-3 facility at LLNL.

Insufficient time to comment: DOE/NNSA has not given the public adequate time or opportunity to respond to the revised EA. The 30-day written comment period is too short for meaningful public involvement and must be extended for at least 45 additional days. In addition, DOE/NNSA must hold public comment hearings in the impacted communities during the extended public comment period. Public comment hearings are necessary in order to provide diverse and ample opportunities for meaningful public participation.

Use of an interim guidance: In December 2006, DOE determined that it would require analysis of terrorist risk in all environmental assessments and issued an interim guidance while preparing the final guidance for how such analysis must be performed. The analysis in the EA is the first analysis of its kind and therefore sets a precedent for future terrorist risk analyses.

In addition, analysis of terrorist risk at a BSL-3 facility is far too significant to be performed using an interim guidance, which does not include the full requirements and which may be changed in the final guidance. DOE/NNSA must withdraw this revised EA and release a second revision of the EA for public review following the finalized guidance.

The December 2006 DOE Memorandum, "Need to Consider Intentional Acts in NEPA Documents" states that the final guidance will address "the appropriate level of detail for analysis, consistent with the 'sliding-scale' principle (e.g., a more detailed threat analysis is appropriate for a special nuclear material management facility, or for a non-nuclear facility with a significant amount of material at risk; a less detailed analysis may be adequate for a proposed office complex)."

This is of particular concern to the public, because the current EA does not provide sufficient detail for the level of risk. The scenarios proposed are briefly sketched without sufficient detail to either indicate that analysis was actually done or allow the public to make meaningful comments about the analysis.

DOE/NNSA must revise the EA to include greater detail and then allow the public to submit comments. In the alternative DOE/NNSA must withdraw the draft EA until it can provide justification for the less detailed analysis.

Reliance on probability of attack to dismiss impacts: The EA describes its approach to the terrorist analysis as "NNSA has adopted an approach based on that which is used in designing security systems and protective strategies, where one begins with the assumption that a terrorist act will occur, regardless of the actual probability of such an act." (58)

In discussion of the possibility that an insider should steal some of the agents, the EA states, "Some scenarios could have greater consequences (e.g., use of larger quantities), and some of which would have lesser consequences (e.g., agent dilution and partial or complete destruction upon release to air, water, or food environments as the transport mechanism). **Taken to extremes, one can even postulate scenarios with catastrophic implications**." (64) Emphasis added.

However, the EA does not thoroughly analyze the postulated scenario with catastrophic implications. Instead, it dismisses the impacts from theft of pathogenic agents due to assumed improbability that such theft would occur:

"2) because pathogenic agents are available in nature and other, less secure locations, operation of the LLNL BSL-3 facility would not make pathogenic agents more readily available to an outside terrorist, or increase the likelihood of an attack by an outside terrorist; and

3) the theft of pathogenic materials by an insider from any bio research facility could have very serious consequences; this scenario is not expected to occur at LLNL due to human reliability programs, security procedures, and management controls at the Facility." (V)

The dismissal of possible consequences due to the low probability of occurrence is contrary to NNSA's own stated approach to this analysis. Given the possible "catastrophic implications," NNSA must perform a detailed analysis of the impact should the agents be released and provide it for public comment and review.

Thank you for considering my comments. Should you have any questions, please contact me at your earliest convenience.

Sincerely,

Jacob Smith

PM STRAUSS & ASSOCIATES
Energy and Environmental Consulting

May 11, 2007

To: Samuel Brinker
National Environmental Policy Act Document Manager
U.S. Department of Energy
National Nuclear Security Administration
Livermore Site Office, M/S L-293
P.O. Box 808
Livermore, CA 94551-0808

samuel.brinker@oak.doe.gov
Fax: 925/423-5650

Comment on the Revised Environmental Assessment for the Livermore Lab BSL-3

I have been monitoring the cleanup of Lawrence Livermore National Laboratory (LLNL), which had been named to the National Priorities List (NPL) under CERCLA. I conduct research on cleanup practices at the site, make recommendations about remediation, comment on proposals by LLNL, and generally review and monitor cleanup activities. This has acquainted me with a number of releases to the environment that resulted in LLNL being named to the NPL. In 2000, I also conducted research for TVC on environmental releases of plutonium from LLNL. This research culminated in a 2001 report entitled Playing With Poison: Plutonium Use at Lawrence Livermore National Laboratory. This comment is divided into two parts: **General and Detailed**

General Comments

The proposed BSL-3 facility would allow LLNL to experiment with a broad range of biological agents including anthrax, bubonic plague, botulism, and genetically modified lethal bio-warfare agents. This new program, if inadequately managed, could seriously endanger workers and the community. Therefore, past management performance should be carefully evaluated before this project is undertaken.

Constructing and operating a BSL-3 facility also represents a new direction and program for DOE and LLNL. This new direction could have serious health and environmental consequences. This new direction is not within the existing "culture" of the Lab and the EA should be address the ongoing training and knowledge (or lack thereof) that will be necessary to operate it safely and securely.

This new program will require management and leadership that should be evaluated in an environmental review. Based on my review of the Environmental Assessment conducted by the Department of Energy, all relevant information, including past management patterns, has not

been disclosed or discussed in the EA. This information could have a significant effect on the environment and is relevant in the decision to site a BSL-3 facility at LLNL.

Further, in the description of the site in the EA and elsewhere in the document, there is virtually no discussion of the fact that the site is being cleaned up under CERCLA, or the fact that some of the safety features for the BSL-3 facility rely on the same assumptions (often faulty) used to prevent the release of plutonium to the environment. Both of these points deserve a thorough consideration in the Environmental Assessment and in a much needed full Environmental Impact Statement. My detailed comment will provide more information as a starting point for further analysis.

Detailed Comment

The potential failure of the HEPA filters is of serious concern. The revised EA assumes that virtually all biological particles will be captured by the HEPA filters. DOE should explain how it plans to prevent particles not captured from being released to the environment. HEPA filters have a long and infamous history at the Lab, where they are used in the plutonium facility and other buildings. Facilities using plutonium send exhaust through at least two sets of HEPA filters before exhaust air is emitted to the environment. In 1980, plutonium was detected leaving the stacks. HEPA filters are employed to capture fine particles in the exhaust of gloveboxes, from room ventilation systems and from air stacks. They are the last barriers of protection against the release of particulate radioactivity to the environment.

Failures or potential failures of HEPA filters have been documented by numerous inspections indicating them to be in poor shape and not protective in case of an accident. Additionally, in 1999 LLNL acknowledged that there were no regulations regarding the service life of HEPA filters. In 1997, there were three releases of radioactive material associated with HEPA filters. During a period spanning two decades, there were numerous reports of faulty HEPA filters and the use of old HEPA filters that could have led to releases. In 1999, Argonne National Laboratory recommended that LLNL replace all HEPA filters at B-332.

Chemical contamination should be fully addressed. CERCLA was enacted in 1980 and is commonly referred to as the Superfund. Superfund was amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA). Actions taken under CERCLA (Superfund) deal with sites where there have been past releases of hazardous substances and pose a substantial threat to human health. Sites listed and cleaned up under Superfund are named to the National Priorities List (NPL). This list is composed of the most hazardous sites in the U.S., and comes under the rules and regulations of federal environmental jurisdiction.

Both of the sites operated by LLNL are listed on the NPL. In 1987, the LLNL Main Site was named to the Superfund NPL. The basis for listing was the presence of volatile organic compounds (VOCs), such as trichloroethene, trichloroethane, carbon tetrachloride, Freon, chromium and tritium (radioactive hydrogen) in the groundwater in 1982, in proximity to Livermore drinking water supplies. These compounds have been released to groundwater in concentrations above the maximum contaminant level (MCL) established by EPA or the State of California. Many of these substances are known or potential cancer-causing agents.

Contamination at the Main Site raise questions about management's capability to handle hazardous materials. The major causes of release of non-radioactive wastes into the environment at LLNL have been through the improper storage or treatment, accidents, and operational releases. These releases could have been foreseen.

For example, during the early 1960s through the early 1980's, improper storage, treatment and disposal of wastes in earthen pits and evaporation pads led to soil and groundwater contamination. Livermore's sewer system, as diagramed in the Dreicer Report (1985), runs contiguous to areas of contamination. An underground tank ruptured, leading to the release of thousands of gallons of gasoline. Another underground tank leak at LLNL permitted soil and groundwater to become contaminated with Tritium.
A number of reports have been published regarding the extent of contamination at Livermore Lab, including the 1985 report by Dreicer, the 1990 Remedial Investigation (RI), the 1993 Record of Decision and numerous other documents that make up the LLNL Superfund Record. Recently, during the construction of a large laser, over 100 PCB-laden capacitors were found buried at the site, with no demarcation. They and surrounding soil were removed. This was close to an area called the Taxi Strip area, were an unknown quantity of non-radioactive and radioactive wastes were disposed of in earthen pits and evaporation ponds. The resulting contaminated soil and groundwater at the Main Site is still being cleaned up, costing tens of millions of dollars.

Radiological contamination should be fully addressed. Tritium, plutonium, uranium and other radioactive materials were used at LLNL in designing nuclear weapons. Gaseous tritium was released into the air at a monitored rate of 3,978 curies in 1989. Use of tritium has decreased since then. Sometimes, tritium has been accidentally released to groundwater, the air and to the soil. Many of the radioactive releases were due to poor management practices or accidents. For example, the 1991 DOE Task Group on Operation of DOE Tritium Facilities reported the following examples of failures at LLNL:

- 126 curies released on 12/15/86 due to failed pump.
- 198 curies released 4/14/87 due to equipment and operator error.
- 145 curies released 1/19/88 due to unknown cause or monitor malfunction.
- 329 curies release 8/22/89 due to improper pressure relief of container.
- 144 curies released 10/31/89 due to mistaken belief that palladium bed contained on deuterium and hydrogen.
- Unknown quantity of tritium released to soil on 12/24/90 due to unanticipated freezing weather that cracked a pipe leading to an underground vessel.

Plutonium has also been found in soil at the Main Site above "background" levels, and at one location, tainted soil had to be removed. Plutonium is also found in the soil in the surrounding neighborhood above background levels. The plutonium contamination is the result of releases by LLNL to the environment. These releases could have come from the ventilation system, poor storage and treatment practices, buildup in the sewer system, and releases to the City's sewage treatment system. LLNL's theory is that there was a build-up in the sewer lines and during maintenance a large release occurred to the sewage treatment plant. The tainted sewage was processed. The sludge was dried and given to City residents for free as a soil amendment. As I

understand it, the State and County Health Department are still investigating the extent of plutonium contamination in the City Livermore.
In 2000, I undertook a detailed look at the historical use of plutonium at LLNL. Plutonium is extremely hazardous, and can induce cancer in nearly every tissue or organ of the human body. The severity of the radiation dose depends primarily on the quantity of radiation taken into the body and on the route by which it enters the body.

Plutonium 239 (Pu239) is the main component of a nuclear warhead. It has a half-life of 24,000 years, longer than recorded history. In order to approximate the hazardous life of a radionuclide, a general rule of thumb that is used is that a radionuclide's hazardous life is ten times its half-life. So the Pu239 in existence today will be hazardous for 240,000 years. In general, inhaled plutonium is far more hazardous than plutonium that is ingested. Tiny particles can lodge in the lung, where they can remain for a period of 500 days. Of material absorbed into the deep lung, approximately 15% goes to the lymph nodes and eventually to the bloodstream. If deposited in the bone through the bloodstream, it can remain there for up to 200 years. Attached are two tables from the resulting study that describe numerous accidental releases of plutonium and other dangerous radionuclides by the Lab, and provide a list of management and regulatory errors that could have led to releases. (Please note that these tables are taken directly from the report that I prepared.) Incidents that post-date the study are not included in the tables.

The pattern of management failures to contain nuclear materials and prevent exposure to workers and the public is an anologs of predictable patterns and failures for the BSL-3 facility. I have concluded that the accidental releases of radioactive materials and the documented incidents that could have led to releases demonstrate a pattern of management failure at LLNL. For example, an internal investigation report identifies that the 1997 criticality events were "symptomatic of ongoing poor work processes and practices in B-332, rather than an example of planned willful noncompliance with safety measures." It concluded that the repeated violations were in the areas of "personnel training and qualification, procedure compliance, and quality improvement." In an earlier letter from the Defense Nuclear Facilities Safety Board, the Chairman of the Board stated that the number of criticality infractions "raise questions as to whether DOE-OAK is staffed with the technical capabilities necessary to provide guidance" and "neither DOE-OAK nor LLNL management appears to recognize or fully appreciate all of the problems of hazardous work control".

Given the poor management of nuclear materials and the chemical contamination found at the LLNL managed sites, I conclude that LLNL's management practices must be assessed before undertaking a new mission that involves the storage, use, and disposal of highly dangerous biological agents. I believe that this is a critical factor in making an informed decision. A proposal to allow the use of potentially deadly bio-agents at a facility with a history of environmental releases requires a comprehensive analysis of all risk factors that could influence such a decision.

Based on my professional judgment, I conclude DOE's Revised EA is flawed because it did not evaluate all critical factors in the operation of this proposed facility.

Sincerely,

Peter M. Strauss
President
PM Strauss & Associates

Table 2

Reported Incidents and Vulnerabilities at LLNL That Could Have Led to Releases

3/11/79 - LLNL mistakenly sends 21 "sacks" of Am containing 43 microCi (µCi) to Alameda County Landfill. Material is recovered.

4/16/79 - During inspection of B-332 HEPA filters, six failed test, six others too active (i.e., contaminated) to conduct test. All twelve filters replaced.

1/10/80 - -Safety report notes the risk due to fire. It posits scenario where fire in glovebox breaches glovebox, fuel of some sort is left around, fire suppression doesn't work, and there is 4.5 kg of plutonium in glovebox. 0.05% becomes suspended (2.25 grams) goes through one filter (99.97% removal) so 675 micrograms are released. Off-site person would inhale $1x10^{-4}$ or $1x10^{-5}$ microcuries or about 5 millirem. This would increase cancer risk by $1x10^{-7}$.

1/24/80 - 1/26/80 - Earthquakes on Greenville-Diablo fault (5.9 and 6.3 Richter scale) left small damage to walls of increment 1. No releases occurred. Some walls were seismically strengthened.

8/29/80 - Failure of downdraft HEPA filter. Recommendation to re-evaluate changeout schedule "because of significant amount of plutonium in this system" (i.e., filters and duct system).

2/6/81 - Report that stack-sampling system is inadequate, there are inadequate seismic tiedowns, and HEPA filters get plugged with dust.

9/11/81 - Memo states that there are many old filters (10-15 years old) in use at LLNL, noting that tests don't test age related stress/material factors. Report also notes that "Bldg. 332 appears to be one of the only facilities in the world where factors such as dust loading and contamination levels do not necessitate a relatively frequent filter changeout schedule." Attached memo of 1/15/81 states "the system is out of balance", that in August of 1980 staff were informed of the need to change downdraft filters as soon as possible, but this was not done. The report also indicated that one of the rooms "has a significant problem due to low flow", that square hoods "for the most part, have unacceptable flows", and "stack sampling systems on all exhaust points of the building should be reviewed on an annual basis".

4/30/83 - Report that glovebox HEPA filters have leaking housing.

6/1/83 - Report found small plutonium particles in the gloveboxes and the ventilation system that could be dispersed if the filters were not in good shape.

6/30/88 - Power outage in B-332 resulting from LLNL electric system failure. Emergency diesel generator (EDG) maintained power. No releases or corrective actions.

7/29/88 - EIS accident analysis reports a 4.5-kg max-credible release. States that it would have far less off-site effects then release at B-251.

10/3/89 - LLNL employee files a complaint that glovebox in B-332 is too old to safely conduct experiments. While LLNL investigative team establishes that there is no immediate threat to health, it recommends decommissioning the glovebox, and immediately stop using it. The evaluation also states that "[I]n the past, local contamination has been found in the area."

3/9/90 - Report describes how older filters will be destroyed by fire protection (i.e., water spray). At Rocky Flats, a 1980 plutonium incinerator fire caused adhesion on the HEPA filters to degrade and steel supports on frames to warp, and water blew them out of housings. Filter bank housing was in poor shape and did not meet criteria for nuclear grade. There were also possible leaks from gaskets, filters, ball valves, test ports, boot seals, and caulking.

3/27/90 - An inspection report discloses that 17 of 22 HEPA filters in one batch, and 4 of 26 in another were discovered torn or cracked.

6/6/90 - Internal memo, referring to HEPA filters, states that "I hope it doesn't take a release like we had in late 1979 - early 1980 to spring money necessary to resolve the problems."

7/20/91 - Emergency diesel generator (EDG) failure. No releases occurred.

1/27/92 - Report that HEPA filters are 100% efficient for particles > 0.1 to 0.3 microns. Only 1 % of plutonium particles are less than that.

1/30/92 - HEPA filter degradation on glovebox exhaust discovered during annual surveillance testing. Filters tested at 99.90 and 99.95% removal instead of 99.97 %. Filters were replaced.

7/15/92 - EDG test failure. Same EDG as 7/20/91.

9/28/92 - Accidental puncturing in B-332 fire water supply line. Fire department corrected this right after it occurred.

10/17/92 - Inspection showed degradation of room exhaust air ducts and in glove box ducts. No radioactive contamination. Repaired cracked ducts and sections were seismically secured. After further inspection, evidence of corrosion was found in another exhaust duct. Cracking was due to intergranular stress corrosion cracking in weld heat affected areas.

10/28/92 - Failure of glovebox exhaust pressure line. Due to material degradation.

12/1/92 Report states that monitoring gauges not calibrated.

12/13/93 - Failure of EDG during monthly maintenance test. Repairs were made.

5/94 - Defense System/Nuclear Design Directorate requires that all glove boxes be triply filtered. Requires that they should be able to be exposed to 180 degrees F, and have 99.97% removal of particles over 3 microns. Filters should be marked with the flow rate, flow direction, and serial number.

6/17/94 - Worker in storage vault observed two bulged cans containing plutonium ash accumulated from incineration activities. The double can was bulging at both ends. All cans in the vault are bagged.

6/21/94 - Radiographs indicate that several inner cans are bulging.

6/21/94 - Failure of glovebox exhaust fan is discovered.

7/94 - A DOE inspection team discovered another 7 bulging cans of plutonium oxide. This could be the result of hydrogen pressure from moisture in the can, or the breakdown of the plastic bags that are sealed in the cans. X-ray analysis determined that the inner cans had peeled back in two containers.

7/29/94 - Report that HEPA filters for B-332 were unqualified. "This public disclosure [of Westinghouse employee] has increased the urgency to resolve the problem before others discover the problem and force the laboratory to shut down affected operations of B-332." States that specifications for the HEPA filters were prepared in 1962 and that no certification facility could test the equipment because of shape and size.

8/94 - A second DOE inspection revealed another bloated can, and an analysis of gasses from the cans. A mixture of hydrogen, oxygen, and hydrocarbons was found. DOE re-classified the risk of explosion from low to high.

8/4/94 - Plutonium Working Group Assessment Team Report identifies the following vulnerabilities at LLNL. At B-332, vulnerabilities are to workers who receive increased exposure due to storage of excess material, obsolete packages and the lack of specific knowledge of packaging, and inadequate design basis for internal structures during an earthquake. For B-251, vulnerability results from insufficient information to characterize quantities of materials. For B-231, vulnerability includes excess sources leading to increased exposure.

9/30/94 - Plutonium Working Group identifies LLNL B-332 as one of the 14 most vulnerable sites in the DOE complex. Identifies 282 plutonium containers that contain "uncharacterized materials and unknown package configurations". 108 packages contain plutonium ash that is generating hydrogen gas. Eight cans bulged due to pressurization, creating a hazard for workers. Also identifies the lack of supports for the fire suppression system, which could fail in an earthquake. Some interior walls were not made of reinforced masonry so that they could collapse in an earthquake and damage gloveboxes and plutonium contents.

12/12/94 - Vulnerability Assessment indicates that sprinkler system in Increment 1 and HEPA filters housed in Plenum Building could fail under a design basis earthquake. LLNL reinforced piping system.

2/16/95 - Presentation to LLNL states that HEPA filters can fail when exposed to high temperature, high air flows, shock waves, moisture, and heavy particle deposits.

2/16/95 - Report on HEPA filters states that filters may fail under accident conditions; there are many old filters with no guidance for disposal; filters are not qualified for nuclear applications; DOE has standards developed by the army; LLNL has functioning filters with 32 years of service. They have failed at DOE facilities and had 0% efficiency in accidents and off-normal conditions.

4/95 - The Defense Nuclear Facilities Safety Board requires shutdown of plutonium Building after important safety measures were missed in April. Shutdown lasts until October, and ventilation system and emergency generator were added.

5/23/95 - Failure of EDG.

1996 - B-332 HEPA Test database identifies inventory of 277 HEPA filters. Of these, 17 reported removed, and 28 inactive. Of the 232 remaining filters, 48 were installed in 1975, 59 were installed before 1987 (20 years old), and only 31 were less than 5 years old.

1/24/96 - Glovebox pressure is lower than normal and required personnel to leave the area.

6/24/96 - HEPA filters in Increment 1 failed test.

7/18/96 - LLNL is required by DOE to repackage approximately 400 pounds of excess plutonium. New canisters will have to be certified for up to 50 years. LLNL plans to begin repackaging its 300 to 400 canisters in late 1997. New canisters will not have plastic liner. One stainless-steel can will be vacuum sealed, welded shut and placed inside another can, also vacuum sealed and welded shut.

8/23/96 - Potential overmass of dispersible plutonium mass limit.

9/9/96 - HEPA filter report states that abnormal conditions such as fire, high wind, earthquake "may affect the HEPA filters" HEPA filters over 15 years old routinely failed when exposed to over-pressure situations. "Within B-332 there are many filters older that 5 years which have been in service from greater than 10 years."

10/30/96 - Report states that QA tests show vendor testing not adequate, failure rates of 5-10 %. The report noted that accidents within the DOE complex have "challenged HEPA filters" (1957, 1969, 1980). For example, after 15-19 years, the filter strength was degraded by 50 %. DOE facilities have filters in service for 10-20 years; LLNL had filters in-service for as long as 31 years. Additionally, the report pointed out that filters degrade from radiation absorption and that the fiberglass medium and metal borders may be weakened due to water. Testing of the sprinkler system could cause the fiberglass to degrade and the filter boxes made of plywood to warp. Leak tests at the facilities are done to assure proper installation and age-related problems, but do not indicate filter efficiency. Leak tests are done to assure proper installation and age related problems. Not indicative of filter efficiency. Beginning in 1992, over 5%of filters were rejected by QA (through 95). The report also stated that "DOE facilities routinely handled the oxide form of fissionable materials such as plutonium in respirable size particles. Our facility ventilation ducts contain plutonium in significant quantities."

Between 5/20/97 and 7/15/97, a workstation violated criticality controls at least 12 times. In October 1997, criticality safety controls were violated 12 times during activities relating to materials storage vaults. During December another criticality control was violated during re-packaging. In the course of investigating the cause of these violations, it was learned that 18 other infractions had been discovered. In general, operational procedures are designed to keep an activity sub-critical with an adequate margin of safety. In these cases, inadequate procedures and training were the major factors, as well as inadequate supervision. As a result of these safety

infractions, the DOE placed B-332 on standby in October 1997. It resumed operation in April 1998. The record of violations reveals systematic deficiencies in management and worker understanding and attitudes.

7/23/97 - Empty vials found to contain radioactive samples.

10/30/97 - Violation of criticality controls after two containers had been placed in storage locations with lower mass limits than in previous location.

12/97 - Violation of criticality controls while performing re-packaging at B-332.

5/21/98 - Investigation Report identifies that the 1997 criticality events were "symptomatic of ongoing poor work processes and practices in B-332, rather than an example of planned willful noncompliance with safety measures." It concluded that the repeated violations were in the areas of "personnel training and qualification, procedure compliance, and quality improvement." In an earlier letter from the Defense Nuclear Facilities Safety Board, the Chairman stated that the number of criticality infractions "raise questions as to whether DOE-OAK is staffed with the technical capabilities necessary to provide guidance" and "neither DOE-OAK nor LLNL management appears to recognize or fully appreciate all of the problems of hazardous work control".

8/7/98 - LLNL report to DOE confirms safety violation (administrative, personnel) occurred. Mass quantity of plutonium in glovebox is over limit (220 grams). 268 grams were stored in one glovebox.

3/12/99 - Memo from Argonne National Laboratory indicates that B-332 HEPA filters are "not" immune to the type of events that occurred at Rocky Flats. Recommends replacing all HEPA filters at B-332.

5/99 - LLNL In-place leak test for HEPA filters indicates that there are no regulations regarding service life of HEPA filters. A standard was established that replaces any filter that becomes wet; replace any filter that could be exposed to water five years from date of manufacture; and replace all filters within 10 years.

7/15/99 - Glovebox fire damper failed during routine maintenance.

7/20/99 - Combustible loading exceeded in laboratory room.

2/00 - LLNL received a bomb threat via phone against the plutonium processing facility at LLNL. The building was not evacuated per procedure. None of the security officers had either the training or the equipment to deal with a bomb threat.

1/02 - There is an allegation by security officers at LLNL that security officers are not trained for radiological emergencies and that they are ill-equipped and do not receive the same type of external radiation monitoring as do other LLNL employees. The security officers spent at least 20% (the minimum percentage to warrant monitoring of radiation exposure) of their time in the Radioactive Materials Areas (RMA), yet are not provided high quality dosimeters and not all are provided respiratory protection.

Table 1
Accidental Releases at LLNL

11/8/60 - A curium (Cm242) fire occurred in B-251, releasing several Curies. Some Pu238 may have been present.

1953 - 1962 - Radioactive liquid wastes, including plutonium, were disposed of in unlined pits in the Taxi Strip area (presently where Trailer 5475 is located).

1962 - 1976 - Radioactive liquid wastes, including plutonium, were treated in solar evaporation trays at the south end of the Taxi Strip, near B-531 and Trailer 5475.

3/26/63 - An explosion and fire involving enriched uranium resulted from a criticality accident at B-261. The explosion was equivalent to approximately 5.19 pounds of TNT. About 15 kg of uranium burned, and another 10 kg melted and was distributed on the floor. 2 No person received more than 120 mrem.3 Release of radioactivity was detected in two buildings that are 350 meters away. Approximately 900 Ci were released.

9/13/65 - A plutonium fire in B-332 started, involving about 100 grams of wet plutonium in the form of thin plating. A plastic bag containing the plutonium was left over the weekend and it ignited when the bag was handled on Monday. Alpha contamination in room was >106 dpm. Contamination in corridor was 10,000 dpm. It reportedly all contained within building. It took 2 1/2 months to cleanup.

4/20/67 - A spill of radioactive liquid containing plutonium outside B-332 in an outside storage area, resulting in levels between 10,000 and 160,000 dpm. A leaking transfer container caused the spill. It began to rain soon afterwards and there were problems containing the plutonium. After the incident, LLNL changed procedures so that TRU waste no longer stored outside B-332.

5/25/67 - 6/15/67 - Release of 32 mCi to sewer. In late May, monitors detected a permissible release to the sewer although it was 30 to 100 times normal. By early-June, LLNL increased monitoring frequency. On June 6, levels were approximately 1 to 2 thousand times normal. 7 It was estimated that sludge would contain 2-3 pCi/g of plutonium. In 1975, tests indicated that sludge contained 2.8 pCi/g of Pu239.

1973 - Unknown quantity of plutonium may have been released to soil during a 1973 transfer of dry materials from "solar evaporator". LLNL modified evaporation method to reduce wind dispersal.

1974 - LLNL samples around solar evaporation trays confirms that there were releases to the environment.

6/16/75 - An exothermic reaction sprayed contaminated liquids throughout a room in B-332. It was caused by improper addition of reactive chemicals. Decontamination took 3 weeks.8

4/8/80 - Burst glove box released 3 gm (0.26 Ci) outside B-332 because of "improperly installed HEPA filters." 9 Operations at B-332 stopped until similar glove boxes are inspected. Release not detected in offsite air monitors.

4/16/80 - Flash fire in glove box caused pressure to blow the window out. Plutonium escaped to room in B-332. Release was not detected in stack monitors. Caused by leaving ethanol in glovebox, which when heated volatized in the box and finally exploded.10

9/82 - 1983 - Pits at Taxi strip are excavated. 1500 cubic yards of radioactively contaminated soil is removed and disposed at Beatty Nevada. During excavation, rainfall was abnormally high, suggesting that some contaminated soil particles may have been carried away or dissolved and mixed with groundwater.

3/83 - Routine handling of drums at B-612 containing curium, americium, and plutonium spilled on to ground and contaminated at least one worker. Event was discovered day after it occurred because contaminated employee wore the same clothes to work that he had worn previous day. This suggests that some contamination was tracked off site by at least one employee (three were working on the drums when the spill occurred). Event involved a sequence of procedural and human errors. First, in 1980, the drums were mislabeled, which consequently resulted in their being placed outdoors for three years. Second, in 1983 workers mishandled the drums, which was a violation of safety procedures (i.e., the appearance of leakage did not cause employees to monitor what was leaking). Third, there was a violation of procedures preventing egress from the waste storage area.

2/86 - Two workers received internal dose of 1-rem each because of breach in glovebox. This dose was the "allowable" dose over a 50-year period. No respirators were worn. Caused by degradation of gloves.

5/87 - LLNL releases approximately 1 mCi of Pu239 to sanitary sewer.

1990 - DOE inspection team states that LLNL had not investigated or evaluated the cause of measurable off-site plutonium contamination as determined by high-volume air particulate samples collected during 1988. Since there was no detectable plutonium in the stack monitors, the source was unknown, but could have been due to wind-blown soil contamination originating from on-site source area.

6/28/91 - X-ray exposure to worker's hand when worker intentionally bypassed safety interlocks in order to x-ray plutonium part. Exposure of 233 mrem.

7/9/91 - Monitoring indicates statistically significant increase in plutonium discharge too sanitary sewer. Average went from 0.21 Ci per month during first 7 months of 1990 to 1.25 Ci per month from 8/90 through 5/91. Later report indicates that this increase was probably due to sewer cleaning activities.

10/24/91 - Double bag of plutonium powder tore and was spread on floor. Worker received small amount in nasal passage.

10/5/92 - While working in glovebox at B-251, worker punctures glove and thumb with curium-244 contaminated material. Receives estimated dose of no greater than 10 rem.

10/29/92 - Two workers contaminated after can of plutonium oxide is placed in bag. No inhalation occurred.

In 1994, EPA discovers plutonium in three city parks that are above background. The highest levels occur in Big Trees Park, which is adjacent to Arroyo Seco Elementary School. This park is approximately one-half mile from the LLNL boundary.

2/7/96 - DOE reported that LLNL couldn't account for 5.5 kilograms (12 pounds) of plutonium in its stockpile. This could be attributed to releases to the environment, quantities that remain bound in the ventilation and sewer systems, theft, or incorrect weighing of the plutonium. There has been no further explanation.

8/5/96 - Several basement ducts reported contaminated.

12/26/96 - Worker's hand is contaminated with radioactive material.

2/3/97 - Worker's hand is punctured during glovebox operation.

2/7/97 - Complete HEPA filter failure at B-321, releasing depleted uranium.

7/2/97 - Personnel contaminated after shredding a HEPA filter at B-513. The HEPA filter was contaminated with over 500 times the limit of curium. Five workers were exposed to doses 3 to 5 times regulatory limits. The DOE issued a Notice of Violation to LLNL, describing "numerous failures by your organization to implement established radiological protection requirements and quality controls necessary to protect workers. These failures occurred multiple times…"

12/11/97 - Some HEPA filters show leak rate of 0.04% as opposed to the standard of 0.03%. Filter gaskets could also be source of leaks.

-----Original Message-----
From: Janis Turner [mailto:jkturner2001@yahoo.com]
Sent: Wednesday, May 09, 2007 11:38 PM
To: Brinker, Samuel
Subject: BSL-3 Lab at Livermore

I oppose the bio- warfare research facility(BLS-3)at Lawrence Livermore main site because Livermore Lab sits within a 50 mile radius of 7 million people. This highly populated area is not an appropriate place to conduct experiments with some of the deadliest agents known to humans, especially since Livermore Lab is located near active earthquake faults; BSL-3 lab should not be operated in a sismically active area!
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10.302.01

May 11, 2007

VIA FACSIMILE, E-MAIL AND U.S. MAIL

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Re: Comments on Draft Revised Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Lawrence Livermore National Laboratory

Dear Mr. Brinker:

On behalf of Tri-Valley Communities Against a Radioactive Environment ("Tri-Valley CAREs"), and other concerned citizens, we submit the following comments on the Draft Revised Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Lawrence Livermore National Laboratory ("Revised EA"). The Revised EA contains major deficiencies, detailed below, that unless corrected, preclude its approval.

I. NEPA REQUIRES FULL AND FAIR ASSESSMENT OF ENVIRONMENTAL RISKS AND IMPACTS.

The National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321-4370f, establishes a "national policy [to] encourage productive and enjoyable harmony between man and his environment." *Department of Transportation v. Public Citizen*, 541 U.S. 752, 756 (2004) ("*Public Citizen*") (quoting 42 U.S.C. § 4321). Before taking actions that may have a significant impact on the human environment, NEPA requires federal agencies to prepare environmental impact statements ("EISs") that carefully consider the environmental impacts of proposed decisions and alternatives for reducing or avoiding those impacts. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989); 10 C.F.R. § 51.71(d). EISs must consider environmental impacts that are "reasonably foreseeable" and have "catastrophic consequences, even if their probability of occurrence is low." 40 C.F.R. § 1502.22(b)(1). Moreover, a "reasonably close causal connection" must exist between the proposed agency action and the environmental effects of concern. *Public Citizen*, 541 U.S. at 767 (quoting *Metropolitan Edison v. People Against Nuclear Energy*, 460 U.S. 766, 774 (1983)). That the likelihood of an impact may not be easily quantifiable is not an excuse for failing to address it in an EIS. The "mere assertion of unquantifiability" does not immunize an agency from consideration of environmental impacts under NEPA. *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719, 744 n. 31 (3d Cir. 1989).

Where it is not clear whether the impacts of a proposed action are significant, the agency may provide a more limited document, an environmental assessment ("EA"), that "[b]riefly

provide[s] sufficient evidence and analysis for determining whether to prepare an [EIS]." *Public Citizen*, 541 U.S. at 757 (quoting 40 C.F.R. § 1508.9(a)). If, after preparing an EA, the agency determines that an EIS is not required, it must issue a "finding of no significant impact" which states the reasons for the determination. *Id.* (quoting 40 C.F.R. §§ 1501.4(e), 1508.13).

In *San Luis Obispo Mothers for Peace v. Nuclear Regulatory Commission*, 449 F.3d 1016, 1035 (9th Cir. 2006) ("*Mothers for Peace*"), the Ninth Circuit Court of Appeals held that an Environmental Assessment that does not consider the possibility of a terrorist attack is inadequate. After considering the EA prepared for the Biosafety Level 3 ("BSL-3")Facility at Lawrence Livermore National Laboratory ("LLNL") in 2002, on October 16, 2006 the Ninth Circuit ruled the EA deficient. On October 30, 2006, the District Court remanded the matter to the Department of Energy ("DOE") to consider whether the threat of terrorist activity necessitates the preparation of an EIS. As shown below, DOE's Revised EA fails to provide the information NEPA requires.

II. THE REVISED EA DOES NOT ADEQUATELY ASSESS THE RISKS AND IMPACTS OF EARTHQUAKES AND TERRORISM.

Applying the foregoing legal standard for preparation of an EIS and the Ninth Circuit's ruling, it is clear the Revised EA does not meet the standard, and that the serious risks of harm posed by the BSL-3 project require preparation of an EIS. We discuss below the primary defects in the EA.

A. The EA's Assessment of the Risk and Impact of Seismic Failure is Deficient

The Revised EA does not address the deficiencies in its seismic analysis previously raised by Tri-Valley CAREs. Instead, it relies solely on DOE's 2005 Sitewide Environmental Impact Statement ("SWEIS") to quantify the seismic hazard at the Livermore site. Revised EA, p. 38. The 2005 SWEIS, however, understates this site's seismic risk. It claims that "the maximum horizontal peak ground accelerations at the Livermore Site for return periods of 500 and 1,000 years [are] 0.38 g, and 0.65 g, respectively." *Id.* The analysis contained in Appendix H to the SWEIS claims that the probability of exceeding an acceleration of 1.0 g at the LLNL site is only about one in 10,000 years (SWEIS Appendix H, Figure H-1). Both of these claims are mistaken. They ignore seismic maps developed by the U.S. Geological Survey ("U.S.G.S.") in 2003 that show a substantial likelihood of higher accelerations in the Livermore area. More importantly, they ignore more recent strong motion data collected by the U.S.G.S. in 2004 confirming that accelerations in excess of 1.3 g are foreseeable at this site.

The Livermore area has experienced major structural damage from recent earthquake activity. *See* Testimony of Robert R. Curry, Ph.D., filed herewith at ¶¶ 7-9. In 1980, a magnitude 5.9 earthquake struck the Livermore area. *Id.* This earthquake injured 44 people and caused several million dollars in property damage at the Lawrence Livermore Laboratory. *Id.* Damage at the Livermore Laboratory included fallen ceiling tiles, fallen bricks from chimneys, broken gas and water lines, broken windows, and displacement of mobile structures – such as the proposed BSL-3 facility – from supporting foundations. *Id.* Pavement on an overpass over Interstate 580 north of Livermore dropped one foot. *Id.* Surface rupture along the Greenville Fault was observed for a distance of 6 kilometers, or about 4 miles. *Id.*

A similar earthquake of magnitude 6.0 occurred on September 28, 2004 at 10:15 AM near Parkfield, California on the San Andreas Fault. Seismic energy from this earthquake was

recorded by strong-motion seismic array instruments placed by the U.S. Geological Survey and California Geological Survey. The new strong-motion U.S. Geological Survey data generated as a result of this earthquake indicate that a magnitude 6.0 event like this one can generate ground accelerations of up to 1.31 g (131 percent of gravity) as much as 12 kilometers from the source fault. *See* Goel & Chadwell, Preliminary Report on September 28, 2004 Parkfield Earthquake, available at http://www.eeri.org/lfe/pdf/usa_parkfield_goel.pdf, last accessed May 10, 2007 (Attachment 1 to Curry Testimony). The proposed BSL-3 facility is within 1 kilometer of the mapped traces of both the Las Positas and Greenville faults. As attested in the accompanying Testimony of Robert R. Curry, Ph.D., the Revised EA fails to address this new data and ignores the clear potential for a catastrophic failure of the BSL-3's containment system due to foreseeable seismic activity.

Although the Revised EA acknowledges that "a large earthquake on the Greenville Fault is projected to produce the maximum ground-shaking intensities in the Livermore area with intensity ranging from strong (MM VII) to very violent (MM X)" (Revised EA, p. 38), it fails to translate these intensities into the risk of an actual loss of bioagent containment. Consequently, the public is kept in the dark regarding the risk that a big quake could unleash deadly bioagents in a major metropolitan area.

Worse, the EA relies on obsolete assumptions regarding maximum ground accelerations that are included in DOE's 2002 SWEIS. *See*, SWEIS, pp. 4.8-14 – 4.8-17. These assumptions are refuted by recent scientific data. As Professor Curry has attested, this site is subject to quakes that could trigger an acceleration in excess of 1.3 g, causing major structural damage. Curry Testimony at ¶ 6.

The EA thus understates the potential harm from a quake. It states that the maximum damage from a quake is not expected to pose a hazard. Revised EA, p. 51. Instead, it assumes – contrary to the recent history of major quake damage in Livermore – that only "minor cracking" in the walls and ceiling of the building might occur. *Id.* These assumptions are directly contradicted by the strong motion data from the 2004 Parkfield quake and the 1980 Livermore quake, as Professor Curry explains. Accordingly, the EA should be withdrawn and an EIS prepared in light of the far greater seismic hazards posed at the BSL-3 site than are acknowledged in this deficient EA.

B. The EA's Assessment of the Risk and Impact of a Terrorist Attack is Deficient

The Revised EA assumes that all potential breaches of containment will be countered by extraordinary coincidental circumstances that completely extinguish the threat to human health. Although the EA includes a new discussion about the threat of terrorist activity ostensibly in response to the Ninth Circuit Court of Appeal's ruling, it never actually considers the *impact* of uncontained pathogens on the 10,000 workers at the Lab, nor on the millions of residents in the surrounding communities. This is because this EA continues to rely on the same obsolete and inapplicable bounding scenario as the previous, deficient EA – *a scenario that assumes all pathogens released would die before harming anyone*! Revised EA, pp. 57–66.

The Revised EA corrects none of the flaws that were present in the original EA. Like its predecessor, it fails to realistically and quantitatively address the threat of terrorism as required by NEPA. The Revised EA makes several untenable assumptions that are crucial to its conclusion that the possibility of environmental impacts due to terrorist attack is not sufficiently

high to warrant the preparation of an EIS. These assumptions, however, are not supported or justified by any apparent evidence, as we explain below.

1. *The EA unreasonably assumes "[i]t is probable that the organic biological material [released] would be destroyed by any resulting fire" in a loss-of-containment attack.* Revised EA, p. 59.

Although the Revised EA now admits that a terrorist might cause deliberate damage to the facility "with the *intention* of releasing small tube-stored samples or working cultures of pathogenic agents," it negates this acknowledgment by then assuming that a fire would break out (caused by a plane crash or explosive device) and destroy those pathogens. Revised EA, p. 59, emphasis added. This assumption ignores the fact that a terrorist intending to release and disperse pathogenic agents would strive *to preserve the released pathogens from incineration rather than destroy them in a fire*. DOE should therefore examine the risks posed by loss-of-containment attacks that are *not* accompanied by fire. Because such risks pose potentially catastrophic harm, they should be examined in an EIS.

2. *The EA unreasonably assumes that a breach of containment "is likely to rupture containers of disinfectant."* Revised EA, p. 59.

The Revised EA provides no support for its assumption that *a breach of containment "is likely to rupture containers of disinfectant."* Revised EA, p. 59 (emphasis added). The EA claims without explanation that a "[b]reach of containment *in the absence of an explosion* is likely to rupture containers of disinfectant." *Id.*, emphasis added. But the EA never explains how those containers will be ruptured in the *absence* of an explosion or other violent force. Contrary to this pivotal assumption, there is no reason to believe these containers would rupture and kill all the released bioagents. Even assuming contrary to common sense that some containers would rupture with or without an explosion, nowhere does the EA explain how the mere rupture of such containers would kill all bioagents that might be released, regardless of where, and under what wind, rain, and other environmental conditions, the bioagents were released.

3. *The EA assumes that a breach of containment will expose pathogens to "environmental factors" that will kill airborne microbes.* Revised EA, pp. 59-60.

The Revised EA speculates that "environmental factors *could* kill many airborne microbes *in their vegetative state*." Revised EA, p. 59, emphasis added. The Revised EA goes on to conclude that "[t]herefore, a terrorist act, such as a plane crash, would not be expected to result in a release of greater magnitude than from other catastrophic events already considered," or from natural events such as an infected ewe giving birth to a lamb. *Id.* at 60. But the release of potentially millions of lethal doses of Anthrax or other deadly bioagents hardly compares in magnitude to the birth of a sick ewe. The EA's attempt to trivialize the real threats to human health by comparing them to the rare, modest exposures that occasionally occur in the natural world hides the ball from the reader, frustrating NEPA's objectives of full and fair disclosure of the actual risk of environmental harm.

The EA provides no factual support for its extreme assumption that released microorganisms would be substantially reduced in number or lethality within minutes through the action of environmental factors. *Id.* The "comparison" that the EA presents between a "placenta from a ewe infected with *C. burnetii*" (which is presumably disposed of without becoming aerosolized, windborne or otherwise dispersed), and an *intentional* release of aerosolized organisms resulting from a terrorist act designed to cause maximal damage, masks rather than illuminates the magnitude of risk associated with a breach-of-containment attack, contrary to NEPA.

4. *The EA unreasonably assumes that diagnostic testing and medical treatment will be immediately available to those at risk.* Revised EA, p. 60.

The Revised EA assumes that individuals exposed to pathogens after a successful terrorist attack will be immediately identifiable and treatable for exposure to a known pathogen, within 24 hours and using available antibiotics. Revised EA, p. 60. The EA does not appear to consider the strong likelihood that a violent breach of containment will release multiple types of pathogens – since many different ones will be stored or in use – in unknown concentrations. The example provided by the EA assumes that exposed individuals will be immediately treated by a single vaccine and antibiotics known to be effective against a particular pathogen. *Id.* at 60. Since, as the EA later acknowledges, these pathogens "can be extremely difficult to detect and some may not cause illness immediately," this assumption is plainly unreasonable. *Id.* at 62. The EA also fails to consider the possibility that genetically engineered organisms used at the BSL-3, against which available antibiotics (and the environmental factors discussed on p. 59 of the Revised EA, as well) may be *ineffective*, will be released into the environment after a catastrophic breach.

In sum, the EA can point to no evidence in support of its assumption that a breach of containment will be mitigated to insignificance by the action of fire, disinfectant, environmental factors, specific vaccination of exposed individuals, or specific antibiotic therapy of exposed individuals. Since these mitigating assumptions are therefore unsupported, it follows that the potential risks to human health and safety are at best unknown and at worst, severe. Accordingly, an EIS must be prepared to address them.

5. *The EA unreasonably assumes that naturally-occurring pathogens and cultured or aerosolized pathogens are qualitatively equivalent for the purposes of terrorism.* Revised EA, pp. 60, 62-63.

The Revised EA claims that the pathogens studied in a typical BSL-3 facility "are already obtainable from the environment," such as the organisms responsible for Q fever, Valley fever, hantavirus, plague, rabbit fever and anthrax. Revised EA, pp. 62-63. It goes on to conclude that because "a knowledgeable terrorist" could conceivably collect these organisms from the environment, the pathogens "are *just* as accessible" to a terrorist as to a legitimate researcher, and therefore "the facility is not considered an attractive target for an outside terrorist." *Id.* at 63, emphasis added.

This conclusion is contrary to common sense in several respects. First, it ignores the obvious fact that *none* of these bioagents are readily available for collection in the environment. Specialized knowledge, skills and equipment are required to find, identify, collect, concentrate, culture, store and transport these bioagents. That, indeed, is the whole reason why the Department of Energy is spending millions of dollars to operate these facilities. It strains the bounds of credulity to assume that the extreme security measures described in detail on pages 60-62 of the Revised EA are necessary to protect the public from agents that are no more dangerous than those readily and "already obtainable from the environment." *Id.* at 62.

Second, it ignores the obvious fact that a terrorist is far more likely to find attractive, and attack, a facility containing ready-made collected, isolated, cultured, concentrated and aerosolized pathogens than to attempt to find, collect and culture his own pathogens using more limited knowledge, technology and time. If terrorists had their own laboratories to stockpile these bioagents, then perhaps the EA would have a point. But there is no evidence that terrorists have such facilities.

Third, the EA ignores the risk posed by knowledgeable terrorists who may possess technical knowledge, but lack the technology required to aerosolize these pathogens or otherwise convert them into a highly-infectious form. These terrorists would obviously prefer to attack a facility that already has converted such bioagents to these dangerous forms.

6. *The EA unreasonably assumes that covertly stolen pathogenic material will not be in a readily-usable form.* Revised EA, pp. 63-64.

The Revised EA concludes that five crucial steps must be accomplished before a stolen bioagent could cause significant harm, and that this technological barrier mitigates the risk posed by theft. *Id.* at 63. This conclusion fails because its underlying assumptions are devoid of factual support. The EA assumes that the amount stolen will be small, and that the bioagent will not be in a readily-dispersible form. There is no support in the EA for the assumption that a failure of the BSL-3's security systems will permit the theft of a small amount of non-dispersible pathogen, but *not* the theft of a large amount of ready-to-use pathogen.

To the contrary, it is a well documented fact that "a dispersible form of *B. anthracis* was distributed through the U.S. Postal Service in 2001," *infecting 22 people and killing 5*. *Id.* at 64. It is undisputed that "dramatic human health impacts and economic disruption can result following the release of pathogenic materials." *Id.* Yet the EA refuses to quantify or analyze these impacts in any detail. *Id.* Although it outlines some measures designed to respond to another postal anthrax attack, and mentions the BioWatch program in major cities, it does not present any evidence that these measures will be effective against a range of bioterrorist attack strategies, much less that they will be employed and effective at this facility. *Id.* Consequently, there is no support for the EA's claim that stolen bioagents will not pose a serious risk to human health and safety.

III. CONCLUSION

The Revised EA is deficient. It does not address and rectify the numerous deficiencies identified by Tri-Valley CAREs in response to the original, 2002 EA. These defects are catalogued in the attached declarations that Tri-Valley CAREs previously served on DOE during the judicial proceedings that resulted in the Ninth Circuit's Order. These errors and omissions cry out for correction. Further, as discussed above, the revised EA fails to adequately assess the risks and impacts of seismic failure and terrorist attack.

First, it fails to address new seismic information, including the 2003 U.S.G.S. seismic risk maps of the area, and the 2004 U.S.G.S. strong motion data for the Parkfield quake confirming that a magnitude 6.0 quake could cause accelerations of 1.3 g at this site. This omitted data and analysis is essential to informed public review. Seismic shaking of this magnitude could cause severe structural damage, destroying the BSL-3 facility's containment of bioagents. This potential for significant environmental harm requires preparation of an EIS.

Second, the EA fails to provide an adequate assessment of the risks and impacts of a terrorist attack. Its rosy predictions rest on unsubstantiated assumptions. Its conclusion that "the probability of a successful terrorist attack at the LLNL BSL-3 facility has been minimized to an extent commensurate with the potential threat" is not credible for several reasons. *Id.* at 65. It relies on the assumptions, devoid of support by any evidence, that "[a] direct assault on the facility is highly unlikely to succeed," "the risk of an outside terrorist acquiring pathogenic material is not significantly increased by having pathogenic material at LLNL," and "this scenario is not expected to occur at LLNL." *Id.* at 65-66. Because the Revised EA does not demonstrate that the risk of terrorist attack and the ensuing adverse environmental consequences are insignificant, an EIS should be prepared that evaluates and addresses this risk with the scientific accuracy and objectivity NEPA demands.

Very truly yours,

STEPHAN C. VOLKER
Attorney for Tri-Valley CAREs, et al.

SCV:taf

Attachments:
1. Testimony of Robert Curry, Ph.D. Regarding the Revised LLNL BSL-3 EA's Deficient Seismic Analysis
2. Declaration of Marylia Kelley in Support of Plaintiffs' Motion for Summary Judgement dated February 12, 2004

3. Declaration of James J. Coghlan in Support of Plaintiffs' Motion for Summary Judgment dated February 12, 2004

4. Declaration of Robert R. Curry, Ph.D. in Support of Plaintiffs' Motion for Summary Judgment dated February 18, 2004

5. Declaration of Marion M. Fulk in Support of Plaintiffs' Motion for Summary Judgment dated February 10, 2004

6. Declaration of Matthew G. McKinzie, Ph.D. in Support of Plaintiffs' Motion for Summary Judgement dated February 11, 2004

7. Declaration of Peter Strauss in Support of Plaintiffs' Motion for Summary Judgment dated February 10, 2004

8. Declaration of William Scott Ritter, Jr. in Support of Plaintiffs' Motion for Summary Judgment dated February 12, 2004

9. Declaration of Dr. Mark Wheelis in Support of Plaintiffs' Motion for Summary Judgment dated February 12, 2004

8. Declaration of Mathew J. Zipoli in Support of Plaintiffs' Motion for Summary Judgment dated February 10, 2004

10. Declaration of Peter H. Stockton in Support of Plaintiffs' Motion for Summary Judgment dated February 10, 2004

11. Declaration of Edward Hammond in Support of Plaintiffs' Motion for Summary Judgement dated February 12, 2004

12. Declaration of Terrell Watt in Support of Plaintiffs' Motion for Summary Judgment dated February 12, 2004

13. Declaration of Dr. Susan Wright dated October 22, 2003

14. Declaration of Marylia Kelley in Support of Plaintiffs' Consolidated Opposition and Reply to Defendants' Cross Motion for Summary Judgment dated April 14, 2004

15. Declaration of Mathew J. Zipoli in Opposition to Defendants' Motion to Strike dated April 17, 2004

16. Declaration of Edward Hammond in Opposition to Defendants' Motion to Strike dated April 20, 2004

17. Declaration of Marylia Kelley in Opposition to Defendants' Motion to Strike dated April 20, 2004

18. Declaration of Peter D.H. Stockton in Opposition to Defendants' Motion to Strike dated April 20, 2004

18. Declaration of Matthew G. McKinzie, Ph.D. in Opposition to Defendants' Motion to Strike dated April 20, 2004

19. Declaration of Marion M. Fulk in Opposition to Defendants' Motion to Strike dated April 19, 2004

20. Declaration of William Scott Ritter, Jr. in Opposition to Defendants' Motion to Strike dated April 20, 2004

21. Declaration of Susan Wright, Ph.D. in Opposition to Defendants' Motion to Strike dated April 20, 2004

22. Corrected Declaration of Mark Wheelis, Ph.D. in Opposition to Defendants' Motion to Strike dated April 21, 2004

23. Reply Declaration of Marion Fulk dated June 21, 2004

24. Reply Declaration of Matthew McKinzie, Ph.D. dated June 21, 2004

25. Reply Declaration of Mathew Zipoli dated June 14, 2004

26. Reply Declaration of Robert R. Curry, Ph.D. dated June 29, 2004

27. Declaration of Robert R. Curry, Ph.D. in Support of Appellants' Urgent Motion for Stay Pending Appeal

-----Original Message-----
From: Elizabeth West [mailto:ewest@cybermesa.com]
Sent: Thursday, May 10, 2007 9:57 PM
To: Brinker, Samuel
Subject: oppose BSL-3 at LLNL

I add my voice to those who have already spoken up about opposing the bio-warfare research facility at Lawrence Livermore National Labs. So many of us when we learn about this are somewhat confounded by the tragedy of this sort of work. Not good work in a tricky place. Don't, please.
Do you have any friends who you are talking with who oppose BSL-3 at LLNL? Would it be too much trouble to respond to me?
Thank you.
Elizabeth West
<ewest@cybermesa.com>

Dr. Mark Wheelis
Section of Microbiology/CBS
University of California
1 Shields Avenue
Davis, CA 95616

May 11, 2007

Comment on the Revised Environmental Assessment for the BSL-3 Laboratory at Lawrence Livermore National Lab

Livermore Lab's proposed BSL-3 is not an ordinary BSL-3 for a number of reasons and the proliferation risks associated with this project must be carefully examined in a National Environmental Policy Act (NEPA) document. According to the revised EA, experiments performed in this laboratory would include aerosol transmission of extremely virulent and potentially lethal biological agents. The fact that this research will take place at Lawrence Livermore National Laboratory (LLNL), one of two primary nuclear weapons design and development laboratories in the country, heightens the proliferation risk significantly. Moreover, this proliferation risk goes hand in hand with a greater security risk and both increase the potential harm to the environment and the public.

Proliferation Risk

Because of the increased potential for environmental harm due to proliferation and security risks, I strongly recommend that the DOE prepare a Programmatic Environmental Impact Statement (PEIS) for all of the biodefense laboratories that are planned for DOE facilities (including the laboratory planned for Los Alamos National Lab) and a Nonproliferation Impact Review, in addition to a site-specific Environment Impact Statement (EIS) at LLNL and LANL.

If DOE conducts a programmatic review and more thorough site specific reviews, DOE will then be in a legally defensible position to defend its alleged purpose and need for DOE high-level biodefense programs. This will mean that proactive plans to protect the environment, public safety and national security will be developed in advance rather than in response to a problem, accident, crisis or catastrophe.

The Department of Energy (DOE) has set an important precedent by conducting a PEIS that includes a Nonproliferation Impact Review (NIR) for the Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility in December 2000, and Stockpile Stewardship and Management in September 1996. Similarly, the Energy Department's CBNP, in my opinion, necessitates an equally comprehensive review.

I highly recommend that the Nonproliferation Impact Review be conducted as a part of the NEPA process that includes public participation in the scoping and a draft document circulated for public comment. This open process is critical because intent really is the biggest differentiating factor between defensive and offensive biological research. The participation of individual citizens who live near the proposed facility and have personal concerns such as health and property values, as well as representatives from professional and nonprofit groups who specialize in public health, emergency response, sewage treatment, landfills, water, environment, science, medicine and arms control may identify unforeseen problems, more cost-effective solutions and new ways to open up the process while maintaining necessary security. This scrutiny and public debate can only improve the quality of the decision and will likely result in more confidence in the final decision on the part of those most directly impacted.

The mere fact that the US is a signatory to the Biological Weapons Convention (BWC), and has agreed that this nation shall not perform the actual development and production of bioweapons does not provide adequate reassurance that the laboratory will not conduct offensive biological weapons work. **There is no clear dividing line between defensive and offensive research.** Further the treaty is flawed and unverifiable. When the parties attempted to include a verification regime in the treaty, U.S. Ambassador Donald Mahley withdrew U.S. support from the treaty. Please analyze the impact of the unpopular U.S. withdrawal from negotiations on a verification protocol and include a discussion of transparency measures to avoid the perception that the treaty is not being honored at this BSL-3.

There is a lot of suspicion of US intentions due to recent controversies as well. In fall 2001 it was revealed that the CIA built and tested a cluster munitions, modeled on a Soviet bioweapon, to spread biological agents. In addition, the investigation into the anthrax letter attacks revealed that the United States had an ongoing program to produce dried, weaponized anthrax spores for defensive testing. How much was made is unclear, but multiple production runs were apparently conducted over many years, and total production must have been in the 10s or 100s of grams of dried anthrax spores. Since a single gram of anthrax spores contains millions of lethal doses, the quantities produced seem unjustifiable for peaceful purposes under the bioweapons treaty. Whether excess spores were stockpiled or destroyed—or whether they can even be adequately accounted for—is unknown. Several other programs of dubious legality under the BWC were also revealed.

In view of the U.S. retreat from the BWC verification protocol negotiations, the resurgence in classified biodefense work, including at the DOE, and the activities mentioned above that appear to contravene the BWC, this rationale offered about why offensive weapons work would not be conducted at the laboratory needs more explanation. Again, these points raise issues that only a PEIS and Nonproliferation Impact Review would help to answer.

Further, a National Academy of Sciences panel noted that there are certain areas of research in the biological sciences that are so extraordinarily dangerous as to justify the establishment of a new mechanism for review and approval of experimentation and publication in those areas. "The potential threat from the misuse of current and future biological research is a challenge to which policymakers and the scientific community must respond," the Panel report stated. At this time, when this distinguished panel is proposing a process to balance rational security interests with the benefits of open scientific inquiry it is premature to be proposing biodefense research in such a provocative setting, as the DOE laboratories. At a minimum this question should be asked and answered in a PEIS and Nonproliferation Impact Review before actions are taken that could raise suspicions about the United States intent in locating biodefense facilities at the U.S. nuclear laboratories or, on the other hand, stifle the kind of open scientific inquiry integral to research.

This issue of openness and transparency is compounded at the DOE nuclear laboratories because of the secrecy and many levels of classification. A national complex of weapon design, development, testing and production facilities have a different emphasis and parameters than those of civilian or academic institutions when it comes to secrecy. The variation between the level of openness, transparency and public accountability possible for the DOE nuclear complex compared to an academic or public health institution has not been assessed. This is another reason why an adequate review process and Nonproliferation Impact Review is necessary.

The U.S. Nuclear Posture Review (NPR) submitted to Congress on January 8, 2002 caused a shift in U.S. nuclear weapons policy from a policy moored in a defensive posture to one that incorporates an offensive planning basis. The administration's new policies abandon the concept that nuclear weapons are instruments of last resort. Instead, they integrate plans for the use of nuclear weapons with conventional weapons, thereby opening the way for the United States to use nuclear weapons for a variety of purposes against any enemy. The NPR gives a number of specific circumstances in which the U.S. might use nuclear weapons. These circumstances all appear to sanction the use of nuclear weapons by the U.S. in situations that do not involve prior use of nuclear weapons by an enemy."

This shift in U.S. nuclear policy towards pre-emption versus deterrence and the offensive work being conducted by Lawrence Livermore and Los Alamos nuclear weapons laboratories to upgrade current nuclear weapons to enhance the earth penetrating capability makes DOE assertions about the purely defensive nature of its biodefense work suspect. The offensive nuclear design work at the weapons laboratories makes this location for biodefense work provocative and creates a greater proliferation risk.

Security Risk

The co-location of biological warfare agent facilities at nuclear weapons design and development laboratories, already on the FBI list of terrorist targets, make them even

more attractive targets. The threat of theft or sabotage either on site or in route to the facility is now magnified. Biological agents, unlike fissile materials and nuclear weapons, are more easily concealed and take fewer resources to produce. If these biowarfare agent facilities are established more people will have access to these agents and skills in their production and development.

The proposed DOE high-level Biosafety level-3 facilities are by definition permitted to aerosolize biological warfare agents, such as live anthrax. A major accident at one of these facilities could affect thousands of people. A recent test by Alameda County public health officials simulating two to three ounces of well dispersed, weapons-grade anthrax left 9000 people dead, in spite of their 300-page bioterrorism plan.

Work on a wide range of possible biological warfare agents to prepare for possible biological attacks, rapid advances in genetics, and genetic engineering practices at the DOE facilities, will likely result in the production of novel biological agents to which we have no experience controlling. The impacts of the release of genetically modified biowarfare agents due to leaks, spills, accidents remains highly uncertain.

The risk of the development of offensive bioagents and technologies in order to test defensive measures could result in theft of dangerous materials and technologies. Furthermore, the secrecy required by such a program, particularly those located at DOE weapons laboratories is antithetical to the transparency on which long-term bioweapons control must be founded. A world in which a leading nation is perceived to be secretly exploring the offensive military applications of biotech would be ripe for proliferation. If a country doesn't know its enemy's offensive capabilities, military strategists must assume the worst—that the enemy possesses or is developing bioweapons. This will provoke the development of bioweapons for a retaliatory or deterrent capability. And once bioweapons are established in military arsenals and in planning, past experience demonstrates that they become legitimate for military use.

With the proposed expansion of high level biodefense facilities into the Department of Energy without public hearings and a thorough review process we can not be sure that the DOE is prepared to handle these new high level biodefense responsibilities. Without this preparatory work and planning, will the integration of roles and coordination between agencies be clear? Will there be an increased risk of environmental releases, worker exposure, illness and even death, inadequate bioagent accounting, packaging, storage, transportation, handling and emergency response?

In the absence of adequate review, analysis and public scrutiny normally afforded such a potentially harmful enterprise, there is a more likely probability of frequent, complex, systemic problems and catastrophic accidents. Public hearings, a PEIS that includes a Nonproliferation Impact Review and a site specific EIS at LLNL and LANL must determine the full scope of the DOE biological defense program. These reviews must develop, with maximum public input, a clear philosophy by which to guide these programs; establish effective ongoing oversight mechanisms; and promote as much transparency in biodefense as possible.

Sincerely,

Dr. Mark Wheelis

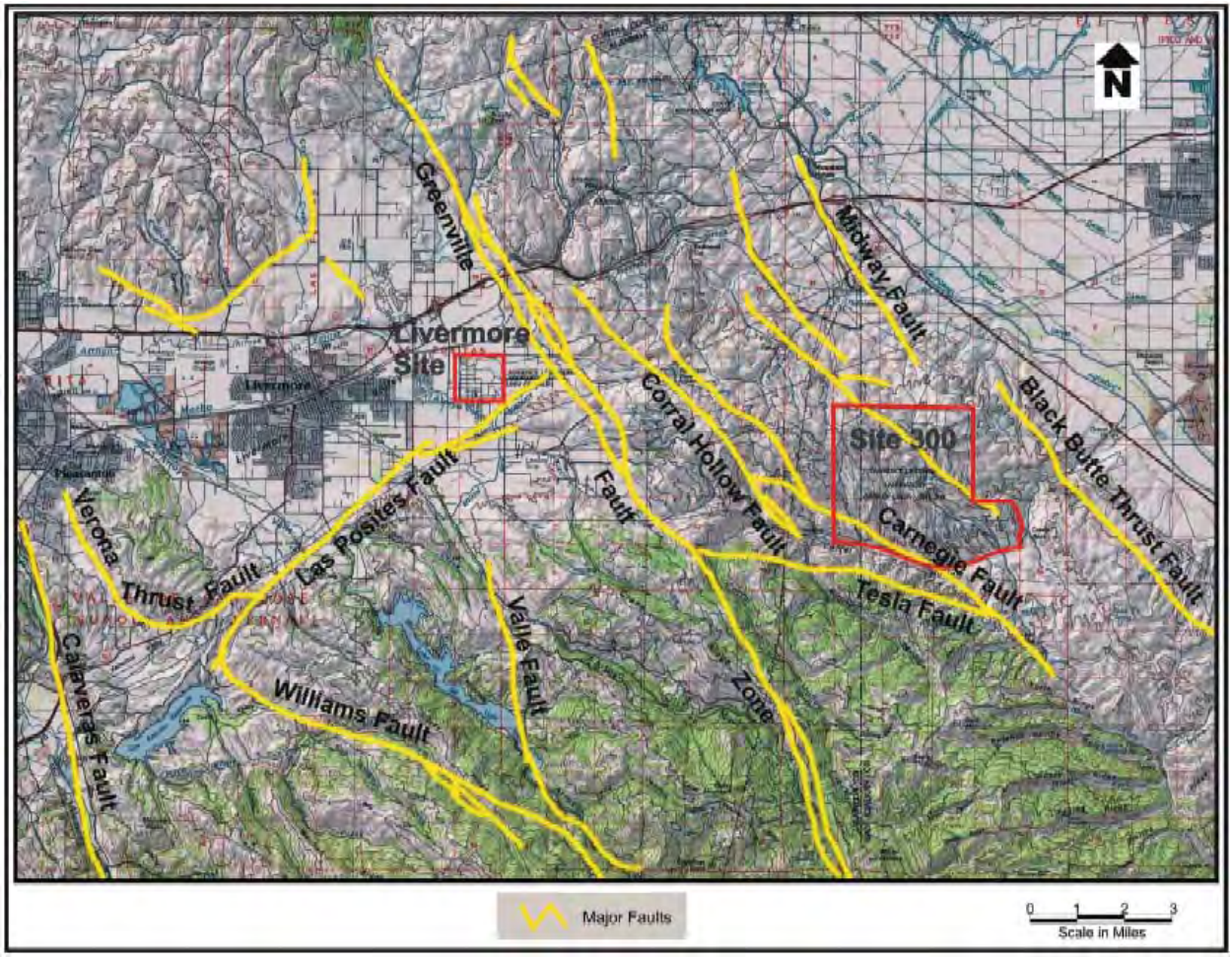

Figure 3-3. Map showing major faults in the Livermore region (DOE 2005)