

## DESIGNING BIORISK OVERSIGHT: APPLYING DESIGN SCIENCE RESEARCH TO BIOSAFETY AND BIOSECURITY

By

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of  
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Date: \_\_\_\_\_ Spring Semester 2016  
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Designing Biorisk Oversight: Applying Design Science Research to Biosafety and Biosecurity

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## **DEDICATION**

This research is dedicated to the memory of Dr. Frances V. Harbour, who kept me on path after completing my doctoral coursework through her reminders to “keep going”.

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## LIST OF ABBREVIATIONS

American Biological Safety Association .....	ABSA
Alternate Responsible Official .....	ARO
American Society for Microbiology .....	ASM
Biosafety in Microbiological and Biomedical Laboratories .....	BMBL
Biological Select Agents and Toxins .....	BSAT
Biorisk Oversight Challenge .....	BOVC
Biorisk Oversight Layer.....	BOVL
Biorisk Oversight BSL .....	BOBSL
Biorisk Oversight Patchwork Map .....	BOPM
Biosecurity Trend .....	BT
Bioterrorism Risk Assessment Group .....	BRAG
Biological Select Agents and Toxins .....	BSAT
Biosafety Level .....	BSL
Biosafety Officer .....	BSO
Center for Disease Control and Prevention .....	CDC
Certificate of Registration .....	COR
Commercial Driver License .....	CDL
CDL-Hazardous Materials Endorsement .....	CDL-HME
Department of Defense .....	DOD
Department of Homeland Security .....	DHS
Design Science Research .....	DSR
Design Science Research for Information Systems .....	DSR-IS
Dual-Use Research for Concern .....	DURC
Dual-Use Research Oversight .....	DURO
Entity Relationship .....	ER
Federal Bureau of Investigation .....	FBI
FBI-Criminal Justice Information Services .....	FBI-CJIS
Federal Select Agent Program .....	FSAP
Gain of Function .....	GOF
Institutional Biosafety Committee.....	IBC
Institutional Review Board .....	IRB
Institutional Review Entity .....	IRE
Laboratory Response Network.....	LRN
National Institutes of Health .....	NIH
NIH-Office of Biotechnology Activities .....	NIH-OBA
National Pathogen Inventory .....	NPI

National Science Advisory Board for Biosecurity .....	NSABB
Pipeline and Hazardous Materials Safety Administration.....	PHMSA
Principal Investigator.....	PI
Personnel Reliability Program .....	PRP
Responsible Official .....	RO
Recombinant DNA .....	rDNA
rDNA Advisory Committee .....	RAC
Select Agent Regulations.....	SAR
Select Agent and Toxin List.....	SATL
Structured Query Language .....	SQL
Security Risk Assessment.....	SRA
Unified Markup Language .....	UML
U.S. Department of Agriculture .....	USDA
USDA-Food Safety and Inspection Service .....	USDA-FSIS
USDA-Animal and Plant Health Inspection Service.....	USDA-APHIS
USDA-Agricultural Research Service.....	USDA-ARS
World Health Organization.....	WHO

## **ABSTRACT**

### **DESIGNING BIORISK OVERSIGHT: APPLYING DESIGN SCIENCE RESEARCH TO BIOSAFETY AND BIOSECURITY**

### **DESIGNING BIORISK OVERSIGHT: APPLYING DESIGN SCIENCE RESEARCH TO BIOSAFETY AND BIOSECURITY**

Jonathan S. Gines, Ph.D.

George Mason University, 2016

Dissertation Director: Dr. Gregory Koblenz

Biorisk management establishes the practices, procedures, system processes, and policies to manage laboratory biorisks, which are vital in the daily operations of research institutions involving biological materials, technologies, and scientific information.

Biorisk oversight is the core function within biorisk management that continuously monitors those processes, procedures, system processes and polices to grade whether or not research institutions and laboratories are compliant. Biorisk incidents since the 2001 anthrax letter cases have spawned diverse proposals, suggestions, and recommendations to expand oversight. Policy recommendations to strengthen biorisk oversight requires the scientific and security communities to understand the entity interrelationships associated with biosafety and biosecurity, what data is collected, and the shared oversight responsibilities between federal agencies and research institutions. Unlike past biodefense studies, this dissertation adopts the design science research for information

systems (DSR-IS) engineering framework to produce visual artifacts that examine the entity interrelationships explaining the research, security, and oversight resources involved with biorisk oversight.

Biorisk is the emerging concept associated with research institutions and microbiological laboratory settings that link the terms biological safety (biosafety) and biological security (biosecurity) to encompass the potential risks associated with the outcomes of laboratory, biological, and infectious agent hazards. The DSR-IS artifacts created to model biorisks were simplified to visualize the entity interrelationships not consistently understood by the scientific, security, and regulatory communities to architect a notional biorisk oversight BSL Registry, suggest a biorisk oversight patchwork map, and formulate recommendations that not only improve oversight, but also augmenting the features of the DSR-IS artifacts afforded. A gap analysis between sample U.S. Biological Weapons Convention – Confidence Building Measure (BWC-CBM) reports from 2011-2013 and the DSR-IS artifacts was conducted to test the DSR-IS artifacts, which established relevant biorisk oversight elements, such as shared entities, time-based metrics, and oversight mapping between compliance and inspections objectives as concrete prerequisites to implement past USG recommendations.

## **CHAPTER 1. INTRODUCTION**

The complexity of biorisk oversight is recognized by the research question, which attempts to visually decipher the relevant federal regulations and policies, and roles of federal agencies and research institution entities to conceptualize the notification schemes and processes explaining the intricate interactions of shared oversight. Biorisk incidents since the 2001 anthrax letter cases have spawned diverse proposals, suggestions, and recommendations to expand oversight. Policy recommendations to strengthen biorisk oversight requires the scientific and security communities to understand the entity interrelationships associated with biosafety and biosecurity, what data is collected, and the shared oversight responsibilities between federal agencies and research institutions. Unlike past biodefense studies, the dissertation contributes by adopting an engineering framework, specifically design science research for information systems (DSR-IS) to produce visual artifacts that examine the entity interrelationships explaining the research, security, and resources involved with biorisk oversight. Chapter one discusses the aggregate biorisks before and after 9/11, and the post-9/11 biodefense funding boom that sparked the expansion of high biological containment laboratories comprised of biosafety level three and four (BSL-3 and BSL-4) laboratories. The proliferation of BSL-3 AND BSL-4 laboratories raised concerns of the implied increases of biorisks, which subsequently defined the concepts of biosafety and laboratory biosecurity. The

remainder of Chapter one reviews the definitions the biorisk domains, the relevant federal policies and guidelines, and example case studies. Finally, Chapter one closes by examining gaps resulting from current biorisk oversight challenges, and how evolving biosecurity trends may exacerbate shared oversight between Federal agencies and individual research institutions. These observations not only drew attention to the biorisk concept, but also raised awareness of the interrelated biosecurity trends describing how advances in science and technology, globalization, and the changing nature of conflict that increase the risks posed by biological threats.<sup>1</sup>

## **1.1 Research Question and Significance of the Study**

The dissertation poses the research question about federal biorisk oversight, “**How do the interrelationships between the problem domains of biosafety and biosecurity affect oversight of biorisks?**” and adopted the design science research (DSR) for information systems (DSR-IS) to conduct the investigation. DSR-IS is an external framework that promotes the development of artifacts, such as the visual models to educate stakeholders understand the complexities of biorisk oversight. The DSR-IS approach is guided by the supporting questions below to answer the research question:

1. “What are the unique and non-unique entities (i.e., persons, objects, places, or events), and their attributes (i.e., characteristics or properties) within the problem domains of biosafety and biosecurity?”
2. “What are the relationships among entities and their attributes between the problem domains of biosafety and biosecurity?”

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<sup>1</sup> Gregory D. Koblentz. "Biosecurity Reconsidered: Calibrating Biological Threats and Responses." *International Security* 34, no. 4 (March 31, 2010): 96-132.

3. “What are the roles and responsibilities (i.e., the business rules) of the federal agencies in the problem domains of biosafety and biosecurity oversight?”
4. “What is the correspondence between the biorisk oversight model developed in supporting questions 1-2 and the oversight model in supporting question 3?”

### **1.1.1 Exclusion of DURC Analysis from Research Question**

The scope of the dissertation involved iterative analysis of the federal regulations and policies addressing biorisks to identify oversight gaps, and confirm if the entity interrelationships and processes further exacerbate oversight gaps identified. Although dual-use research oversight (DURSO) is associated with biorisk oversight and biosecurity, the dual-use dilemma concept directly linked to dual-use research of concern (DURC) experiments are fraught with competing interests between the life sciences and national security communities. Unlike laboratory safety and security, the dual-use dilemma concept is specific to DURC experiments, and remains a controversial topic between the federal security and life science research communities.

The U.S. government (USG) formally defined DURC experiments in federal policies 2012 and 2014 as “life sciences research that, based on current understanding, can be reasonably anticipated to provide knowledge, information, products, or technologies that could be directly misapplied to pose a significant threat with broad potential consequences to public health and safety, agricultural crops and other plants,

animals, the environment, materiel, or national security.”<sup>2</sup> The recent release of USG DURC policies would not afford ample data, and was confirmed where the 2014 DURC policy imposed research institutions to create DURC guides and review plans effective September 2015. As more research institutions comply with the USG DURC 2014 policy by creating specified DURC guides and review processes, future studies adopting the DSR-IS to examine the distinct organizational structures of individual research institutions and their roles within DURO should be considered. While the dissertation neither analyzed policy gaps in USG DURC policies nor formulated recommendations to deconflict the security needs of federal oversight over the potential advancements from DURC experiments, brief overviews of the dual-use dilemma concept and the USG 2012 and 2014 DURC policies will be introduced.

### **1.1.2 Significance of the Study – DSR-IS to Model Examine Biorisk Oversight**

This study contributes by examining the interrelationships between research institutions and federal agencies to understand why there are gaps in national biorisk oversight. Proposed recommendations are limited by non-concrete guidance and requirements as opposed to the granular technical details to formulate the implementation plans needed by research and operations staff. This dissertation clarifies the intricacies of biorisk management and oversight, and promotes graphical models reflecting the entities

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<sup>2</sup> U.S. Department of Health and Human Services. National Institutes of Health. *United States Government Policy for Oversight of Life Sciences Dual Use Research of Concern*. Available online at: <http://www.phe.gov/s3/dualuse/Documents/us-policy-durc-032812.pdf>; U.S. Department of Health and Human Services. National Institutes of Health. *United States Government Policy for Institutional Oversight of Life Sciences Dual Use Research of Concern*. Available online at: <http://www.phe.gov/s3/dualuse/Documents/durc-policy.pdf>

and corresponding interrelationships to make clear the dynamic interactions of federal agency and research institution actors through visualization. Biorisk is associated with research institutions and microbiological laboratory settings that link the terms biological safety (biosafety) and biological security (biosecurity) as a single term. The biorisk concept encompasses the potential biosafety and biosecurity risks associated with the outcomes of laboratory, biological, and infectious agent hazards. Biorisk management establishes the practices, procedures, system processes, and policies to manage laboratory biorisks that are vital in the operations of research institutions involving biological materials, technologies, and scientific information. Biorisk oversight is the specialized function within biorisk management that continuously monitors those processes, procedures, system processes and polices to grade whether or not research institutions and laboratories are compliant. This dissertation draws attention to biorisk oversight by examining the entities involved with biorisk management to identify oversight gaps.

Understanding these biorisks and biorisk management entities, which are persons, places, objects, and events afforded the specialized knowledge to empower policymakers and regulatory agencies to critically examine and identify hurdles from proposed oversight recommendations. For example, proposed national licensure or accreditation of life science research programs, such as the Biological Research Security System (BRSS), imposed requirements for all USG and privately funded research facilities.<sup>3</sup> The idea of

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<sup>3</sup> Harris, Elisa D. "Dual Use Biotechnology Research: The Case for Protective Oversight." In *A Web of Prevention: Biological Weapons, Life Sciences and the Governance of Research*. London: Routledge, 2007. 115-131.; Greenberger, Michael, Talley Kovacs, and Marita Mike. "Governance and Biosecurity: Strengthening Security and Oversight of the Nation's Biological Agent Laboratories." *DePaul*

the BRSS to require “all scientists, students and technical staff proposing to conduct research covered by the oversight system” as a national licensing scheme was sensible, but omits the concrete guidance to implement the underlying biorisk oversight BSL (BOBSL) Registry implied to correlate the licensing triad comprised of research programs, research institutions, and research staff.<sup>4</sup> Eventually, proposals asserting the legal requirement for all research institutions, federally funded or otherwise, to register with the USG unconditionally as part of a national licensing system implies having an operational BOBSL Registry aligned with shared biorisk oversight.<sup>5</sup>

The DSR-IS framework contributes by establishing specialized visual artifacts to analyze the focal research question. There are no published studies that applied external frameworks to produce meaningful visual models untangling the interrelationships that explain the complexities associated with biorisk oversight. Unlike past biodefense studies, visual artifacts are employed to formulate entity interrelationships aligned with biorisk oversight objectives, and empower general audiences to rapidly understand biorisk federal regulations, laboratory safety, laboratory security, and the *NIH Guidelines*. The shared responsibility of biorisk oversight is so divided among federal agencies, research institutions, and across disciplinary boundaries that entities may fail to identify gaps or detect wasteful redundancies that are part of continuous oversight. Further

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*Journal of Health Care Law* 12, no. 2009-38 (2010): 77-101.; Report of the Trans-Federal Task Force on Optimizing Biosafety and Biocontainment Oversight (July 2009).

<sup>4</sup> Harris, 2007. "Dual Use Biotechnology Research: The Case for Protective Oversight.", 118-120.

<sup>5</sup> *Germs, Viruses, and Secrets: The Silent Proliferation of Bio-Laboratories in the United States*, United States House. 110<sup>th</sup> Cong. (2007) (statement of Alan Pearson, Witness, Director of Biological and Chemical Weapons Control Program, Center for Arms Control and Non-Proliferation, Congressional Oversight Panel, Washington DC).

frustrations are evident where safety and laboratory security biorisks were not equally understood among policymakers, scientists, and regulatory agencies. Unless the complex interrelationships among biorisk domains are equally understood by scientific and federal entities, setting a comprehensive oversight strategy may never be realized. Auditors remain unable to provide end-to-end biorisk oversight assessments to policymakers, which are needed to identify inadequate oversight mechanisms. A gap analysis between sample U.S. Biological Weapons Convention – Confidence Building Measure (BWC-CBM) reports from 2011-2013 and the DSR-IS visual artifacts was completed. The findings of the gap analysis not only confirmed inadequate reporting by ignoring the continuous monitoring function of biorisk oversight, but also the missing data structures to complete a notional BOBSL Registry.

## **1.2 Brief Overview of DSR-IS**

The methodology applies the study of information systems and an external framework, design science research (DSR) to tackle the research question. Design science research for information systems (DSR-IS) is the application of DSR in formulating artifacts suitable for developing or examining complex information systems. This approach contributes towards biodefense studies by introducing a tool to enable policymakers, auditors, and scientists to visualize the entity interrelationships and processes that underscore biorisk oversight challenges. The custom DSR-IS framework produced specialized artifacts that depict the entities, entity attributes, and the interrelationships and processes part of biosafety and laboratory biosecurity to visually

articulate the shared complexities of biorisk oversight. The DSR-IS artifacts were produced from iteratively analysis considered the “design science research cycles”, as biorisk oversight and its complexities were learned.

The design science research cycles in Figure 1-1 represent the iterative analysis to create and refine the artifacts in the dissertation, which is represented by the Design Cycle.<sup>6</sup> The Relevance, Rigor, and Design cycles must be distinguishable in a design science research project.<sup>7</sup> The Relevance Cycle links the specific problem spaces that form the boundaries of the environment to the design science research activities, and determines the requirements to initiate research. The Rigor Cycle considers historical knowledge, and evaluates how the design research project contributes to past studies. The churning of “Build Design Artifacts & Processes” and “Evaluate” process blocks underlying the Design Cycle is the actual execution of DSR.<sup>8</sup> The design cycle is the core process that interacts with the relevance and rigor cycles, and its interactions ensures new artifacts contribute to the existing knowledge base.<sup>9</sup>

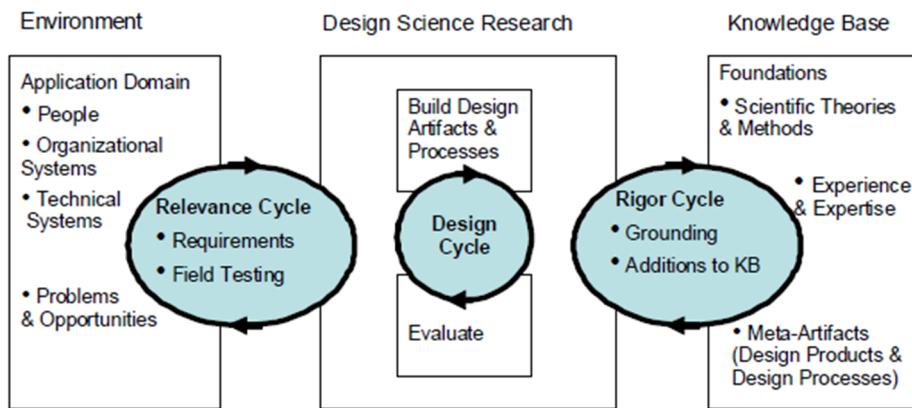
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<sup>6</sup> Hevner, Alan R. 2007. A Three Cycle View of Design Science Research. *Scandinavian Journal of Information Systems* 19: 87-92.

<sup>7</sup> Hevner, *A Three Cycle View of Design Science Research*, 88.

<sup>8</sup> Hevner et al., *Design Science in Information Systems Research*, 79-81.

<sup>9</sup> Hevner, *A Three Cycle View of Design Science Research*, 88.



**Figure 1-1 Three Cycles of Design Science Research<sup>10</sup>**

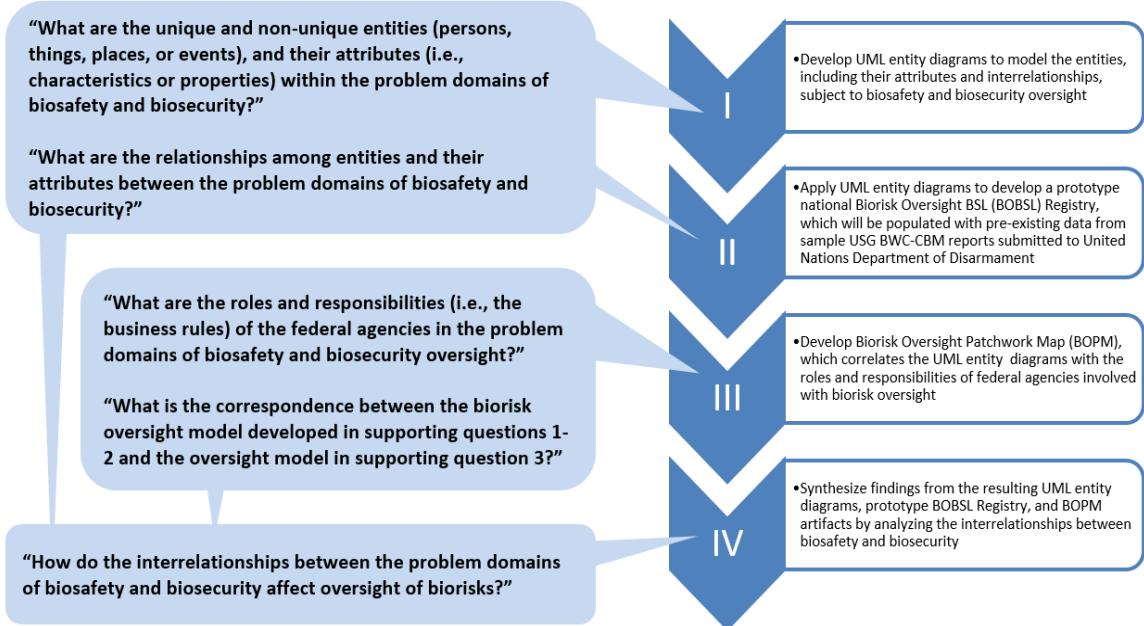
The three cycle DSR process correlates to elements of the dissertation. The relevance cycle is driven by the research question. The iterative analysis of open source materials to understand biorisk oversight gaps in policy, regulations, and challenges encompass the knowledge base and rigor cycle afforded by Chapters 3-6. Finally, the central DSR-IS cycle is the creation of the original visual artifacts, conceptual BOBSL Registry, and biorisk oversight patchwork work (BOPM) that contributed towards biodefense studies and biorisk oversight.

### 1.2.1 Overview of DSR-IS Framework Addressing Research Question

A custom DSR-IS framework was split into phases to reflect how the main research question and supporting questions were answered. The DSR-IS produced artifacts from that build upon the knowledge acquired from each phase in Figure 1-2.

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<sup>10</sup> Ibid.



**Figure 1-2 Methodology DSR-IS framework map to dissertation research questions**

The approach of the DSR-IS phases explains how the artifacts were produced, and how artifacts from each phase build upon answering the research question in separate dissertation chapters. DSR-IS Phases I and II identified the relevant entities involved with biorisk oversight, and examined their roles within the safety and laboratory security processes. Freely available USG regulations, guidelines, reports, and policies, such as the *BMBL*, *NIH Guidelines*, and Select Agent Regulations were iteratively analyzed to create visual wire diagrams depicting the entities, their interrelationships as part of biosafety and biosecurity processes. Phase I artifacts were analyzed as part of a gap analysis during Phase II, which parsed data from sample U.S. BWC-CBM reports to implement a conceptual biorisk oversight BSL (BOBSL) Registry. The gap analysis acknowledged biorisk oversight as a continuous process, and suggested time-based

metrics to record when biorisk entities were last audited as part of the BOBSL. The iterative analysis of the visual artifacts from Phase I, and repetitive gap analysis of Phase I artifacts with Phase II data extraction of U.S. BWC CBM reports satisfied the Rigor Cycle and initial Design Cycle from Figure 1-1 since a knowledge based was established to produce artifacts from each DSR-IS Phase.

The Design Cycle was terminated at the end of Phase III, which iteratively examined Phase I and II artifacts to understand biorisk oversight objectives, and correlated the oversight responsibilities and shared entity artifacts between federal agencies and research institutions to create the original biorisk oversight patchwork map (BOPM) artifact. The shared entity artifacts, which were reportable correspondence or USG forms that inherit the time-based metrics described from Phase II, were subsequently mapped to biorisk oversight objectives to reconcile entity interrelationships and processes. The BOPM produced by Phase III was implemented as a set of specialized tables to organize the mapped relationships between the previous artifacts, which could be used as the software engineering blueprint to develop an online application used by USG auditors to coordinate national biorisk oversight activities. Phase IV terminated the DSR-IS framework, and represents the conclusion of the dissertation that answers the research question.

### **1.3 Biodefense Funding Boom Post-9/11**

The boost in biodefense spending was stirred by Federal agencies advancing life sciences research by expanding the number of BSL laboratories with pathogen

inventories. A report by Sell and Watson indicated USG spending levels for biodefense programs since September 11, 2001 by federal agency for fiscal years 2001 to 2014 were prevalent by three agencies.<sup>11</sup> Sell and Watson further clarifies that USG funds either support programs dedicated to biodefense, or multi-use research programs that recognize biodefense as the driving force to improve upon preparedness and response.<sup>12</sup> The three major federal agencies heavily invested with biodefense related research programs were the Department of Health and Human Services (HHS), Department of Defense (DOD), and the Department of Homeland Security (DHS) where USG funds supports programs dedicated to biodefense or multi-use research programs applying biodefense concepts to improve preparedness and response.<sup>13</sup>

The anthrax letters events post-9/11 triggered the boom biodefense, which more than quintupled from fiscal years 2001 to 2005. Biodefense research pre-9/11 was historically less than one billion dollars, but has since peaked twice in fiscal years 2005 and 2009 to just over eight-billion dollars. The funding levels between fiscal years 2005 and 2009, and post-fiscal year 2009 have remained over five-billion dollars.<sup>14</sup> The reemergence of biodefense research is evident from steady increase of thereabouts five and one-half billion dollars in fiscal year 2012 to just under seven billion dollars fiscal year 2014.<sup>15</sup> Although the trend in biodefense spending were invested towards

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<sup>11</sup> Sell, Tara Kirk and Watson, Matthew. 2013. “Federal Agency Biodefense Funding, FY2013-FY2014”, *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, Vol. 11, Num 3, 2013, DOI: 10.1089/bsp.2013.0047.

<sup>12</sup> Ibid., 196-197.

<sup>13</sup> Sell and Watson. 2013. “*Federal Agency Biodefense Funding, FY2013-FY2014*”, 197.

<sup>14</sup> Ibid., 202.

<sup>15</sup> Ibid., 202.

BioShield, mainly biodefense, or multiple use programs throughout fiscal years 2001-2014, HHS received at least double the funding dollars of the DOD and DHS biodefense dollars combined.<sup>16</sup>

## 1.4 Growth in High Biocontainment Labs

The boost in US federal spending for biodefense research creates a positive correlation with the increased number of BSL-3 and BSL-4 laboratories. The population of known BSL-4 laboratories in the United States has tripled from pre-9/11 to 2008 (see Table 1-1). From pre-1990 to 2000, only five BSL-4 laboratories were known in the United States. The impact of biodefense spending greatly expanded the inventory of BSL-4 laboratories in the federal, academic, and state sectors three-fold by end of year 2007.

**Table 1-1 Summary of Known BSL-4 Labs in US by Sector as of October 4, 2007<sup>17</sup>**

<b>Summary of Known BSL-4 Labs in the United States by Sector</b>				
<b>Sector</b>	<b>Before 1990</b>	<b>1990-2000</b>	<b>2001-Present</b>	<b>Total</b>
Federal government	2	1	6	9
Academic	0	1	3	4
State	0	0	1	1
Private	0	1	0	1
<b>Total</b>	<b>2</b>	<b>3</b>	<b>10</b>	<b>15</b>

Source: GAO analysis based on open source information.

<sup>16</sup> Ibid., 202.

<sup>17</sup> U.S. Government Accountability Office. *High-Containment Biosafety Laboratories: Preliminary Observations on the Oversight of the Proliferation of BSL-3 and BSL-4 Laboratories in the United States*. GAO-08-108T.

Research institutions providing workspaces where actual microbiological research activities involving biological agents take place are rated by biosafety level (BSL). There are four levels, and BSL-3 AND BSL-4 are equipped to handle research activities with indigenous, exotic or dangerous biological agents lethal to humans. The oversight challenges between BSL-3 and BSL-4 research institutions conceivably make the former more difficult to track. For instance, there are exponentially more BSL-3 than BSL-4 laboratories, and the inventory if the former is unknown. The indefinite population of BSL-3 research institutions across all sectors implies no oversight entity could accurately quantify aggregate risks.<sup>18</sup> Since the population of BSL-4 laboratories are generally known, research activities and biological agent inventories could be easily audited even if there were no registration requirements posed by conditional federal funding or the Federal Select Agent Program (FSAP).<sup>19</sup> The inventory of BSL-3 laboratories per sector are known if tracked by a registry, such as the FSAP (see Table 1-2). The GAO reported just 1400 total BSL-3 laboratories in the United States by year-end 2007, which excludes BSL-3 facilities that are federally funded but not registered with FSAP, and neither federally funded nor registered with FSAP.

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<sup>18</sup> GAO. *High-Containment Biosafety Laboratories*, 10-11.

<sup>19</sup> Ibid., 9.

**Table 1-2 FSAP-Registered BSL-3 Labs by Sector - October 4, 2007<sup>20</sup>**

Sector	CDC-registered labs	USDA- registered labs	Total
	Number	Number	Number
Federal	291	167	458
Academic	429	58	487
State	248	20	268
Private	74	69	143
<b>Total</b>	<b>1042</b>	<b>314</b>	<b>1356</b>

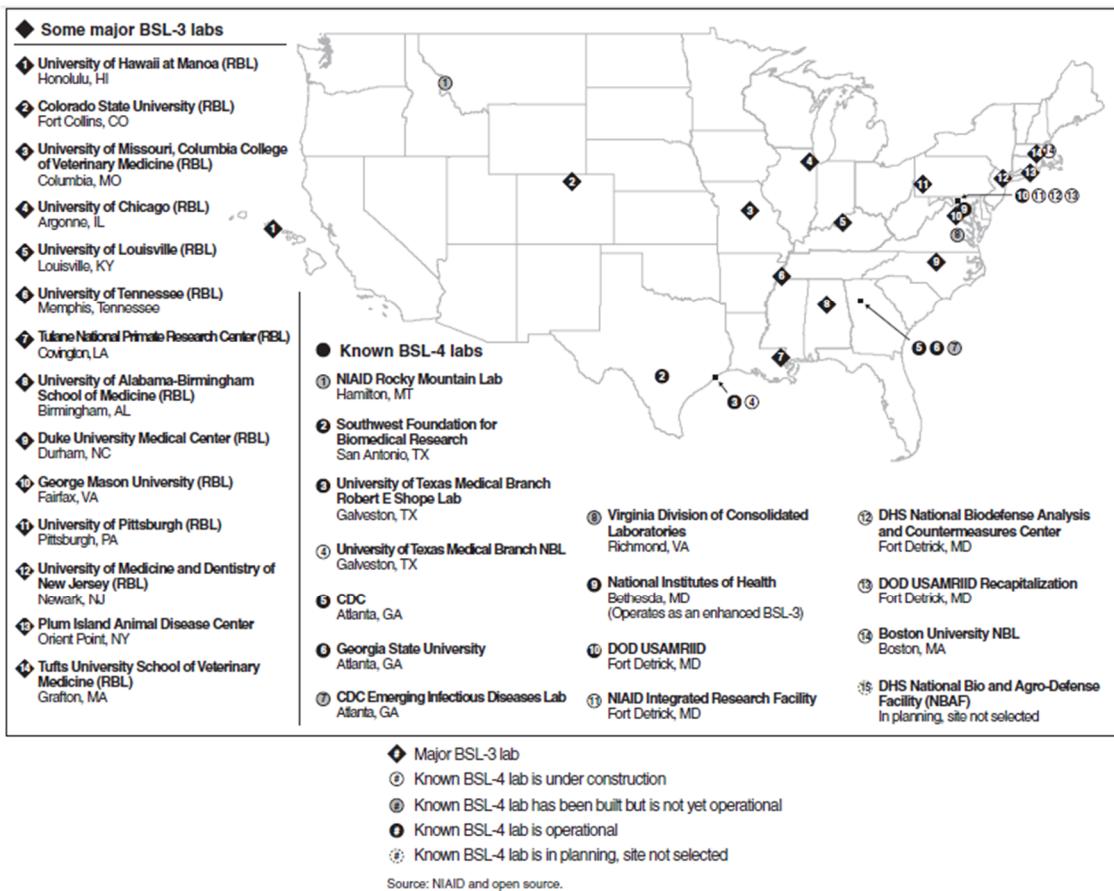
Source: GAO's analysis of CDC-USDA data.

The geographic locations of major BSL-3 and known BSL-4 laboratories vividly reveal the one-off and clustered research locations (see Figure 1-3). The BSL laboratories depicted in Figure 1-3 are reported by the GAO 2008 report, which are regulated laboratories. The perception that heavily regulated laboratories subjected to federal and local oversight are safer than non-regulated facilities is fallible. The types of risks familiar to scientists are now front and center from the expanding population of BSL-3 laboratories, public outcry over the construction of BSL-4 laboratories, and financial commitment by the USG to invest in biodefense research.<sup>21</sup>

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<sup>20</sup> GAO. *High-Containment Biosafety Laboratories*, 10.

<sup>21</sup> Kirk C. Bansak (2011): BIODEFENSE AND TRANSPARENCY, *The Nonproliferation Review*, 18:2, 349-368; GAO. *High-Containment Biosafety Laboratories*, 9-14.



**Figure 1-3 Known BSL-3 and BSL-4 Laboratories in US - October 4, 2007<sup>22</sup>**

The combination of the biodefense spending boom post-9/11 and proliferation high biological containment laboratories poses risks associated with biosafety and laboratory biosecurity. In October 2007 and September 2009, the GAO testified that the federal government cannot determine the aggregate life sciences research capacity of laboratories because no single federal agency is tracking the population BSL-3 and BSL-

<sup>22</sup> GAO. *High-Containment Biosafety Laboratories*, 12.

4 facilities.<sup>23</sup> The same GAO testimony concluded that no federal agency has the burden of computing the aggregate risks associated with the proliferation of BSL-3 and BSL facilities during that time. The specter of biological weapons stems from potential biosafety breaches and the involuntary exposure to disease and contagion are inherently naturally fear inducing.<sup>24</sup> The perception and dread that someone would deliberately circumvent biosecurity measures to infect others with exotic diseases makes “bioterror frightening, disgusting, and infuriating.”<sup>25</sup> These concerns are reinforced from the inability to register the population of operational BSL-3 facilities. The inadequacies of biorisk oversight has created a mixed model of self-governance and regulation, where the former heavily applies to research institutions not funded by the federal government and do not store regulated biological agents.<sup>26</sup> Gottron and Shea point out that self-reporting mechanisms practiced by non-federal research institutions managing BSL-3 laboratories within academia, public health agencies, and industrial research and quality control may be insufficient.<sup>27</sup>

The expansion of research spaces afforded by the proliferation of BSL-4 laboratories post-9/11 presumes an increase of scientists will be trained in the specialized

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<sup>23</sup> U.S. Government Accountability Office. *High-Containment Biosafety Laboratories: National Strategy for Oversight is needed.* GAO-09-574.; GAO. *High-Containment Biosafety Laboratories*, 3.

<sup>24</sup> Stern, Jessica. 2003. Dreaded Risks and the Control of Biological Weapons. *International Security*.

<sup>25</sup> Ibid., 104.

<sup>26</sup> National Research Council (U.S.). Committee on a New Government-University Partnership for Science and Security, Committee on Science, Technology, and Law Policy and Global Affairs. *Science and Security in a Post 9/11 World: A Report Based on Regional Discussions Between the Science and Security Communities.* Washington, DC. National Academies Press (2007).

<sup>27</sup> U.S. Congressional Research Service. *Oversight of High-Containment Biological Laboratories: Issues for Congress* (R40418; March 27, 2009), by Frank Gottron and Dana A. Shea.

practices to handle lethal biological agents.<sup>28</sup> Supporters of biodefense and life sciences research argue that magnifying the number of BSL-4 laboratories and trained scientists will afford prompt breakthroughs in countermeasure development.<sup>29</sup> Security zealots counter that enlarging BSL-4 laboratory spaces will unwittingly disseminate information involving lethal biological agents, which could possibly leak to scientists opposing the United States.<sup>30</sup> Even if security monitoring of DOD research laboratories are faultless, there is no way to prevent a determined adversary from acquiring dangerous biological materials for malevolent purpose from other sources.<sup>31</sup>

## **1.5 Defining Biorisks – Federal Policies, Regulations and Oversight**

The biorisk domains are defined by the corresponding Federal policies and oversight model. Since dual-use research oversight and experiments of concern are beyond the scope of this dissertation, example case studies for biosafety and biosecurity are briefly reviewed to reinforce concepts and issues. Biorisk is the emerging concept associated with research institutions and microbiological laboratory settings that link the terms biological safety (biosafety) and biological security (biosecurity) as a single term. The biorisk concept encompasses the potential biosafety and biosecurity risks associated with the outcomes of laboratory, biological, and infectious agent hazards. Biorisk management establishes the practices, procedures, system processes, and policies to

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<sup>28</sup> U.S. Congressional Research Service. The National Biodefense Analysis and Countermeasures Center: Issues for Congress (RL32891; Feb. 15, 2007), by Dana A. Shea.

<sup>29</sup> Ibid., 13.

<sup>30</sup> Ibid.

<sup>31</sup> Defense Science Board, “Report of the Defense Science Board Task Force on Department of Defense Biological Safety and Security Program” (May 2009).

manage laboratory biorisks, which are vital in the daily operations of research institutions involving biological materials, technologies, and scientific information. Biorisk oversight is a function of biorisk management that monitors those processes, procedures, system processes and polices to grade whether or not research institutions and laboratories are compliant.

Biorisk oversight visibility into research institutions are linked to the federal guidelines directing how research entities control the possession, use, or transfer of biological agents. The USG have established regulations of specific to select agents, which are subjected to federal oversight. The core federal guidelines addressing biosafety and laboratory biosecurity are detailed in the *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*. The *NIH Guidelines* guides the safety practices and containment procedures for basic and clinical research, but specifically addresses experiments that construct or handle recombinant and synthetic nucleic acid. Biosecurity is addressed by the Select Agent Regulations (SAR) that designate certain pathogens, or Tier-1 agents requiring stricter physical security and access controls, and from the adoption of personnel reliability programs (PRP). The definitions, federal policies and regulations relevant to laboratory safety and security domains of biorisk are discussed, and examples from past events are briefly reviewed to reinforce concepts and issues.

### **1.5.1 Defining Biosafety**

The Center for Disease Control and Prevention (CDC) describes biosafety by adopting two concepts, containment and risk assessment.<sup>32</sup> Containment describes the safety methods, facilities and equipment for managing and handling infectious materials within the laboratory environment.<sup>33</sup> Biosafety containment is the implementation of specialized laboratory practices, physical infrastructure of the institution, and physical construction of the laboratory research workspaces, safety equipment, and the occupational health programs adopted by an institution when working with precarious biological agents and materials.<sup>34</sup> Containment mechanisms should collectively create the barriers to protect laboratory staff, the immediate external environment, and the public from exposure or release of infectious biological agents that handled and stored in BSL-3 and BSL-4 laboratories.<sup>35</sup>

The CDC considers risk assessment as the process identifying the hazardous characteristics of a known infectious or potentially infectious agents or materials, the activities that might expose infectious agents to persons, the probability that those exposures may cause an LAI, and the consequences of such infections if they occur.<sup>36</sup> The results of the risk assessment process expressed by the CDC should determine the most suitable microbiological practices, safety equipment, and physical facility

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<sup>32</sup> U.S. Department of Health and Human Services. Center for Disease Control and Prevention. *Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5<sup>th</sup> Ed.* Washington, DC: Government Printing Office, 2009.

<sup>33</sup> *BMBL*, 22.

<sup>34</sup> *Report of the Working Group on Strengthening the Biosecurity*, 6-7.

<sup>35</sup> *BMBL*, 1.

<sup>36</sup> *Ibid.*, 9.

safeguards required to block laboratory acquired infections (LAI).<sup>37</sup> Risk assessment factors the pathogenicity and infectiousness of biological agents, and the specific research operations that will be performed on such agents.<sup>38</sup> The containment requirements prescribed by a thorough risk assessment are synthesized to determine which among four biosafety levels (BSL) is appropriate.<sup>39</sup> There are several recent cases where the need to augment biorisk oversight were fueled by lapses in biosafety controls. In 2014 alone, multiple incidents demonstrated the compromise of biosafety controls at NIH on several occasions, and each incident involved a different biological pathogen.<sup>40</sup>

### **1.5.2 USG Biosafety Oversight**

The reach of biosafety oversight depends on whether restrictions imposed by federal guidelines or regulations are applicable. In order to explain why oversight assessments continue to be inadequate for biosafety, two prevalent federal guidelines in life sciences, the *Biosafety in Microbiological and Biomedical Laboratories (BMBL)* and *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines)* were discussed. The guidance presented in both federal documents are maintained and updated by child agencies of the Department of Health and Human Services, and describe the entities that implement and oversee biosafety and

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<sup>37</sup> Ibid.

<sup>38</sup> Ibid.

<sup>39</sup> Ibid.

<sup>40</sup> Lena H. Sun and Brady Dennis, “CDC says it improperly sent dangerous pathogens in five incidents in past decade,” *Washington Post*, July 11, 2014, accessed October 3, 2014 [http://www.washingtonpost.com/national/health-science/cdc-says-it-improperly-sent-dangerous-pathogens-in-five-incidents-in-past-decade/2014/07/11/acd55bfc-0882-11e4-a0dd-f2b22a257353\\_story.html](http://www.washingtonpost.com/national/health-science/cdc-says-it-improperly-sent-dangerous-pathogens-in-five-incidents-in-past-decade/2014/07/11/acd55bfc-0882-11e4-a0dd-f2b22a257353_story.html)

biosecurity practices. The *BMBL* and *NIH Guidelines* are well established, and provide ample guidance to institutions that conduct life sciences research. Current oversight of research activities in BSL-3 and BSL-4 laboratories are shared between local institutional entities and several federal agencies. The *BMBL* and the *NIH Guidelines* are considered primary federal guidelines recognized in life sciences research, and adoption by American research institutions are the norm. *NIH Guidelines* compliance applies to research institutions that employ recombinant DNA (rDNA) in research activities, and receive funds from the NIH or other federal agencies.

### **1.5.2a Biosafety in Microbiological and Biomedical Laboratories (BMBL)**

The *BMBL* is a publicly available federal document that is periodically updated by the Center for Disease Control and Prevention (CDC), and the National Institutes of Health (NIH). The *BMBL* focuses on biosafety best practices to safely conduct research in biomedical and clinical laboratories, and are considered advisory guidelines without regulatory backing. However, *BMBL* compliance is a de facto condition imposed upon research institutions dependent on federal funding. Periodic updates to the *BMBL* not only affords keeps pace with emerging issues posing new risks towards laboratory workers and the public health, but also maintains its status as the authoritative biosafety best practices reference for the life sciences community.

The *BMBL* considers containment and risk assessment as the foundation of biosafety. Life science researchers rely on the *BMBL* to understand risk assessment, reference containment requirements for certain biological agents, and the laboratory

procedures to thoroughly disinfect or decontaminate work spaces. The link between containment and risk assessment is realized where the latter determines the former to either increase or decrease containment. Containment includes the laboratory practices, safety equipment, and facility safeguards that shield laboratory workers, the immediate environment outside of the research institution, and the general public from accidental exposure to infectious pathogens. The *BMBL* containment concept is broad since laboratory practices, primary and secondary barriers are considered with the manipulation of specific biological agents.<sup>41</sup> Primary barriers are safety equipment and personal protective equipment, such as a biosafety cabinet or a pressurized full-body suit, employed to contain or handle biological agents.<sup>42</sup> Secondary barriers are the controls or equipment part of the physical work space, such as a “clean room” or controlled air flow of work spaces.<sup>43</sup> The grouping of barrier attributes comprising containment describe four biosafety levels (BSL), where BSL-4 offers maximum containment.

Risk assessment is the process that determines the applicable laboratory practices, safety equipment, and facility safeguards to prevent laboratory acquired infections (LAI). The risk assessment process starts by factoring the hazardous characteristics of specific biological agents, current laboratory procedures and practices adopted that mitigate potential LAI incidents, and that potential hazards from work practices, safety equipment, and facility safeguards.<sup>44</sup> The *BMBL* recognizes the principal investigator (PI) as the key

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<sup>41</sup> *BMBL*, 22-28.

<sup>42</sup> Ibid., 22-23.

<sup>43</sup> Ibid., 23-24.

<sup>44</sup> Ibid., 9-19.

local oversight entity that leads risk assessments, and consults with the laboratory director and IBC to determine the appropriate BSL for life sciences research programs.<sup>45</sup>

*BMBL* compliance is not without flaws. In 2007, Pearson argued the NIH Office of Biotechnology Activities (OBA) allowed research institutions to determine which non-rDNA activities involving dangerous biological agents may be reviewed by its IBC.<sup>46</sup>

Even if a research institution did not impose IBC-review of non-rDNA activities, the lack of resources, disconnected involvement, and the inability to furnish meeting minutes to the public doubts IBC oversight.<sup>47</sup> In 2004, a Sunshine Project survey determined the non-binding oversight role was poorly executed based on nearly 400 IBC responses.<sup>48</sup>

The survey afforded examples of poor IBC oversight at research institutions, which were supported by the lack of meeting minutes, approval of critical experiments from partial IBC reviews, and the consistent inability to meet membership composition and disclosure requirements of the non-binding provisions that charter the IBC.<sup>49</sup> Inconsistent IBC review practices across research institutions, and “blanket approvals” of proposed experiments that skip full committee reviews discredits adoption of self-regulation.<sup>50</sup> The 2004 survey also found that institutional and IBC oversight requires genuine participation of scientists, and if researchers hesitate to place restrictions on the scientific work of their

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<sup>45</sup> Ibid.

<sup>46</sup> Pearson (written statement), *Germs, Viruses, and Secrets*, 12.

<sup>47</sup> Ibid.

<sup>48</sup> Sunshine Project, *Mandate for Failure*, 12-24.

<sup>49</sup> Aken, Jan van. 2006. When risk outweighs benefit. *EMBO reports* 7 Spec No: S10-3.; Sunshine Project, *Mandate for Failure*, 12-24.

<sup>50</sup> Sunshine Project, *Mandate for Failure*, 12-24.

colleagues, the idea of a full self-regulatory framework based on non-legally binding, voluntary guidelines would never be accepted.<sup>51</sup>

### **1.5.2b NIH Guidelines**

The *NIH Guidelines* complements the *BMBL* by reinforcing safety practices and containment procedures for basic and clinical research, but is specific to experiments that construct or handle recombinant nucleic acid molecules (rDNA), synthetic nucleic acid molecules, including those that are chemically or synthetically modified to allow base pairing with naturally occurring nucleic acid molecules, and the manipulation of cells, organisms, and viruses containing such nucleic acid molecules.<sup>52</sup> The *NIH Guidelines* affords the criteria for NIH and federal agencies with jurisdiction over experiments employing nucleic acid molecules to conduct reviews and approvals. If approval is granted to the requesting institution, *NIH Guidelines* state that those experiments may commence without subsequent NIH reviews or approvals.<sup>53</sup> The exception applies to experiments involving human research participants subjected to the planned transfer of recombinant or synthetic nucleic acid molecules, or DNA or RNA derived from recombinant or synthetic nucleic acid molecules, which requires multiple layers of approval.<sup>54</sup> The *NIH Guidelines* requires experiments involving human gene transfer

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<sup>51</sup> Aken. 2006. *When risk outweighs benefit*, S13.; Sunshine Project, *Mandate for Failure*, 12-24

<sup>52</sup> Recombinant DNA (rDNA) replication is within a living cell, but its construction is outside the cell. See *NIH Guidelines*, 10.;

<sup>53</sup> *NIH Guidelines*, 10.

<sup>54</sup> *Ibid.*

must complete the RAC review process, and if necessary, obtain approvals from the IBC, Institutional Review Board (IRB), and all applicable regulatory agencies.<sup>55</sup>

*NIH Guidelines* compliance applies towards research institutions that conduct rDNA experiments, or are sponsored by a public or private entity receiving NIH funding for rDNA research.<sup>56</sup> The reach of the *NIH Guidelines* applies to persons sponsored by authorized institutions or research institutions receiving NIH funds within the United States or its territories to host recombinant or synthetic nucleic acid research with or without human subjects, even if NIH funds are not used to support recombinant or synthetic nucleic acid research hosted by the receiving institution.<sup>57</sup> Institutions or persons that receive NIH funds from abroad must comply with *NIH Guidelines* with the rules of conduct of the host country.<sup>58</sup> Institutions requesting NIH funds from a host country lacking established rules for the conduct of recombinant or synthetic nucleic acid molecule research, requires the approval from an NIH-approved IBC or equivalent review body of the proposed research and the appropriate national governmental authority of the host country.<sup>59</sup>

There are provisions within the *NIH Guidelines* when non-compliance is proven against a violating institution. When non-compliance violations are reported to the IBC of the violating institution, an internal investigation by the IBC is conducted. The investigation findings and recommendations are submitted to the National Institutes of

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<sup>55</sup> Ibid.

<sup>56</sup> Ibid.

<sup>57</sup> Ibid., 11.

<sup>58</sup> Ibid., 10-11.

<sup>59</sup> Ibid.

Health-Office of Biotechnology Activities (NIH-OBA) for review and feedback.<sup>60</sup>

During the initial investigation, the IBC may prescribe immediate actions for the research institution to execute before submitting a complete report with recommendations to the NIH-OBA for adjudication.<sup>61</sup> The findings and recommendations submitted to the NIH-OBA are reviewed, and settles whether NIH will suspend, limit, or terminate financial support to violating institutions found non-compliant.<sup>62</sup> The NIH may also impose the requirement for violating institutions to obtain prior NIH approval of random or all recombinant or synthetic nucleic acid molecule projects being considered.<sup>63</sup>

### **1.5.3 National Biosafety Lapses Reported – 2003 to 2007**

Subject matter experts agree high-containment laboratories pose baseline risks that explain the correlation between aggregate biorisks and proliferation of BS-3 and BS-4 laboratories.<sup>64</sup> Biological agents that are collected, harvested, stored or handled in research laboratories invite biorisks, such as security breaches or underperforming biosafety controls. The notion that “risks due to accidental exposure or release can never be completely eliminated”, and the idea of all labs “including those most extensively regulated—have had and will continue to have safety failures” were confirmed by a CDC official.<sup>65</sup> The Sunshine Project argued the proliferation of BS-3 and BS-4 laboratories in the United States augmented biorisks by identifying sites that conduct

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<sup>60</sup> Ibid., 11.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid.

<sup>63</sup> Ibid.

<sup>64</sup> GAO. *High-Containment Biosafety Laboratories*, 14.

<sup>65</sup> Ibid.

open air testing or allows classified research. The increasing biorisk concerns argued by the Sunshine Project were validated when the GAO confirmed that “high-containment labs have health risks for individual lab workers as well as the surrounding community.”<sup>66</sup> The proliferation of biological laboratories handling deadly germs and toxins in Figure 1-4 spanned over 24 states, and confirmed more than 100 biosafety incidents and missing shipments of deadly pathogens between 2003 and 2007.<sup>67</sup> The oversight gap is evident where unknown BSL-3 laboratories need to become known to visually examine which densely populated areas are at-risk.

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<sup>66</sup> Ibid.

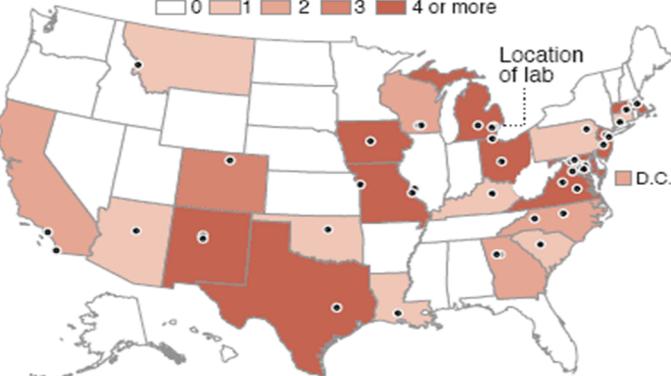
<sup>67</sup> NBC News. “U.S. labs mishandling deadly germs” nbcnews.com (October 2, 2007) [http://www.nbcnews.com/id/21096974/ns/health-infectious\\_diseases/t/us-labs-mishandling-deadly-germs/#.VDsSLvldUIM](http://www.nbcnews.com/id/21096974/ns/health-infectious_diseases/t/us-labs-mishandling-deadly-germs/#.VDsSLvldUIM)

## Toxic incidents at U.S. labs

More than 100 accidents and missing shipments involving anthrax, bird flu virus and other poisons occurred at 44 labs since 2003.

Number of Incidents, by state

■ 0 ■ 1 ■ 2 ■ 3 ■ 4 or more



SOURCE: Centers for Disease Control and Prevention

AP

Figure 1-4 Toxic Incidents at US BSL Labs Reported 2003 to October 2007<sup>68</sup>

The potential and confirmed biosafety breaches described by Figure 1-4 are expected to rise as the population of American scientists authorized to access lethal pathogens grows with the proliferation of laboratories. Documented biosafety incidents confirm USG oversight can neither keep pace with high containment laboratories that experiment with pathogens where potential exposures leading to infections have no cure, nor detect when laboratories break the legal obligation to report all biosafety accidents.<sup>69</sup>

<sup>68</sup> NBC News. “U.S. labs mishandling deadly germs” nbcnews.com (October 2, 2007) [http://www.nbcnews.com/id/21096974/ns/health-infectious\\_diseases/t/us-labs-mishandling-deadly-germs/#.VDsSLvldULM](http://www.nbcnews.com/id/21096974/ns/health-infectious_diseases/t/us-labs-mishandling-deadly-germs/#.VDsSLvldULM) (AP\_labs\_071002\_1215p.gif)

<sup>69</sup> NBC News. “U.S. labs mishandling deadly germs.”

### **1.5.3a CDC Biosafety Lapses, June 2014 to September 2014**

The government agency responsible for setting the pace of biosafety best practices and maintaining the *BMBL*, the CDC, is not immune to biosafety lapses. In June 2014, the CDC was found to have improperly stored anthrax.<sup>70</sup> Anthrax is a deadly infectious disease caused by bacteria *Bacillus anthracis* spores that are resilient in the environment, and inhalational exposure to humans is lethal. The biosafety lapse initially identified 75 scientists from three CDC laboratories in Atlanta, GA where live anthrax bacteria was accidentally released, but later found up to 84 CDC employees and scientists were possibly exposed to anthrax.<sup>71</sup> Investigators confirmed scientists did not complete a thorough risk assessment to ensure the appropriate BS<sub>L</sub> containment, or specialized practices to prevent the accident release of anthrax, nor the due diligence to take proper precautions to inactivate bacteria samples before transferring them to three BS<sub>L</sub> laboratories not equipped to handle live anthrax.<sup>72</sup>

In August 2014, the CDC misdirected the shipment of a virulent avian flu virus as opposed to a harmless animal strain to a poultry research laboratory of the USG Department of Agriculture (USDA).<sup>73</sup> The lack of coordination causing the misdirection of the correct biological materials for shipment started when a scientist haphazardly

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<sup>70</sup> Len H. Sun, “CDC says about 75 scientists may have been exposed to anthrax,” *Washington Post*, June 19, 2014, accessed October 3, 2014

[https://www.washingtonpost.com/national/health-science/cdc-says-about-75-scientists-may-have-been-exposed-to-anthrax-and-receiving-antibiotics/2014/06/19/4b96467e-f7ea-11e3-8aa9-dad2ec039789\\_story.html](https://www.washingtonpost.com/national/health-science/cdc-says-about-75-scientists-may-have-been-exposed-to-anthrax-and-receiving-antibiotics/2014/06/19/4b96467e-f7ea-11e3-8aa9-dad2ec039789_story.html)

<sup>71</sup> Sun, “CDC says about 75 scientists may have been exposed to anthrax.”

<sup>72</sup> Ibid.

<sup>73</sup> Lena H. Sun and Brady Dennis, “CDC scientist took shortcuts handling deadly bird flu virus, investigation finds,” *Washington Post*, August 15, 2014, accessed October 3, 2014

[http://www.washingtonpost.com/national/health-science/cdc-scientists-took-shortcuts-handling-deadly-bird-flu-virus-investigation-finds/2014/08/15/893471c8-2403-11e4-86ca-6f03cbd15c1a\\_story.html](http://www.washingtonpost.com/national/health-science/cdc-scientists-took-shortcuts-handling-deadly-bird-flu-virus-investigation-finds/2014/08/15/893471c8-2403-11e4-86ca-6f03cbd15c1a_story.html)

wanted to “speed up work” that led to the accidental contamination of harmless samples.<sup>74</sup> Although neither exposures nor infections had occurred, and the virulent pathogen was destroyed, more than six weeks passed before CDC laboratory staff reported the incident to supervisory and management for escalation.<sup>75</sup> CDC investigators determined that individuals aware of the contamination not only were confused by the vague incident reporting requirements, but also lacked the prudence to notify peers and supervisory staff.<sup>76</sup> Further CDC investigations involving the flu lab incident determined that the scientist ignored laboratory best practices, and neither had approved laboratory procedures nor written records explaining the work being done.

On September 5, 2014 a comprehensive CDC facility and laboratory inventory sweep uncovered five unique misplaced biological materials just months after the CDC was found to have biosafety breaches involving anthrax, smallpox, and lethal bird flu samples.<sup>77</sup> All of the biological materials discovered were considered regulated select agents that impose specific storage requirements within secured facilities.<sup>78</sup> The inventory sweep found improperly stored samples of staphylococcal enterotoxin, Melioidosis, tularemia, ricin, botulism toxin by FDA, CDC, and NIH staff. The itemized samples discovered by FDA staff involved several vials of staphylococcal enterotoxin.

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<sup>74</sup> Ibid.

<sup>75</sup> Ibid.

<sup>76</sup> Ibid.

<sup>77</sup> Brady Dennis and Lena H. Sun, “More deadly pathogens, toxins found improperly stored in NIH and FDA labs,” September 5, 2014, accessed October 3, 2014  
[http://www.washingtonpost.com/national/health-science/six-more-deadly-pathogens-found-improperly-stored-in-nih-and-fda-labs/2014/09/05/9ff8c3c2-3520-11e4-a723-fa3895a25d02\\_story.html](http://www.washingtonpost.com/national/health-science/six-more-deadly-pathogens-found-improperly-stored-in-nih-and-fda-labs/2014/09/05/9ff8c3c2-3520-11e4-a723-fa3895a25d02_story.html)

<sup>78</sup> Dennis and Sun, “More deadly pathogens, toxins found improperly stored in NIH and FDA labs”

CDC staff discovered two vials of *Burkholderia pseudomallei* and three vials of *Francisella tularensis*, where the former causes melioidosis and the latter yields tularemia. The NIH research staff assisting with the inventory sweep recovered a single vial of ricin, and two vials of botulism nerve toxin. Fortunately, FDA, CDC and NIH employees were exposed or endangered while handling and transporting the biological materials into secure containment spaces.<sup>79</sup>

### **1.5.3b NIH and Improperly Stored Smallpox, July 2014**

In Bethesda, MD an FDA scientist discovered 16 vials of smallpox while cleaning a storage room at a NIH building on July 1, 2014.<sup>80</sup> The smallpox vials discovered were dated several decades old from the 1950s, and were labeled “variola”.<sup>81</sup> There is no cure for smallpox, and one-third of those persons infected have died historically. This was the second incident at NIH in 2014 that involves the mishandling of a highly dangerous pathogen by a major federal agency. There was neither any evidence that the vials were compromised nor that laboratory workers were exposed to the smallpox virus.<sup>82</sup> Smallpox is considered a deadly virus, and biosafety mishandling of the discovered vials explains why it is the first time the virus was located outside the only two facilities in the

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<sup>79</sup> Ibid.

<sup>80</sup> Lena H. Sun and Brady Dennis, “Smallpox vials, decades old, found in storage room at NIH campus in Bethesda,” *Washington Post*, July 8, 2014, accessed October 3, 2014 [http://www.washingtonpost.com/national/health-science/smallpox-vials-found-in-storage-room-of-nih-campus-in-bethesda/2014/07/08/bfdc284a-06d2-11e4-8a6a-19355c7e870a\\_story.html](http://www.washingtonpost.com/national/health-science/smallpox-vials-found-in-storage-room-of-nih-campus-in-bethesda/2014/07/08/bfdc284a-06d2-11e4-8a6a-19355c7e870a_story.html)

<sup>81</sup> Sun and Dennis, “Smallpox vials, decades old, found in storage room at NIH campus in Bethesda.”

<sup>82</sup> Ibid.

world where smallpox samples are permitted to be stored by international agreement.<sup>83</sup>

The two international locations allowed to store smallpox are CDC headquarters in Atlanta, Georgia and Novosibirsk, Russia.<sup>84</sup>

#### **1.5.4 Defining Biosecurity**

Biosecurity has multiple meanings, but the dissertation specifically refers to laboratory security. Laboratory biosecurity is concerned with the safeguarding, engineering and physical access controls, inventory management, and accountability of biological agents and toxins within research facilities to restrict unauthorized access, theft, loss, and misuse that could lead to intentional release or exposure. Likewise, the implementation of laboratory biosecurity is represented by the combination of physical and engineering controls, and operational processes within research microbiological laboratories to block the unauthorized or malicious use of dangerous pathogens and toxins.

The primary endeavor of practicing biosecurity at research institutions are to protect against acts of bioterrorism and to prevent security breaches that could result in adverse events towards humans, animals, and plants.<sup>85</sup> The implementation of biosecurity systems comes from a combination of specialized training and education,

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<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> Biosecurity was originally applicable towards the protection of crops, plants, and livestock from infectious diseases. The dissertation recognizes there are multiple meanings of biosecurity, but is emphasizing the protection against acts of bioterrorism from deliberate misuse, unauthorized access, theft, loss, or intentional release of dangerous biological agents and toxins stored within research laboratories.

physical and electronic access controls to BSAT inventories and research workspaces, and the regulated inter-transfers of BSAT materials between registered entities.<sup>86</sup> Biosecurity and its oversight is a shared responsibility between scientists, policy makers, security professionals, auditors, law enforcement, and regulatory agencies. Although previous biosecurity breaches have greatly assisted in the development of augmented countermeasures, individuals harboring harmful intentions will continue to threaten biosecurity controls. The intent to inflict harm to individuals via unauthorized access to biological agents or toxins stored within laboratories implies compromising biosecurity or biosafety controls. There are several notable incidents that demonstrate biosecurity breaches involving dangerous biological pathogens.

### **1.5.5 USG Biosecurity Oversight**

USG biosecurity oversight is a shared responsibility between scientists, policy makers, security professionals, auditors, law enforcement, and regulatory agencies. For this reason, federal agencies and research institutions harbor the responsibility to encourage scientific advancements while safeguarding biological agents, toxins, and materials from misuse. The main biosecurity controls applicable to research institutions imposed by the USG are the Select Agent Regulations (SAR) and its underlying Select Agent and Toxins List (SATL), and personnel reliability programs (PRP).

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<sup>86</sup> *Report of the Working Group on Strengthening the Biosecurity*, 6.

### **1.5.5a Select Agent Regulations (SAR)**

The Antiterrorism and Effective Death Penalty Act of 1996 appointed the Department of Health and Human Services (HHS) to regulate the transfer of select agents posing severe threats to public health from authorized microbial collection suppliers, but excluded entities that either obtained dangerous biological agents isolated from nature or possessed them prior to April 15, 1997.<sup>87</sup> In the early-2000s, the USA Patriot Act of 2001, the Agricultural Bioterrorism Protection Act of 2002, and the Bioterrorism Act of 2002 were introduced to further tighten regulated access to biological select agents and toxins.<sup>88</sup> The Federal Select Agent Program (FSAP) identified a set of regulated biological agents and toxins, and the law binding requirements for research institutions to possess, use, or transfer said biological materials.

The FSAP has a defined Select Agent and Toxins List (SATL) identifying regulated biological select agents and toxin materials (BSAT), and the law binding requirements enforced by the Select Agent Regulations (SAR) imposed upon research institutions.<sup>89</sup> The FSAP registration has specific requirements that are guided by the set of USG forms, checklists, and manuals to assist tracking regulated biological agents and toxins.<sup>90</sup> SAR compliance is satisfied by implementing internal laboratory security

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<sup>87</sup> Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 109.

<sup>88</sup> John Strovers and Michael Fleming, “Bioterrorism Risk Assessment Group (BRAG)” (presentation, Federal Bureau of Investigation – Criminal Justice Information Services Division, Clarksburg, WV, November 16, 2012).; The Bioterrorism Act is formally known as the Public Health Security and Bioterrorism Preparedness and Response Act of 2002.

<sup>89</sup> The specific Federal regulations are 42 CFR Part 73, 7 CFR Part 331, and 9 CFR Part 121. See also <http://www.selectagents.gov/Regulations.html>

<sup>90</sup> See <http://www.selectagents.gov>

controls for biological agent and toxin inventories as specified by the SAR, and furnishing additional records or demonstrating compliance as requested by the FSAP.

Several federal agencies share the responsibility of biosecurity oversight via interagency coordination, but no federal agency is capable of providing an end to end oversight solution. The Center for Disease Control and Prevention (CDC), Division of Select Agents and Toxins (CDC-DSAT) and the U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) manage the FSAP.<sup>91</sup> The SAR enforces the provisions of the FSAP, and applies to individuals or entities that possess, use, or transfer any select agent or toxin, including receipt of select agents and toxins from outside the United States, and must register with either CDC-DSAT or USDA-APHIS.<sup>92</sup> The joint ownership between the CDC and USDA-APHIS to operate FSAP established the National Select Agent Registry (NSAR) to enhance the oversight involving the use, possession, and transfer of BSAT.<sup>93</sup>

The CDC mainly serves to oversee non-agricultural or plant biological agents, which are reviewed by USDA-APHIS.<sup>94</sup> Institutions that intend to employ BSAT materials in research activities are required to register with the FSAP, and obtain a Certificate of Registration (COR) from either the CDC or APHIS.<sup>95</sup> Research institutions

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<sup>91</sup> There are other sub-federal agencies that have significant roles in life science research or advisory regarding oversight, such as the Recombinant DNA Advisory Committee and the National Science Advisory Board. The said sub-federal agencies are children organizations within the Department of Health and Human Services, but their policies and oversight recommendations lack regulatory powers.

<sup>92</sup> *BMBL*, Appendix F---Select Agents and Toxins.

<sup>93</sup> Ibid. See also <http://www.selectagents.gov>

<sup>94</sup> CDC is a sub-federal agency of the Department of Health and Human Services. APHIS is a sub-federal agency of the U.S. Department of Agriculture.

<sup>95</sup> “National Select Agent Registry: Registration for Possession, Use, and Transfer of Select Agents and Toxins,” last accessed January 3, 2013, <http://www.selectagents.gov/RegistrationForm.html>.

with a valid COR are considered a “registered entity”, and authorized to work with BSAT materials listed in their COR application during FSAP registration.<sup>96</sup> Registered entities may be research institutions, laboratories or persons authorized by either the CDC or USDA-APHIS to possess, use, or transfer BSAT.

The FSAP and corresponding SAR enforcement has several flaws. First, only regulated BSAT materials are subjected to SAR, which exempts non-regulated biological materials from registration requirements imposed by the FSAP. Research institutions that possess, use, or transfer non-regulated biological materials considered dangerous are excluded from FSAP oversight. Finally, the FSAP only recognizes registered entities, which are facilities and persons holding a valid FSAP Certificate of Registration (COR) authorizing the possession, use, or transfer of regulated BSAT materials. Oversight limitations were realized by the BSL-3 laboratories that store, use, or transfer BSAT materials, but are a subset of the unknown population of BSL-3 or equivalent biological containment institutions that receive private funding. For example, non-registered institutions and registered entities supported by U.S. Department of Health and Human Service or other federal agencies are required to comply with the *BMBL* and *NIH Guidelines* as a condition of funding, that requirement does not identify BSL-3 facilities that are completely privately funded.<sup>97</sup>

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<sup>96</sup> Ibid. The COR application is referred to as “APHIS/CDC Form 1”. If a registered entity needs to work with additional BSAT materials, a new COR application is not necessary. Instead, the current COR must be amended and submitted to the FSAP.

<sup>97</sup> Report of the Trans-Federal Task Force on Optimizing Biosafety and Biocontainment Oversight (July 2009).; Pearson (written statement), *Germs, Viruses, and Secrets*, 11.

### **1.5.5b Select Agent and Toxin List (SATL)**

In 2012, Executive Order 13546, “Optimizing the Security of Biological Select Agents and Toxins in the United States” imposed the FSAP to update the latest Select Agent and Toxin List (SATL).<sup>98</sup> Managed by the CDC and USDA-APHIS, the SATL is the FSAP component identifying biological agents that “pose a severe threat to public health and safety.”<sup>99</sup> The latest SATL had become official October 5, 2012, which lessened the number of agents from the previous select agent list, and introduced Tier 1 select agents. Tier 1 select agents were considered pathogens that “present the greatest risk of deliberate misuse with significant potential for mass casualties or devastating effect to the economy, critical infrastructure, or public confidence.”<sup>100</sup>

The SATL shrank the list of BSAT entries and introduced Tier 1 select agents that impacted FSAP registration requirements, caused the unnecessary destruction of biological materials, and weakened response or forensics research capabilities. Obscure regulations regarding the legal and logistical requirements to execute the transport procedures of biological materials to FSAP-registered entities have resulted in the unnecessary destruction of microbial collections.<sup>101</sup> Research institutions that wanted to salvage microbial collections by transporting them to FSAP-registered locations failed

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<sup>98</sup> Federal Select Agent Program (FSAP). "Bioterrorism: A Brief History." [www.selectagents.gov](http://www.selectagents.gov). <http://www.selectagents.gov/history.html> (accessed June 9, 2015); President Barack Obama, Proclamation, “Executive Order 13546---Optimizing the Security of Biological Select Agents and Toxins in the United States,” Federal Register 75, no. 130 (July 2010): 39439.

<sup>99</sup> Casadevall, Arturo, and David A Relman. 2010. Microbial threat lists: obstacles in the quest for biosecurity? *Nature reviews. Microbiology* 8, no. 2: 149-154.; *BMBL*, 336.; See also <http://www.selectagents.gov/>

<sup>100</sup> FSAP. "Bioterrorism: A Brief History." <http://www.selectagents.gov/history.html>.

<sup>101</sup> Casadevall, Arturo, and Michael J. Imperiale. 2010. Destruction of Microbial Collections in Response to Select Agent and Toxin List Regulations. *Biosecurity and bioterrorism: biodefense strategy, practice, and science* 8, no. 2: 151-154.

due to ambiguous procedures, and timeliness to take action before becoming non-compliant.<sup>102</sup> Research institutions choosing not to register with the FSAP and harbor the burden of compliance may reluctantly obliterate their microbial collections. While the amount of destroyed microbial collections cannot be quantified, it is plausible research institutions would rather save their biological materials and forego the legal and logistical hurdles to facilitate transfer of agents.<sup>103</sup>

Destruction of microbial collections not only diminishes biodiversity for pathogenic microbes, but also lessens samples for research endeavors.<sup>104</sup> The intent to regulate access to pathogens set by the SATL has weakened research into vaccines, epidemiology, pathogenesis, and responses to future forensic investigations.<sup>105</sup> Abundant microbial collections from multiple research institutions empowered forensics scientists to examine attack samples, and analyze associations with *Bacillus anthracis* spore samples from the 2001 anthrax letters.<sup>106</sup> More recently, the knowledge from studying viral collections from previous decades led to the rapid identification of the 2009 pandemic swine influenza and subsequent treatment response.<sup>107</sup> The impact in replenishing new samples would delay responses to emerging and reemerging infectious

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<sup>102</sup> Casadevall and Relman. 2010. *Microbial threat lists: obstacles in the quest for biosecurity?*, 150.; Casadevall and Imperiale. 2010. *Destruction of microbial collections*, 152.

<sup>103</sup> Ibid., 154.

<sup>104</sup> Casadevall and Relman. 2010. *Microbial threat lists: obstacles in the quest for biosecurity?*, 150.; Casadevall and Imperiale. 2010. *Destruction of microbial collections*, 153-154.

<sup>105</sup> Casadevall and Imperiale. 2010. *Destruction of microbial collections*, 154.

<sup>106</sup> Casadevall and Relman. 2010. *Microbial threat lists: obstacles in the quest for biosecurity?*, 149.; Casadevall and Imperiale. 2010. *Destruction of microbial collections*, 154.

<sup>107</sup> Casadevall and Relman. 2010. *Microbial threat lists: obstacles in the quest for biosecurity?*, 149.; Casadevall and Imperiale. 2010. *Destruction of microbial collections*, 151-152.

diseases, or deliberate outbreaks by not affording reference databases.<sup>108</sup> Policies intended to improve the public health infrastructure globally by addressing the threat of emerging, reemerging, and antibiotic-resistant disease are setback when microbial collections were unnecessarily destroyed.<sup>109</sup>

Appending new microorganisms into the SATL may have comparable effects of agent destruction towards response capabilities when natural outbreaks involving the same agent were either restricted or destroyed.<sup>110</sup> Current regulations disallow access to BSAT for scientists without a valid security risk assessment (SRA) and towards non-FSAP registered research institutions, which limits controlled research to examine emerging and reemerging infectious disease outbreaks.<sup>111</sup> New pathogens into the SATL narrows the population of authorized scientists if those agents previously afforded unregulated access. The realized tradeoff in shrinking the authorized population of scientists to access regulated pathogens could slow down response capabilities to natural or malicious outbreaks.

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<sup>108</sup> Casadevall and Relman. 2010. *Microbial threat lists: obstacles in the quest for biosecurity?*, 150.; Casadevall and Imperiale. 2010. *Destruction of microbial collections*, 154.

<sup>109</sup> Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 122.

<sup>110</sup> Casadevall and Relman. 2010. *Microbial threat lists: obstacles in the quest for biosecurity?*, 152.; Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 113-114.

<sup>111</sup> Security Risk Assessments (SRA) are an authorization credential specific to registered entities under the Federal Select Agent Program. Research institutions exclusively experimenting with non-regulated biological and toxin materials would have no need to request an SRA for its staff.

### **1.5.5c Personnel Reliability Programs**

The attention drawn from the 2001 anthrax attacks fueled concerns over insider threats that could compromise biosafety controls and security risk assessments.<sup>112</sup> The Personnel Reliability Program (PRP) is a type of security, psychological, and medical screening practice adopted by the United States Department of Defense (DOD) to evaluate the trustworthiness of individuals needing access to nuclear, chemical, and biological materials. A PRP comprises numerous evaluations, and may include background investigations, credit checks, medical examinations, polygraph examinations, random drug and alcohol screenings, and psychological evaluations.<sup>113</sup> Unfortunately, there is neither an official biological personnel reliability program (BPRP) adopted by non-DOD entities, nor any requirement for non-DOD research institutions to comply. Research institutions have the option to implement a custom BPRP and create security screening protocols in addition to the SRA.<sup>114</sup>

The NSABB proposed several iterations of a BPRP, which was finally published in 2009.<sup>115</sup> The 2009 NSABB report argued against establishing a federally mandated PRP for life sciences, but recommended augmenting the current SRA processes managed

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<sup>112</sup> William J. Broad and Scott Shane, “Scientists’ Analysis Disputes F.B.I. Closing of Anthrax Case,” *New York Times*, October 9, 2011.; New York Times. “Who Mailed the Anthrax Letters?” nytimes.com (October 17, 2011)

<sup>113</sup> National Science Advisory Board for Biosecurity. *Enhancing Personnel Reliability among Individuals with Access to Select Agents* (2009). Available online at: <http://osp.od.nih.gov/sites/default/files/resources/NSABB%20Draft%20Report%20on%20PR%205-20-09.pdf> (accessed October 1, 2010)

<sup>114</sup> Gorman, Brian J., and Creek, J. Corey, “Risk & Reliability of Laboratory Personnel,” *Biosecurity Commons Review: Developments, Trends & Issues for the Year Ending May 2010* 1, no. 1 (May 2010): 28-48, accessed November 16, 2014, [http://wwwnew.towson.edu/sociology/3%20-%20Faculty%20Information/faculty/documents/Bio-Security-Commons-AR-May-2010\\_R.pdf](http://wwwnew.towson.edu/sociology/3%20-%20Faculty%20Information/faculty/documents/Bio-Security-Commons-AR-May-2010_R.pdf)

<sup>115</sup> NSABB, *Enhancing Personnel Reliability*, Executive Summary.

by the FBI and nurturing the culture of research responsibility and accountability at the institutional level.<sup>116</sup> The chief reason in not establishing a federal mandated BPRP, but rather “least bothersome PRPs” is to recruit talent from a limited pool life science researchers that want to work with select agents.<sup>117</sup> Currently, there are no federal mandated BPRP standard, but rather suggestions to augment personnel screening, such as the SRA credentials, as part of oversight within individual research institutions.<sup>118</sup>

### **1.5.6 Infamous Biosecurity Breaches**

The circumvention of biosecurity controls and mechanisms is a constant challenge of biorisk oversight. The two biosecurity case studies discussed point out the importance of airtight policies and regulations to prevent unauthorized access to regulated pathogens, and also element of insider threat. The notion of unauthorized access to biological pathogens by overcoming previously loose regulations is afforded by studying actions of Larry Wayne Harris. The presence of insider threat specific to laboratory security briefly revisits Dr. Bruce Ivins, who was associated with the anthrax letters following the 9/11 terrorist attacks.

#### **1.5.6a Larry Wayne Harris**

In 1995, Larry Wayne Harris ordered three vials of *Yersinia pestis* from the American Type Culture Collection (ATCC), but was arrested and later convicted on

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<sup>116</sup> NSABB, *Enhancing Personnel Reliability*, 11.

<sup>117</sup> Gorman and Creek, “Risk & Reliability of Laboratory Personnel”, 31-32.

<sup>118</sup> Ibid., 31.;

federal charges of mail fraud and wire fraud for misrepresenting the purpose of the purchase.<sup>119</sup> Harris, a microbiologist with the CIA prior to his 1995 conviction, had written extensively on the dangers of biological warfare and how people can protect themselves with massive doses of antibiotics.<sup>120</sup> Harris also described himself as a white separatist who served as lieutenant colonel in the far-right white separatist group Aryan Nations.<sup>121</sup> Prior to his 1995 arrest, Harris feared an Iraqi invasion via “supergerm-carrying rats” was imminent, and that he needed carry out biological defensive research involving *Yersinia pestis*. The absence of an actual law that prohibits any person from acquiring Class-3 biological agents proved to be a liability when Harris furnished letterhead of a fake laboratory to successfully order *Yersinia pestis* from the ATCC. In 1996, the USG examined Harris’ actions and declared new regulations restricting the transfers by requiring shippers and receivers of certain infectious agents to register with the CDC.<sup>122</sup> Even though Harris was released on probation from the 1995 conviction, he was arrested in 1998 after the FBI received a tip that Harris allegedly possessed military-grade anthrax that could be dispersed throughout Las Vegas.<sup>123</sup> Although the 1998 federal charges against Harris were later dropped after the FBI learned the anthrax strain in possession was harmless, Harris’ actions reinforced the need for biorisk oversight.<sup>124</sup>

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<sup>119</sup> Jonathan Tucker, *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons* (Cambridge: The MIT Press, 2000), 233-243.; Cable News Network. “2 Charged with making biological weapons” <http://www.cnn.com/US/9802/19/fbi.arrest.pn/>

<sup>120</sup> Cable News Network. “2 Charged with making biological weapons.”

<sup>121</sup> Tucker, *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, 233-236.; Cable News Network. “2 Charged with making biological weapons.”

<sup>122</sup> Tucker, *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, 238.

<sup>123</sup> Tucker, *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, 239-243.; Cable News Network. “2 Charged with making biological weapons.”

<sup>124</sup> Tucker, *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, 242-243.

### **1.5.6b Dr. Bruce Ivins and the Anthrax Letters**

The anthrax-laced postal mail following the 9/11 terrorist attacks that killed five people is one of the most analyzed law enforcement cases drawing attention to biological pathogens and bioterrorism. The federal investigation of Dr. Bruce Ivins, a former Army biodefense expert working in Fort Detrick, Maryland, introduces the notion that insider threats within institutions storing lethal biological agents could breach biosecurity controls.<sup>125</sup> Since federal investigators were unable to prove Dr. Ivins as the perpetrator allegedly responsible for the anthrax letters before his July 2008 suicide, independent inquiries have scrutinized Dr. Ivins' capabilities and the assortment of circumstantial evidence.<sup>126</sup> Federal prosecutors contend that Dr. Ivins worked long hours at his laboratory just before the anthrax letters were submitted, and also tried to misguide investigators by providing anthrax samples that were missing genetic markers when compared with the samples examined from the letters.<sup>127</sup> The circumstantial evidence employed by prosecutors created doubt when journalists learned that Dr. Ivins routinely worked late hours at other laboratories, and that Dr. Ivins provided overlooked anthrax samples that contained genetic markers.<sup>128</sup> An independent analysis by the National Academy of Sciences found that none of the circumstantial evidence could prove that the

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<sup>125</sup> New York Times. “Who Mailed the Anthrax Letters?” [nytimes.com \(October 17, 2011\)](http://www.nytimes.com/2011/10/18/opinion/who-mailed-the-anthrax-letters.html?_r=0) [http://www.nytimes.com/2011/10/18/opinion/who-mailed-the-anthrax-letters.html?\\_r=0](http://www.nytimes.com/2011/10/18/opinion/who-mailed-the-anthrax-letters.html?_r=0)

<sup>126</sup> William J. Broad and Scott Shane, “Scientists’ Analysis Disputes F.B.I. Closing of Anthrax Case,” *New York Times*, October 9, 2011.; Scott Shane, “F.B.I., Laying Out Evidence, Closes Anthrax Case,” *New York Times*, February 19, 2010, accessed October 3, 2014, <http://www.nytimes.com/2010/02/20/us/20anthrax.html>; New York Times. “Who Mailed the Anthrax Letters?”

<sup>127</sup> Broad and Shane, “Scientists’ Analysis Disputes F.B.I. Closing of Anthrax Case”; New York Times. “Who Mailed the Anthrax Letters?”

<sup>128</sup> Ibid.

mailed anthrax were definitely derived from the spores grown in Dr. Ivins' laboratory.<sup>129</sup>

The F.B.I. argued Dr. Ivins acted as a lone wolf even though the sophisticated coating present with the anthrax laced letters have scientists asserting that Dr. Ivins either received the powder elsewhere or is not the perpetrator.<sup>130</sup> After more than eight years since the anthrax-laced letters killed five people, the F.B.I. finally end their investigation regarding the 2001 anthrax letters.<sup>131</sup>

### **1.5.7 Defining Dual-Use Research of Concern (DURC) and Oversight (DURO)**

The concept of dual-use makes biorisk oversight complex because quantifying the risks versus benefits of dual-use research of concern (DURC) experiments remains controversial. Scientists proclaim their research as legitimate efforts to create knowledge, products and technologies, but life sciences experiments are inherently dual-use having potential benefits along with potential for misuse. The definition of DURC comes from the NIH Office of Biotechnology Activities (NIH-OBA), NSABB on behalf of the biomedical and life sciences communities, and also USG policies.<sup>132</sup> The NIH-OBA recognizes DURC as research having multiple applications that afford significant

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<sup>129</sup> Ibid.

<sup>130</sup> Ibid.

<sup>131</sup> Shane, "F.B.I., Laying Out Evidence, Closes Anthrax Case"

<sup>132</sup> Biosecurity and dual-use research oversight are areas of focus under NIH-OBA, see also <http://osp.od.nih.gov/office-biotechnology-activities/oba/index.html>. The NSABB is a Federal advisory committee under the NIH-OBA that affords guidance and advisory expertise regarding biosecurity oversight of dual-use research to all Federal entities having a stake in life sciences research. See also <http://osp.od.nih.gov/office-biotechnology-activities/biosecurity/nsabb/faq>

potential to generate information for misuse.<sup>133</sup> The NSABB considers DURC as research that could reasonably afford the knowledge, products, or technologies that might be directly misapplied by others to pose a threat to public health and safety, agricultural crops and other plants, animals, and the environment.<sup>134</sup> The USG DURC policies published in 2012 and 2014 modify the definition by including “national security” where ‘Life Sciences research that, based on current understanding, can be reasonably anticipated to provide knowledge, information, products, or technologies that could be directly misapplied to pose a significant threat with broad potential consequences to public health and safety, agricultural crops and other plants, animals, the environment, materiel, or national security’.<sup>135</sup>

Dual-use research may be identified as work having palpable benefits to society, but its potential for misuse highly noticeable. Dual-use research oversight (DURO) is considered a form of biosecurity that focuses of the method, techniques and biotechnologies that may be employed to produce new biological pathogens.<sup>136</sup> Scientists familiar with synthesizing pathogens from scratch could easily circumvent restricted access to seed inventory of lethal pathogens by harvesting their own biological materials.<sup>137</sup> For this reason, biosecurity and DURO scrutinizes how scientists prevent

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<sup>133</sup> Patron, Daniel, Resnik, David, and Chin, Lisa. 2012. Biosecurity and the Review and Publication of Dual-Use Research of Concern. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*.

<sup>134</sup> Aken, Jan van. 2006. When risk outweighs benefit. *EMBO reports* 7 Spec No: S10-3. Accessed March 26, 2014, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1490308/pdf/7400726.pdf>

<sup>135</sup> HHS. *United States Government Policy for Oversight of Life Sciences*, 1-2.; HHS. *United States Government Policy for Institutional Oversight of Life Sciences*, 3.

<sup>136</sup> Koblentz. 2010. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 106.

<sup>137</sup> Ibid., 106.

the misuse of the detailed methods and findings about the biological materials and technologies used in their experiments as potential sources of biological threats.<sup>138</sup>

The dual-use dilemma discriminates whether or not the purpose is “good” or “harmful”, and if the results are aligned with either “military” or “non-military” objectives.<sup>139</sup> The implications of the dual-use dilemma are important because there are no official approaches that determine how the potential risks and potential benefits are quantified.<sup>140</sup> Research experiments involving the aerosolization of biological pathogens specific to military applications, the further distinction of “offensive” or “protective” invites interpretation since former could be employed in biowarfare, and the latter may afford development of countermeasures against aerosolized biological pathogens used as a weapon.<sup>141</sup> The inability to predict whether new ideas will be applied to cure diseases or fabricate novel, but more lethal variants makes answering the dual-use dilemma problematic.<sup>142</sup> The same benefits of developing specializations in the biomedical and microbiological sciences, such as synthetic biology and RNA interference, and the applied knowledge of genomics, neurobiology, and immunology, may unwittingly

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<sup>138</sup> Ibid., 106-107.

<sup>139</sup> Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 526.

<sup>140</sup> Ibid., 556.

<sup>141</sup> Ibid.

<sup>142</sup> Ibid., 562-563. Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 562-563.; Resnik, David B. “Can Scientists Regulate the Publication of Dual Use Research?”. *Studies in Ethics, Law, and Technology*. Volume 4, Issue 1, ISSN (Online) 1941-6008, DOI: [10.2202/1941-6008.1124](https://doi.org/10.2202/1941-6008.1124), May 2010; Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 119.

empower would-be bioterrorists inspired to design advanced biological weapons.<sup>143</sup> For example, the continuous refinement of scientific methods and the adoption of new biotechnologies has empowered scientists to fully reconstruct deadly biological pathogens from the past, such as the 1918 Spanish influenza pandemic.<sup>144</sup> Likewise, DURC experiments with the H5N1 influenza virus showed genetically engineered pathogens may overcome medical treatments if transmissibility is enhanced.<sup>145</sup> As policymakers and regulators lacking a life sciences background increasingly examine the dual-use dilemma, scientists are pressured to prioritize the potential risks of their work. The notion that DURC results may yield its intended outcomes, produce unintended but probable outcomes, or observe unforeseeable outcomes that could never be predicted further underscores the risks versus benefits debate.<sup>146</sup>

From the perspective of the life sciences community, federal oversight is a burden where disagreements over DURC involve quantifying risk versus benefits, and restrictions to publish DURC experiments. The main conflicts described were evident within the three DURO relationships, which foster competing interests. The three DURO relationship models are self-regulation within life sciences community, regulatory

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<sup>143</sup> Koblentz. 2010. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 106-107.; Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 549.

<sup>144</sup> Morens, David M, Jeffery K Taubenberger, Hillery A Harvey, and Matthew J Memoli. 2010. The 1918 influenza pandemic: lessons for 2009 and the future. *Critical care medicine* 38, no. 4 Suppl: e10-e20.; Taubenberger, Jeffery K., David Baltimore, Peter C. Doherty, Howard Markel, David M. Morens, Robert G. Webster, and Ian A. Wilson. 2012. Reconstruction of the 1918 influenza virus: Unexpected rewards from the past. *mBio* 3, no. 5:1-5.

<sup>145</sup> Webster, Robert G. 2012. Mammalian-transmissible H5N1 influenza: The dilemma of dual-use research. *mBio* 3, no. 1: 1-2.; Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 535.; Aken. 2006. *When risk outweighs benefit*, S10.

<sup>146</sup> Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 527.

oversight by the USG, or shared oversight between the USG and research institutions.<sup>147</sup> DURO is further complicated where scientists practice self-regulation by publishing their uncensored scientific research and findings while depending on USG funding. Early DURO was afforded when the USG leverages its stake as the major funding source entitled to review risks prior to publication.<sup>148</sup> The reliance of conditional funding by the scientific community from the USG is strained where the USG perceives researchers practicing self-regulation with intentions to publish scientific findings, which not only undermine funding provisions, but also condone risks and national security interests.<sup>149</sup>

### **1.5.7a Open Publication of DURC Experiments**

The dilemmas questioning whether or not scientific findings should be published, or if the perceived benefits greatly outweigh the perceived risks in approving experiments explains why DURO is perhaps the most complex biorisk domain.<sup>150</sup> The dual-use dilemma linked to DURC experiments drive the opposing views among policymakers, regulatory entities, and scientists driven by their competing interests to monitor experiments and whether or not to abandon, censor, or fully publish the details of scientific findings. These conflicts between microbiologists and the USG predates the 1975 Asilomar conference, which discussed the regulatory issues of biotechnology and

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<sup>147</sup> Resnik. 2010. “*Can Scientists Regulate the Publication of Dual Use Research?*”, 1.

<sup>148</sup> Frank L. Smith III and Adam Kamradt-Scott, “Antipodal biosecurity? Oversight of dual use research in the United States,” *Frontiers in Public Health* 00142 (2014):2, accessed October 3, 2014, doi:10.3389/fpubh.2014.00142.

<sup>149</sup> Smith III and Kamradt-Scott, 2014, *Antipodal biosecurity? Oversight of dual use research in the United States*, 2.

<sup>150</sup> Smith III and Kamradt-Scott, 2014, *Antipodal biosecurity? Oversight of dual use research in the United States*, 2.

risks of recombinant DNA research in addition to preserving scientific openness versus safeguarding the general public from DURC.<sup>151</sup> The competing interests between scientists and federal oversight is evident where the former values freedom to carry out dual-use research experiments, and the open dissemination of manuscripts via open publication, conferences, and speaking engagements.<sup>152</sup> The traditional practice of open dissemination, and the shared motivations to advance research among scientists contradicts the secrecy associated with governmental control.<sup>153</sup> In contrast, government and regulatory agencies accountable to DURO and dissemination of DURC manuscripts value security, research institution and personnel compliance, and promoting awareness of the dual-use dilemma.<sup>154</sup>

The scientific community argues federal oversight needs towards national security could unfairly suppress scientific freedom and progress if the government wanted to impose its will.<sup>155</sup> Concerns over censorship cannot be ignored even though the safeguarding of national security and public health favors restricting information

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<sup>151</sup> Webster. 2012. *Mammalian-transmissible H5N1 influenza: The dilemma of dual-use research*, 2.

<sup>152</sup> HHS. *United States Government Policy for Oversight of Life Sciences*, 1-3.; HHS. *United States Government Policy for Institutional Oversight of Life Sciences*, 3-6.; Aken. 2006. *When risk outweighs benefit*, S10-S13.; Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 561-571.; Resnik. 2010. “*Can Scientists Regulate the Publication of Dual Use Research?*”, 4.

<sup>153</sup> Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 550.

<sup>154</sup> Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 561-571.; Resnik. 2010. “*Can Scientists Regulate the Publication of Dual Use Research?*”, 1.

<sup>155</sup> Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 571.

associated with dual-use discoveries.<sup>156</sup> For example, the artificial reconstruction of the 1918 Spanish pandemic virus that resulted in 50 million deaths underscored the perception that rogue scientists would reassemble the full genome sequence if given the opportunity.<sup>157</sup> Likewise, the awareness of DURC experiments was further underscored after the accidental creation of the vaccine-resistant, virulent mousepox (ectromelia) virus in Australia was followed by its open publication in 2001.<sup>158</sup> Challengers of the mousepox virus research argue the creation of a highly virulent strain invites the possibility of terrorist groups considering biological attacks to develop smallpox strains that are highly virulent and resistant to vaccines.<sup>159</sup> Nonetheless, publication of the details to reconstruct the 1918 Spanish influenza pandemic and the vaccine-resistant Australian mousepox experiment underscored the debate about the open dissemination of detailed scientific procedures and findings. The outcomes from DURC involving the specialization of synthetic biology in the biomedical sciences raises transparency concerns because of the corresponding detailed manuscripts that might be published.<sup>160</sup>

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<sup>156</sup> Ibid., 549.

<sup>157</sup> Aken. 2006. *When risk outweighs benefit*, S10.; Morens et al. 2010. *The 1918 influenza pandemic: lessons for 2009 and the future*, e3-e5.; Taubenberger et al. 2012. *Reconstruction of the 1918 influenza virus: Unexpected rewards from the past*, 1-3.

<sup>158</sup> Jackson, R J, A J Ramsay, C D Christensen, S Beaton, D F Hall, and I A Ramshaw. 2001. Expression of mouse interleukin-4 by a recombinant ectromelia virus suppresses cytolytic lymphocyte responses and overcomes genetic resistance to mousepox. *Journal of virology* 75, no. 3: 1205-1210.; Harris, 2007. "Dual Use Biotechnology Research: The Case for Protective Oversight", 115-116.; Smith III and Kamradt-Scott, 2014, *Antipodal biosecurity? Oversight of dual use research in the United States*, 1.

<sup>159</sup> Miller and Selgelid, 2008. *Ethical and philosophical consideration of the dual-use dilemma in the biological sciences*, 524.

<sup>160</sup> Shea, *Oversight of Dual-Use Biological Research*.

### **1.5.8 USG DURC 2012 and 2014 Policies**

The USG afforded several policies to provide official guidance about DURC from life science research, but the dissertation singled out the USG DURC policies from March 2012 and September 2014 that credited the NSABB as a major advisory source of recommendations.<sup>161</sup> The scope of the USG DURC policies from 2012 and 2014 applies to institutions that conduct research involving specific biological agents and toxins or receive federal funds for life sciences research.<sup>162</sup> Research institutions that exercise private funds or non-regulated biological agents and toxins are not subjected to the oversight mechanisms specified by USG DURC policies.

The DURC policy released March 2012, *Policy for Oversight of Life Sciences Dual-use Research of Concern* formalized how the USG would review life sciences research involving certain high-consequence pathogens and toxins to identify DURC and implement risk mitigation measures. Although the biological agents and toxins specified were subjected to SAR, the USG DURC 2012 policy neither appointed nor tasked the FSAP to oversee the implementation of federal DURC guidelines.<sup>163</sup> The USG DURC policy released September 2014, *United States Government Policy for Institutional Oversight of Life Sciences Dual-use Research of Concern*, focuses on local DURO within institutions. The USG DURC 2014 policy built upon the USG DURC 2012 policy by

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<sup>161</sup> The two federal documents address dual-use research of concern (DURC), and not dual-use research. DURC is considered a subset of dual-use research, and focuses on the life sciences research with certain biological agents and toxins.

<sup>162</sup> HHS, *United States Government Policy for Oversight of Life Sciences*, 2.; HHS, *United States Government Policy for Institutional Oversight of Life Sciences*, 3-4.

<sup>163</sup> HHS, *United States Government Policy for Oversight of Life Sciences*, 2.; HHS, *United States Government Policy for Institutional Oversight of Life Sciences*, 3-4.

prescribing a shared oversight system between USG and institutional oversight processes.<sup>164</sup>

The September 2014 federal policy affords guidance in identifying DURC at the institutional level and expressed practices and procedures to implement risk mitigation measures as needed.<sup>165</sup> The guidance offered by the USG DURC 2014 policy suggests policies, practices, and procedures that institutions should adopt to ensure DURC is identified and risk mitigation measures are implemented.

The USG DURC policies from 2012 and 2014 only considered 15 select agents regulated through the 2001 PATRIOT Act and the 2002 Bioterrorism Act (see Table 1-3), but also seven categories of experiments of concern described by the Fink Report (see Table 1-4).<sup>166</sup> The USG DURC policies are linked to the SAR and FSAP since the 15 pathogens singled out were regulated biological select agents and toxins (BSAT) materials, and have the potential to pose severe threats to human, animal, or plant health, or to animal and plant products. The relationship between USG DURC policies and SAR is evident where the latter addresses physical and laboratory security measures, but is unable to address dual-use research issues. Likewise, the spirit of the USG DURC 2012 and 2014 policies were based on responsible conduct where the knowledge, information or technologies realized from research could pose risks to public health or national security if intentionally misused.

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<sup>164</sup> HHS, *United States Government Policy for Institutional Oversight of Life Sciences*, 3-4.

<sup>165</sup> Ibid.

<sup>166</sup> Smith III and Kamradt-Scott, 2014, *Antipodal biosecurity? Oversight of dual use research in the United States*, 1.; The biological agents and toxins specified by the March 2012 Policy and September 2014 Policy does not match the select agent list maintained by the Federal Select Agent Program.

**Table 1-3 DURC Agents and Toxins<sup>167</sup>**

Name of DURC Biological Agent or Toxin	
Avian influenza virus (highly pathogenic)	Marburg virus
Bacillus anthracis	Reconstructed 1918 Influenza virus
Botulinum neurotoxin6	Rinderpest virus
Burkholderia mallei	Toxin-producing strains of Clostridium botulinum
Burkholderia pseudomallei	Variola major virus
Ebola virus	Variola minor virus
Foot-and-mouth disease virus	Yersinia pestis
Francisella tularensis	

**Table 1-4 DURC Categories of Experiments<sup>168</sup>**

DURC Categories of Experiments	
1.	Enhances the harmful consequences of the agent or toxin.
2.	Disrupts immunity or the effectiveness of an immunization against the agent or toxin without clinical and/or agricultural justification.
3.	Confers to the agent or toxin resistance to clinically and/or agriculturally useful prophylactic or therapeutic interventions against that agent or toxin or facilitates their ability to evade detection methodologies.
4.	Increases the stability, transmissibility, or the ability to disseminate the agent or toxin.
5.	Alters the host range or tropism of the agent or toxin.
6.	Enhances the susceptibility of a host population to the agent or toxin.
7.	Generates or reconstitutes an eradicated or extinct DURC agent or toxin listed.

The challenge has always been proving the malicious intent from DURC experiments since the processes, knowledge, materials, and technologies employed could be used for either malevolent or benevolent purposes.<sup>169</sup> Even though both USG DURC polices recognize oversight as a shared responsibility, no concrete requirements were

<sup>167</sup> HHS, *United States Government Policy for Oversight of Life Sciences*, 2-3.; HHS, *United States Government Policy for Institutional Oversight of Life Sciences*, 8-9.

<sup>168</sup> HHS, *United States Government Policy for Oversight of Life Sciences*, 2-3.; HHS, *United States Government Policy for Institutional Oversight of Life Sciences*, 8-9.

<sup>169</sup> HHS, *United States Government Policy for Institutional Oversight of Life Sciences*, 5-6.

presented to ease implementation. The guidelines to satisfy USG DURC terms were loose and invites non-standardized reporting to meet compliance. For example, the USG DURC 2014 policy leaves it up to individual research institutions to satisfy its provisions of DURO. Again, pitching a new framework or suggesting policies for DURC issues were beyond the scope of the dissertation. Fortunately, the recent release of USG DURC 2014 policy imposed upon research institutions takes effect September 2015, which warrants future studies in collecting the DURC implementation guides for analysis.

## **1.6 Biorisk Oversight Gaps and Challenges**

This dissertation found that certain biorisk oversight gaps contribute to challenges shared by the USG and individual research institutions. The main oversight gap found by the GAO stems from no federal agencies accountable in tracking the U.S. population of BSL-3 laboratories since FSAP-registered BSL-3 laboratories only comprise a subset.<sup>170</sup> Biorisk sites are represented by the BSL-3 laboratories that neither handle select agents nor receive USG funds, but are exempt from FSAP registration requirements.<sup>171</sup> These concerns pressured policymakers to justify the construction of laboratories, and reevaluate oversight mechanisms in the life sciences.<sup>172</sup> Yet, policymakers that authorize biodefense funds are not afforded the comprehensive needs assessment from all federal

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<sup>170</sup> GAO. *High-Containment Biosafety Laboratories*, 13.

<sup>171</sup> Ibid.

<sup>172</sup> *Germs, Viruses, and Secrets: The Silent Proliferation of Bio-Laboratories in the United States*, United States House. 110<sup>th</sup> Cong. (2007) (statement of Alan Pearson, Witness, Director of Biological and Chemical Weapons Control Program, Center for Arms Control and Non-Proliferation, Congressional Oversight Panel, Washington DC).

agencies executing research activities, but continue to finance biodefense programs or biodefense-related programs having non-biodefense goals.<sup>173</sup>

The GAO also proved USG biorisk oversight cannot track the aggregate risks from the unknown population or new construction of BSL-3 and BSL-4 laboratories.<sup>174</sup> Oversight is further complicated where dangerous biological pathogens having dual-use applications are concealed within untracked laboratories.<sup>175</sup> This limited visibility of the USG to quantify the population of BSL-3 laboratories and aggregate biorisks eludes the recommendation to establish a regulatory body accountable to biorisk management and oversight. This limitation has empowered the general public to challenge transparency of life science research programs. For example, Boston University Medical Center (BUMC) is well-regarded with infectious disease research, but faced community opposition after its National Emerging Infectious Diseases Laboratories was constructed in 2008.<sup>176</sup>

Another biorisk oversight complication stems from individual Institutional Biosafety Committee (IBC) tied to a research institution that receives federal funds. The IBC primarily reviews experiments involving recombinant DNA, but may participate with biosecurity reviews. Research institutions and entities that receive federal funding for life sciences research must register its IBC with the National Institutes of Health

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<sup>173</sup> Franco, Crystal, and Sell, Tara Kirk. 2011. Federal Agency biodefense funding, FY2011-FY2012. *Biosecurity and bioterrorism: biodefense strategy, practice, and science* 9, no. 2: 117-137.; Franco, Crystal, and Sell, Tara Kirk. 2012. Federal Agency biodefense funding, FY2012-FY2013. *Biosecurity and bioterrorism: biodefense strategy, practice, and science* 10, no. 2: 162-181.

<sup>174</sup> GAO. *High-Containment Biosafety Laboratories*, 13.

<sup>175</sup> Kirk C. Bansak (2011): BIODEFENSE AND TRANSPARENCY, *The Nonproliferation Review*, 18:2, 349-368

<sup>176</sup> Bansak, *BIODEFENSE AND TRANSPARENCY*, 349.

(NIH). Federal biorisk oversight breakdowns are compromised when IBC registration requirements to the NIH are ignored by research institutions, which denies oversight.<sup>177</sup> The Sunshine Project examined the inability of the USG to enforce the requirement to have research institutions receiving federal funds establish an IBC for NIH registration.<sup>178</sup> The Sunshine Project identified 37 private biotechnology companies that received NIH funding, but did not have an NIH-registered IBC as part of a 2004 report.<sup>179</sup> The same 2004 Sunshine Project report also revealed the NIH and its sub-agencies, the NIH Office of Biotechnology Activities (NIH-OBA) and National Institute of Allergy and Infectious Diseases (NIAID), permitted biodefense grants to private research institutions not following *NIH Guidelines*, and that private “biotechnology companies plainly do not feel the need to register IBCs before seeking biodefense funding.”<sup>180</sup>

The federal biorisk policies carried out by local and USG entities are complex, and requires tight interagency communication and cooperation to be effective. Complications were evident where local oversight entities within research institutions have competing interests with federal agencies that resist shared biorisk oversight responsibilities. Even if the lockstep coordination and cooperation between local and federal oversight entities were consistent across research institutions, the limited scope of federal biorisk policies exempts scientists and research institutions completely independent from USG funding to be fully autonomous. The conflicts among local and

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<sup>177</sup> Sunshine Project. *Mandate for Failure: The State of Institutional Biosafety Committees in an Age of Biological Weapons Research* (2004).

<sup>178</sup> Sunshine Project, *Mandate for Failure*, 13-14.

<sup>179</sup> Ibid.

<sup>180</sup> Ibid., 14.

federal entities exacerbate the gaps introduced from the poor execution, limited applicability and visibility of federal biorisk oversight policies.

This section presents two tables drawn from by Professor Koblentz's Biosecurity Taxonomy Model that explains four trends contributing to increased biosecurity risks.<sup>181</sup> The first table introduces two biorisk oversight variables, Biorisk Oversight Layer (BOVL) and Biorisk Oversight Challenge (BOVC) to generalize the limited biorisk oversight capabilities of USG and research institutions. The second table further scrutinizes USG biorisk oversight challenges by introducing the Biosecurity Trend (BT) variable to deduce the plausible implications. The BT variable categorizes the environment conditions established by Koblentz that promote biosecurity risks, and presents its implications towards the biorisk oversight challenges from the first table.

### **1.6.1 Biorisk Oversight Variables: Oversight Layer (BOVL) and Challenge (BOVC)**

The section present two variables, Biorisk Oversight Layer (BOVL) and Biorisk Oversight Challenge (BOVC) to generalize limited biorisk management and oversight capabilities of the USG and research institutions. The BOVL variable represents either the U.S. Government (USG) as “Federal Oversight”, or Research Institution as “Local Oversight”. The second variable, BOVC represents one of three values, which are “Poor Execution”, “Limited Applicability” and “Limited Visibility” that are mapped to

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<sup>181</sup> Koblentz. 2010. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 110-112.

generally descriptive biorisk oversight challenges dealt by either “Federal Oversight” or “Local Oversight” entities. The BOVC variables comprised the table headers while the BOVL variables were assigned the table rows depicted in Table 1-5.

Table 1-5 organized the diverse biorisk oversight challenges and shortcomings that reference whether Federal Oversight or Local Oversight entities should be prescribed additional policies and guidance. The relationships between BOVL and BOVC variables followed the level-of-analysis approach to map the types of biorisk oversight challenges that necessitates Federal Oversight and Local Oversight entities to implement corrective or mitigation responses.<sup>182</sup> The BOVL variable acknowledges biorisk oversight as a shared responsibility, and its effectiveness is dependent on the cooperation and lockstep coordination between local and federal entities to address the challenges represented by the BOVC variables.

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<sup>182</sup> Koblentz. 2010. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 110-112.

**Table 1-5 Biorisk Oversight Layer (BOVL) and Challenges (BOVC)**

Biorisk Oversight Layer (BOVL)	Poor Execution – Compliance and Reporting	Biorisk Oversight Challenge (BOVC)	Limited Applicability – Federal Biorisk Regulations	Limited Visibility – Privately Funded Research Institutions
USG (Federal Oversight)	<ul style="list-style-type: none"> <li>Lack of coordination to carry out inspections of research institutions (Which oversight agency? When? What were the findings and overall assessment?)</li> <li>Difficult to track lack of compliance (Research institutions not following the rules).</li> <li>Permitting research institutions without NIH-registered IBC to continue experiments with federal funds (Federal agencies not enforcing the rules).</li> <li>Difficult to track lack of enforcement (Lack of federal resources to catch rule breakers, and impose penalties for non-compliance).</li> </ul>	<ul style="list-style-type: none"> <li>NIH-RAC role is authoritative, but narrow scope (funding condition).</li> <li>Limited scope of <i>BMBL</i> compliance (funding condition).</li> <li>Limited scope of <i>NIH Guidelines</i> compliance (funding condition).</li> <li>Limited scope of Select Agent Regulations (SAR).</li> <li>Limited scope of security risk assessment (SRA).</li> <li>Non-standardized Personnel Reliability Programs (PRP).</li> </ul>	<ul style="list-style-type: none"> <li>Lack of visibility of unknown population of BS-3 research institutions that are privately funded.</li> <li>No comprehensive BSL registry (visibility) demonstrates indecision, and squanders opportunity to develop deeper partnership with scientific community.</li> </ul>	
Research Institution (Local Oversight)	<ul style="list-style-type: none"> <li>IBC lack of participation or meeting minutes, inability to furnish information on demand (Sunshine Project raises lack of transparency).</li> <li>IBC membership are mostly scientists, so research interests ahead of security oversight interests; Integrity is questioned.</li> <li>Safety incident reporting is not timely, and under-reported (i.e., Sunshine Project raises lack of transparency).</li> <li>Research institution staff are unclear on incident reporting procedures, or what should be reported.</li> <li>Biological agent inventory tracking is questionable.</li> </ul>	<ul style="list-style-type: none"> <li>Federal policies offer guidance on incident reporting requirements, but execution by local entities are inconsistent and invites incomplete submissions.</li> <li>Non-standardized PRPs means the requirements across research institutions will implement different PRP practices based on resources, priorities and needs of the research institution.</li> </ul>		<ul style="list-style-type: none"> <li>Do-it-yourself biology movement is non-regulated, and provides scientists form of independence exempt from federal and local oversight.</li> </ul>

### **1.6.2 Biorisk Oversight Challenge Variables**

The Biorisk Oversight Challenge (BOVC) table header is the first level of analysis categorizing the challenges that warrant examination by federal or local entities. The biorisk oversight challenges were represented as variables, “Poor Execution – Compliance and Reporting” (“Poor Execution”), “Limited Applicability – Federal Biorisk Regulations” (“Limited Applicability”), and “Limited Visibility – Privately Funded Research Institutions” (“Limited Visibility”). The taxonomy table depicted by Table 1-5 correlated the BOVC variables with the level of oversight described the Biorisk Oversight (BOVL) variable representing either federal or local oversight entities. Each of the BOVC variables comprise separate conflicts between the scientific and security communities, and considered the competing interests and interrelationships that complicate biorisk oversight. The intent of presenting BOVC variables afforded visually mapping to BOVL sources as either federal or local entities as opposed to attempting to identify a comprehensive set of biorisk oversight challenges.

### **1.6.3 Biorisk Oversight Layer Variables: Federal and Local Oversight**

The second level of analysis described in Table 1-5 comes from where BOVC variables may be resolved or mitigated by either federal or local oversight entities. The Biorisk Oversight Layer (BOVL) described by Research Institution represents local oversight entities that were internal and external to an individual research institution. Local oversight entities may be scientists, researchers, IBC members that either reside at the research institution, or participate in either laboratory research or administrative

operations. Highly experienced scientists working with sophisticated biotechnologies and infectious diseases pose biorisks from either the accidental release of pathogens outside the physical lab containment boundaries, or the unwitting generation of dual-use knowledge or technology of interest to malevolent persons.<sup>183</sup> The Biorisk Oversight Layer (BOVL) described by USG represents federal oversight. Similarly, federal oversight sources are specific USG agencies that either directly or indirectly SAR on behalf of FSAP. Also, federal oversight includes advisory bodies, such as the NSABB and NIH Recombinant Advisory Committee, or law enforcement, such as the FBI.

#### **1.6.4 BOVC Variable: Poor Execution – Compliance and Reporting**

The BOVC variable in Table 1-5 with column labeled, “Poor Execution – Compliance and Reporting” described how federal and local entities were not keeping pace with their shared biorisk oversight responsibilities. The “Poor Execution” BOVC variable focused on poor execution of shared biorisk management and oversight responsibilities, lack of awareness, or undermining policies. The mediocre execution of compliance and reporting comes from local oversight entities wanting self-regulation or scientific autonomy, and federal entities having inadequate resources to satisfy its biorisk oversight commitments. NIH-registered IBCs that represent local oversight may demonstrate disinterest or non-compliance in its responsibilities by not recording meeting minutes or the inability to furnish information under the Freedom of Information Act (FOIA) to NGOs, such as the Sunshine Project. Research institutions may inadvertently

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<sup>183</sup> Koblenz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 110.

fail to report safety or security incidents promptly to the appropriate federal agency, such as the NIH, CDC, USDA, or FBI for various reasons. The reasons research institutions might underreport biorisk incidents may include avoiding embarrassment from media reaction, compliance audits, or site inspections perceived as disruptive, or lack of incident reporting procedures or guidance. Since the population of research institution exponentially outnumbers USG agencies involved with biorisk management, federal oversight entities may be inefficient at coordinating site inspections to audit compliance or promptly responding to reported biorisk incidents.

#### **1.6.5 BOVC Variable: Limited Applicability – Federal Biorisk Regulations**

The BOVC variable in Table 1-5 with column labeled, “Limited Applicability – Federal Biorisk Regulations” described how research institutions (local oversight) and the USG (federal oversight) were impacted by the narrow scope of current biorisk regulations and policies. The scope of national biorisk management and oversight is answered by whether or not a biological agent is regulated, if a research institution is federally funded, and if persons accessing regulated biological agents were authorized. The complications linked to “Limited Applicability” were evident where safety and security incident reporting was required, but was not standardized, warranted detailed guidance, and consumed resources that stimulate promote scientific self-regulation to bypass federal oversight where possible, and exacerbate the hurdles posed by “Poor Execution”. The competing interests between scientists and security entities may inadvertently be promoted by “Limited Applicability”.

The Federal Select Agent Program (FSAP) and Select Agent Regulations (SAR) requires research institutions to register with either the CDC or USDA if biological select agents or toxins (BSATs) were inventoried, used, transferred to conduct scientific experiments. The FSAP registration scope is widened where research institutions receiving biodefense funds must have its IBC register with NIH regardless if BSATs are employed. However, research institutions completely supported by private funds that work with dangerous non-BSAT pathogens are exempt from any USG registration requirement, and may voluntarily follow *BMBL* and *NIH Guidelines* or subject staff to security risk assessments (SRA). Local oversight entities may adopt personnel reliability programs (PRP) based on the resources, priorities and needs of the research institution in lieu of a standard PRP mandated by the U.S. government.

#### **1.6.6 BOVC Variable: Limited Visibility – Privately Funded Research Institutions**

The BOVC variable in Table 1-5 with column labeled, “Limited Visibility – Privately Funded Research Institutions” described the culmination of the relationships between federal and local oversight entities, and “Poor Execution” and “Limited Applicability” BOVC variables. The “Limited Visibility” BOVC variable discriminates lack of visibility of unknown population of privately funded research entities and BSL-3 facilities. The former is driven by attempting to answer “How many are privately funded research institutions pose biorisks that warrant federal oversight?” and seeks to quantify the existence of private research institutions, personnel, and scientific experiments exempt from USG oversight. The limited visibility of BSL-3 facilities seeks to answer

“What are the known entities and what are they doing?” against pre-identified research institutions, personnel, or scientific experiments that would be tracked in a notional BSL Registry. The questions posed by “Limited Visibility” was inspired by the concept of “known unknowns” towards privately funded research institutions and BSL-3 facilities.<sup>184</sup> The “known unknowns” concept acknowledges uncertainties as “factual and measurable; things are known, or not known, or known to a quantifiable degree or within quantifiable bounds.”<sup>185</sup> “Known unknowns” are considered expressible, potentially relevant, handled qualitatively, and typically identified by risk management plans.<sup>186</sup> For example, the biorisk oversight void in not having a national BSL registry underscores the known lack of visibility into the unknown population of privately funded research entities and non-registered BSL-3 laboratories. Likewise, the do-it-yourself biology (DIYbio) movement employs unregulated biological materials and community laboratory workspaces. To be sure, quantifying the types of research experiments, planned, current, and unauthorized but unterminated, or the diverse set of scientific research experiments conducted in unregulated DIYbio environments would be

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<sup>184</sup> McManus, Hugh, and Daniel Hastings. 2006. A framework for understanding uncertainty and its mitigation and exploitation in complex systems. *IEEE Engineering Management Review* 34, no. 3: 81-94.

<sup>185</sup> Former US Secretary of Defense, Donald Rumsfeld, made the controversial “Known knowns” speech in a 2002 NATO press conference about the Iraq war. See <http://www.nato.int/docu/speech/2002/s020606g.htm>; McManus and Daniel Hastings. 2006. *A framework for understanding uncertainty and its mitigation and exploitation in complex systems*, 83.; Pawson, R., G. Wong, and L. Owen. 2011. Known Knowns, Known Unknowns, Unknown Unknowns: The Predicament of Evidence-Based Policy. *American Journal of Evaluation.*; Phillips, H. (2006). Known unknowns. *New Scientist*, 192(2582), 28-31.

<sup>186</sup> Sutcliffe, Alistair, and Pete Sawyer. 2013. Requirements elicitation: Towards the unknown unknowns. In *2013 21st IEEE International Requirements Engineering Conference, RE 2013 - Proceedings*, 92-104. IEEE Computer Society.; McManus and Daniel Hastings. 2006. *A framework for understanding uncertainty and its mitigation and exploitation in complex systems*, 84.; Phillips, H. (2006). Known unknowns. *New Scientist*, 192(2582), 28-31.

considered a “known unknown” variable. While an astute biodefense analyst may devise additional uncertainties about USG and local oversight, the idiosyncrasies of the “known unknown” concepts that underscore “Limited Visibility” confirm unregistered research institutions exempt from USG oversight are a weakness of national biorisk oversight.

The lack of visibility is evident where privately funded research institutions may access dangerous non-BSAT materials, or provide the equipment and laboratory space to host dual-use experiments with or without BSAT materials. For example, the inability of the USG design and implement a comprehensive BSL registry affords no means to evaluate proposals that widen the scope of the FSAP. The SAR requires registration if research institutions or entities will possess, use, or transfer BSAT materials, which exempt private BSL-3 laboratories and entities that never formally request BSAT materials. Authorized persons physically transporting BSAT materials between registered entities could misdirect trace samples to private research institutions. If a national BSL registry were operational, and subsequent legislation required registration of all BSL-3 and BSL-4 laboratories, policymakers would have full visibility into all laboratories within U.S. borders.

### **1.6.7 Implications of Biosecurity Trends**

Changes to the biosecurity environment complicate biorisk oversight challenges. This section introduces the Biosecurity Trend (BT) variable to deduce the plausible implications of the overwhelming biorisk oversight challenges previously discussed. As biosecurity trends converge and place biological threats onto the international agenda,

policymakers have to tighten regulations controlling access to pathogens and related information.<sup>187</sup> The insertion of environment changes to biosecurity introduced new burdens to the mounting inefficiencies of federal and local biorisk oversight as a type of “wicked problem”.<sup>188</sup> Operational policy responses addressing biorisk oversight challenges creates tradeoffs from the possible solutions to resolve risks even when target and compensating risks cannot be weighed.<sup>189</sup> For instance, extra bioterrorism legislation may build reluctance by microbiologists to work with select agents, which may weaken USG preparedness against biological weapons attacks or emerging and reemerging infectious diseases.<sup>190</sup> Likewise, regulating access to pathogens and USG-controlled access to information is a double-edged sword.<sup>191</sup> The proposed solutions may appear sensible, but also puts values important to the security and scientific communities at risk, specifically researchers and universities.<sup>192</sup>

Several trends explain not only the increased risks of biosecurity, but also the awareness of its concepts to the point where international security experts cannot ignore the implications.<sup>193</sup> The broad concept of biosecurity is interrelated with four trends demonstrating 1) advances in science and technology, 2) globalization, 3) emerging and reemerging infectious diseases (ERID), and 4) the changing nature of conflict that

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<sup>187</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 103.; Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 112.

<sup>188</sup> Rittel, Horst W. J., and Melvin M. Webber. 1973. Dilemmas in a general theory of planning. *Policy Sciences*.

<sup>189</sup> Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 92.

<sup>190</sup> Ibid.

<sup>191</sup> Ibid., 108-112.

<sup>192</sup> Ibid., 115.

<sup>193</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 100.

increase the risks posed by biological threats.<sup>194</sup> Each trend embodies dissimilar challenges within international security, but unifying the separate trends has pushed the spectrum of biological threats onto the international forum.<sup>195</sup>

A correlation table is presented in Table 1-6, and applied the characteristics of the four biosecurity trends by postulating its implications against the biorisk oversight challenges. The BT variable is introduced to understand the impact to the BOVC variables from Table 1-5 when additional burdens were realized. The correlation table borrowed from Koblenz's caveat that predicting "when a particular risk poses a threat to security—and whether national security or human security is the more appropriate paradigm for addressing that threat—is an inexact science."<sup>196</sup> The BOVC variables from Table 1-5 were carried over as table header parameters in Table 1-6 to understand how evolving biosecurity trends insert complications to biorisk oversight challenges. Interpreting Table 1-6 follows the same approach as Table 1-5, and conceptualized the continuous presence of biosecurity trends independent from biorisk oversight challenges, and the trends exacerbates biorisk oversight challenges pinned to federal and local oversight entities. A comprehensive analysis of all the possible impacts affecting oversight entities within the scientific or security communities was not afforded since the intent was to present plausible examples.

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<sup>194</sup> Ibid., 100-104.

<sup>195</sup> Ibid., 100.

<sup>196</sup> Ibid., 112.

**Table 1-6 Oversight Implications of Biosecurity Trends**

Biosecurity Trend (BT)	Biorisk Oversight Challenge (BOVC)		
	Poor Execution – Compliance and Reporting	Limited Applicability – Federal Biorisk Regulations	Limited Visibility – Privately Funded Research Institutions
Advances in Science and Technology	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>Oversight entities are forced to keep pace with new scientific advancements.</li> <li>Oversight may necessitate additional site audits to determine if scientific experiments are withholding information where research institutions exploit new technologies.</li> <li>Research institutions may not initially share how new technologies and advancements were involved if USG policies are unclear.</li> <li>If technological advancements circumvent security regulations, scientists could delay reporting research activities if disclosure restricts opportunity to study advancements.</li> </ul>	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>New policies needed if advances in science and technology adopted by research entities are not regulated.</li> </ul>	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>Do-it-yourself biology (DIYbio) movement is non-regulated, and provides scientists form of independence exempt from USG oversight.</li> </ul>
Globalization	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>Oversight entities are forced to keep pace with international outlets that afford access to scientific materials and biological agents that are otherwise regulated.</li> <li>Promote international code of ethics for scientists.</li> <li>Encourage international partnerships in developing a standardized PRP and vetting process.</li> <li>Strategy may shift towards monitoring international supply sources of biological materials/technologies unregulated by USG.</li> <li>Align with USG to promote code of ethics, and awareness of dual-use dilemma.</li> <li>Emphasis to monitor people with scientific aspirations in addition to those holding SRA.</li> </ul>	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>New policies needed if advances in science and technology from globalization are adopted by research entities are not regulated.</li> <li>New policies needed if globalization affords unregulated research entities access to biological materials that are regulated.</li> <li>USG may need to extend SAR with international partner states willing to enforce its provisions.</li> <li>Outreach regarding code of ethics.</li> <li>Reevaluate PRP, may need to standardize to address globalization implications.</li> <li>Adjust SRA requirements with the provision that regulated agents will be obtained from authorized biological storage facilities.</li> </ul>	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>Accessibility to scientific knowledge, expertise, equipment, and materials are more widely available if one seeks to recruit resources for malicious purposes.</li> <li>Globalization widens accessibility to scientific knowledge, expertise, equipment, and materials if non-state actors seek to recruit resources for malicious purposes.</li> </ul>

<p><b>Changing Nature of Conflict (CNC):</b></p> <p><b>Emerging and Reemerging Infectious Diseases (ERID)</b></p>	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>• Out of scope – no impact unless modifying USG policies to address CNC or ERIDs.</li> <li>• Evolving CNC not always predictable, and requires additional analysis to link biological materials to capabilities of actors or states with bioterrorism aspirations.</li> </ul>	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>• Out of scope – no impact unless USG policies afford funding requirements or provisions to address CNC or ERIDs.</li> <li>• Loosen SAR requirements if working with non-FSAP registered entities to investigate ERIDs</li> </ul>	<p>Shared oversight implications</p> <ul style="list-style-type: none"> <li>• (CNC) Do-it-yourself biology movement is non-regulated, and non-state actors could take leverage lack of government oversight.<sup>197</sup></li> <li>• Unregulated microbial collections escapes federal and local oversight.</li> </ul>
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<sup>197</sup> The dissertation author considers unregulated do-it-yourself (DIY) biology movement, and its research activities as indistinguishable from unregistered BSL-3 laboratories.

The convergence of biosecurity trends, such as globalization and scientific advancements and technologies, have complicated failing efforts to manage the spread of information and technologies.<sup>198</sup> The diffusion of information and technologies across borders, including biological weaponry, confirms access by hostile nations or would-be bioterrorists may be delayed, but not prevented.<sup>199</sup> An overview of the biosecurity trends are discussed to conceptualize the distinct characteristics, and credible implications in exacerbating the biorisk oversight challenges.

Advances in science and technology acknowledged the role of biotechnology and the motivation to refine scientific techniques and methods.<sup>200</sup> Outlets contributing towards this biosecurity trend include synthesizing technologies, and techniques to either increase the virulence or resistance to antibiotics and vaccines via molecular biology and synthetic biology. The refinement of skills, materials, and technologies contributing towards biomedical research and pharmaceutical production demonstrates the dual-use dilemma where the aforementioned assets, intellectual or tangible, could be produce biological weapons.<sup>201</sup>

The pharmaceutical and biotechnology industries have heightened biorisks to international security via the globalization biosecurity trend.<sup>202</sup> Koblentz brilliantly summarizes that “the diffusion of information about the life sciences are making the ingredients necessary to develop biological weapons—knowledge, expertise, equipment,

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<sup>198</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 100.; Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 118.

<sup>199</sup> Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 118-119.

<sup>200</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 100-101.

<sup>201</sup> Ibid.

<sup>202</sup> Ibid.

and materials—more widely available.”<sup>203</sup> Stern echoed a similar finding biological pathogens considered by the USG as potential agents for bioterrorism were stocked by thousands of clinical and diagnostic laboratories. Similarly, equipment and materials used for beer production that are available to the international scientific community could be repurposed to produce biological agents.<sup>204</sup> Globalization is further demonstrated by international terrorist organizations that form virtual networks, or operate affiliate groups across borders to avoid detection.<sup>205</sup> While the probability is low, international terrorists may extend their presence in the pharmaceutical and biotechnology industries to access loosely guarded biological agents by planting insiders or recruiting current employees of clinical, pharmaceutical or biomedical laboratories.

Equally, globalization introduced another biosecurity trend, which is the spread of emerging and reemerging infectious diseases (ERID) without assistance of terrorists.<sup>206</sup> Unlike nuclear weapons produced in authorized government facilities, biological pathogens that exist in the environment may unwittingly be carried across borders and many pathways via growth in global agricultural supply chains, international travel, and tourism.<sup>207</sup> The SARS coronavirus and the H1N1 influenza virus are respiratory diseases that originated as local outbreaks eventually spreading to other countries.<sup>208</sup>

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<sup>203</sup> Ibid.

<sup>204</sup> Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 95.

<sup>205</sup> Ibid., 97.

<sup>206</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 100.

<sup>207</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 102-103.; Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 95.

<sup>208</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 103.

The changing nature of conflict (CNC) biosecurity trend was evident from the emergence of terrorist groups with aspirations to cause mass casualties via the acquisition of chemical, biological, and nuclear weapons.<sup>209</sup> The Aum Shinrikyo Japanese cult, known for the 1995 sarin gas attacks in Tokyo subway system, aligned with the biosecurity trend.<sup>210</sup> Although an accurate casualty count cannot be quantified, if Aum Shinrikyo employed ‘pure sarin or advanced delivery technology, or if this had been an attack with a biological agent, the lack of rapid decontamination of the subway and the victims could have been fatal to far more people.’<sup>211</sup> The terrorists’ visible motivation to cause mass casualties not only endangered human lives, but also compromised the political values, interests, and institutions.<sup>212</sup> While it is difficult for intelligence analysts to predict the evolving motivations and intentions of terrorists over time, terrorists were generally able to keep pace with risk-reduction strategies by widening their selection of more vulnerable targets or acquire more effective or less detectable weapons.<sup>213</sup> Unless terrorists become biological warfare stalwarts, the range of outcomes for biological attacks may be a “minor annoyance to a society-altering catastrophe.”<sup>214</sup>

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<sup>209</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 103-104.; Koblentz points out another example of changes in the nature of conflict, which is demonstrated when a state is hit with a disease outbreak that causes internal conflicts, such as a severely weakened public health infrastructure, a large population of displaced persons that require food, shelter, and medical care, and international assistance.

<sup>210</sup> Pangi, Robyn. 2002. Consequence Management in the 1995 Sarin Attacks on the Japanese Subway System. *Studies in Conflict & Terrorism*.

<sup>211</sup> Pangi. 2002. *Consequence Management in the 1995 Sarin Attacks on the Japanese Subway System*, 434.

<sup>212</sup> Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 99.

<sup>213</sup> Ibid., 100.

<sup>214</sup> Ibid., 101.

## **1.7 Biorisk Oversight Challenges, and Biosecurity Trends**

Table 1-5 presented two variables, Biorisk Oversight Layer (BOVL) and Biorisk Oversight Challenge (BOVC) that acknowledged biorisk oversight as a shared responsibility fraught with limitations in either policy or resources enforce compliance. The second table, Table 1-6 reapplied the BOVC variables from Table 1-5 to understand how changes in the biosecurity environment increase biorisks by introducing additional complications to biorisk oversight. The relationship between the two tables demonstrated federal and local entities were unable to keep pace with national biorisk oversight challenges as a shared responsibility, which becomes more evident when biosecurity trends impose new complications and oversight responsibilities.

A complete analysis formulating a comprehensive set of impacts of biosecurity trends towards biorisk oversight challenges at the intersections were beyond the scope of the dissertation, but plausible examples considered public knowledge were introduced. The abovementioned variables, Biorisk Oversight Layer (BOVL), biorisk oversight challenge (BOVC), and biosecurity trend (BT) may be examined to formulate the impact of the latter against the former. For example, Advances in Science and Technology and Globalization reflect the inherent dual-use characteristics of biomedical research that produce new medicine or refine basic science techniques employed in the commercial, security and defense sectors, possibly internationally.<sup>215</sup> As sophisticated science techniques are learned, practiced, and coupled with the increasing availability of

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<sup>215</sup> Koblentz. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 100-104.; Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 110.

seemingly harmless dual-use equipment, such as hardware employed by alcohol and beer producers, may be repurposed to mimic biomedical capabilities to international scientific communities.<sup>216</sup> The combination of scientific advancements shared internationally and the global availability of pathogens and dual-use hardware complicates the perceived problems in controlling access to information. Even if federal oversight entities and the general scientific community address the dual-use dilemma by agreeing to suppress controversial DURC methods and findings, the latter is cautioned to “regulate themselves or that controls will be imposed on them”.<sup>217</sup>

The individual biorisk oversight challenges may not be enough to justify allocating resources to regulate research entities that were either supported by private funds or exempt from SAR. A BSL-3 laboratory by itself does not make it dangerous, neither does studying biological agents as part of an experiment make the research dual-use. However, when each biorisk oversight challenge were combined with the lack of applicability and visibility of privately funded research institutions, the weaknesses of self-regulation and its concerns were heightened. Biorisk oversight is so divided among agencies and across disciplinary boundaries that policymakers may fail to identify all biosafety and biosecurity gaps, or detect wasteful redundancies within the oversight process. Again, the plausible impacts of the biosecurity trends towards biorisk oversight challenges and oversight were beyond the scope of the dissertation, and necessitates further investigation.

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<sup>216</sup> Stern, 2003. *Dreaded Risks and the Control of Biological Weapons*, 95.

<sup>217</sup> Ibid., 112.

## **1.8 Roadmap of the Dissertation**

Chapter 2 provides the detailed methodology, and discusses the DSR-IS framework that will be used to produce the artifacts, and their order of creation. Each phase of the DSR-IS framework describes the artifacts created, the activities involved, and the data, tools, and technologies employed. Chapters 3-4 commences the methodology by fabricating the DSR-IS artifacts to answer supporting questions 1-2. Chapter 5 analyzes the DSR-IS artifacts produced from Phases I and II. Chapter 6 applies the knowledge learned about the interrelationships of entities from the scientific and government agencies to create new DSR-IS artifact, which are the specialized tables representing the biorisk oversight patchwork map (BOPM). Finally, Chapter 7 synthesizes the findings from Chapters 3-6 to answer “How do the interrelationships between the problem domains of biosafety and biosecurity affect oversight of biorisks?”, affords the conclusion and several policy recommendations. Policy recommendations, such as establishing a lead federal agency accountable to biorisk management, broadening the applicability of a national biorisk oversight BSL (BOBSL) Registry, and the standardization of biorisk oversight reporting are discussed.

## **CHAPTER 2. METHODOLOGY**

Chapter two introduces design science research for information systems (DSR-IS), and how it was applied to answer the research question. The strength of DSR-IS stems from the information technology (IT) artifacts taught in academia and practiced by IT professionals to develop information systems when requirements are not well understood. The custom DSR-IS framework employed produced original artifacts, such as entity instance and unified modeling language (UML) activity diagrams, and a relational database to understand the complexities of biorisk oversight.<sup>218</sup> The selection of DSR-IS afforded the flexibility to create novel artifacts to understand a complex problem, develop a knowledge base, and refine the fidelity of the artifacts as details were learned. The contributions of the study come from the original diagrams inspired by entity relationship (ER) and UML notations, and conceptual biorisk oversight patchwork map (BOPM) synthesizes the said diagrams to examine the shared oversight responsibilities between federal agencies and research institutions for specific biorisk oversight objectives. The remainder of Chapter two presents a background of the design science research (DSR) and the types of artifacts produced before revisiting the research question and the customized DSR-IS framework. Finally, Chapter two closes by describing the original DSR-IS artifacts produced.

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<sup>218</sup> Entity relationship (ER) diagrams were originally considered as an appropriate DSR artifact to produce in the methodology. Through subsequent evaluations of visual IT models, and suggestions from committee member, Dr. Nirup Menon, the dissertation creates novel diagrams inspired by notations used by UML class and activity diagrams. However, the notations employed will not strictly follow UML conventions for DSR-IS Phase I artifacts since the intent is to conceptualize entities and entity relationships as opposed to implementing a live information system.

## 2.1 Background of DSR and DSR for Information Systems

The dissertation justifies the use of design science research (DSR) to develop the framework that organizes the relevant entities, their characteristics, and their interrelationships explaining the interfaces between problem domains. The wicked complexities of biorisk oversight introduced by the intricate interrelationships between the problem domains, and its entities continually frustrate policymakers. DSR addresses what would be considered wicked problems.<sup>219</sup>

Simon popularized design science, which he originally termed “sciences of the artificial”, by making distinctions against natural science, and the use of artifacts to acquire knowledge to understand the complexities of natural science.<sup>220</sup> The relationship between natural science and design science is explained by the role of artifacts.<sup>221</sup> Natural science impinges upon designs science by observing artifacts based on its implemented structures and how they perform in their intended environment.<sup>222</sup> So then design science establishes the knowledge demonstrated by the constructs, techniques, and methods representing the artifacts to test a set of functional requirements.<sup>223</sup> DSR is demonstrated by the act of acquiring the missing knowledge via the design, analysis,

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<sup>219</sup> Hevner, Alan R., Salvatore T March, Jinsoo Park, and Sudha Ram. 2004. Design Science in Information Systems Research. *MIS Quarterly* 28, no. 1: 75-105.; Rittel and Webber, *Dilemmas in a general theory of planning*.

<sup>220</sup> Simon, Herbert A.. *The sciences of the artificial*. 3rd ed. Cambridge, Mass.: MIT Press, 1996

<sup>221</sup> Natural science is also referenced as behavioral science in literature. The dissertation employs the former term when surveying sources.

<sup>222</sup> Simon, *The sciences of the artificial*, 4-6.; Simon explains the concept by using a knife as an artifact example. How well a knife will cut depends on the material of the blade, and the surface hardness of the object to which the knife is applied.

<sup>223</sup> Vaishnavi, V. and Kuechler, W. (2004). “Design Science Research in Information Systems” January 20, 2004, last updated September 30, 2011. URL: <http://www.desrist.org/desrist>

reflection, and abstraction techniques that create the artifacts.<sup>224</sup> Iivari posits that a practical problem comprised of sub-problems may be easily linked to theories if it is abstracted.<sup>225</sup> Once a practical problem was abstracted into a general problem, the utility of design science was demonstrated where a new idea or artifact introduces fresh opportunities to improve field practices. Simon does not make the distinction between design science and DSR, but recognizes that every “problem-solving effort must begin with creating a representation for the problem a problem space in which the search for a solution can take place.”<sup>226</sup> So then the major objective of DSR is to develop knowledge that will be applied to produce artifacts addressing unsolved problem space. DSR ignores justified theories that will not contribute to its intended knowledge base in the same way conceived artifacts solve nonexistent problems.<sup>227</sup> Subsequent studies maintain the premise that acquired knowledge and competency of a problem domain to formulate solutions are fundamental, but emphasize the need to scrutinize the rigor and contribution of artifacts produced.<sup>228</sup> Hevner summarized this view by asserting the main difference between “routine design and design research is the clear identification of a contribution to the archival knowledge base of foundation and methodologies”.<sup>229</sup>

March and Smith developed a two-dimensional (2D) DSR model that considered the interaction between natural science and design science to assist researchers and

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<sup>224</sup> Vaishnavi and Kuechler, *Design Science Research in Information Systems*, 2-4.

<sup>225</sup> Iivari, Juhani. 2007. A Paradigmatic Analysis of Information Systems As a Design Science. Scandinavian Journal of Information Systems 19, no. 2: 39-64.52

<sup>226</sup> Iivari, *A Paradigmatic Analysis of Information Systems As a Design Science*, 52.; Simon, *The sciences of the artificial*, 108-109.

<sup>227</sup> Hevner et al., *Design Science in Information Systems Research*, 81.

<sup>228</sup> Ibid.

<sup>229</sup> Ibid.

scholars in categorizing the research activities and research outputs to produce. At a high level, natural science consumes and applies, but carry no capability to create methods.<sup>230</sup> Design science was devised to produce the “methodological tools that natural scientists use.”<sup>231</sup> Since design science activities were left at the discretion of engineers and architects to devise prescriptive solutions for complex problems, the 2D DSR model also considered rigor and scrutinizes how artifacts contribute to an existing knowledge base. The 2D DSR model developed is aligned with their belief that natural science seeks to understand reality while design science seeks to “create things that serve human purposes”.<sup>232</sup> The 2D DSR model in Figure 2-1 illustrates the research outputs and research activities where the former are types of artifacts, and the latter are either natural science or design science activities.<sup>233</sup>

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<sup>230</sup> March & Smith, *Design and natural science research on information technology*, 257-258.

<sup>231</sup> Ibid.

<sup>232</sup> Ibid., 253.

<sup>233</sup> Ibid., 255-256.

		Research Activities			
		Build	Evaluate	Theorize	Justify
Research Outputs	Constructs				
	Model				
	Method				
	Instantiation				

**Figure 2-1 March & Smith 2D Design Science Research Model<sup>234</sup>**

The first dimension of the 2D DSR framework maps research outputs to the artifacts recognized by design science, which are constructs, models, methods, and instantiations. The research activities in the second dimension relate to either design science or natural science. The build and evaluate research activities align with design science while the remaining activities, theorize and justify, map to natural science. The 2D DSR model intersects with information systems research where design science activities to build and evaluate constructs, models, methods, and instantiations are executed. The 2D DSR model also intersects information systems research with natural science by demonstrating how the theories are supported by artifacts, and justifying such theories.

The “*Three Cycle View of Design Science Research*” presented by Hevner described the internal processes aligned with 2D DSR framework by March and Smith in

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<sup>234</sup> March & Smith, *Design and natural science research on information technology*, 256.

Figure 2-1 as design cycles, which iterated the research activities of building and evaluating artifacts and processes to evaluate said artifacts.<sup>235</sup> The design science research cycles in Figure 2-2 represent the iterative analysis to create and refine the artifacts in the dissertation, which is represented by the Design Cycle.<sup>236</sup> The Relevance, Rigor, and Design cycles must be distinguishable in a design science research project.<sup>237</sup> The Relevance Cycle links the specific problem spaces that form the boundaries of the environment to the design science research activities, and determines the requirements to initiate research. The Rigor Cycle considers historical knowledge, and evaluates how the design research project contributes to past studies. The churning of “Build Design Artifacts & Processes” and “Evaluate” process blocks underlying the Design Cycle is the actual execution of DSR.<sup>238</sup> The design cycle is the core process that interacts with the relevance and rigor cycles, and its interactions ensures new artifacts contribute to the existing knowledge base.<sup>239</sup>

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<sup>235</sup> Hevner et al., *Design Science in Information Systems Research*, 79-81.; Hevner, *A Three Cycle View of Design Science Research*, 88-91.; March & Smith, *Design and natural science research on information technology*, 255-260.

<sup>236</sup> Hevner, *A Three Cycle View of Design Science Research*, 88-91.

<sup>237</sup> Ibid., 88.

<sup>238</sup> Hevner et al., *Design Science in Information Systems Research*, 79-81.

<sup>239</sup> Hevner, *A Three Cycle View of Design Science Research*, 88.

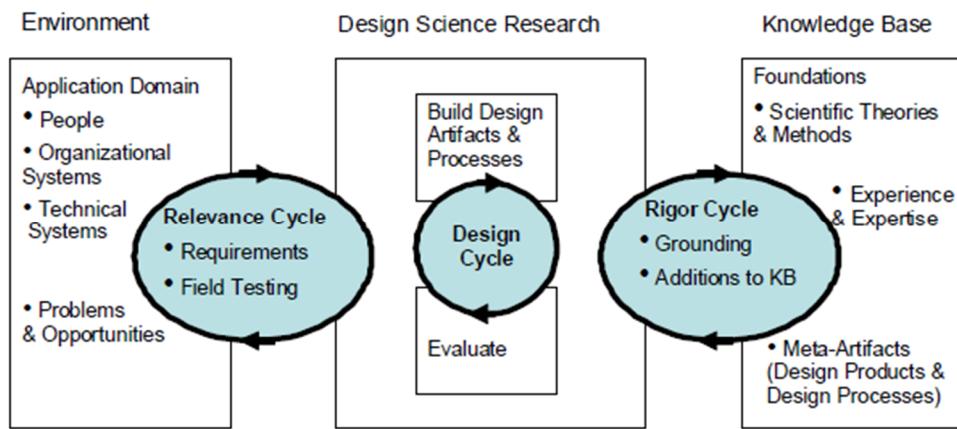


Figure 2-2 Three Cycles of Design Science Research<sup>240</sup>

The “rigor” and “contribution” concepts that scrutinize the construction of artifacts were adopted by information systems researchers, and distinguishes information systems as a “design science from the practice of building IT artifacts”.<sup>241</sup> Information systems engineers and software architects develop artifacts, which could be synthesized in a DSR framework, to explain complex processes, systems, and relationships between objects.<sup>242</sup> The pairing between DSR and information systems research (DSR-IS) has been successful in creating specialized information technology (IT) artifacts, such as unified markup language (UML) class diagrams, UML activity diagrams, and entity relationship diagrams (ER) as artifacts produced from iterative systems analysis and design to understand the behavior of complex systems.<sup>243</sup> These types of artifacts are

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<sup>240</sup> Hevner, *A Three Cycle View of Design Science Research*, 88.

<sup>241</sup> Iivari, *A Paradigmatic Analysis of Information Systems As a Design Science*, 50.

<sup>242</sup> Ibid., 43-53.

<sup>243</sup> Tan, Xin, K. Siau, and John Erickson. 2007. Design Science Research on Systems Analysis and Design: The Case of UML. In Thirteenth Americas Conference on Information Systems, Keystone, CO.;

relevant because they are the constructs employed to produce models studied as part of information systems research.<sup>244</sup> Information systems is an applied discipline, and the approaches and techniques used to create specialized IT artifacts represent prescriptive research.<sup>245</sup> The relationship is reciprocated since IT practice focuses on development and maintenance as design activities practiced by systems analysts, engineers, and software developers to construct artifacts that specifically address organizational tasks.<sup>246</sup>

The visual framework developed by Hevner et al. in Figure 2-3 incorporated the research activities from the 2D DSR model conceived by March and Smith, but affords the holistic interactions between design science and information systems research (DSR-IS). The problem spaces recognized by DSR are represented by the people, organizations, and technologies within a specific environment.<sup>247</sup> The business needs from the environment represent the perceived problem by the researcher, and initiates the research activities and research outputs of DSR.<sup>248</sup> Relevance to initiate a DSR study is established by the problem spaces explaining the business needs that compel information systems researchers to take action. The knowledge base affords the historical intelligence to assist researchers review prior foundational theories, frameworks, instruments, and artifacts to develop the build and evaluate phase of the DSR.<sup>249</sup> The foundational

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there is an active organization comprised of industry and academic scholars that promotes the use of design science research in information systems and technology. See <http://desrist.org>

<sup>244</sup> The terms artifact, construct, model, and method have special meanings in design science. A more detailed discussion is afforded at the end of the chapter.

<sup>245</sup> Iivari, *A Paradigmatic Analysis of Information Systems As a Design Science*, 55.

<sup>246</sup> March & Smith, *Design and natural science research on information technology*, 252.

<sup>247</sup> Hevner et al., *Design Science in Information Systems Research*, 79.; Simon, *The sciences of the artificial*, 108-109.

<sup>248</sup> Hevner et al., *Design Science in Information Systems Research*, 79.

<sup>249</sup> Ibid., 79-80.

knowledge and methodologies provided the standard rigor recognized by researchers, and afforded pertinent insights or approaches in formulating the potential solution spaces and research activities to consider.<sup>250</sup>

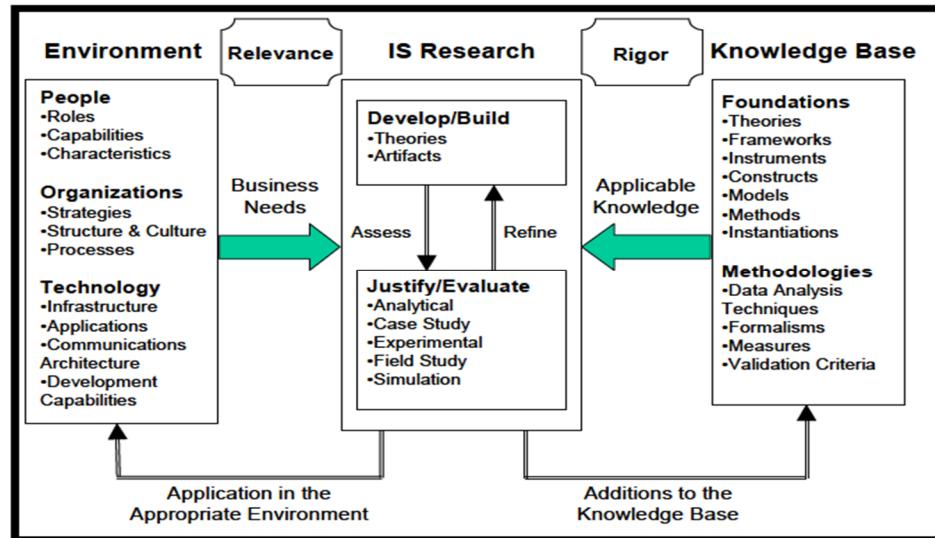


Figure 2-3 Design Science in Information Systems Research<sup>251</sup>

The three cycle DSR and DSR-IS processes in Figure 2-2 and Figure 2-3 were correlated to elements of the dissertation. The relevance cycle is driven by the research question. The iterative analysis of open source materials to understand biorisk oversight gaps in policy, regulations, and challenges encompass the knowledge base and rigor cycle afforded by Chapters 3-6. Finally, the central DSR-IS cycle is the creation of the original

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<sup>250</sup> Peffers, Ken, Tuure Tuunanen, Marcus A. Rothenberger, and Samir Chatterjee. 2008. A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*.

<sup>251</sup> Hevner et al., *Design Science in Information Systems Research*, 80.

visual artifacts, conceptual BOBSL Registry, and biorisk oversight patchwork work (BOPM) that contributed towards biodefense studies and biorisk management.

## 2.2 Types of Design Science Research Artifacts

Design Science Research employs artifacts to understand complex problems. An artifact refers to any of the four classes of objects created to solve or examine a domain problem.<sup>252</sup> The four classes of objects are constructs, methods, models, and instantiations, and their relationships within DSR are depicted in Figure 2-4. Constructs establish the vocabulary, symbols, and notations used to define problems and solutions.<sup>253</sup> Constructs are used as tools to “enable the construction of models or representations of the problem domain”.<sup>254</sup> Actually, constructs are employed in Design Science to visualize or represent a problem “so as to make the solution transparent”.<sup>255</sup> The symbols and notations used to create entity-relationship diagrams (ER Diagram) are examples of constructs to carry out systems analysis and database design when representing

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<sup>252</sup> Hevner et al., *Design Science in Information Systems Research*, 77.; March & Smith, *Design and natural science research on information technology*, 253-254.; Peffers et al., *A Design Science Research Methodology for Information Systems Research*, 8-10.; Simon, *The sciences of the artificial*.

<sup>253</sup> Hevner et al., *Design Science in Information Systems Research*, 78.; March & Smith, *Design and natural science research on information technology*, 255-256.

<sup>254</sup> Hevner et al., *Design Science in Information Systems Research*, 83.

<sup>255</sup> Simon, *The sciences of the artificial*, 132.

information systems.<sup>256</sup> Constructs establish the underlying language, which afford the vocabulary and symbols to illustrate the problem being examined.<sup>257</sup>

Methods are the algorithms and practices employed to perform goal-directed activities. DSR method artifacts are based on underlying languages defined by the construct artifacts to formulate possible solution spaces and create model artifacts.<sup>258</sup> Methods establish the algorithms and practices, which describe the steps to perform a task.<sup>259</sup> The selection of methods employed in a Design Science methodology should afford guidance on how to solve specific problems or “how to search the solution space”.<sup>260</sup> Likewise, methods are used to “translate from one model or representation to another in the course of solving a problem”.<sup>261</sup>

Models are the abstractions or set of propositions that express the relationships among constructs.<sup>262</sup> DSR employs model artifacts to represent “situations as problem and solution statements”.<sup>263</sup> DSR models are produced by construct artifacts that are aggregated to describe processes, tasks, and relationships between objects. DSR model and method artifacts may be paired so that the latter may apply parts of the former as input, which may be used to “translate from one model or representation to another in the

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<sup>256</sup> Chen, Peter Pin-Shan. 1976. The Entity-Relationship Unified View of Data Model-Toward. *ACM Transactions on Database Systems* 1, no. 1: 9-36.; Hevner et al., *Design Science in Information Systems Research*, 84.; March & Smith, *Design and natural science research on information technology*, 256.

<sup>257</sup> Hevner et al., *Design Science in Information Systems Research*, 77-78.; March & Smith, *Design and natural science research on information technology*, 256.

<sup>258</sup> March & Smith, *Design and natural science research on information technology*, 257.

<sup>259</sup> Hevner et al., *Design Science in Information Systems Research*, 76-79.; March & Smith, *Design and natural science research on information technology*, 257.

<sup>260</sup> Hevner et al., *Design Science in Information Systems Research*, 79.

<sup>261</sup> March & Smith, *Design and natural science research on information technology*, 257.

<sup>262</sup> Ibid., 256-257.

<sup>263</sup> Ibid.

course of solving a problem".<sup>264</sup> Models establishes the abstractions and representations by identifying the propositions or statements that depict the relationships among constructs.<sup>265</sup> Really, models organize constructs to examine the effects of design decisions by identifying the connections between problem and solution components of real world dilemmas.<sup>266</sup> For example, the "representation of an information system's data requirements using the Entity-Relationship constructs is more appropriately termed a model" that unravels what information a notional reporting system must provide.<sup>267</sup>

Instantiations are the implemented and prototype systems to realize a possible solution in its environment. DSR instantiations artifacts not only afford the feasibility and effectiveness of the models and methods they contain, but also the tacit knowledge to refine subsequent model and method artifacts to address complex problems.<sup>268</sup> An instantiation artifact implements the prototype system to demonstrate feasibility with regards to the design process and the models and methods contained in the designed product.<sup>269</sup> In effect, the instantiation implements the constructs, methods and model artifacts to realize a prototype system or functional product.<sup>270</sup> Unlike methods and models, an instantiation artifact affords a concrete assessment of the suitability a prototype system or functional product in regards to its intended purpose.<sup>271</sup>

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<sup>264</sup> Ibid.

<sup>265</sup> Hevner et al., *Design Science in Information Systems Research*, 82-90.; March & Smith, *Design and natural science research on information technology*, 256-257.

<sup>266</sup> Hevner et al., *Design Science in Information Systems Research*, 82-90.

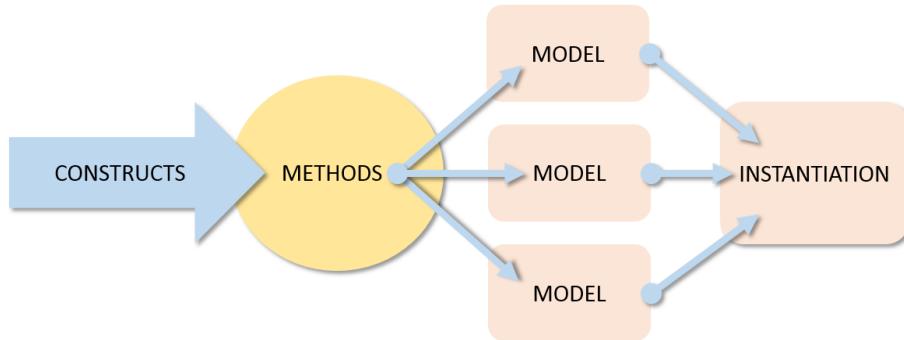
<sup>267</sup> March & Smith, *Design and natural science research on information technology*, 256-257.

<sup>268</sup> Ibid., 257-258.

<sup>269</sup> Hevner et al., *Design Science in Information Systems Research*, 84.; March & Smith, *Design and natural science research on information technology*, 257-258.;

<sup>270</sup> March & Smith, *Design and natural science research on information technology*, 257-258.

<sup>271</sup> Hevner et al., *Design Science in Information Systems Research*, 79.



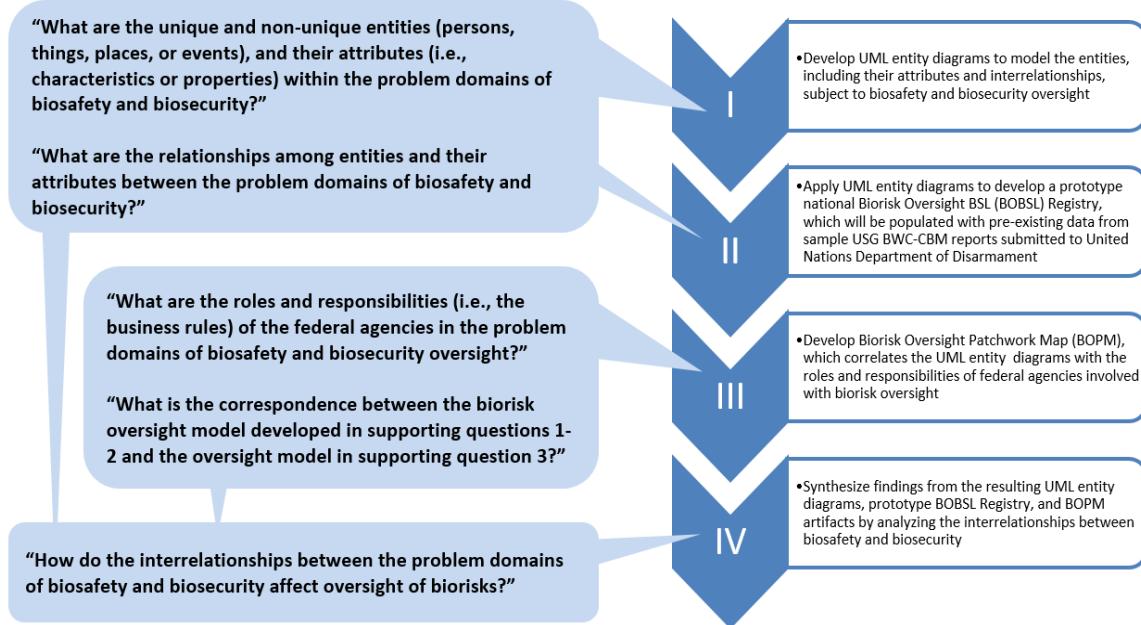
**Figure 2-4 Relationships of design science research artifacts**

## 2.3 Custom DSR-IS Framework Mapping to Research Questions

The methodology leveraged Design Science Research (DSR) for Information Systems (DSR-IS) to develop specialized artifacts to observe biorisk oversight and its complexities. The original artifacts produced establish a tool to visually understand the entity interrelationships and processes linked to biorisk oversight, the shared entity artifacts, underlying data requirements to implement a biorisk oversight BSL (BOBSL) Registry, and the shared oversight matrix between federal agencies and research institutions. The artifacts and realized findings were not meant to draft legislation, deconflict the competing interests between the scientific and security communities, or fix federal policy gaps. Instead, the DSR-IS artifacts were designed to empower policymakers to review biorisk oversight objectives, study the shared entity artifacts, and visually examine the entity interrelationships and processes that explain how biorisks were addressed.

The central research question, “How do the interrelationships between the problem domains of biosafety and biosecurity affect oversight of biorisks?” is answered

by sequentially addressing the set of questions organized in the DSR-IS framework. The DSR-IS framework depicted in Figure 2-5 is divided into four phases, which deliberately tackle the supporting questions and the main research question in a particular order. The findings from DSR-IS Phases I to III, which examined the supporting questions, were synthesized to meticulously respond to the main research question in Phase IV.



**Figure 2-5 Methodology DSR-IS framework map to dissertation research questions**

The graphic in Figure 2-5 lays out the DSR-IS Phases, which will correspond to particular Chapters in the dissertation. The methodology and findings from DSR-IS Phase I were documented in Chapter 3. DSR-IS Phase II builds upon Phase I artifacts and also examined sample U.S. BWC-CBM reports to architect a prototype biorisk oversight BSL (BOBSL) Registry in Chapter 4. The aggregate biorisk oversight findings

and observations from Phases I and II are afforded in Chapter 5, which were further incorporated in DSR-IS Phase III. The methodology and development of the biorisk oversight patchwork map (BOPM) for DSR-IS Phase III is depicted in Chapter 6. Finally, Chapter 7 is the dissertation conclusion that closes the DSR-IS framework as Phase IV.

## **2.4 Original DSR-IS Artifacts Produced**

The methodology produced several types of design science research artifacts, and each type served a specialized purpose to understand USG biorisk regulations, policies, and the entity relationships and processes tied to safety and security. The different types of artifacts are unique, and each phase in the DSR-IS framework synthesized what was learned from artifacts created. The notional framework was customized so that artifacts were refined as biorisks were gradually understood. The experience gained from developing each type of artifact identified knowledge dependencies and interconnections reflecting the interrelationships of the problem domains. The visual design science research artifacts were inspired by Unified Markup Language (UML) notations for class and activity diagrams, but were simplified to conceptualize entities and entity relationships without following strict UML syntax. The artifacts produced are a set of entity instances represented by UML class and activity diagrams, a small-scale notional

biorisk oversight BSL (BOBSL) Registry derived from sample data, and the biorisk oversight patchwork map (BOPM) tables derived from the visual UML artifacts.<sup>272</sup>

The methodology adopted a design science research approach to produce visual artifacts to untangle the complexities of biorisk oversight. The visual artifacts were referenced as entity instance diagrams, which employed symbols and notations used by UML class diagrams. Entity instance artifacts would be considered hybrid diagrams inspired by entity-relationship (ER) concepts, but incorporated notations from UML class diagrams. Traditional ER models required stringent notation sets, such as Chen or Crow's Foot, which were practical in creating prerequisite abstract data models to implement database systems. UML class diagrams were suitable models to describe static data structures, demonstrate the behavior and functions of real-world objects within conceptual systems, and were considered less difficult to understand. Although ER and UML class diagrams describe relationships and attributes, the latter is relevant in representing physical or real-world objects as opposed to database tables by the former. A preliminary review of open source materials about biosafety and biosecurity revealed entities were arguably classes, or instances of a type of entity with physical attributes or was logically intangible. For example, a “Scientist” is a physical entity that performs research experiments. Likewise, an “Oversight Body” is considered a logical or intangible entity with subtype instances of “Federal Oversight” and “Local Oversight”. For these reasons, the methodology adopted a hybrid modeling approach inspired by the

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<sup>272</sup> The creation of simplified UML diagrams to produce entity instance diagrams, but using consistent notations, follows the spirit of design science research by abandoning strict UML syntax.

symbols that represent entities, classes, instances, subtypes, relationships, functions, and activity flows found in ER and UML notation sets. This approach implies the visual artifacts produced by the DSR-IS framework resembled ER, UML class or activity diagrams, but required further refinement. The entity instance hybrid diagrams afforded the flexibility to describe entities as either logical or physical, terminal or a subtype, and the notations to detail the functions and relationships between entities. A brief introduction to entity relationship and UML concepts are provided to assist with translating the visual artifacts presented in subsequent dissertation chapters.

#### **2.4.1 Entity Relationship Diagram Concepts**

The dissertation methodology applied entity relationship (ER) concepts, but incorporated a hybrid modeling approach with UML notations to create the core DSR-IS artifacts for Phase I. The author determined that while ER concept were applicable, the notations required to understand biorisk oversight, and the relationships between entities spanning across problem domains should be decoupled using additional modeling approaches. The methodology only applied ER concepts to assist identifying the logical and physical entities relevant in answering the dissertation question. Since the methodology does not favor any specific ER notation, a primer on creating ER diagrams is not afforded. Instead, the methodology briefly explains ER concepts and introduces the notations employed to understand entity instance diagrams.

ER diagrams implement a diagrammatic notation technique introduced by Chen to visualize the relationships between entities in an entity relationship model. Within an ER

diagram, the roles of entities in the relationship are stated.<sup>273</sup> ER diagrams are commonly used by information systems researchers to understand the interaction among entities within domains and organizations, and how the removal or insertion of new entities may impact their relationships. Information technology professionals and information systems researchers employ ER diagrams to determine and model user information requirements when developing agency-specific or enterprise-wide pilot database systems.<sup>274</sup> The notations used in ER models empower database designers to translate English statements to visualize entities, entity attributes, and their interrelationships.<sup>275</sup>

The initial creation and subsequent refinements of ER diagrams are an iterative process that forces researchers and IT professionals to demonstrate competence in identifying the appropriate entities, the interrelationships between entities, and the attributes of those entities used by a system or set of processes. “Entities” are nouns that represent a collection of objects in the real world. Examples include persons, objects, locations, and events.<sup>276</sup> According to Chen, an “entity is a ‘thing’ which can be distinctly identified. A specific person, company, or event is an example of an entity”.<sup>277</sup> Figure 2-6 depicts the ER notation of a “Person” entity having several attributes. En masse, the attributes of an entity are aggregated to identify specific entities. For example,

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<sup>273</sup> Chen, *The Entity-Relationship Unified View of Data Model*, 11-12.

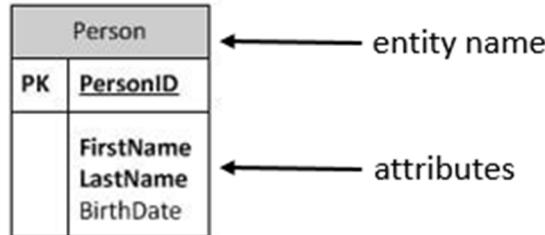
<sup>274</sup> Chen, Peter Pin-Shan. 1983. English sentence structure and entity-relationship diagrams. *Information Sciences*.

<sup>275</sup> Chen, *English sentence structure and entity-relationship diagrams*, 128.

<sup>276</sup> The methodology recognizes terms “entity” from ER diagrams, and “class” from UML class diagrams. Unless noted, “entity class” will be the superset term when discussing the concept of an “entity” regardless of ER or UML notation, and will be used in subsequent dissertation chapters to analyze research findings.

<sup>277</sup> Chen, *The Entity-Relationship Unified View of Data Model*, 10.

a specific person entity may be identified by having all attributes, such as its first name, last name, and birthdate, match certain values. In the context of database tables derived from ER diagrams, attributes are components that describe the meaning and name of a column of a relation.<sup>278</sup> For example, attributes “LastName” and “BirthDate” may represent two columns used to filter a single row or set of rows for a table matching the entity name “Person”.<sup>279</sup>



**Figure 2-6 ER expression of entity with attributes**

The power of ER diagrams are realized by the notations used to develop descriptive relationships that characterize how data is shared between entities. An entity relationship is an “association among entities”.<sup>280</sup> An example would be “Father and Son”, which describes a one-to-one relationship between two unique “Person” entities.<sup>281</sup>

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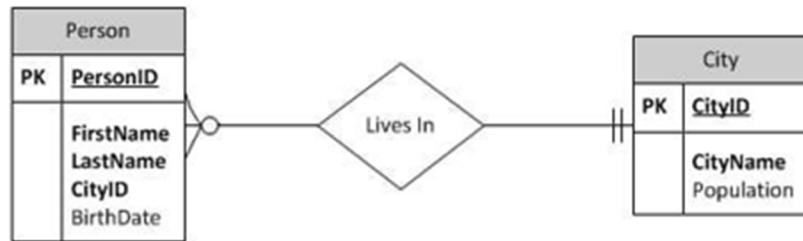
<sup>278</sup> Teorey, Toby J., Dongqing Yang, and James P. Fry. 1986. A logical design methodology for relational databases using the extended entity-relationship model. *ACM Computing Surveys.*; Teorey, Toby, Sam Lightstone, and Tom Nadeau. 2006. *Database Modeling and Design*. *Database Modeling and Design*. Elsevier. <http://www.sciencedirect.com/science/article/pii/B9780126853520500082>.

<sup>279</sup> The concept is if the “LastName” and “BirthDate” values are unique when concatenated, the “Person” table should return a single table row.

<sup>280</sup> Chen, *The Entity-Relationship Unified View of Data Model*, 10.

<sup>281</sup> Ibid.

A one-to-many relationship between Person and City is expressed in Figure 2-7.<sup>282</sup> The relationship between the two entities may be expressed by asserting a “Person may live in one City at a time, but a City may have many Persons as residents.”<sup>283</sup> As can be seen, the ER notations are powerful in expressing English sentences that are understandable to audiences without a computer science or database design background.<sup>284</sup>



**Figure 2-7 ER expression describing relationship between entities**

The entities and their attributes illustrated in ER diagrams may be translated into separate relations, which are two-dimensional tables that unique instances of an entity as a record. The interrelationships between entities are implemented via their shared attributes, which are called the foreign key columns of each table.<sup>285</sup> Thus, the “CityID” shared attribute that exists for both entities would be the foreign key column used to establish the

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<sup>282</sup> There are several notations that implement ER diagrams, such as Chen and Crow’s Foot. Figure 7 is an example of the Crow’s Foot notation showing entity as a table.

<sup>283</sup> In Crow’s Foot ER notation, the vertical hash bars to the left of the City entity means “one and only one”. The Crow’s Foot symbol to the right of the “Person” entity is read “zero to many”.

<sup>284</sup> Chen, *English sentence structure and entity-relationship diagrams*, 127-128.; Storey, Vede C. 1993. Understanding semantic relationships. *The VLDB Journal*.

<sup>285</sup> Song, Il-Yeol, and K. Froehlich. 1994. Entity-relationship modeling. *IEEE Potentials*.

relationship between the Person and City tables. The above approach, which translates entities into relations, then maps entity attributes into columns, and then finally translates entity relationships via foreign key columns are the mechanics of relational database modeling.<sup>286</sup> The said mechanics are iterative, and eventually organizes data within a collection of relations where the relationships between rows are represented by data values.<sup>287</sup>

The DSR-IS framework conducted by the dissertation acknowledges UML class diagrams to understand the types of entity classes, how the entity classes are categorized, whether or not there are parent and child entities, and to describe hierarchies of entity class types.<sup>288</sup> The relationships between entities will incorporate UML symbols, which affords the descriptive notations required to fully examine the roles of each entity. The UML artifacts will be simplified by excluding attribute and multiplicity notations to not only enhance readability of the diagrams, but also invites readers lacking a computer science, information systems, or database development background to quickly grasp the meaning of the visual DSR artifacts.<sup>289</sup> Notations used in ER and UML expressing multiplicity relationships between entity classes, such as “one to one”, “one to many”,

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<sup>286</sup> Song and Froehlich, *Entity-relationship modeling*, 29-33.

<sup>287</sup> Ibid., 30-32.

<sup>288</sup> Hierarchical relationships given an entity type in the context of understanding a specialized domain, such as local oversight, federal oversight, or life sciences research entities could evolve into an ontology study. The DSR-IS methodology affords ample artifacts if one desires to conduct subsequent research of Biorisk management through the application of ontologies.

<sup>289</sup> A comprehensive discussion of ER and UML diagram modeling techniques, and the notations employed are beyond the scope of the dissertation. Database development, systems engineering and architecture are specialized disciplines in computer sciences and information systems fields. For these reasons, the methodology applies basic ER and UML diagram notations to explain the entities involved with biorisk management, but affords ample detail to invite database designers, systems analysts, and information systems researchers to implement a prototype system if they so desire.

and “many to many” will be excluded. This approach emphasizes understanding the high level interrelationships between entities, and their high level roles with regards to either scientific research or biorisk oversight.

#### **2.4.2 UML Class Diagram Concepts**

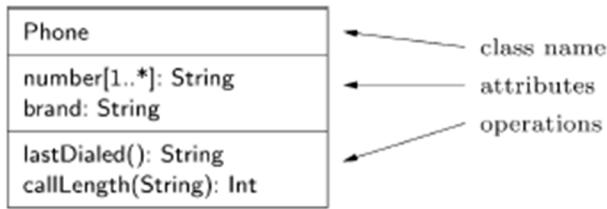
The notations employed in UML class diagrams affords declarative modeling to understand the static structure of an application domain through the use conceptual relationships between entities.<sup>290</sup> UML class diagrams are a superset of entity relationship diagrams, and inherits all of its modelling rules albeit different notations. UML class diagrams afford the same features, but employs different notations to implement the concepts of ER diagrams. ER diagrams capture entities, entity attributes, and the relationships between entities. UML class diagrams adopt the terms class, attributes, operations and associations.<sup>291</sup> Figure 2-8 illustrates the components a UML class, which translates the entity notation in ER diagrams. A UML class has unique functions or behavior that are represented as its operations.<sup>292</sup> There are different notations recognized by ER designers that could be used to depict individual entity behavior, but the methodology will employ ER concepts and notations for UML class and activity diagrams to understand the interrelationships between entities examined in the dissertation.

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<sup>290</sup> Berardi, Daniela, Diego Calvanese, and Giuseppe De Giacomo. 2005. Reasoning on UML class diagrams. *Artificial Intelligence* 168, no. 1-2: 70-118.

<sup>291</sup> Ambler, Scott W. *The object primer: the application developer's guide to object orientation and the UML*. 2nd ed. Cambridge: Cambridge University Press, 2001.

<sup>292</sup> Berardi et al., *Reasoning on UML class diagrams*, 74-75.



**Figure 2-8 UML class with attributes and operations<sup>293</sup>**

A major advantage of UML class diagrams over ER diagrams are the stout notation sets to illustrate hierarchies that describe the ontology of a class. UML class diagrams recognize relationships between classes as associations, and also provides robust notation to demonstrate hierarchical types of classes, and grouping of classes that comprise a larger class.<sup>294</sup> Although ER diagrams may be implemented using any one of the notations recognized by database designers or systems analysts, ER models are limited in expressing general entity types and their derived subtypes derived.<sup>295</sup>

A major flaw with ER modeling is evident from cumbersome efforts to illustrate an entity type that may have other entities as subtypes.<sup>296</sup> The “Father and Son” example previously demonstrating a “one to one” relationship between entities assumes both are instances of the Person entity type. A descriptive entity class name, such as “Relative”, would also be a Person entity class type, with Father and Son as subtypes of the former.

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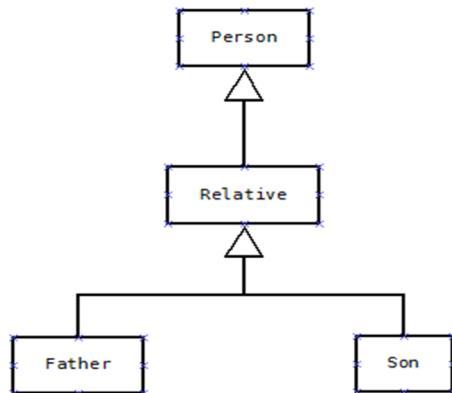
<sup>293</sup> Ibid., 74.

<sup>294</sup> Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 208-219.

<sup>295</sup> West, Matthew. 2011. *Developing High Quality Data Models. Developing High Quality Data Models*. Elsevier. <http://www.sciencedirect.com/science/article/pii/B978012375106500004X>; Teorey et al., *Database Modeling and Design. Database Modeling and Design*, 199-201.

<sup>296</sup> Teorey et al., *Database Modeling and Design. Database Modeling and Design*, 200-201.; West, *Developing High Quality Data Models*, 51-53.

Figure 2-9 captures the entity class type and subtype relationships that recognize Father and Son as subtypes of Relative, and Relative as a subtype of Person. The translation would yield an explanation expressing “Father and Son are entity class types of Relative. Relative is an entity class type of Person.” The aforementioned statement maintains the notion that Father and Son are instances of the Person entity class type, but uses the Relative entity class type to describe the relationship roles accurately.<sup>297</sup>



**Figure 2-9 UML class notation for entity type/subtype hierarchy via instantiation**

Figure 2-10 applies UML class notation to demonstrate the entity type/subtype concept using Phone as the root entity type, and CellPhone and FixedPhone as entity subtypes. Unlike the Father and Son example, Figure 2-10 demonstrates how UML class diagrams illustrate entity class types having subtypes with different physical

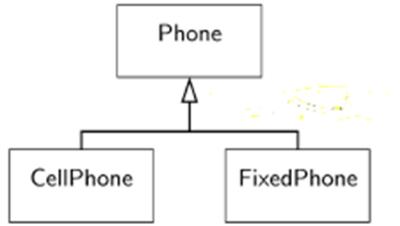
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<sup>297</sup> Szlenk, M. 2006. Formal Semantics and Reasoning about UML Class Diagram. *2006 International Conference on Dependability of Computer Systems.*; UML recognizes instances of a class as objects. The methodology is aligned with object-oriented terminology, and adopts the term “instance” as opposed to “object”.

implementations or properties, but are also generalized. The graphic demonstrated in Figure 2-10 may be translated as “A Phone may either be a CellPhone or a FixedPhone entity class. A CellPhone and a FixedPhone are entity class types of Phone.” This relationship between a general entity class and its derived entity sub-classes also implies the latter inherits attributes and behavior of the former.<sup>298</sup> The commonality between the CellPhone and FixedPhone entity classes are that both may be generalized as a type of Phone entity class, but implement the inherited communication and messaging features differently. The CellPhone entity class is a portable communication device that inherits the attributes and functions of the general Phone entity class, but receiving and placing voice calls and text messages are implemented over a wireless network. In contrast, the FixedPhone entity class may also implement features to receive and place voice calls, but is not a portable communication device since voice calls are over a physical wired network connection.

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<sup>298</sup> Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 220-222.; Berardi et al., *Reasoning on UML class diagrams*, 78-80.; Storey, *Understanding semantic relationships*, 461-465.; The concept is also known as inheritance in software engineering in regards to object-oriented software architectures. Object-oriented software architecture is a specialization in the computer sciences discipline, and will not be discussed in detail as it is beyond the scope of study.



**Figure 2-10 UML class notation for entity type/subtype hierarchy via inheritance<sup>299</sup>**

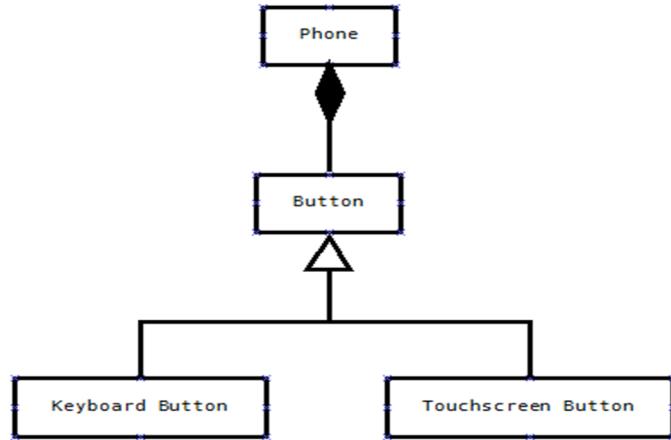
Another major advantage afforded by UML class diagrams is its notation support to demonstrate the composition relationship between classes.<sup>300</sup> Composition is used to describe a “whole/part” relationship between multiple classes.<sup>301</sup> Figure 2-11 illustrates the concept of composition employed in UML class diagrams. The composition relationship between the Phone and Button entity classes are indicated by the solid line with a black-diamond, and may be expressed as “a Phone has Buttons”. The overall diagram applies the composition and inheritance notations between two entity classes, and their relationships may be translated as “a Phone has Buttons, and Keyboard Button and Touchscreen Button are types of Button.”

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<sup>299</sup> Berardi et al., *Reasoning on UML class diagrams*, 79.

<sup>300</sup> Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 222-224.

<sup>301</sup> Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 224.; Storey, *Understanding semantic relationships*, 474-477.



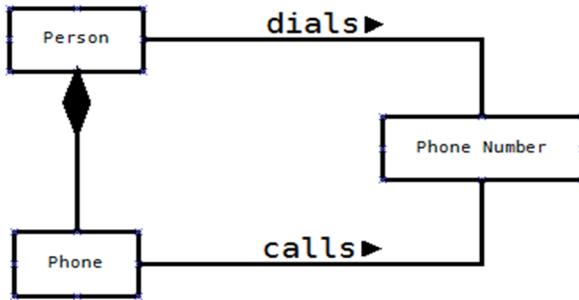
**Figure 2-11 UML class composition between Phone and Button**

UML class diagrams also afford a notation scheme to illustrate the general relationships between entity classes. The relationships between entity classes in UML class diagrams are called associations, and the notations employed may also be translated from ER diagrams.<sup>302</sup> The previous examples introduced Person and Phone as independent entity classes. A general association between the Person and Phone entity classes are illustrated in Figure 2-12 employing the UML class diagram notation describing the role of the former making a phone call. As can be seen, class diagrams may enhance the understanding the roles of an entity class by employing other notations to explain associations. A new entity class, “Phone Number” is inserted to accurately describe the relationship between Person and Phone when making a phone call. The decomposition notation inserted between the Person and Phone entity classes not only

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<sup>302</sup> Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 218-220; UML activity diagrams have notations supporting the cardinality concepts practiced in ER modeling to describe “one to one”, “one to many”, and “many to many” relationships between entities. Again, cardinality relationship notation will be minimized in the DSR artifacts, but inserted if diagram translation will be enhanced as needed.

means “a Person has a Phone”, but also identifies two separate associations that are between Person and Phone Number, and between Phone and Phone Number.<sup>303</sup> The notation to indicating an association between entity classes are indicated by a solid line, a descriptive label, and a directional icon to indicate the starting point.<sup>304</sup> The broad translation of the UML activity diagram depicts that a “Person has a Phone, and dials a Phone Number. The Phone calls the Phone Number that was dialed by Person.”



**Figure 2-12 UML class diagram showing general associations**

### 2.4.3 UML Activity Diagram Concepts

UML activity diagrams are the appropriate artifacts to visualize specific types of behavior, processes, or entity relationships within a system using object-oriented

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<sup>303</sup> The power of UML class diagrams also comes from its flexibility to include or exclude associations and compositions as techniques to examine entity classes having multiple roles. A Phone also has a Phone Number, which implies a Person that has a Phone also has a Phone Number. This relationship would explain how Person receives calls or text messages to his/her Phone.

<sup>304</sup> Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 224-227.

concepts.<sup>305</sup> However, the notations employed by UML activity diagrams are only suitable for describing the visual roles and specific interactions between entity classes. For this reason, UML activity diagrams are complimentary to UML class and ER diagrams, and is not the ideal type of artifact to implement a relational database. Figure 2-13 expands upon the previous UML class diagram by abstracting the associations between the Person, Phone, and Phone Number entity classes into the end-to-end activities of comprising a typical phone call.

The solid colored circles indicate either the entry or exit points of the overall activity where the former commences the activity, and the latter terminates the activity.<sup>306</sup> Processes within the activity are indicated by the rounded blocks enclosing descriptive text explaining the behavior.<sup>307</sup> Process blocks are connected to other process blocks or decision diamonds via solid unidirectional line arrows to demonstrate activity flow.<sup>308</sup> The typical phone call activity depicted in Figure 2-13 originates when a phone number is dialed and sent to attempt a phone call.<sup>309</sup> If a phone call connection is successful, there are several possible outcomes, which are indicated by the process blocks between the

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<sup>305</sup> Eriksson, H., and M. Penker. 2000. *Business Modeling With UML: Business Patterns at Work. Open Training*. Wiley.; Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 229-232.

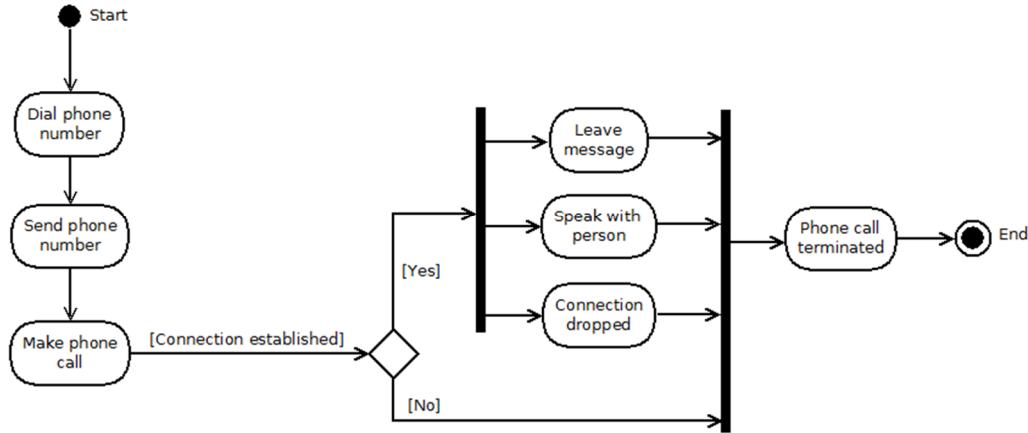
<sup>306</sup> Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 229.

<sup>307</sup> Ibid.

<sup>308</sup> Ibid.

<sup>309</sup> There are other entity classes implied, such as a phone service carrier, where a phone number is “sent” to establish a call connection. However, the example provided is designed to understand how to read a UML activity diagram.

thick vertical “fork and union” lines.<sup>310</sup> Once any of the possible outcomes completes, the phone call is also completed, and terminates the activity.<sup>311</sup>



**Figure 2-13 UML activity diagram of a typical phone call**

The entity and their attributes captured in the UML class and activity diagrams may be translated into separate two-dimensional tables that guide the implementation of a notional prototype registry database.<sup>312</sup> The relations represented by the comprehensive set of entity classes may also be translated into subsequent conceptual, logical and

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<sup>310</sup> Ambler, *The object primer: the application developer's guide to object orientation and the UML*, 229.; The “fork and union” activity notation are also used to illustrate parallel or concurrent processes.

<sup>311</sup> A “Hang up” process block may also be inserted between the “fork and union” lines, or just before the “Phone call terminated” process block. The level of detail depicted by an activity diagram will reflect how well the UML artifact author understands the processes, and associations between entity classes being described.

<sup>312</sup> The components of a UML class in *Figure 9* would closely represent a relational table if discounting the operations.

physical data models where the most latter would be implemented by an open source or commercial relational database management software (RDBMS).

#### **2.4.4 Prototype BOBSL Registry and Data Extraction Software**

The methodology implements a prototype database that serves as a notional biorisk oversight BSL (BOBSL) Registry, which required developing specialized data extraction and data loading software. The notional laboratory registry applied the data definition language (DDL) to create the table schemas storing data extracted from sample Biological Weapons Conventions Confidence Building Measure (BWC-CBM) reports submitted by the USG. The laboratory registry artifact was populated with extracted data from USG BWC-CBM transparency reports submitted to the United Nations.<sup>313</sup> The sample reports submitted to the United Nations were selected as data sources since the content was intended to demonstrate transparency and BWC compliance.

The data extraction software also created specially formatted input files using pipe character “|” to delimit to separate column values read by the data loader software. The text values in Figure 2-14 represent an example raw data record directly extracted from a BWC-CBM transparency report. The “|” separated values populating the columns of target database table. For instance, “Jan 20, 2014 01:19:39” and “lab\_space=BSL 4 Laboratory 186 m2 Shope Laboratory” marks the first and last column values.

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<sup>313</sup> BWC reports submitted by United States covering years 2011-2013.

```

truncate cbm_bioresearch_labs;
LOAD DATA LOCAL INFILE
'D:/home/GMU/Dissertation DRAFTS/chapter4-artifacts/cbm_bioresearch_labs_rawdata_formatted_08-29-2015.txt'
INTO TABLE cbm_bioresearch_labs FIELDS terminated by '|';
Jan 20, 2014 01:19:39|BWC_CBM_2011_United_States.docx|April 15 2011|CBM-Form-A, Part 1|
facility_name=Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|
responsible_org=The University of Texas Medical Branch|street_city=301 University Blvd. Galveston|
state=TX|zipcode=77555|funding_src=DOD|lab_space=BSL 4 Laboratory 186 m2    Shope laboratory

```

**Figure 2-14 Raw data record extracted from BWC file**

The data loader software generated dynamic generated structured query language (SQL) entries insert records into target database tables. SQL is the language used to implement database schemas, including tables and table rules and triggers when data is inserted, updated, and deleted.<sup>314</sup> Entity class attributes captured in the UML class diagrams could then be translated as columns of each relational table where the rows were populated with values via SQL entries created from the data loader input file. The meaning of each entity attribute mapped to the corresponding column is the same for each row, and the set of column values form a record must be unique.<sup>315</sup> The raw data record from Figure 2-14 is translated into the SQL entry in Figure 2-15 to populate a database table where the “INSERT” keyword instructs the RDBMS software to map values to table columns.<sup>316</sup> The SQL example in Figure 2-15 shows the first and last record values as “Jan 20, 2014 01:19:39” and “lab\_space=BSL 4 Laboratory 186 m2 Shope Laboratory” that populate the “create\_date” and “lab\_space” table columns.

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<sup>314</sup> Hoffman, James. 2001. Introduction to Structured Query Language. *Journal of Geography in Higher Education*.

<sup>315</sup> Chen, *The Entity-Relationship Unified View of Data Model*, 14-16.; Multiple attributes may be used to identify a specific entity (i.e., instance) within an entity set. ER notation applies the notation “PK” to mean “Primary Key”, which should always be a unique value within a relation.

<sup>316</sup> Hoffman, *Introduction to Structured Query Language*, 16.

```
INSERT INTO cbm_bioresearch_labs SET create_date='Jan 20, 2014 01:19:39',
uscbm_report='BWC_CBM_2011_United_States.docx', uscbm_submit_date='April 15 2011',
uscbm_form_section='CBM-Form-A, Part 1',
facility_name='Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory',
responsible_org='The University of Texas Medical Branch',street_city='301 University Blvd. Galveston',
state='TX',zipcode='77555',funding_src='DOD',lab_space='BSL 4 Laboratory 186 m2 Shope laboratory';
```

**Figure 2-15 SQL translation of raw data record**

Source code for data extraction, and data loading to populate the relational database tables was developed using the practical extraction and reporting language (PERL) programming language. The data loader input file follows an unconventional format employing the “|” delimiter inspired from electronic data interchange (EDI) files and “key=value” delimiter used the JavaScript Object Notation (JSON) files. All source code implementing the software created within the methodology are considered DSR artifacts reused to produce subsequent artifacts, and were included in the dissertation appendices.

#### **2.4.5 Biorisk Oversight Patchwork Map**

The DSR-IS methodology developed a biorisk oversight patchwork map (BOPM), which is the original and hybrid system modeling artifact developed in Phase III. The patchwork map employed the Phase I and Phase II artifacts to understand the conceptual cross-domain relationships between the oversight responsibilities of federal agencies, and their interactions with research institutions, and the shared entity artifacts that are passed among entities as part of the processes and notification schemes. The entities learned from Phase I were matched with the biorisk oversight objectives that describe the roles

and shared oversight responsibilities of federal agencies. The taxonomy of USG agencies linked to biorisk oversight, and the entities identified from Phases I and II were synthesized to create a tightly coupled BOPM that categorized USG biorisk regulations, biosafety, biosecurity, and the *NIH Guidelines* biorisk oversight elements to examine the shared entity artifacts referenced by federal and local oversight.

## **CHAPTER 3. DSR-IS PHASE I**

Chapter three presents the artifacts created from the iterative analysis of open source literature and government documents as part of DSR-IS Phase I. The finalized DSR-IS artifacts from Phase I sets foundation for the remaining DSR-IS phases by establishing the unique entities and non-unique entity instances associated with the biorisk problem domains. The two goals of Chapter 3 are to discuss the approach of the methodology employed, and the presentation of DSR-IS Phase artifacts. First, the methodology carried out provides a high-level overview describing the how the visual UML decomposition and activity diagrams were developed. Finally, the findings from the iterative analysis to complete DSR-IS Phase I visual artifacts, the order the biorisk problem domains examined, and the interrelationships of unique entities and non-unique entity instances are discussed. Unique entities indicate a single instance to describe authoritative objects, such as a specific person, place, thing, or event. Non-unique entity instances represent a type of object that is common. For example, Federal Agency is a non-unique entity as there are instances of different agencies. The Department of Health and Human Services is a unique entity, but is an instance of a Federal Agency entity. Where possible, the DSR-IS Phase II artifacts presented attempts to indicate unique objects as “entity or entities” versus non-unique objects as “entity instances”.

### **3.1 DSR-IS Phase I Objectives and Roadmap of Artifacts Created**

There are three objectives sought by DSR-IS Phase I methodology where objectives one and two reflect the supporting questions needed to answer the main dissertation question. The first objective involves identifying the common entities and unique entities (persons, objects, places, or events) within the biorisk problem domains as part of biological research at individual research institutions and federal agencies.<sup>317</sup> The second objective involves understanding the roles and interrelationships among the entities that explain the internal and external interactions among research institutions and federal agencies.<sup>318</sup> Finally, the last objective synthesizes the findings of the first and second objectives by identifying entities with inherent reportable characteristics or certain entities that represent a type of reportable product relevant to biorisk oversight. The simplified UML notations introduced in the methodology afford the notations to graphically describe the biorisk entities as objects, their roles and interrelationships, and their associations relative to a research institution or a federal agency to satisfy the aforementioned objectives.

The findings in DSR-IS Phase I presents the comprehensive results from examining selected open source literature at least five iterations focusing on different objectives. The first and second iterations of surveying open source materials focused on

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<sup>317</sup> First objective reflects supporting research question, “What are the common and unique entities (i.e., persons, objects, places, or events), and their attributes (i.e., characteristics or properties) within the problem domains of biosafety and biosecurity?”

<sup>318</sup> Second objective is guided by the last two supporting research questions, “What are the relationships among entities and their attributes between the problem domains of biosafety and biosecurity?” and “What are the roles and responsibilities (i.e., business rules) of the federal agencies in the problem domains of biosafety and biosecurity?”

identifying federal and research institution entities, and developing entity instance diagrams described by UML class and composition notations. The third and fourth iterations focused on the interrelationships among the entities identified, refinement of the entity instance diagram artifacts, and identifying relevant, but complex oversight processes.<sup>319</sup> The final iteration focused on modeling the complex oversight processes identified as UML activity diagram artifacts. The UML diagrams presented will not afford a review of the notations described in the methodology, but rather a summary explanation of the biorisk management, scientific, and oversight entities, their interrelationships, and specific activities that are perceived complex.

### **3.2 DSR-IS Phase I Methodology**

DSR-IS Phase I established the foundation for the subsequent phases by identifying the entities associated with biorisk management. The characteristics of the entities identified and their interrelationships were examined to understand their roles within the biorisk problem domains. Open source literature that focused on a biorisk problem domain were analyzed to identify the relevant entities, and if there were common and unique entities guiding the behavior of biosafety and biosecurity. The initial DSR-IS phase also determined whether or not specific entity roles were applicable to certain or multiple problem domains. The artifacts produced, the activities executed,

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<sup>319</sup> The methodology employs UML class relationship diagrams as opposed to database entity relationship diagrams. The former is appropriate for systems modelling, and the latter is considered as input to design shared databases.

and the resources employed to accomplish DSR-IS Phase I created the foundation knowledge to analyze the data and reporting gaps that were investigated during Phase II.

### **3.2.1 Phase I Artifacts Produced**

The core artifacts produced by DSR-IS Phase I were the UML diagrams identifying the entities involved with federal regulations, biosafety, biosecurity, and the *NIH Guidelines*. The UML diagrams not only identified the entities, but also their interrelationships with one another. Specifically, the diagrams were developed to understand the general entities, and the high-level interactions with other entities representing federal and local biorisk oversight. A limited set of activity diagrams were developed to understand the high-level processes, policies, and services carried out by entities. The Phase I artifacts produced included:

- Entity instance diagrams illustrating biorisk entity classes and entity associations involved with federal regulations biosafety, biosecurity, and the NIH Guidelines.
- UML activity diagrams illustrating the high-level processes, policies, business rules, and services carried out by biorisk entities having multiple roles.

### **3.2.2 Phase I Activities**

DSR-IS Phase I comprised of two major activities, which were scanning open source materials to identify the relevant entities involved with biorisk management, and then developing the UML decomposition and activity diagrams representing the entity

instances and their associations. Since the diagrams focused on entities, the first activity surveyed literature that identified the roles, responsibilities, and placement of entities involved with life sciences research, and oversight with regards to the federal regulations, safety, security, and the *NIH Guidelines*. The main literature were unclassified USG guides, manuals, or reports that explain biosafety, biosecurity, and *NIH Guidelines* processes, policies or rules. Unclassified USG guides, manuals and reports, such as the *NIH Guidelines*, Biosafety in Microbiological and Biomedical Laboratories (*BMBL*) manual, the “Trans-Federal Task Force on Optimizing Biosafety and Biocontainment Oversight”, the “Executive Order Working Group on Strengthening the Biosecurity of the United States” will be analyzed.<sup>320</sup> The results of the survey cataloged the biorisk entity names, the high level interrelationships, and any oversight activity processes that explain the conditions and general maxims.

The second activity entailed the iterative refinement of the entity instance and UML activity diagrams that served as the initial set of artifacts. The diagrams identified the entities and the high level interrelationships that explain biorisk oversight, and was repeatedly examined to understand the characteristics of the entities. As the roles and characteristics of each entity were learned, and further refinement of the entity relationships were materialized, the diagrams were subsequently applied to analyze

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<sup>320</sup> Report of the Trans-Federal Task Force on Optimizing Biosafety and Biocontainment Oversight (July 2009); Report of the Working Group on Strengthening the Biosecurity of the United States (October 2009); The NIH Guidelines are maintained by the Office of Biotechnology Activities (OBA). The latest publication was released March 2013. See [http://oba.od.nih.gov/oba/rac/Guidelines/NIH\\_Guidelines.pdf](http://oba.od.nih.gov/oba/rac/Guidelines/NIH_Guidelines.pdf); The BMBL is maintained by the Center for Disease Control and Prevention (CDC). The latest publication is the fifth edition. See <http://www.cdc.gov/biosafety/publications/bmbl5/>

artifacts in the remaining DSR-IS phases. Completion of the second activity identified the biorisk entities, and produced the diagrams associated with federal biorisk regulations, biosafety, biosecurity, and the *NIH Guidelines*. The entity instance diagrams were considered when analyzing the BWC CBM reports submitted by the United States to the United Nations in Phase II.

### **3.2.3 Phase I Data, Tools or Technologies Employed**

The diagrams capturing the entities of the biorisk problem domains were derived from open source literature. The data drawn from USG guides, manuals, and reports emphasized entities, their interrelationships, and the processes that each entity participates as opposed to literature that recommends improvements to policies. The software that created the diagrams were Microsoft Visio Professional 2013 and DIA with the majority of the wire diagrams accomplished by the latter. The wire diagram software applications included the entity relationship (ER) and UML stencils needed to create the entity instance and UML activity diagrams of the biorisk problem domains.<sup>321 322</sup>

### **3.3 Limitations of Data Sources Employed for DSR-IS Phase I**

Acquiring the comprehensive knowledge of the biorisk management entities tied to research or oversight during DSR-IS Phase I encountered two caveats. First, the study necessitated review of additional sources available online, such as federal agency

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<sup>321</sup> For more information about the free DIA wire diagram software, see <http://dia-installer.de/>

<sup>322</sup> Microsoft Visio 2013 is graphical diagram that supports 3<sup>rd</sup> party stencils, and the dissertation author is the owner of the registered software copy.

websites of the Department of Health and Human Services, the U.S. Department of Agriculture, the Federal Select Agent Program, the Department of Transportation, Department of Commerce, and the Department of Labor, the *Federal Register*, and the *Electronic Code of Federal Regulations* to ascertain further understanding of the various research institution and federal agency entities, scope of responsibilities respective to regulations, and reporting requirements.<sup>323</sup> Other sources surveyed to understand the unique and non-unique entities involved with biorisk management include the U.S. GAO Reports, U.S. Congressional Research Service Reports, the “Report of the Defense Science Board Task Force on Department of Defense Biological Safety and Security Program”.<sup>324</sup> Finally, no consistent data was available to investigate where biorisk oversight breakdowns occur in the reporting mechanisms or notification schemes once the entity interrelationships were understood at the end of DSR-IS Phase I. Although data indicating the number of biosafety incidents were limited or considered underreported due to various reasons, such as persons not knowing the incident reporting procedures, ensuring anonymity, or carelessness – data leading up to reportable incidents and the deviations from not following routing processes were not available.

The remaining sections of Chapter 3 are organized into five sections, which reflect the visual DSR-IS artifacts representing the problem domains associated with biorisk management. The first and second sections introduce biorisk management and

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<sup>323</sup> See *Electronic Code of Federal Regulations* <http://www.ecfr.gov/cgi-bin/ECFR?page=browse>

<sup>324</sup> *High-Containment Biosafety Laboratories* (GAO-08-108T).; *High-Containment Biosafety Laboratories: National Strategy for Oversight is needed* (GAO-09-574).; *Oversight of High-Containment Biological Laboratories: Issues for Congress* (R40418).; *The National Biodefense Analysis and Countermeasures Center: Issues for Congress* (RL32891).; Report of the Defense Science Board Task Force on Department of Defense Biological Safety and Security Program (May 2009).

oversight relative to individual research institutions and the various federal agency entity instances, and the federal regulations and guidelines imposed. Sections three and four discuss the unique entities and entity instances associated with biosafety and biosecurity. The final section focuses on the *NIH Guidelines* and the specific entities at research institutions and the National Institutes of Health (NIH) to monitor rDNA and human gene transfer research.

### **3.4 Federal Oversight versus Local Oversight Entity Instances**

The UML diagrams in the chapter emphasizes the physical oversight of those entities associated with biorisks as opposed to logical oversight. To be clear, regulations, guidelines, and statutes defining how federal and local entities are monitored afford the logical oversight criteria carried out by persons, places, or processes. The actions carried out by entities represented as persons, places, or processes demonstrate the physical oversight of biorisk domains. Thus, the specific entities executing the oversight functions, tasks, and activities are directed by regulations, guidelines, or statute considered enforceable. Both logical and physical UML artifacts depicting the entities (as UML classes), composition, interrelationships, and activities will be presented. The concept of logical versus physical oversight is depicted Figure 3-1 and Figure 3-2.

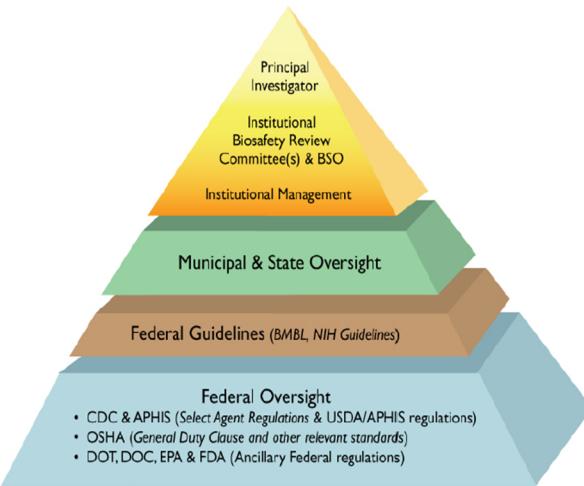
Depending on the nature of the research, the various Federal agencies and their internal departments depicted in Figure 3-1 have the shared oversight responsibility of

high and maximum containment research activities and facilities.<sup>325</sup> Other federal entities are responsible for ensuring compliance with biosafety/biocontainment regulations and standards.<sup>326</sup> The “pyramid of oversight” diagram in Figure 3-1 was originally meant to convey multiple levels of biosafety oversight, but oversimplifies the complexities of biorisk oversight as a whole. For example, the Federal Guidelines layer in Figure 3-1 wouldn’t be considered a form of oversight, but are nonetheless associated with both Federal Oversight and the entities at individual research institutions. The former has specific federal agencies that set, standardize, and enforce guidelines while the latter complies to possess, use, or transfer regulated biological agents. Thus, Federal Guidelines and Federal Oversight would be considered conceptual logical oversight entities, but the specific federal agencies and individuals or roles at an individual research institution would be conceptual physical entities that demonstrate oversight functions. The physical and logical entity concepts derived from Figure 3-1 are discussed in Figure 3-2 and Figure 3-3.

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<sup>325</sup> Report of the Trans-Federal Task Force on Optimizing Biosafety and Biocontainment Oversight (July 2009), 41.

<sup>326</sup> Ibid.



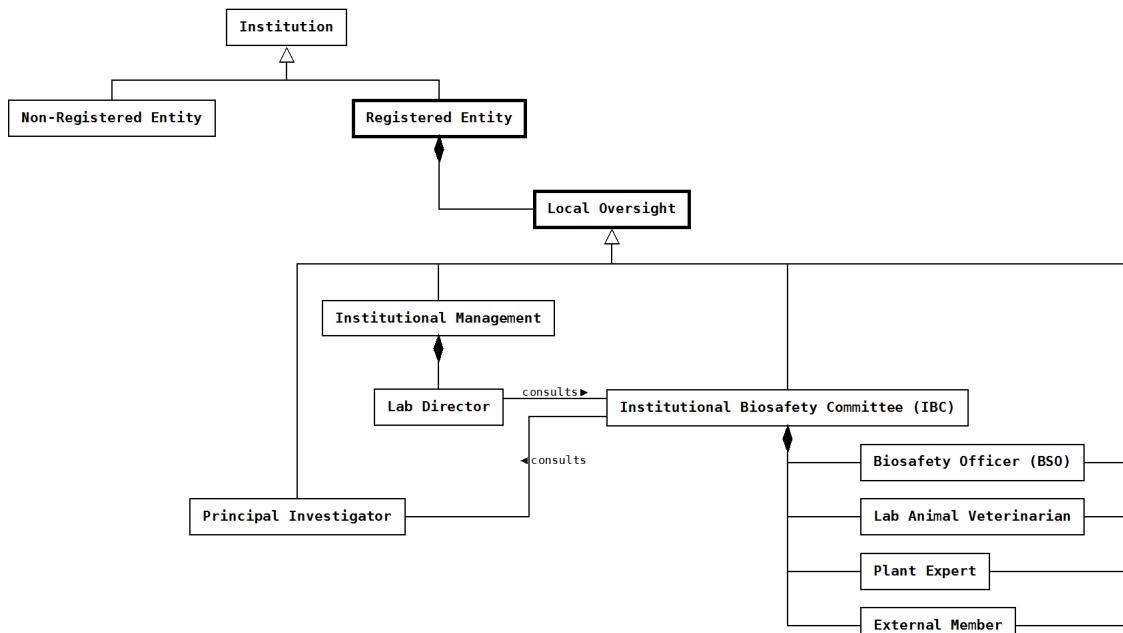
**Figure 3-1 Levels of Biosafety and Biocontainment Oversight**<sup>327</sup>

The conceptual logical and physical entities for an individual research institution in Figure 3-2 represent the “top” of the pyramid in Figure 3-1, and start with the physical entity Institution. In the context of biorisk oversight, there are two subtypes of an Institution, Non-Registered Entity and Registered Entity where the latter establishes logical entity, Local Oversight. The labels in Figure 3-2, Institutional Management, Institutional Biosafety Committee (IBC), Principal Investigator, and Biosafety Officer (BSO) are considered physical entities. The logical Local Oversight entity is instantiated by Institutional Management, which contains the Lab Director entity, and the IBC and its members. The role members of the IBC are physical entities, and may individually instantiate Local Oversight. For example, a Registered Entity employing multiple Principal Investigators or BSOs that are not members of the IBC are still subtypes of Local Oversight. The Institutional Management in Figure 3-2 is the umbrella entity

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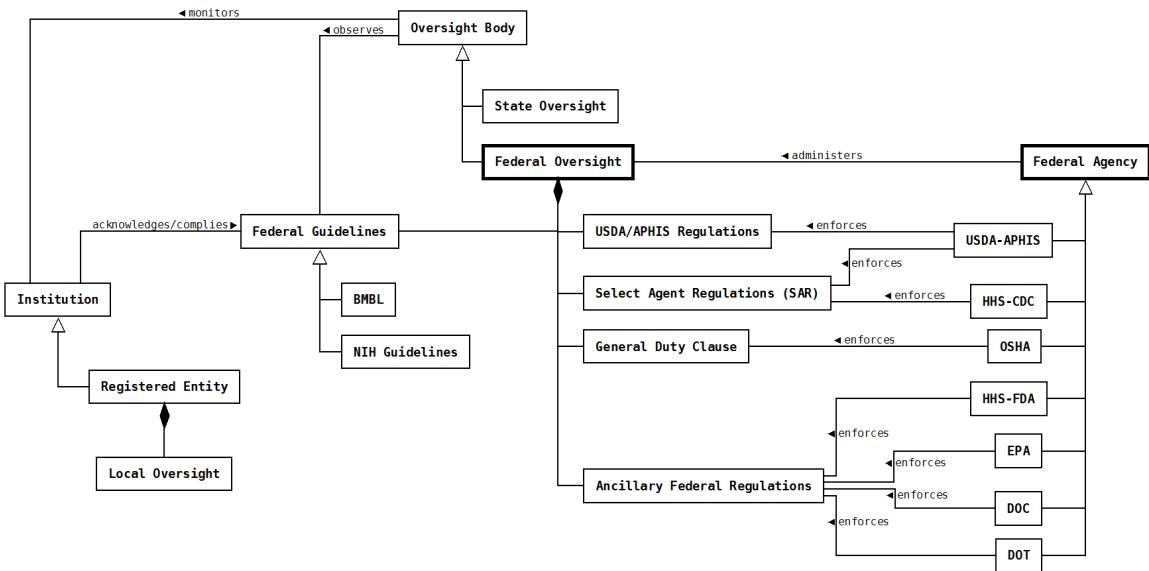
<sup>327</sup> Ibid., 43.

instance that abstracts the variations of local oversight review from literature, and includes staff resources not directly associated with an IBC. To be certain, Institutional Management was described as Institutional Review Entity (IRE), Institutional Review Board (IRB), Institutional Review or simply Review Committee that collaborates with the IBC to conduct overlapping review and oversight functions within the individual research institution. For these reasons, inserting the Institutional Management entity instance was sensible to account for the inconsistent organization structures of individual research institutions and invites future researchers to discriminate whether or not some institutions employ IBC to also act as the IRE/IRB, if there are two separate committees, or if members within the IBC also participate with the oversight functions of the IRB/IRE.



**Figure 3-2 Entity Instances Associated with Institution and Local Oversight**

The bottom two layers in Figure 3-1, Federal Oversight and Federal Guidelines, are explored to explore the entity instances not captured and incorporates the abstract placement of Institution in Figure 3-2. The logical entity, Oversight Body, generalizes Figure 3-1 in that its subtypes, State Oversight and Federal Oversight, monitors the Institution entity and the latter observes Federal Guidelines. The Institution, specifically an entity instance of Registered Entity, acknowledges and complies with Federal Guidelines, the *BMBL* and the *NIH Guidelines*. The relationships among Federal Oversight, Federal Guidelines, and Federal Agency entities untangles the abridged oversight levels depicted by Figure 3-1. Federal Oversight is composed of Federal Guidelines, along with regulations specific to controlled access of regulated biological agents. There are specific Federal Agency entity instances that administer Federal Oversight, which are the U.S. Department of Agriculture (USDA), the Department of Health and Human Services (HHS), the Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), the Department of Commerce (DOC), and the Department of Transportation (DOT). Each Federal Agency subtype enforces specific regulations aligned with agency mission in the context of controlled access of biological agents, but the HHS and USDA bear the most federal oversight responsibilities.

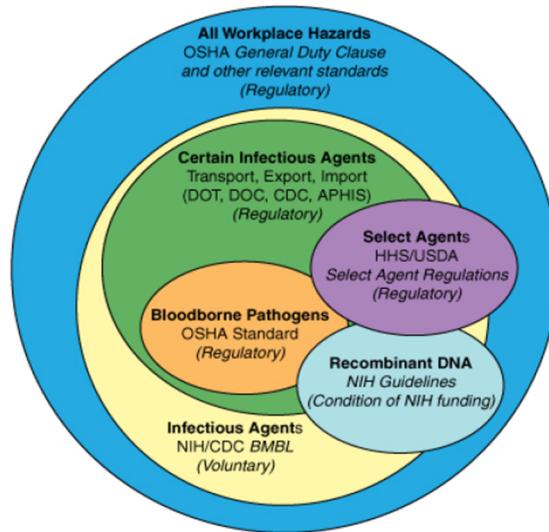


**Figure 3-3 Entity Instances Associated – Federal Oversight and Federal Guidelines**

### 3.5 Federal Regulations and Guidelines Entity Instances

The logical and physical relationships among Federal Oversight, Federal Agency, and Federal Guidelines entity instances were summarized in Figure 3-3. It was made clear that Federal Oversight, depicted as a “layer” from Figure 3-1, and as a logical entity in Figure 3-3, are comprised of primary Federal Guidelines, the *BMBL* and *NIH Guidelines*, and additional ancillary regulations. The Federal Oversight logical entity composition of federal guidelines and regulations specific to biosafety and biosecurity are represented in Figure 3-4. The visual artifacts in Figure 3-2 to Figure 3-3 imply the regulations and guidelines are applicable to Registered Entity instances subjected to federal oversight. The specific regulations supporting biorisk management, and their

accountable federal agencies are explained in the entity instance artifacts in Figure 3-5 to Figure 3-7.



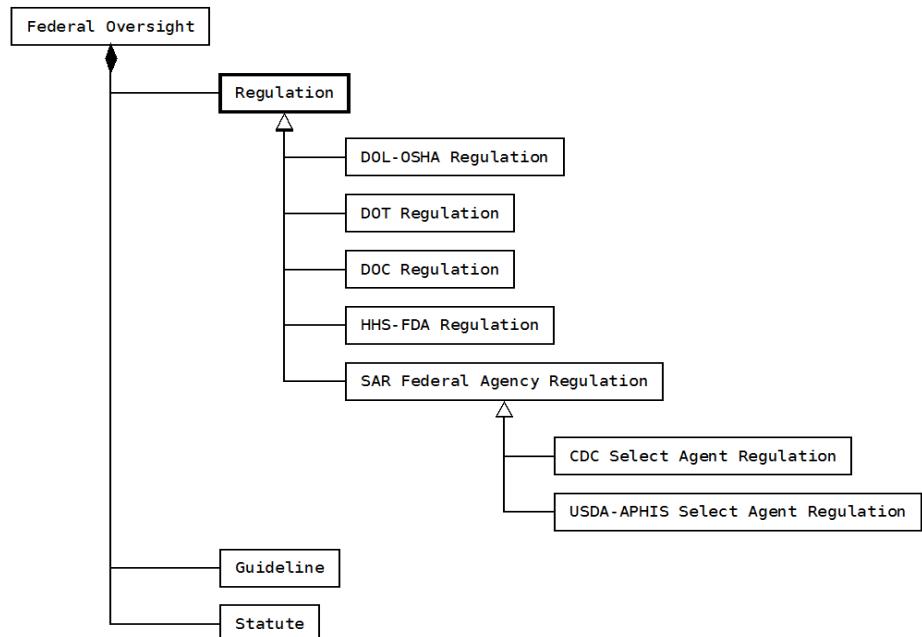
**Figure 3-4 Regulations, Standards, and Guidelines (Biological Containment)**<sup>328</sup>

The conceptual entity, Federal Oversight, is composed of three logical entity instances, Regulation, Guideline, and Statute as depicted in Figure 3-5. The findings indicate three “parent” federal agencies, Department of Labor (DOL), Department of Transportation (DOT), Department of Commerce (DOC), HHS, and the USDA provide the regulations aligned associated with biorisk management. For example, the Center for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) are “child” or sub-agencies of HHS. The goal of DSR-IS artifacts represented by Figure 3-5

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<sup>328</sup> Ibid., 41.

to Figure 3-7 captures the federal agencies directly or indirectly associated with biorisk oversight, and their regulations, guidelines of statutes. However, analysis of individual regulations, guidelines, and statutes were beyond of the scope of the DSR-IS framework employed by the methodology.



**Figure 3-5 Composition of Federal Oversight and Entity Instances of Regulation**

Figure 3-6 and Figure 3-7 expand on Federal Oversight, which is comprised of Regulation, Guideline, and Statute entity instances. The relationship between each entity instance type clarifies that Federal Oversight is conceptual, and that Regulation, Guideline, and Statute are logical entities mapped to federal agencies. The implementation of oversight carried out by federal agencies may then be pieced together by agency mission to observe logical processes or physical objects. Since the Local

Oversight entity instance is associated with an individual research institution (see Figure 3-2 to Figure 3-3), role-based entity instances, such as Principal Investigator, Biosafety Officer, or Institutional Biosafety Committee are inherently accountable in addressing the various compliance requirements for each federal agency. The specific regulatory oversight of high and maximum biological containment facilities are mapped to the DOL and its child sub-agency OSHA, the CDC, and the USDA Animal and Plant Health Inspection Service (APHIS).<sup>329</sup> The itemized list of federal regulations tied to either the physical containment or the logical processes handling regulated biological agents are captured in Figure 3-6.<sup>330</sup> Regulations by OSHA generally ensures the safety of workers in all workplaces, but the OSHA Bloodborne Pathogens Standard, and the Personal Protective Equipment Standards focus on biosafety within the research institution, and are relevant to research involving biohazards within BSL-3 and BSL-4 research laboratories. Ancillary federal regulations and regulatory oversight also acknowledge biosafety, but emphasize biosecurity via the controlled access or transfer of dangerous biological agents between registered entities with equal or greater biological containment. For example, federal regulations enforced by the DOT, DOC, APHIS, and CDC restrict the transfer of hazardous biological agents by imposing import and export requirements, and specific notification requirements when transporting within the United States.

The Select Agent Regulations are comprised of CDC and USDA regulations. Regulations by the USDA require permits to import or export high-consequence animal

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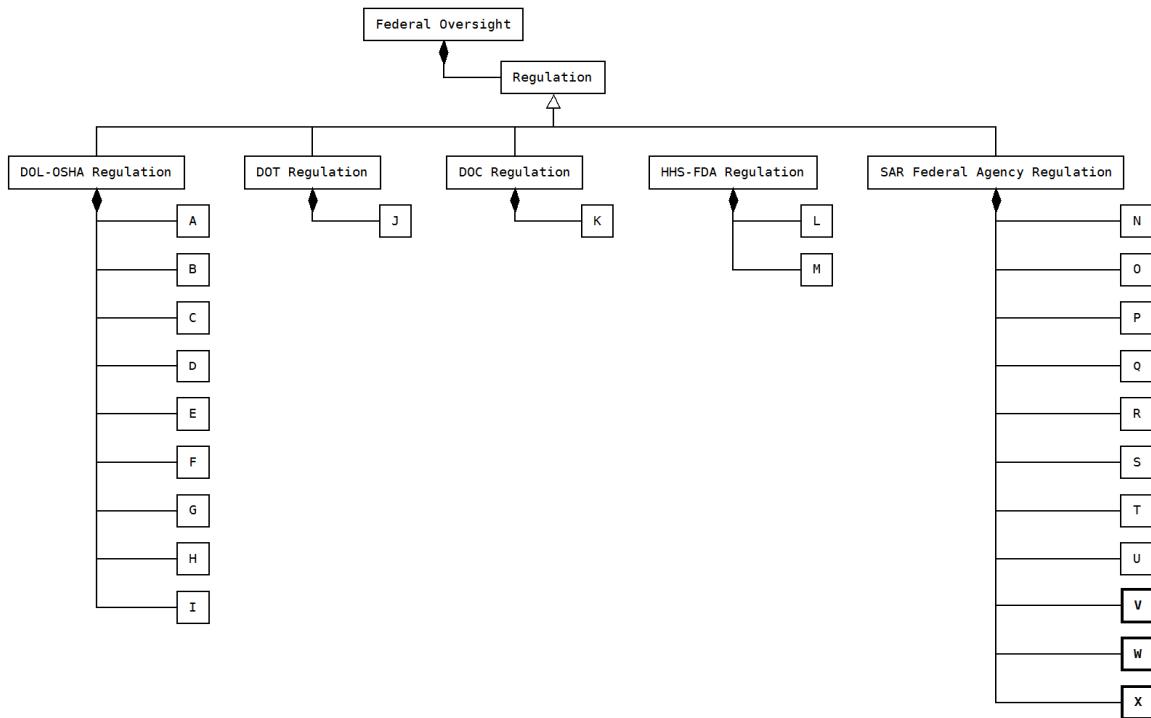
<sup>329</sup> Literature examined during the methodology discriminates high and maximum containment as BSL-3 in the former, and BSL-4 in the latter. The dissertation also follows the distinction described.

<sup>330</sup> For details of any specific Code of Federal Regulations (CFR), see <http://www.ecfr.gov/cgi-bin/ECFR?page=browse>

and plant pathogens. The permits and certifications system established by APHIS considers biosecurity by regulating the import, transport and use of regulated animal and animal products, plant and plant products, pests, organisms, and genetically engineered organisms agents that are hazardous to agriculture.<sup>331</sup> APHIS prioritizes biosafety by inspecting facilities to determine whether or not research institutions affords adequate containment to store regulated agricultural agents. The CDC also imposes a comparable regulation requiring a permit involving the permit of known infectious biological agents towards humans. Although the CDC and APHIS impose distinct federal regulations, both sub-agencies share the responsibility in administering the Select Agent Regulations (SAR) that effectively covers human and agricultural pathogens and toxins. The SAR is the conceptual entity providing the Federal oversight of research institutions that possess, use, or transfer any agent or toxin considered by the Select Agent Toxin List (SATL) as posing significant risks to public health or agriculture. The three Code of Federal Regulations (CFR) implementing the SAR are depicted by letters V, W, and X in Figure 3-6.

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<sup>331</sup> The USDA-APHIS established its “ePermits” web-based system that allows research institutions to apply or renew permits that authorize the import, transport, or release of USDA-regulated BSAT. See [http://www.aphis.usda.gov/wps/portal/aphis/resources/permits/ct\\_permits\\_home](http://www.aphis.usda.gov/wps/portal/aphis/resources/permits/ct_permits_home)



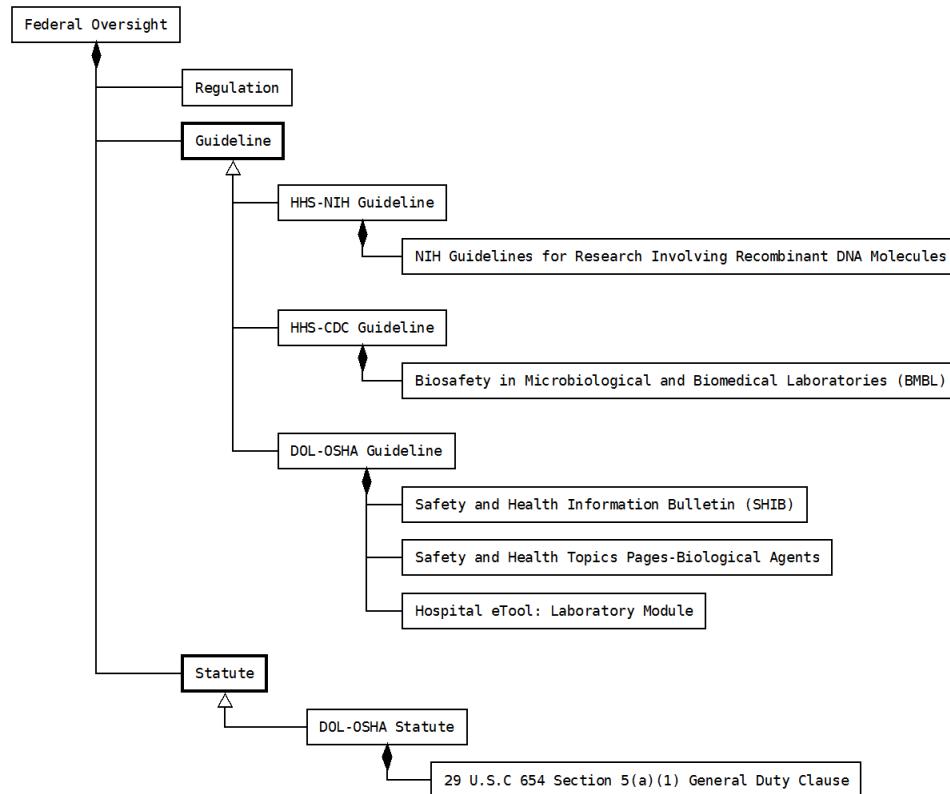
**Figure 3-6 Regulation Entity Instance with Entity Subtypes**

- A. 29 C.F.R. Part 1910.1030 Bloodborne Pathogens Standard
- B. 29 C.F.R. Part 1910, Subpart I Personal Protective Equipment (PPE) Standards
- C. 29 C.F.R. PART 1910.120 Hazardous Waste Operations and Emergency Response
- D. 29 C.F.R. Part 1910.141 Sanitation
- E. 29 C.F.R. Part 1910.151 Medical Services and First Aid
- F. 29 C.F.R. Part 1910.1020 Access to RR Exposure and Medical Records
- G. 29 C.F.R. Part 1910.1200 Hazard Communication
- H. 29 C.F.R. Part 1910.1201 Retention of DOT Markings, Placards and Labels
- I. 29 C.F.R. Part 1910.1450 Occupational Exposure to Hazard Chemicals in Laboratories
- J. 49 C.F.R. Part 173 Transportation of Etiologic Agents
- K. 15 C.F.R. Part 730-774 Export Administration Regulations
- L. 21 C.F.R. Part 56 Good Laboratory Practice for Nonclinical Laboratory Studies
- M. 21 C.F.R. Part 26, Subpart A Specific Sector Provisions for Pharmaceutical Good Manufacturing Practices
- N. 42 C.F.R. Part 71.54 Etiologic Agents, Hosts, and Vectors
- O. 7 C.F.R. Part 330 Federal Plant Pest Pathogens Regulations
- P. 9 C.F.R. Part 92 Importation of Animals and Animal Products
- Q. 7 U.S.C. 7701 et seq. Plant Protection Act
- R. 7 U.S.C. 8301 et seq. Animal Health Protection Act
- S. 9 C.F.R. Part 101-118 Veterinary Biologics
- T. 9 C.F.R. Part 122 Organisms and Vectors
- U. 7 C.F.R. Part 340 Genetically modified organisms that are plant pests
- V. 42 C.F.R. Part 73 CDC, Public Health, and Select Agents and Toxins
- W. 9 C.F.R. Part 121 USDA-APHIS, Animals and Animal Products, and Possession, Use, and Transfer of Select Agents and Toxins
- X. 7 C.F.R. Part 331 USDA-APHIS, Public Health, and Select Agents and Toxins

The established federal oversight scheme is augmented through the use guidelines, where regulations may require the compliance of guidelines. Figure 3-7 captures three relevant guidelines associated with federal oversight where two of the three guidelines are directly linked to scientific research activities in BSL-3, BSL-4, and equivalent agricultural containment facilities. The Biosafety in Microbiological and Biomedical Laboratories (*BMBL*), and the *NIH Guidelines* for Research Involving Recombinant DNA Molecules (*NIH Guidelines*) are the primary guidelines recognized by both the scientific and security communities. The core focus of the *BMBL* is the prevention and protection of laboratory workers from accidental exposures to infectious biological agents and toxins that pose various levels of health risks, including lethality, to humans. The scope of the *NIH Guidelines* is narrow by focusing on recombinant DNA (rDNA) research, or where compliance is a requirement by institutions receiving conditional NIH funding towards rDNA research. The *NIH Guidelines* are applicable to research institutions involving recombinant human and agricultural pathogens in BSL-3 or BSL-4 laboratories, but also provides guidance to research experiments at BSL-2.

The lesser-known OSHA guidelines, such as the Safety and Health Information Bulletin (SHIB) and Safety and Health Topics Pages – Biological Agents, applies to all research institutions where biological agents are present, and covers all employers, federal, academic, or private, as part of the Occupational Safety and Health Act. The collective composition of federal oversight implemented by regulations, guidelines, and statutes focuses on protecting humans from exposure to biological hazards, scrutinizes the physical containment and controlled access mechanisms of high-consequence

agricultural agents that could threaten animal or plant health, or contaminate the food supply, or the possession, use, or transfer of both human and agricultural pathogens.



**Figure 3-7 Federal Oversight – Guidelines and Statute Entity Instances**

### **3.5.1 Findings of Federal Regulations and Guidelines**

The various federal agencies indirectly involved with oversight most likely explains one of the wicked problems of biorisk oversight. Specifically, research institutions choosing to destroy their biological agent inventories instead of learning the transport requirements to move BSAT materials to other registered entities implies

complying with the Select Agent Regulations (SAR), separate CDC or USDA requirements independent from SAR, Department of Transportation regulations, and ensuring external commercial transport providers and internal resources between sending and receiving entities are authorized to access materials. The multi-layered requirements imposed by different USG entities exacerbates the unfamiliarity by the scientific community to comply with non-scientific regulations or guidelines compelled by FSAP addressing biosafety, containment, transport, inventory management, and personnel security compliance. The UML activity diagrams in the “BSAT Transportation Security Entity Instances” translates the multi-layered requirements, and serve as DSR-IS artifacts to model BSAT transport requirements unevenly understood by research institutions. If a national lead federal agency dedicated to national biorisk management and oversight were established, including representatives from the specific USG agencies in Figure 3-6 is strongly recommended. As can be seen, HHS has three children sub-agencies involved with providing guidelines or regulations specific to scientific research or containment compliances. The HHS sub-agencies are the NIH, the CDC, and the FDA. Likewise, the USDA has two children sub-agencies, which Animal Plant and Health Inspection Service (USDA-APHIS) and Agricultural Research Service (USDA-ARS).

### **3.6 Conceptual Biosafety Entity Classes and Interrelationships**

The main entity instances associated with biosafety are conceptual, which are Risk Assessment and Containment. The stratification schemes related to Risk Assessment are specific to the implications of exposure to certain biological agents, the

internal protective barriers between research institution staff from biological agents, and the external barriers between the research institution structure and the airspace to its immediate surroundings. The findings from open source literature identified hazards caused from either agents or laboratory procedures as relevant stratification systems to formulate. Additional biological agent stratification schemes, specific to bioterrorism threat assessment as opposed to risk assessment, discovered from literature review are captured in the visual DSR-IS artifacts, and will be briefly discussed.

### **3.6.1 Risk Assessment and Stratification Entity Instances**

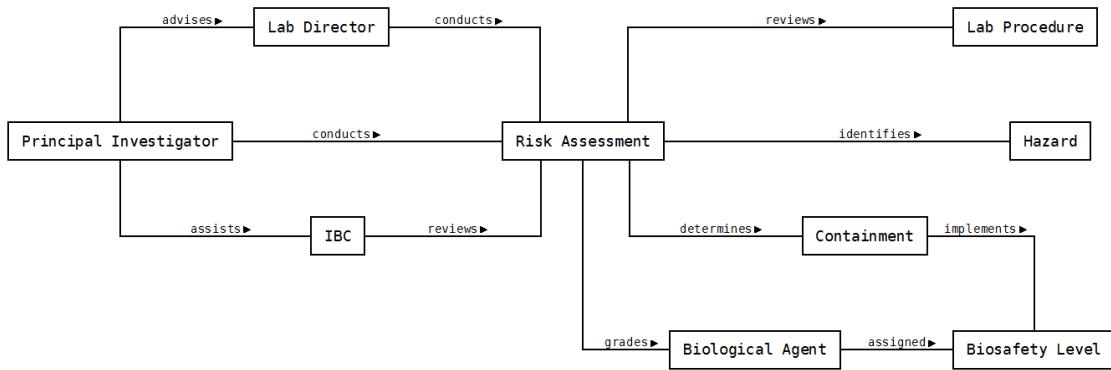
The Risk Assessment entity instance may be considered either the process to grade hazards (“as a process”), or the actual grade or assessment represented by a report (“as a report artifact”). Figure 3-8 shows the high-level interrelationships with Risk Assessment serving as a process. As a process, Risk Assessment considers the engineering controls, and the biosafety stratification of containment and laboratory practices suitable to allow proposed operations performed with infectious biological agents. The main objectives are to analyze known or emerging biological agents that will be handled, identify the hazardous characteristics where possible, review the proposed scientific activities and laboratory procedures that will be employed, determine the potential biorisks that may result from accidental exposure, and formulate the probability and consequences if accidental exposures result in laboratory acquired infections (LAI). The risk assessment process considers the engineering mechanisms, general and specialized laboratory practices, personal and facility barriers best suited to handle the

exact procedures performed with infectious agents based on the degree of risk factors, such as pathogenicity and severity of disease. The findings and analysis when risk assessment is serving as a process eventually becomes referenced as Risk Assessment as a report artifact that is further reviewed by local oversight entities within the research institution. As a report artifact, Risk Assessment articulates its findings and analysis to determine the most suitable biosafety level (BSL) factoring the pathogenicity, infectiousness, and lethality of the biological agent being handled.

The entity instance roles of Risk Assessment as either a process or report artifact is demonstrated with its interrelationships in Figure 3-8. Risk Assessment is considered a process from the perspectives of the Lab Director and Principal Investigator since both entity instances are accountable in analyzing the potential hazards from proposed laboratory procedures, and the biological agents involved with experiments. The IBC and other research institution personnel may assist with risk assessment, but their roles are secondary and less visible. As a report artifact, Risk Assessment is used by laboratory directors and the principal investigators to evaluate skillset and experience gaps when handling certain pathogens, and to point out what proficiencies should be acquired specific to safety practices and protective equipment prior to endorsing an experiment. The quality of the risk assessment as a process, and its accuracy as a report artifact correlates with the knowledge and experience of the laboratory directors and principal investigators held accountable.

A limitation of the DSR-IS artifact represented by Figure 3-8 is evident where Risk Assessment as a process and reportable artifact may be specific to individual

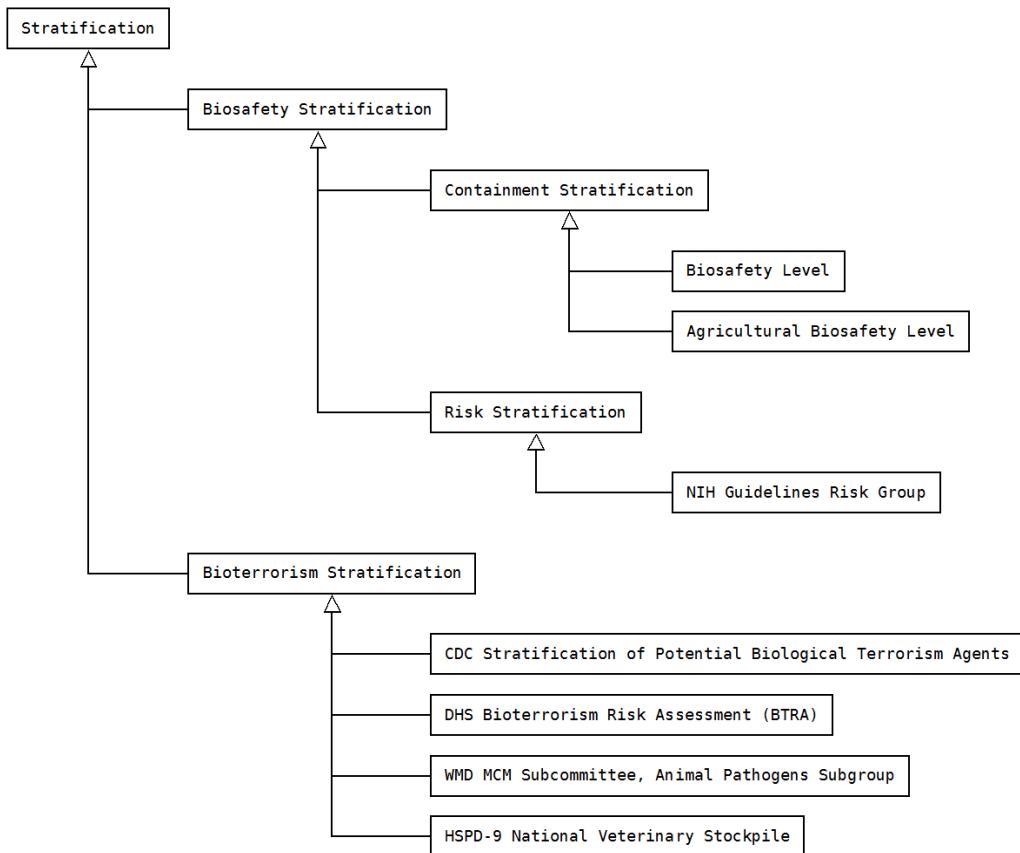
research institution where the methods or considerations may leverage or single out protective gear and physical facility safeguards known by the laboratory directors or principal investigators. Similarly, the input parameters represented as entity instances in Figure 3-8, Lab Procedure, Hazard, Biological Agent, and Containment, may be addressed by researchers intimate with the biosafety safeguards and laboratory capabilities of an individual research institution when proposing scientific experiments. The interactions between researchers and scientists with local oversight entity instances, Lab Director and Principal Investigator are plausible, but the latter pair is faced with critical decisions to ensure risks are not underestimated without levying unneeded safeguards that incur additional expenses and afford no extra protection. Figure 3-8 captures the interrelationships reflecting the subjective process of risk assessment, which attempts to identify the many hazardous characteristics of biological agents and laboratory procedures. What's not shown, and cannot be modeled accurately, are the non-standard decision making processes practiced by lab directors and principal investigators to make judgments based on incomplete information. Despite the caveats and handicaps, the intent of containing agent and laboratory procedure hazards within the laboratory serves to quarantine infectious areas from tenants in the same building, and airspace outside the physical structure of the research institution.



**Figure 3-8 Interrelationships with Risk Assessment Entity Instance**

A survey of the literature did not come across a standard risk assessment process, but rather common practices where its execution was dependent on the experience and knowledge of the lab directors and principal investigators at individual research institutions. The lack of a standard biological risk assessment process explains the various suggestions from the *BMBL* and *NIH Guidelines* with the caveat that research institutions may establish their own risk assessment practices. Fortunately, the known outcome of the risk assessment process determines the required containment after vetting the laboratory procedures proposed, the biological agents involved, and the conceivable hazards from potential biosafety breaches. The general steps of the risk assessment involves identifying hazards specific to the biological agents and the lab procedures involved, applying a risk stratification to grade the biological agents involved, and finally apply containment stratification criteria to determine the appropriate biosafety level to support the experiment. The DSR-IS artifact in Figure 3-9 visualizes the Stratification entity instance where Biosafety Stratification is the subtype relevant in completing a risk assessment as a process and a report artifact. Post-risk assessment activities conducted

by the principal investigator and lab director may involve imposing additional biosafety precautions, vetting the laboratory training and biosafety experience of staff supporting the research experiment, confirming the operational readiness of safety equipment, such as biosafety cabinets (BSC), and a final risk assessment review with the Institutional Biosafety Committee (IBC). The IBC approves the risk assessment and *BSL* determined by the principal investigator and lab director for recombinant of synthetic nucleic acid experiments. However, additional risk assessment approvals may come from federal oversight entities, such as the NIH Recombinant-DNA Advisory Committee (RAC) Review, the NIH Office of Biotechnology Activities (OBA), and the NIH Director. The approvals required to authorize carrying out certain types of research experiments will are discussed in section, *NIH Guidelines and Recombinant DNA Entity Instances.*



**Figure 3-9 Biosafety Stratification and Bioterrorism Stratification Entity Subtypes**

The considerations to identify hazards as part of the risk assessment process are perplexing when principal investigators and lab directors are provided incomplete information. The DSR-IS framework acknowledges Hazard as an entity instance, and its interrelationship will be discussed in the following sections. The Bioterrorism Stratification entity instance in Figure 3-9 is not directly applicable towards bioterrorism threat risk assessment as opposed to risk assessment, but was recognized to be a subtype of stratification. The Bioterrorism Stratification entity instance will be discussed in subsequent sections in Chapter 3.

### **3.6.2 Risk Assessment, Hazard Entity Instances, and Biosafety Stratification**

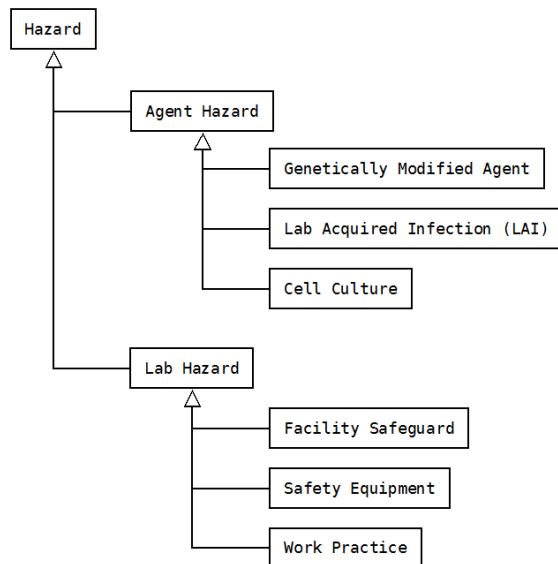
As can be seen in Figure 3-8, the Hazard entity instance is one of the main parameters when conducting the risk assessment process. The hazards that are identified are then further scrutinized to determine the most appropriate containment conditions for a proposed biological experiment. Figure 3-10 reflects the subtypes of the Hazard entity instance as either an Agent Hazard or a Lab Hazard. The *BMBL* defines the Agent Hazard entity instance as the “possible exposure to potentially infectious latent and adventitious agents” from human or animal cells and tissues, such as HIV infections and the Hepatitis C virus of infected persons.<sup>332</sup> The Genetically Modified Agent entity subtype is evident where genetic modification may increase the pathogenicity of an agent or increase its resistance to antibiotics or other known treatments. The Lab Acquired Infection (LAI) entity subtype is interrelated with biosafety incident reporting mechanisms (not shown). The availability of LAI incident reports are considered historical artifact when prescribing specialized laboratory practices or precautions as part of the risk assessment process. The *BMBL* does not afford guidance on other biorisk scenarios, such as an infected animal escaping from laboratory containment running in the wild, and would be considered incomplete based on the comprehensive definition of biorisk.<sup>333</sup> Unless the hazards of a specific pathogen are not well known, principal investigators and laboratory directors may conduct risk assessments without referencing the “Agent Summary Statements” afforded by the *BMBL* if they are familiar with the

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<sup>332</sup> *BMBL*, 10-13.

<sup>333</sup> Credit and special thanks to Dr. Gregory Koblenz in pointing out the Agent Hazard entity instance described by the *BMBL* does not address certain biorisks.

pathogens involved with a proposed experiment, and consider biosafety controls, equipment, and procedures represented by entity instances, Facility Safeguard, Safety Equipment, and Work Practice adequate.<sup>334</sup>



**Figure 3-10 Hazard Entity Instance – Agent and Lab Hazard Entity Subtypes**

Once the types of hazards are identified and examined, the initial risk assessment process considers the stratification criteria specific to risks of the biological agents and the appropriate containment for proposed experiments. Figure 3-11 expands upon the Biosafety Stratification entity instance introduced by Figure 3-9 by capturing the entity subtypes, Biosafety Level and *NIH Guidelines* Risk Group. The Risk Stratification entity

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<sup>334</sup> The “Agent Summary Statements” are quick reference guides to biological agents, and is content within the BMBL fifth edition. The summary statements offers guidelines to safely handle agents, the potential hazards, and the recommended containment conditions and biosafety level.

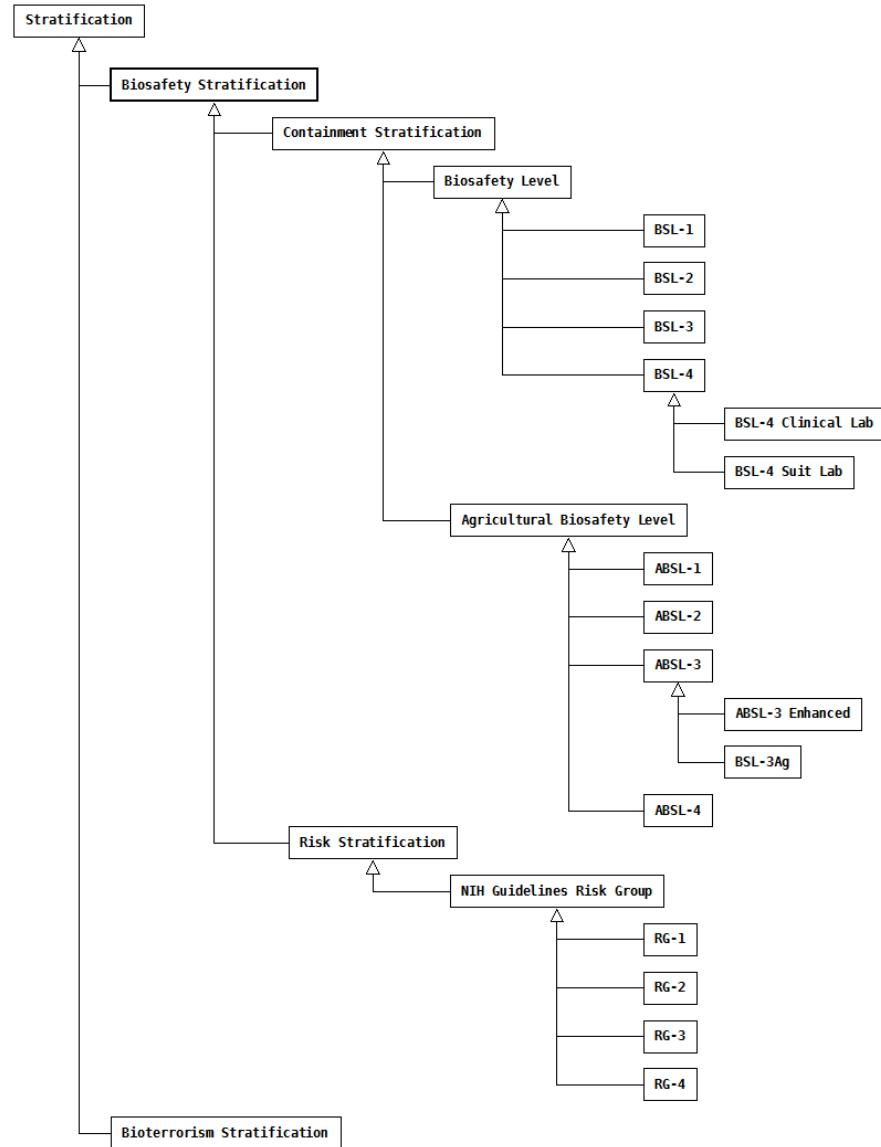
subtype represented by *NIH Guidelines* Risk Group, is applied to assess the hazards and risks of biological agents. The *NIH Guidelines* Risk Group may be juxtaposed with the *BMBL* “Agents Summary Statements” as the first step of the risk assessment process. The risk groups described by the *NIH Guidelines* represented by RG-1 to RG-4, are specific to human etiologic pathogens, and their hazardous characteristics in causing infectious diseases and the treatments, if any, available. The Lab Procedure entity instance captured in Figure 3-8 becomes relevant in the risk assessment since principal investigators, laboratory directors, and the IBC will scrutinize how biological agents will be handled and manipulated in the proposed experiment. Once the Lab Procedure entity instance is well-understood by the principal investigators and lab directors of the research institution, the Lab Hazard entity instance and its subtypes in Figure 3-10 are considered.

Laboratory hazards, such as safety equipment and procedures to produce aerosol particles from wet or dry biological agent concentrations are analyzed, and necessitate evaluating the Work Practice (generation of aerosol particles) and Facility Safeguard (aerosol chambers and biosafety cabinets) entity instances. Experiments involving animals, not captured in the DSR-IS artifacts, pose hazards that involve treatment for bites, scratches or accidental exposure to zoonotic diseases.<sup>335</sup> Identification of laboratory hazards includes gauging the complexities of the procedures to manipulate the biological agents involved, and is not captured in the DSR-IS artifacts since risk assessment is a subjective process directly tied to the knowledge and experience of the principal investigators and lab directors. The DSR-IS artifacts imply the prescriptive content of risk assessment (as

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<sup>335</sup> Zoonotic diseases may be viruses or bacteria that can be passed between animals and humans.

a report artifact) produced by risk assessment (as a process) should clearly articulate the potential hazards mapped to proposed laboratory procedures.



**Figure 3-11 Biosafety Stratification Entity Instance with Entity Subtypes**

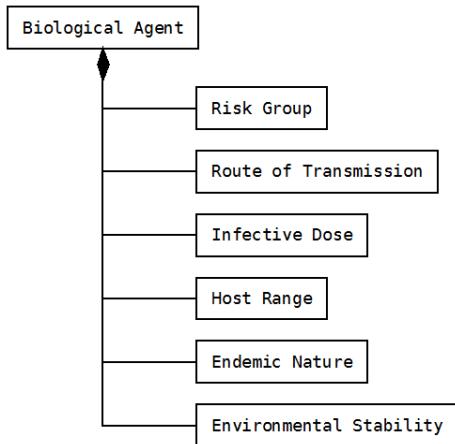
### **3.6.2a Risk Stratification and Agent Hazard Interrelationship**

The interrelationship between Risk Stratification and Agent Hazard entity instances is evident where the hazardous characteristics of the latter are correlated with the *NIH Guidelines* Risk Group entity subtype of the former. The composition of the Biological Agent entity instance in Figure 3-12 are the main parameters to formulate the hazardous attributes of pathogens, but in context of the Agent Hazard subtypes, Genetically Modified Agent, Lab Acquired Infection (LAI), and Cell Culture in Figure 3-10.<sup>336</sup> The Biological Agent entity instance represents the Federal Select Agent Program definition published in Code of Federal Regulations title 7 part 331 (7 C.F.R., Part 331) “Title 7 Agriculture, Part 331 Possession, use and transfer of select agents and toxins” as any “microorganism (including, but not limited to, bacteria, viruses, fungi, or protozoa), or infectious substance, or any naturally occurring, bioengineered, or synthesized component of any such microorganism or infectious substance, capable of causing (1) Death, disease, or other biological malfunction in a human, an animal, a plant, or another living organism; (2) Deterioration of food, water, equipment, supplies, or material of any kind; or (3) Deleterious alteration of the environment.”<sup>337</sup>

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<sup>336</sup> The origin of the biological agent, represented by the Endemic Nature attribute of Biological Agent entity instance in Figure 3-12 is critical in the risk assessment process if testing the transmission of infectious diseases towards humans or animals with agents coming from foreign countries. Importation requirements of etiological agents imposed by the CDC and USDA-APHIS are discussed in subsequent sections of Chapter 3.

<sup>337</sup> There are three Code of Regulations (C.F.R.) directly linked to the Federal Select Agent Program, which are 7 C.F.R. Part 331, 9 C.F.R. Part 121, and 42 C.F.R. Part 73. See also <http://www.selectagents.gov/regulations.html>



**Figure 3-12 Composition of Biological Agent Entity Instance**

The hazardous characteristics of the Biological Agent entity instance includes its capability to infect via aerosol particles or droplets (Route of Transmission) and cause disease in a susceptible human hosts or animals (Host Range), virulence, and access to available treatments.<sup>338</sup> Analyzing the Biological Agent composition with each subtype of Agent Hazard assists principal investigators and lab directors to formulate which risk group (RG) is appropriate in Figure 3-11. The four risk group classifications in Table 3-1 are defined by the *NIH Guidelines*, and are specific to human etiological agents.<sup>339</sup> Eventually the outcome of the risk assessment resolves the correlation between risk group of the agent and biosafety level, which form the interrelationships between Biological

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<sup>338</sup> Exposure to aerosol particles of an infectious agent is considered one of the most serious hazards towards scientists handling the agents, and the community airspace if physical containment were breached. Infectious aerosols may not be considered the natural route of infections for agents in the wild, but requires specialized laboratory practices and precautions.

<sup>339</sup> The World Health Organization (WHO) affords a comparable risk group classification that recognizes human and animal etiological agents. The risk group classifications between the WHO and *NIH Guidelines* correlate, but the latter also considers biosafety level.

Agent, Risk Assessment, Agent Hazard, Risk Stratification, and Containment  
Stratification entity instances.

**Table 3-1 Risk Group Classification of Infectious Microorganisms<sup>340</sup>**

Risk Group Classification	NIH Guidelines for Research involving Recombinant DNA Molecules 2002 <sup>2</sup>
Risk Group 1	Agents not associated with disease in healthy adult humans.
Risk Group 2	Agents associated with human disease that is rarely serious and for which preventive or therapeutic interventions are often available.
Risk Group 3	Agents associated with serious or lethal human disease for which preventive or therapeutic interventions may be available (high individual risk but low community risk).
Risk Group 4	Agents likely to cause serious or lethal human disease for which preventive or therapeutic interventions are not usually available (high individual risk and high community risk).

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<sup>340</sup> *BMBL*, 10.

### **3.6.2b Containment Stratification, Lab Hazard, and Agent Hazard**

#### **Interrelationships**

The interrelationship between Containment Stratification in Figure 3-11 and Lab Hazard entity instances in Figure 3-10 are evident where the hazardous characteristics of the latter are prescribed a specific biosafety level by the former. The Lab Procedure entity instance introduced in Figure 3-8 is acknowledged during the initial risk assessment process, and the hazardous characteristics identified formulate the Lab Hazard entity instance. A poorly executed laboratory procedure may inadvertently cause a subtype instance of an Agent Hazard, such as a Lab Acquired Infection (LAI).<sup>341</sup> Sources of LAI via exposure to infectious aerosols may come from laboratory procedures that employ equipment to handle virulent agents, such as pipets, blenders, centrifuges, and vortex mixers. The inhalation of infectious aerosol particles into the lungs is an exposure hazard to persons not only physically collocated with the biological agent being operated, but also nearby persons sharing work spaces separated by ventilation systems from the laboratory.<sup>342</sup>

A limitation of the DSR-IS artifacts was the inability to depict negligence, reckless actions, or carelessness of researchers that could lead to laboratory hazards, but are not shown in any of the UML-based diagrams. The subtypes of Lab Hazard, which

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<sup>341</sup> There are five general route of exposures for a LAI, which are intravenous inoculation via syringe needles, skin contact with biological agents from accidental splashes or spills, ingestion, animal bites or scratches, and exposure to infectious aerosols.

<sup>342</sup> Route of transmission for virulent biological agents should consider respirable particles and droplets where the former cause inhalational risk. The latter produces the risk of contaminated surfaces, such as work benches, gloves, and personal protective equipment (PPE) linings, which may contact the skin or mucous membranes.

are Work Practice, Safety Equipment, and Facility Safeguard pose distinct hazardous characteristics, but each subtype is exacerbated through carelessness and irresponsible actions. The Work Practice subtype of the Lab Hazard entity instance may also represent “carelessness” of scientists conducting a research experiment. The implications of hazards from a Work Practice subtype may lead to compromised facility safeguards or containment breaches, which causes increased risks to persons in shared lab spaces. Adequate training and periodic retraining may reduce such hazards under the assumption that laboratory staff will responsibly follow safety procedures. Laboratory directors or principal investigators should train and retrain new staff to mitigate the inherent risks involving physical handling of hazardous agents. For example, the improper use of personal protective equipment (PPE) from inadequate sufficient training or carelessness reduce its effectiveness and provides a false sense of security.<sup>343</sup>

The hazards specific to the Safety Equipment entity subtype are linked to poor maintenance, impaired functionality, and makeshift uses of laboratory equipment other than their original purpose. Biological safety cabinets (BSC) and centrifuge safety cups are effective in protecting laboratory staff from exposure to microbial aerosols and droplets, but become liabilities if neglected and not periodically tested to detect malfunctions. The DSR-IS artifacts imply that biosafety programs should not only incorporate training in the proper use of laboratory equipment and laboratory procedures, but also implement training to routinely inspect equipment to detect malfunctions.

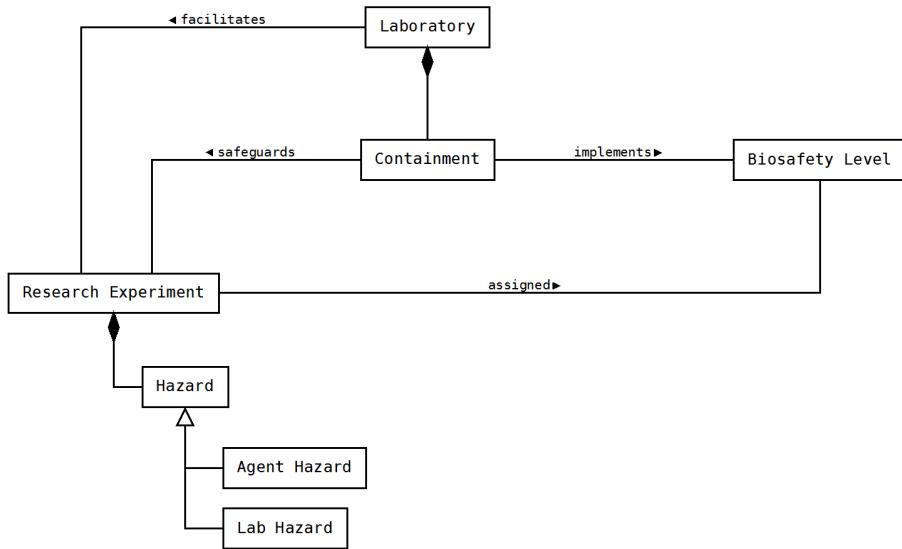
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<sup>343</sup> The types of PPE typically used by researchers and scientists include safety glasses, face masks, face shields, gloves, and laboratory gowns. The use of full-body air pressurized suits becomes necessary when physically handling agents considered lethal through direct contact or from inhalation.

The hazards associated with Facility Safeguard entity subtype are the inability to prevent the accidental release of infectious agents from the laboratory. For example, directional airflow is a type of Facility Safeguard that counteracts aerosol transmission from a laboratory into shared heating, ventilation, and air conditioning (HVAC) systems of the same building. A poorly maintained or compromised HVAC system that results in the loss of directional airflow not only degrades laboratory operations, but also severely introduces health risks if there are improperly stored lethal agents known to transmit diseases via inhalation. The risk assessment process should confirm the integrity of facility safeguards, and have multiple research institution entities, such as biosafety officers, building maintenance and facilities personnel, and members of the resident Institutional Biosafety Committee (IBC) inspect the facility safeguards to confirm adequate protection is afforded for the proposed experiments.<sup>344</sup> The characteristics identified from Agent Hazard and Lab Hazard entity instances not only form the composition of a Research Experiment entity instance in Figure 3-13, but also the suggests a “Proposed Research Experiment” entity instance (not shown) with the same composition during the risk assessment process introduced in Figure 3-8. The interrelationships between the Hazard and Containment entity instances are also implied during the risk assessment process in Figure 3-8 where the former is an input parameter, and Figure 3-13 as an attribute of Research Experiment.

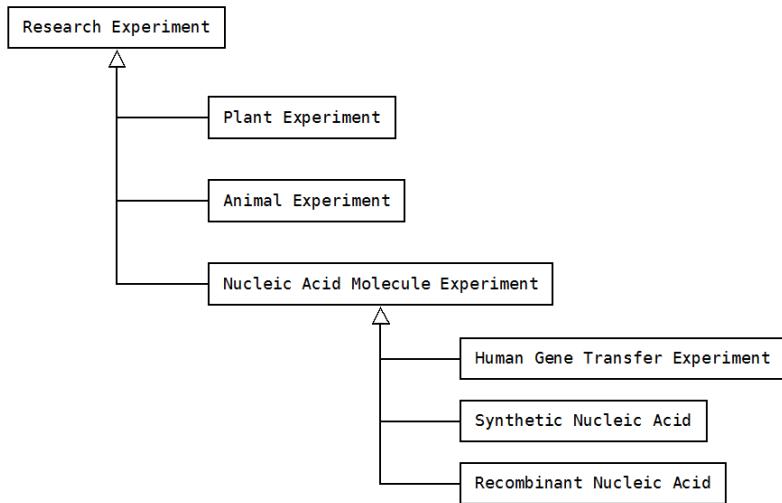
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<sup>344</sup> There were no findings or data available to examine whether or not facility safeguards significantly differ from newly constructed BSL-3 or higher laboratories in terms of design, implementation, and needed maintenance.



**Figure 3-13 Containment Entity Instance and Interrelationships**

The composition of the Research Experiment entity instance having agent and laboratory hazards applies to its subtypes in Figure 3-14. Thus, Plant Experiment, Animal Experiment, and Nucleic Acid Molecule Experiment will have distinct agent and laboratory hazards posed. The Research Experiment entity instance in Figure 3-14 also reflects the Nucleic Acid Molecule Experiment subtype addressed by the *NIH Guidelines*, which follow specific approval procedures with notification requirements to both federal agency and local research institution oversight entities. Federal agency oversight entities include the NIH Director, the NIH Recombinant DNA Advisory Committee (RAC), and the NIH Office of Biotechnology Activities (NIH-OBA). The main local oversight entities at an individual research institution are the Institutional Biosafety Committee (IBC) and institutional review board. The research experiment approval process and notification requirements will be reviewed in subsequent sections within chapter 3.



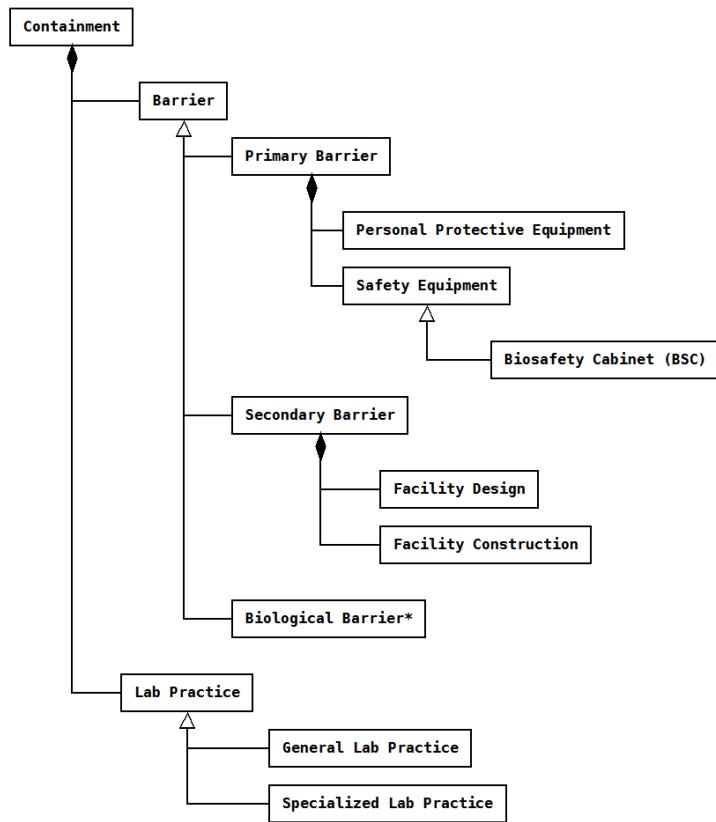
**Figure 3-14 Research Experiment Entity Instance with Subtypes**

The interrelationship between the Containment and Research Experiment entity instances in Figure 3-13 may be expressed by observing the latter subtypes, Plant Experiment, Animal Experiment, and Nucleic Acid Molecule Experiment in Figure 3-14 with the Containment composition artifact in Figure 3-15. The characteristics of Containment comprised by the Barrier and Lab Practice entity instances are applicable to all entity subtypes of Research Experiment, and is not specific to any biosafety level. The Containment entity instance is inherently conceptual where procedures represented by Lab Practice are either general or specialized, and the biosafety mechanisms represented by Primary and Secondary Barrier are either standard or augmented as biohazards increase. Research experiments not involving recombinant or nucleic acid molecules will always employ the Primary and Secondary Barrier attributes of the Containment entity instance. In contrast, subtypes of the Nucleic Acid Molecule

Experiment may employ highly specific barriers represented as Biological Barrier as an additional containment layer. The use of a Biological Barrier (not visualized as a DSR-IS artifact), such as a living cell, restricts either the infectivity of a viral vector for specific hosts, or its transmissibility in the open environment.<sup>345</sup> The attributes of the Containment entity instance, Primary Barrier, Secondary Barrier, General Lab Practice, and Specialized Lab Practice may be implemented in different combinations to effectively confine biological agents and experiments employing nucleic acid molecules.

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<sup>345</sup> Vectors are molecules used as carriers of foreign DNA that are inserted into living cells, which demonstrates the practice of recombinant DNA (rDNA) research. The use of vectors allows host cell replication as they are genetically engineered, and allows researchers to artificially attenuate lethal virus strains for study and decrease dissemination outside the laboratory environment.

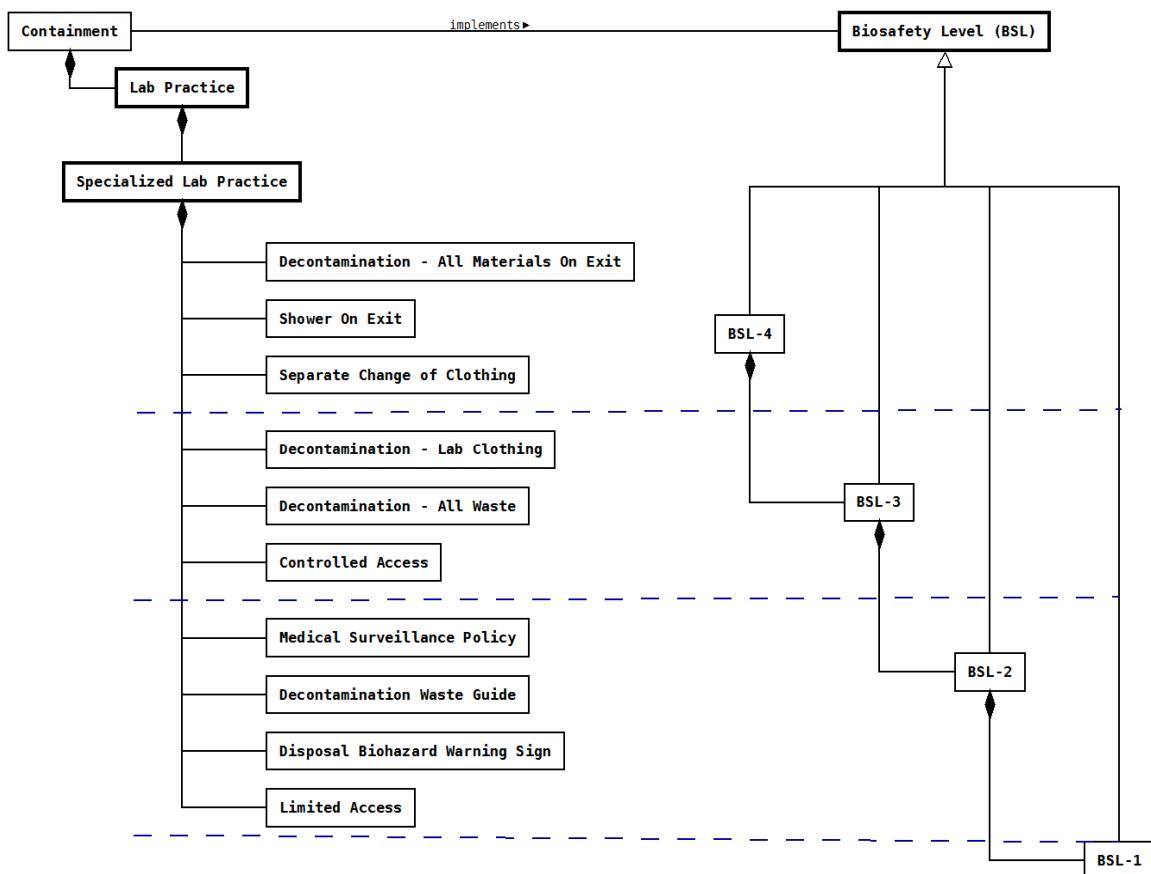


\* Applicable to rDNA experiments

**Figure 3-15 Composition of Containment Entity Instance – Neutral Biosafety Level**

The different combinations of attributes comprising the Containment entity instance in Figure 3-15 implement the biosafety levels considered during the risk assessment process. Since the initial risk assessment process, and subsequent IBC risk assessment review are subjective, the containment properties may not necessarily consider all available or uncollected information on the special laboratory procedures proposed for experiments under different conditions subsequent to risk assessment review. The DSR-IS artifact represented by Figure 3-16 itemizes the Specialized Lab Practice entity subtypes with the biosafety level boundaries, which not only reflects the

flexibility in having principal investigators and IBC members to recommend additional containment procedures for proposed experiments, but also the cumulative composition of the Specialized Lab Practice as the biosafety level ascends. The dotted lines shows the boundaries where the higher biosafety levels above the dotted line absorb the specialized lab practices below the dotted line. The laboratory practices for biosafety level 1 (BSL-1) are general whereas BSL-4 requires highly specialized laboratory practices coupled with rigorous containment barriers.

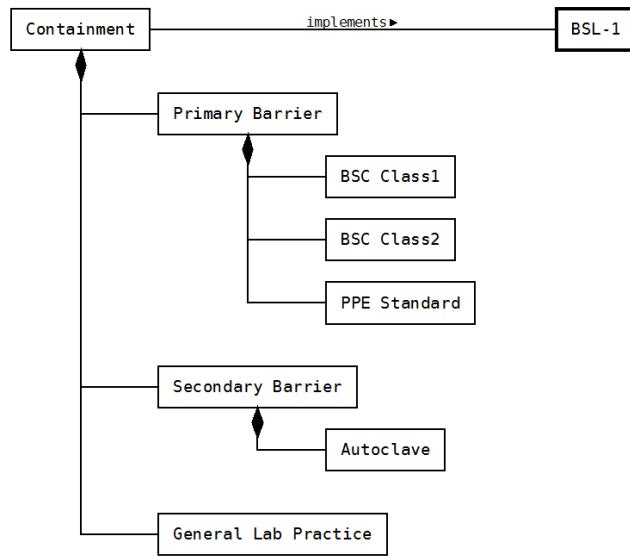


**Figure 3-16 Specialized Lab Practice Correlation to Biosafety Level**

As can be seen, the Specialized Lab Practice entity instance become gradually sophisticated as each the biosafety level increases starting with BSL-2. The DSR-IS artifact from Figure 3-17 demonstrates the Containment implementation of biosafety level-1 (BSL-1), and is evident from the lack of the Specialized Lab Practice entity instance. BSL-1 is considered least stringent biosafety level, and typically provides the containment conditions to examine biological agents that are neither lethal to humans nor pose major hazards to researchers and the open environment. The following three diagrams represent the DSR-IS artifacts illustrating the composition of the Containment entity instance for BSL-2, BSL-3, and BSL-4.<sup>346</sup>

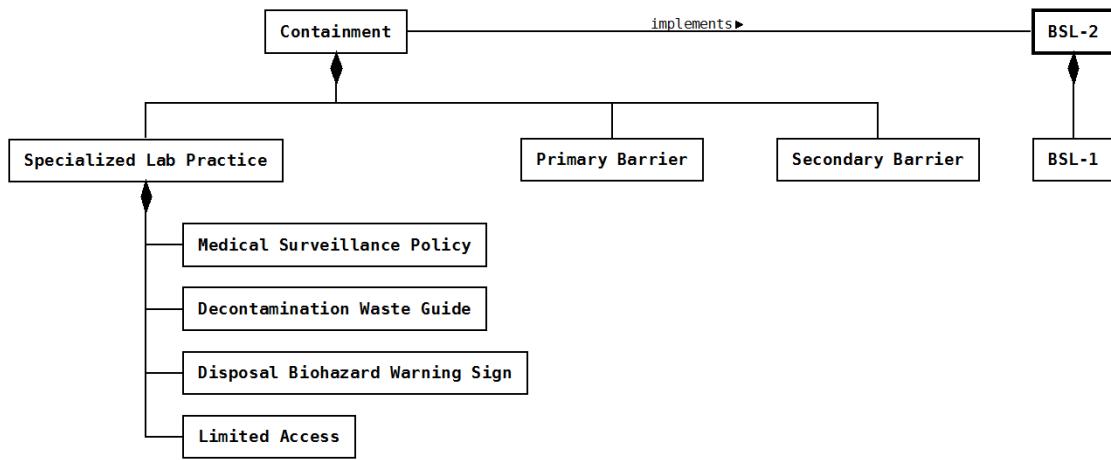
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<sup>346</sup> The BMBL also specifies four biosafety levels for animals (ABSL), and the *NIH Guidelines* offers biosafety levels for plant and animal experiments employing nucleic acid molecules. The composition schemes for nucleic acid molecule or rDNA experiments with plants (BL1-P to BL4-P) or animals (BL1-N to BL4-N) are counterparts to the BSL-1 to BSL-4 containment concepts, but considers hazards specific to research combinations involving nucleic acid molecules and either animals or plants. No DSR-IS artifacts were created for biosafety levels for plant and animal experiments defined by *NIH Guidelines*.



**Figure 3-17 BSL-1 Containment Composition**

Figure 3-18 reinforces the role of the conceptual Containment entity instance in its implementation of BSL-2. The composition of BSL-2 absorbs the attributes of BSL-1 depicted in figure 40, but includes a Specialized Lab Practice entity instance with four properties. The composition of BSL-2 Specialized Lab Practice, which are Medical Surveillance Policy, Decontamination Waste Guide, Disposal Biohazard Warning Sign, and Limited Access are the unique attributes separating BSL-2 from BSL-1. This finding is consistent when comparing DSR-IS artifacts representing BSL-1 and BSL-2 where the latter reveals no additional Primary or Secondary Barrier attributes are provided, but rather a Limited Access mechanism coupled with safety guides, labels, or signs. BSL-2 containment is employed for research biological agents posing moderate hazards to researchers and the open environment.



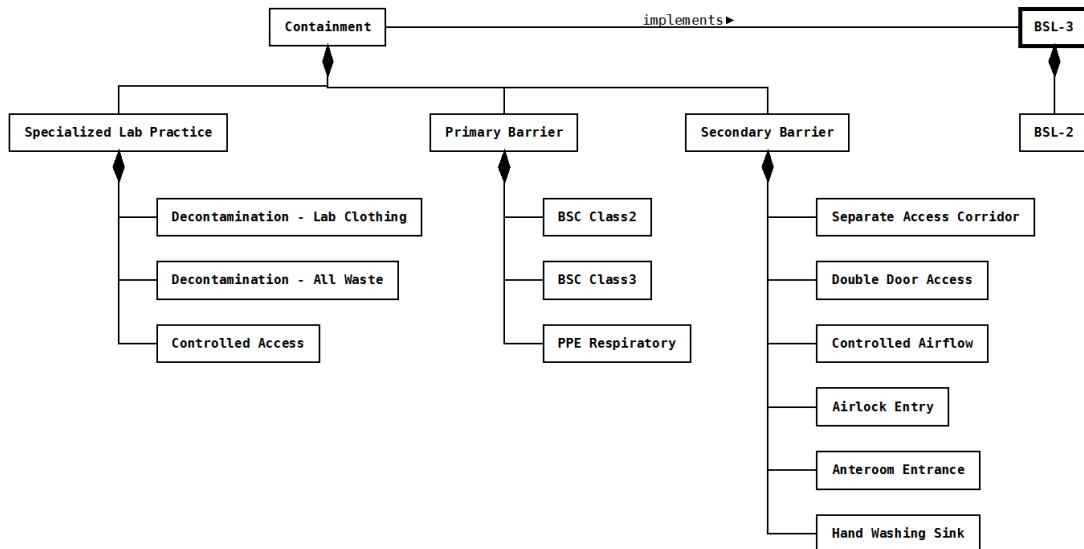
**Figure 3-18 BSL-2 Containment Composition**

The interrelationships shown in Figure 3-19 illustrates the Containment entity instance implementing BSL-3, which in turn are a composition of the containment attributes for BSL-2 depicted in Figure 3-18. Unlike BSL-1 and BSL-2, the Containment composition for BSL-3 noticeably augments Specialized Lab Practice, Primary and Secondary Barrier entity instances. The composition of the BSL-3 Primary Barrier introduces BSC Class3 and PPE Respiratory attributes, and physical facility safeguard upgrades not found with either BSL-1 or BSL2 Secondary Barrier.<sup>347</sup> The DSR-IS artifact representing BSL-3 introduces changes to the actual facility or physical laboratory space, such as Separate Access Corridor, Controlled Airflow, Airlock Entry, and an Anteroom Entrance that collectively confine biological agents in laboratory spaces. BSL-3 containment is prescribed for experiments examining either domestic or

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<sup>347</sup> Secondary Barrier represents the facility, physical laboratory space, or building structure.

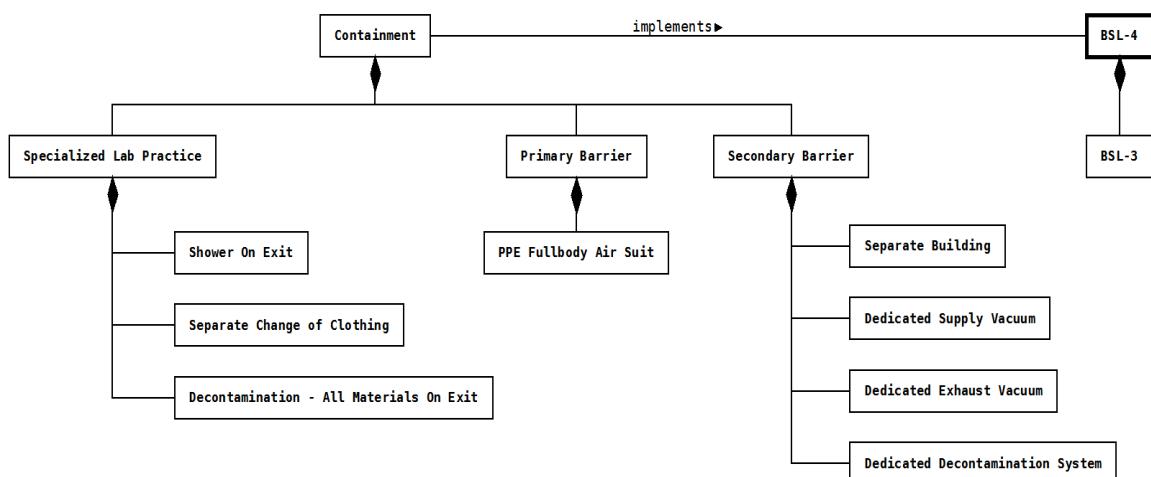
exotic biological agents having the potential to cause serious or potentially lethal diseases from inhalational exposure.



**Figure 3-19 BSL-3 Containment Composition**

The artifact representing BSL-4 visualized in Figure 3-20 follows the preceding biosafety level diagrams, which demonstrate an augmented Containment composition and its implementation of the lower biosafety level (e.g., BSL-3). The Specialized Lab Practice for BSL-4 emphasizes decontamination, and the Barrier entity instances underscore maximum protection. The Primary Barrier requires researchers to wear a PPE Fullbody Air Suit, and physical facility safeguards afford decontamination systems, requires a separate building, and dedicated supply and exhaust vacuums composing the BSL-4 Secondary Barrier. The containment conditions afforded by BSL-4 are very specific towards exotic biological agents posing the risk of aerosol exposures leading to

laboratory infections considered lethal or life-threatening. BSL-4 containment is considered most appropriate for handling biological agents where treatment is not established or known, and infection and incurable. All BSL-4 laboratories in the United States have at least one research program involving select agents, which implies all BSL-4 facilities are regulated by the Federal Select Agent Program.<sup>348</sup>



**Figure 3-20 BSL-4 Containment Composition**

### 3.6.3 Bioterrorism Stratification

As can be seen, the Stratification entity instance has two subtypes, Biosafety Stratification and Bioterrorism Stratification. The former employs the Risk Assessment entity instance (as a process) to identify the hazardous characteristics of biological agents and proposed laboratory procedures to determine the appropriate Containment and Risk

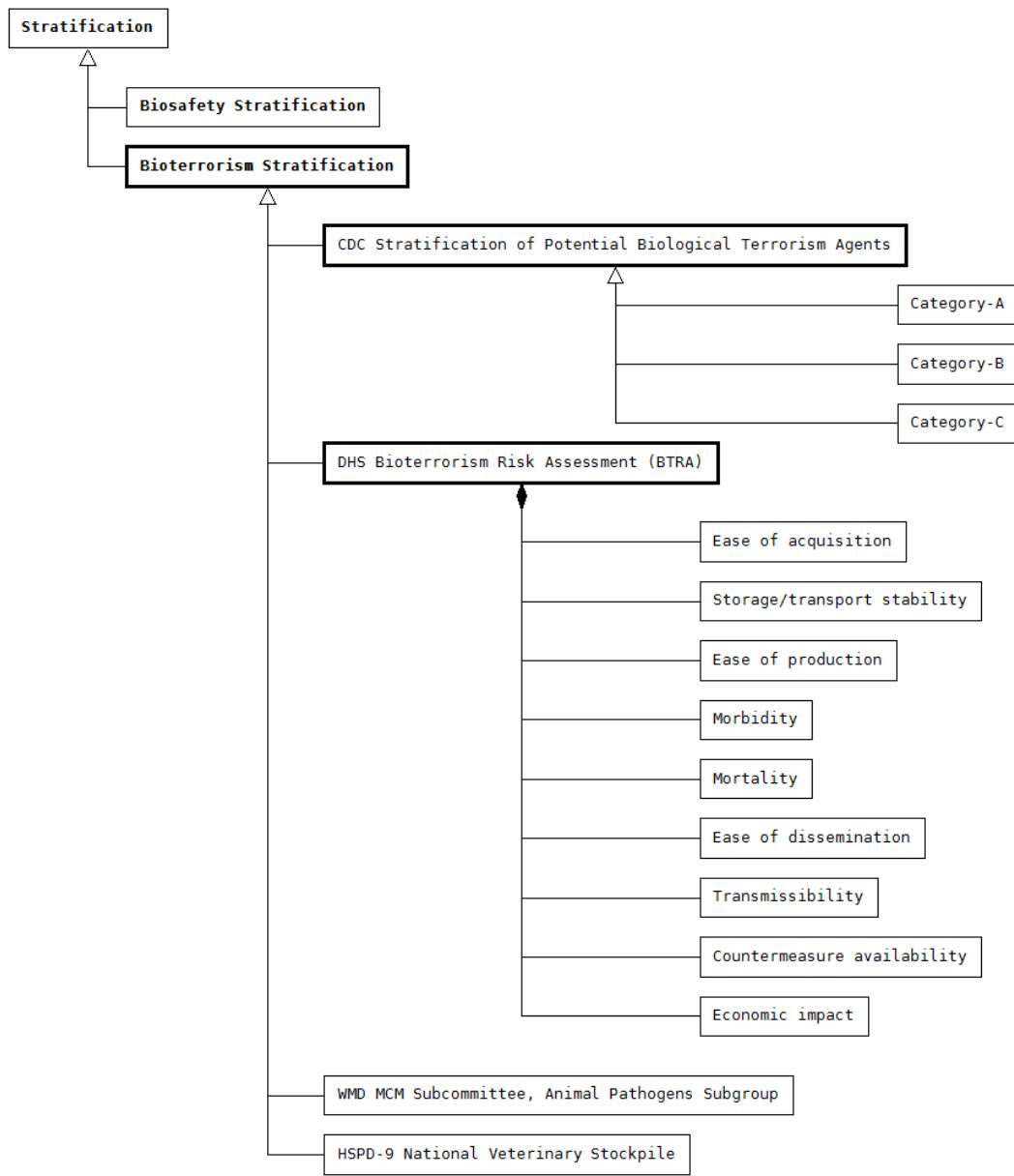
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<sup>348</sup> *Oversight of High-Containment Biological Laboratories: Issues for Congress* (R40418), 8.

Stratification conditions. Unlike the Biosafety Stratification scheme, Bioterrorism Stratification ignores research-oriented risk assessment and biosafety, but prioritizes the use biological agents and toxins in bioterrorism. Figure 3-21 captures four subtypes of the Bioterrorism Stratification entity instance, which are associated with the CDC, DHS, the National Science and Technology Council (NSTC), and USDA.<sup>349</sup>

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<sup>349</sup> The NSTC established the Weapons of Mass Destruction Medical Countermeasures (WMD MCM) Subcommittee that formed the Animal Pathogens subgroup. The stratification scheme is specific to USDA list of biological threat agents. The Homeland Security Presidential Directive 9 (HSPD-9), National Veterinary Stockpile (NVS) is managed by USDA-APHIS.



**Figure 3-21 Bioterrorism Stratification Entity Instance with Subtypes**

### **3.6.3a Center for Disease Control and Prevention Bioterrorism Agents Stratification**

The Center for Disease Control and Prevention (CDC) Potential Biological Terrorism Agents stratification scheme was formally published in 2002.<sup>350</sup> The “Public Health Assessment of Potential Biological Terrorism Agents” published by the CDC presents the criteria and ranking procedures to identify infectious agents that pose the greatest public health threats in the context of preparedness efforts. The underlying objective of the CDC publication was to assist the coordination and planning efforts among federal and state agencies, the medical community, and public health and local emergency response agencies once priority agents are identified. The CDC stratification scheme is comprised of three categories, which is captured in Table 3-2.

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<sup>350</sup> Rotz, Lisa D., Ali S. Khan, Scott R. Lillibridge, Stephen M. Ostroff, and James M. Hughes. 2002. Public health assessment of potential biological terrorism agents. In *Emerging Infectious Diseases*, 8:225-230.

**Table 3-2 CDC Bioterrorism Priority Agent Categories<sup>351</sup>**

<b>Category-A: High priority agents that are considered a national security risk</b>
<ol style="list-style-type: none"><li>1. May be easily disseminated or transmitted person to person</li><li>2. May result in high mortality rates with potential major impact to public health</li><li>3. May cause public panic and social disruption</li><li>4. May require special action for public health preparedness</li></ol>
<b>Category-B: Moderate priority agents</b>
<ol style="list-style-type: none"><li>1. Moderately easy to disseminate</li><li>2. May result in moderate morbidity rates and low mortality rates</li><li>3. May require specific enhancements of the diagnostic capacity by the CDC and enhanced disease surveillance</li></ol>
<b>Category-C: Emerging agents and pathogens that could be engineered for mass dissemination in the future due to:</b>
<ol style="list-style-type: none"><li>1. Availability</li><li>2. Ease of production and dissemination</li><li>3. Potential for high morbidity and mortality rates and major health impact</li></ol>

### **3.6.3b DHS Bioterrorism Risk Assessment (BTRA)**

The BTRA program is managed DHS Science and Technology Directorate (DHS S&T), and is mandated by Homeland Security Presidential Directive 10 (HSPD-10), Biodefense for the 21st Century, and produce updated reports every two years. The BTRA adopts a probabilistic risk analysis methodology to analyze end-to-end risk assessments of the bioterrorism threat, and was used by DHS to publish its first report in 2006, which examined 28 biological agents and prioritized groups into “High Risk”,

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<sup>351</sup> See also <http://www.niaid.nih.gov/topics/biodefenselated/biodefense/pages/cata.aspx>

“Medium Risk”, and “Low Risk”.<sup>352</sup> The 2008 and 2010 BTRA reports each covered 38 biological agents, and augments data from previous risk assessments, such as economic consequences, agricultural threats, and the application of a public health response model.<sup>353</sup> The DHS Biological Threat Characterization Program (BTCP) is chartered with the mission to formulate the best techniques in prioritizing preparedness and response efforts to the nation’s health security, and conducts experimental research to characterize threats posed by certain biological agents. In doing so, the BTCP complements efforts of the BTRA program to refine risk assessment models, and calculate quantitative values more accurately where numeric parameters are considered.<sup>354</sup> The composition of the DHS Bioterrorism Risk Assessment (BTRA) from Figure 3-21 is based on the criteria identified in formulating the agent scoring of the USDA Select Agents and Toxins List (SATL) as the source parameter.

### **3.6.3c WMD MCM Subcommittee, Animal Pathogens Subgroup**

The Committee of Homeland and National Security under the National Science and Technology Council created the Weapons of Mass Destruction Medical

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<sup>352</sup> Dr. Sara Klucking “DHS S&T Bioterrorism Risk Assessment (BTRA)” (presentation, International Symposium on Bioterrorism Risk, Department of Homeland Security, October 6, 2009).; Additional DSR-IS artifacts were not created to model entities within or associated the Department of Homeland Security. Thus, the role of DHS is examined using open and publicly available information.

<sup>353</sup> “DHS S&T Bioterrorism Risk Assessment (BTRA)”, slide 5.

<sup>354</sup> DHS has a dedicated a national biodefense program. The National Biological Threat Characterization Center and National Biosurveillance Integration Center address preparedness, and the National Bioforensic Analysis Center focuses on response. See also <http://www.dhs.gov/topic/biological-security>

Countermeasures (WMD MCM) Subcommittee.<sup>355</sup> In October 2003, the WMD MCM subsequently formed the Animal Pathogens Subgroup, which developed a ‘straw man’ report prioritizing a list of animal pathogens for recommending methods to resolve weaknesses in countermeasure development.<sup>356</sup> The White House Office of Science and Technology Policy (OSTP) acknowledged the findings of the WMD MCM Animal Pathogen Subgroup, and established the Blue Ribbon Panel representing the scientific and public policy interests of federal, state, and local governments, as well as academia, industry, and the international communities.<sup>357</sup> The Blue Ribbon Panel examined the possibility of biological terrorism directed against U.S. agricultural livestock, analyzed the potential consequences, and proposed the priorities for future federal defense research and development (R&D) agendas establishing four working groups. Each working group focused on specific subject areas by identifying major research needs, prioritizing research requirements, suggesting approaches to overcome the existing gaps, and the approximate costs and timelines to carry out the recommendations. The four working groups were split out to concurrently assess and improve the capabilities of surveillance, epidemiology, vaccines, and diagnostics where the latter three developed a prioritized list of pathogen threats as part of their tasks.

The agents of concern highlighted in the report of the WMD MCM Subcommittee, Animal Pathogen subgroup provided the initial guidance to the Blue

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<sup>355</sup> Kelly, Terrence K. et al. 'The Office Of Science And Technology Policy Blue Ribbon Panel On The Threat Of Biological Terrorism Directed Against Livestock'. Washington DC: RAND Science and Technology, 2003. 102-103.

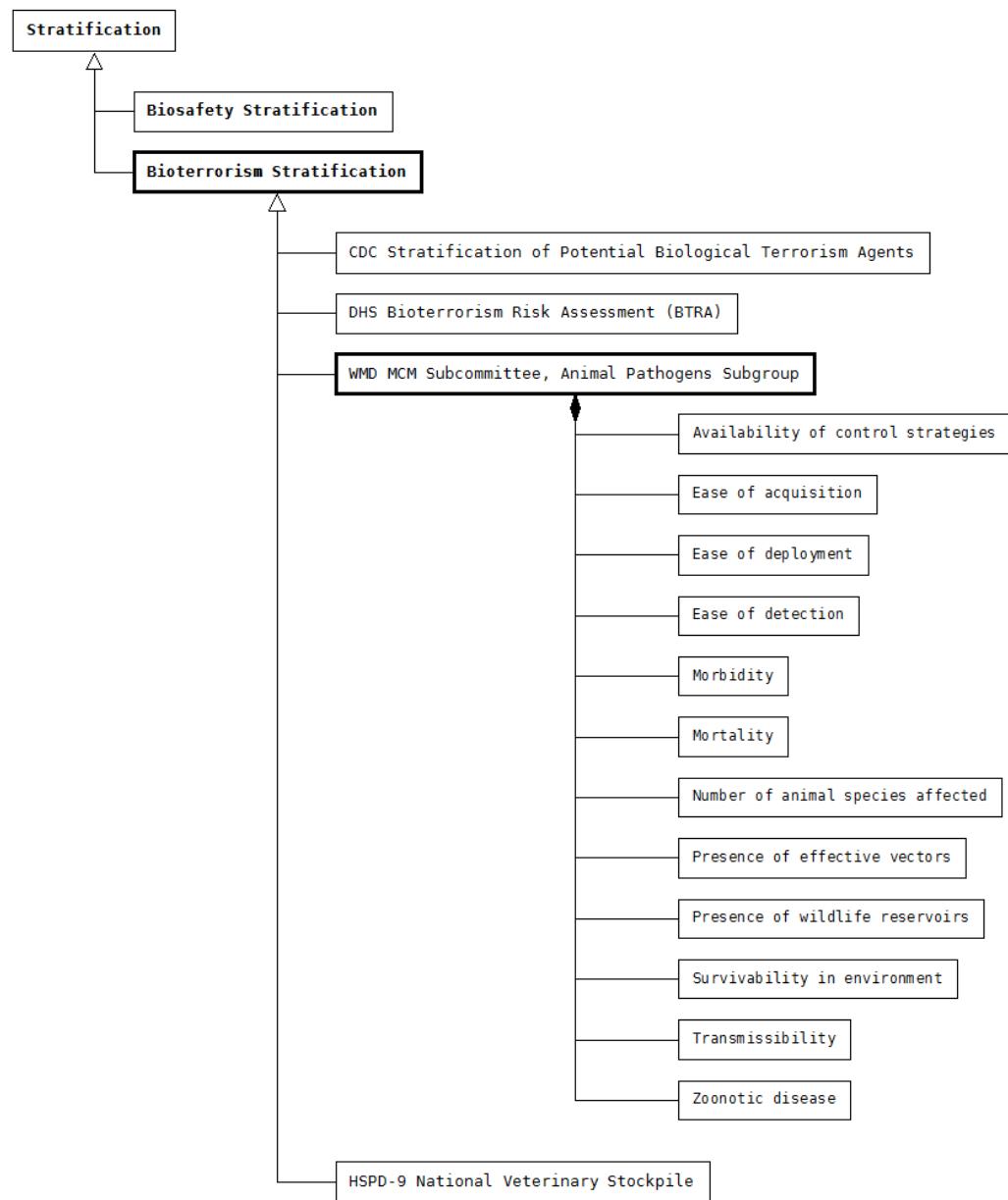
<sup>356</sup> Kelly et al. 2003. *Blue Ribbon Panel On The Threat Of Biological Terrorism*, 103.

<sup>357</sup> Ibid., 83-93.

Ribbon Panel diagnostics and vaccine working groups. The Blue Ribbon Panel vaccine working group determined that animal agents identified by the WMD MCM Subcommittee, Animal Pathogens Subgroup as having the highest priority for vaccine development does not necessarily match agents having the highest priority for diagnostic testing research. Collectively, the Blue Ribbon Panel working groups combined their findings and further examined the findings of the WMD MCM Subcommittee, Animal Pathogen Subgroup, and determined that the attractiveness of animal agents to prospective bioterrorists and potential impact if released are the attributes to identify diseases of the highest concern.<sup>358</sup> The composition of the WMC MCM Subcommittee, Animal Pathogen Subgroup, a subtype of Bioterrorism Stratification, is depicted in Figure 3-22.

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<sup>358</sup> Ibid., 84.



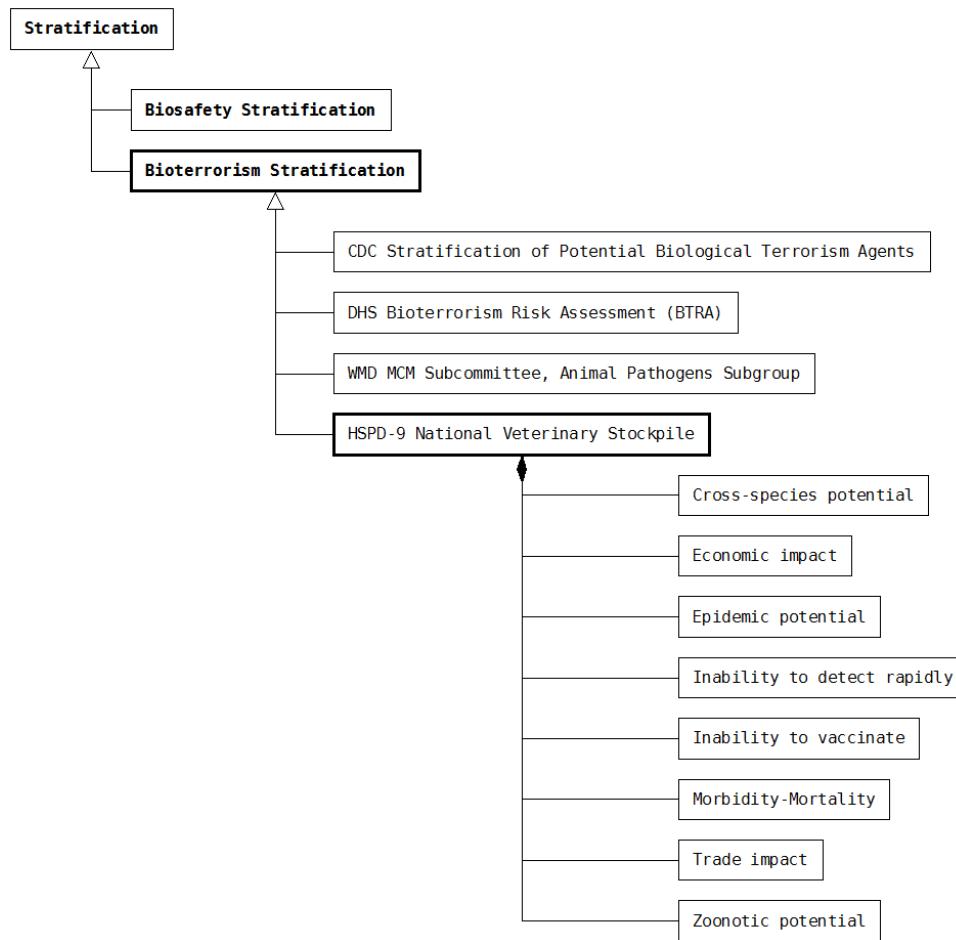
**Figure 3-22 Bioterrorism Stratification Subtype, WMD MCM Subcommittee**

### **3.6.3d HSPD-9 National Veterinary Stockpile (NVS)**

The Homeland Security Presidential Directive 9 (HSPD-9), National Veterinary Stockpile (NVS) was established in 2004 to answer “terrorist acts, major disasters, and other emergencies” relevant to the USDA.<sup>359</sup> Managed by USDA-APHIS, the NVS was primarily tasked with attaining the countermeasures for animal diseases, and would be observed by a Steering Committee to ensure its mission was followed and afford interagency support as needed. The Steering Committee subsequently assembled an NVS working group to prioritize the animal disease threats considered the most dangerous threats to the United States, and used the USDA select and overlap agents lists as part of the assessment. The composition of HSPD-9 National Veterinary Stockpile, a subtype of Bioterrorism Stratification, in Figure 3-23 represents the criteria determined by the NVS working group in prioritizing the most dangerous animal disease threats to the United States.

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<sup>359</sup> U.S. Government Publishing Office, 'Homeland Security Presidential Directive/HSPD-9—Defense Of United States Agriculture And Food'. N.p., 2004. Accessed July 19, 2015. <http://www.gpo.gov/fdsys/pkg/PPP-2004-book1/pdf/PPP-2004-book1-doc-pg173.pdf>



**Figure 3-23 Bioterrorism Stratification Subtype, National Veterinary Stockpile**

The composition entries for the HSPD-9 National Veterinary Stockpile entity subtype from Figure 3-23 are explained in Table 3-3.

**Table 3-3 National Veterinary Stockpile (Bioterrorism Stratification subtype)**

**NVS Working Group Criteria for Prioritizing Animal Disease Threats to United States**

**Cross-species potential** - Ability of a pathogen to cross the species barrier, which would cause disease in other animal species, and possibly establish reservoirs in important domestic or wildlife species

**Economic impact** - Loss of revenue to a region, one or more agricultural segment (e.g., beef, dairy, broilers), the agricultural segment nationwide, and associated industries

**Epidemic potential** - Ability to shed, spread, and rapidly infect target species

**Inability to detect rapidly** - Availability of very specific and sensitive tests to rapidly detect the pathogen in the field

**Inability to vaccinate** - Availability of vaccines that have the characteristics needed to control and eradicate the pathogen (i.e., unable to implement a vaccine strategy if vaccines are not available or not marked, and do not prevent shed and spread or colonization of target tissues in carrier animals)

**Morbidity-Mortality** - The virulence potential of a pathogen and its ability to cause subclinical disease, moderate disease, severe disease, and/or mortality

**Trade impact** - Loss of revenue due to trade restrictions imposed by one or more trade partners

**Zoonotic potential** - Ability of an animal disease to spread and cause morbidity and/or mortality to a small or large number of people

### **3.6.3e Federal Agency Entity Instances: Bioterrorism Threat Assessments**

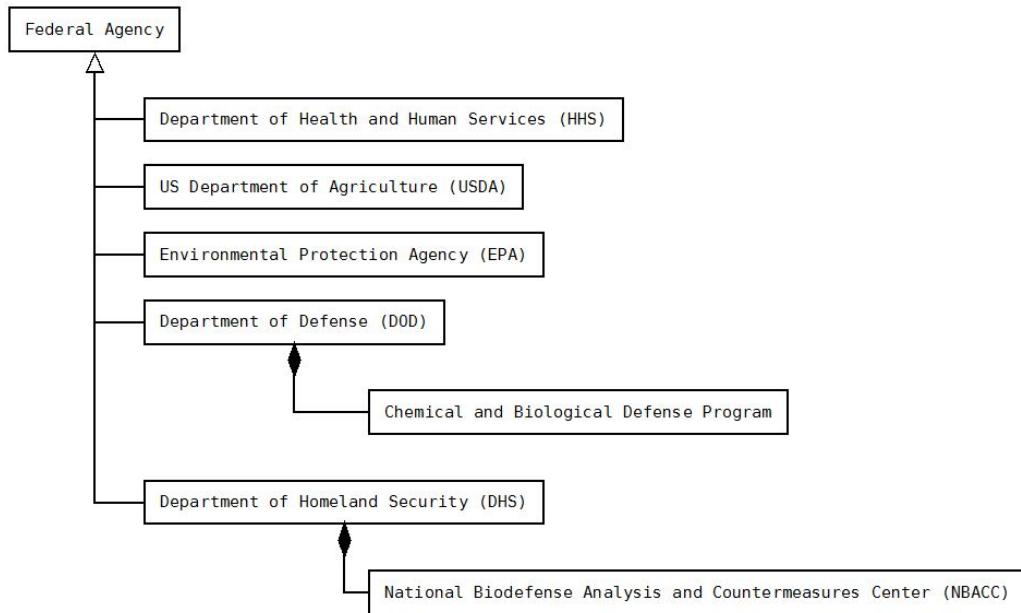
The Stratification entity subtypes, Biosafety and Bioterrorism Stratification, initially introduced from DSR-IS artifacts in Figure 3-11 and Figure 3-21 to Figure 3-23 are mapped to Federal Agency entity instances. The Federal Agency subtypes in Figure 3-24 capture the major federal agency entities involved with bioterrorism threat assessment, which include the Department of Health and Human Services (HHS), the U.S. Department of Agriculture (USDA), the Environment Protection Agency (EPA), the Department of Defense (DOD), and the Department of Homeland Security (DHS). Each Federal Agency entity instance will be discussed briefly, but HHS and USDA will be discussed last.

Prior to the 2001 anthrax letter incidents, the role of the EPA with regards to biodefense and bioterrorism threat assessment has been trivial. Since the said anthrax letter incidents, the EPA has expanded its homeland security presence in being responsible for the protection and remediation of public water supplies subsequent to bioterrorism attacks on indoor or outdoor areas. Authorized by HSPD-9, the EPA is the lead agency in assessing the vulnerabilities of water utilities, and the development and use of technological advances in water security. To fulfill its obligations under HSPD-9, the EPA established several homeland security research programs, such as the Water Alliance Initiative and the Water Laboratory Alliance.<sup>360</sup> The Chemical and Biological Defense Program (CBDP) managed by the DOD provides biological threats research, and the development of countermeasures. The scope of the CBDP involves research activities at numerous facilities across sectors, including military laboratories, and research universities and private institutions via funded government contracts.<sup>361</sup> The National Biodefense Analysis and Countermeasures Center (NBACC) managed by DHS supports research and risk assessment models to understand biological threat agents, such as its Bioterrorism Risk Assessment (BTRA) methodology. The NBACC also affords the development of forensics capabilities to support analysis and investigation of acts of bioterrorism and crimes involving biological agents.

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<sup>360</sup> Environmental Protection Agency., 'Legislation And Directives | Legislation & Directives | US EPA'. Accessed July 19, 2015, <http://water.epa.gov/infrastructure/watersecurity/lawsregs>

<sup>361</sup> Office of the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs, 'OASD (NCB/Chemical And Biological Defense)'. Accessed July 19, 2015, <http://www.acq.osd.mil/cp>



**Figure 3-24 Bioterrorism Threat Assessment, DOD and DHS**

The role of the Federal Agency entity subtypes in Figure 3-25 to Figure 3-26, HHS and USDA, are prominent in bioterrorism threat assessments. The HHS has several child agencies, such as the NIH and CDC that perform bioterrorism threat assessment based on Biosafety and Bioterrorism Stratification schemes. The NIH-managed National Institute of Allergy and Infectious Diseases (NIAID) supports various programs involving the research and the development of new or improved capabilities to diagnose, prevent, and treat of diseases caused by emerging and reemerging infectious diseases (ERID), which include potential bioterrorism agents. The CDC also provides vast expertise and resources to provide national response capabilities to bioterrorism by enhancing the development of State and local readiness. The presence of the CDC supplements its peer federal agency, the NIH, by committing resources towards the applied research, diagnostic development, and methods to characterize agents as part of a national

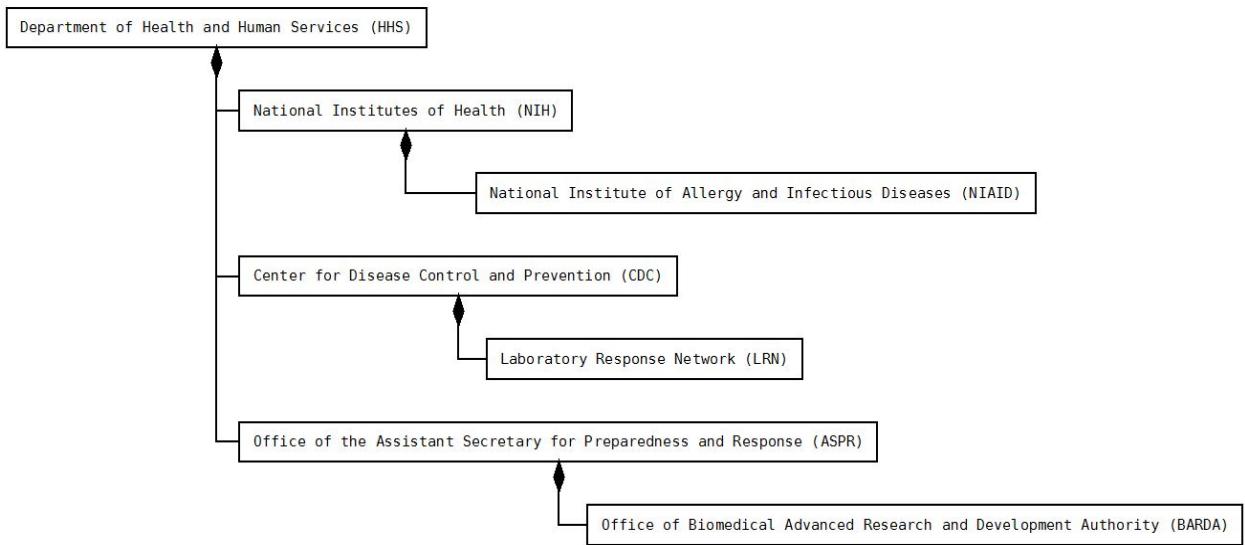
response strategy. The Laboratory Response Network (LRN) was established by the CDC, and is considered a national security asset that develops, maintains, and strengthens “an integrated domestic and international network of laboratories to respond quickly to biological, chemical, and radiological threats and other high priority public health emergencies needs through training, rapid testing, timely notification and secure messaging of laboratory results.”<sup>362</sup> The LRN includes more than 150 laboratories throughout the United States with several research laboratories overseas, and its network of state and local laboratories spanning federal, state and local public health, veterinary, agriculture, environmental, military, and food and water testing laboratories is unmatched.<sup>363</sup> The Biomedical Advanced Research and Development Authority (BARDA), which is managed by the Office of the HHS Assistant Secretary for Preparedness and Response (ASPR), provides advanced research, development, and procurement of medical countermeasures that address the public health and medical consequences of chemical, biological, radiological, and nuclear (CBRN) incidents and attacks, pandemic influenza, and emerging and reemerging infectious diseases (ERID). The operations of BARDA specifically carry out the advanced development and procurement of drugs, vaccines and other biomedical products considered high priorities of United States national health security agenda.<sup>364</sup>

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<sup>362</sup> Center for Disease Control and Prevention., 'Laboratory Response Network (LRN)|CDC'. Accessed July 19, 2015, <http://emergency.cdc.gov/lrn/>

<sup>363</sup> See also <http://emergency.cdc.gov/lrn/factsheet.asp>

<sup>364</sup> HHS Office of the Assistant Secretary for Preparedness and Response, 'Biomedical Advanced Research and Development Authority - PHE'. Accessed July 19, 2015, <http://www.phe.gov/about/pages/default.aspx>



**Figure 3-25 Bioterrorism Threat Assessment, Health and Human Services**

The DSR-IS artifact represented by Figure 3-26 captures the multiple roles conducted by the USDA to assess bioterrorism threats. The USDA Agricultural Research Service (USDA-ARS) is one of the main internally managed research agencies within USDA that focuses in solving scientific and agricultural problems by examining research areas specific to four categories: 1) nutrition, food safety and quality, 2) animal production and protection, 3) natural resources and sustainable agricultural systems, and 4) crop production and protection. The USDA-ARS “farm to fork” system, is an end-to-end assessment of food safety that examines production through processing, preparation, and consumption.<sup>365</sup> The entry points of food production and distribution systems in the United States are diverse, extensive, accessible and susceptible to exposure from pathogens, bacterial toxins, fungal toxins (mycotoxins), and chemical contaminants via natural

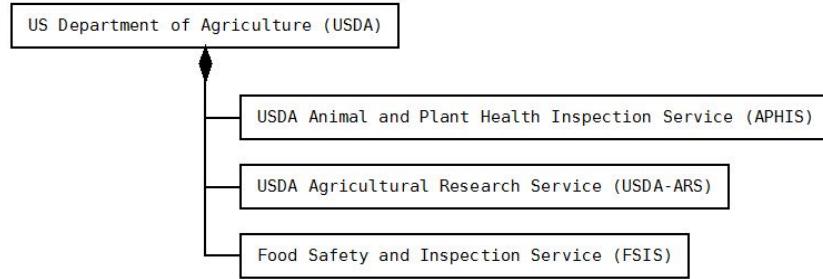
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<sup>365</sup> The “farm to fork” system is sometimes referenced as “farm to table” in various literature.

processes, global commerce and trade, and by intentional actions. The USDA-ARS acknowledges these threats may cause disease to humans if crop and livestock production systems are not adequately protected from pathogens, toxins, and chemicals, and helps ensures food production and distribution systems are resilient by developing new food safety technologies, pest-management strategies, sustainable production systems, and methods to control potential contaminants. The interrelationships between the USDA-ARS and USDA-APHIS and Food Safety and Inspection Service (USDA-FSIS) are demonstrated where the latter two USDA child agencies employs the tools developed by the former to carry out their daily mission in protecting the U.S. agriculture and the food supply.<sup>366</sup> The USDA-APHIS jointly manages the shared oversight responsibility for high and maximum containment agricultural research facilities registered with the Federal Select Agent Program, and is the main federal agency that observes the health, inspections, and care of animals and plants. The USDA-FSIS focuses on food supply safety, and develops, validates, and updates threat agent detection methods, and is a major federal funding source to state and local food-testing laboratories participating in the development and validations of threat agent detection methods.

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<sup>366</sup> The interrelationships are not shown as DSR-IS, but implied if the USDA-ARS is creating tools and new technologies that are employed or examined by the USDA-APHIS and USDA-FSIS.



**Figure 3-26 Bioterrorism Threat Assessment, USDA**

### **3.6.4 Observations of Conceptual Biosafety Entity Instances**

The conceptual entity instances, Risk Assessment and Containment, comprise the implementation of biosafety controls. The former describes either a process to produce a report, or the risk assessment report itself. The latter describes the encasement of biological materials from accidental release, and the controls, such as laboratory practices, designed to protect people within and outside of the research institution. The knowledge and experience in creating the DSR-IS artifacts categorizes biosafety entities either involved with Risk Assessment, Stratification, or both via the interrelationships from less visible entity instances. The findings are split out accordingly by Risk Assessment or Stratification.

#### **3.6.4a Risk Assessment Entity Instance**

The non-standardization of Risk Assessment implies the inability to examine whether one approach is superior over another at individual research institutions. Risk Assessment is determined by the knowledge and experience of the resident lab directors

and principal investigators of an individual research institution, which may partially explain non-standardized approaches. It's plausible that risk assessments could be influenced by scientists familiar with the equipment, biosafety controls, physical facility barriers, and the amenities offered at specific research institutions. Unfortunately, no data was available to quantify whether or not prescribed risk assessment reports were actually followed by scientists conducting experiments that eventually become approved. For example, scientists may advance their research interests by acknowledging risk assessments, but could circumvent required biosafety procedures or safeguards if enforcement is lax. Equally perplexing, there is no consideration for personnel screening during the risk assessment. The current model of having active security risk assessment (SRA) and periodic personnel reliability programs (PRP) checks are independent from agent and laboratory hazards. Ensuring the SRA is active and periodic PRP investigations were unconditionally completed for staff directly accessing biological agents, or with administrative permissions to biosafety controls allows tracking of personnel assigned to experiments. A separate study complementing the inclusion of SRA and PRP that analyzes a survey of laboratory staff holding professional biosafety certifications should be considered as part of risk assessment standardization.<sup>367</sup>

Implementing a professional certification mandate comparable to DOD Directive 8570,

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<sup>367</sup> The open source literature used to create the DSR-IS artifacts did not provide any data on processes or biosafety training certifications to conduct experiments. Subsequent creation of DSR-IS artifacts related to personnel reliability programs (PRP) also did not find data specifying requirements related to biosafety training certifications. Likewise, no literature acknowledged professional biosafety training certification as prerequisites when authorizing laboratory staff to work on biomedical or microbiological experiments. However, the American Biological Safety Association (ABSA) is an established professional association that offers professional certifications, such as Certified Biological Safety Professional (CBSP) and Registered Biosafety Professional.

“Information Assurance Workforce Improvement Program”, specific to biosafety may help standardize risk assessments and may be incorporated into a PRP.<sup>368</sup>

Risk Assessment is considered either a process or reportable artifact that invites inconsistent approaches, and its execution depends upon the resources, maturity and experience of research staff, biorisk stratification schemes considered, and other factors of its research institution, such as mission, objectives, or conditional funding of proposed experiments. Risk Assessment as a process and reportable artifact should be standardized as opposed to suggested guidelines by the HHS or World Health Organization. As a process and reportable artifact, uniform biorisk assessments would imply executing a common checklist and set of standard procedures to evaluate research staff, biological materials and inventory management, containment, and technologies independent from specific institutional requirements. If there are unique provisions as part of a risk assessment, a knowledgebase should be established for periodic review for possible inclusion as a standard. The knowledgebase would be based on examining the risk assessment practices at private and NIH-registered research institutions in the context of experiments proposed, and the total number of biosafety incidents recorded should be considered.

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<sup>368</sup> See also <http://iase.disa.mil/iawip/Pages/iabaseline.aspx>

### **3.6.4b Stratification Entity Instance**

There is no dual-use dilemma stratification for research experiments proposed, which should be considered as part of the risk assessment process. Conceptually a dual-use stratification scheme could be based on the Agent Hazard and Lab Hazard entity instances juxtaposed with the agent risk groups, the laboratory procedures proposed, and the laboratory equipment involved. The dual-use stratification schemes could be graded on whether or not the biological agents involved in the research experiment have increased virulence, transmissibility, resistance to treatment, and ease of production. Likewise, it's understandable in having human and agricultural threat assessment stratification schemes. However, stratification schemes are aligned with federal agency mission, and their implementation to formulate agent prioritization or ranking would need to be more universal to be widely accepted by multiple federal agencies. A prescriptive suggestion from the above findings would be to establish an oversight body that seeks to not only lessen the number of stratification schemes by broadening their applicability, but also maps the stratification tiers with risk assessment practices.

## **3.7 Conceptual Biosecurity Entity Instances and Interrelationships**

The concept of biosecurity and its associated entities evolve around the Federal Select Agent Program (FSAP) and Select Agent Regulations (SAR). The DSR-IS artifacts will not revisit the specifics of SAR, but rather introduce the relevant entities and high level interrelationships between research institutions, federal agencies, and conditions that authorize the latter to monitor the former. Unlike the previous DSR-IS

artifacts tied to biosafety that integrated composition and entity instances or subtypes, UML activity diagrams will serve as artifacts to clarify certain biosecurity activities or processes.

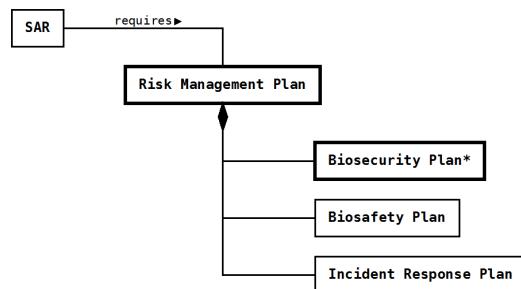
### **3.7.1 SAR Registration Requirements and Risk Management/Biosecurity Plans**

The SAR requires each research institution (not shown) requesting to possess, use, or transfer regulated biological agents satisfy certain requirements as part of the initial registration process. All research institutions and persons seeking to possess biological select agents and toxins (BSAT) must furnish a several written plans as part of an overall Risk Management Plan for FSAP review.<sup>369</sup> A Biosecurity Plan that details how the safeguards, physical access, and engineering controls ensure unauthorized access, theft, or loss of BSAT are implemented. Another component of the Risk Management Plan is the Biosafety Plan where research institutions explain the implemented safeguards that prevent the release of BSAT, and detail the biosafety and containment procedures that are proportionate with the biorisks posed by an agent or toxin given intended use case scenarios. Finally, the Incident Response Plan considers situations where emergency responders or public safety personnel need to enter the physical facility or laboratory air spaces when responding to accidents, injury or other safety issue or security threat. The Incident Response Plan is considered site-specific, and should address how the potential exposures of hazardous biological materials

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<sup>369</sup> The BMBL (fifth edition), *NIH Guidelines*, and OSHA regulations defined by 29 CFR 1910.1200 and 1910.1450 provide guidance to research institutions of persons seeking SAR registration.

towards first responders will be minimized. Other types of incidents that should be addressed by the Incident Response Plan includes, but is not limited to, natural disasters and inclement weather, unplanned power outages, compromised facility safeguards, and bomb threats. Figure 3-27 demonstrates the interrelationship between the unique SAR entity and the Risk Management Plan entity instance. The composition of the Risk Management Plan captures its major components, Biosecurity Plan, Biosafety Plan, and Incident Response Plan. The Risk Management Plan also reveals its interrelationship with Risk Assessment (as a report artifact) via its Biosecurity Plan attribute.

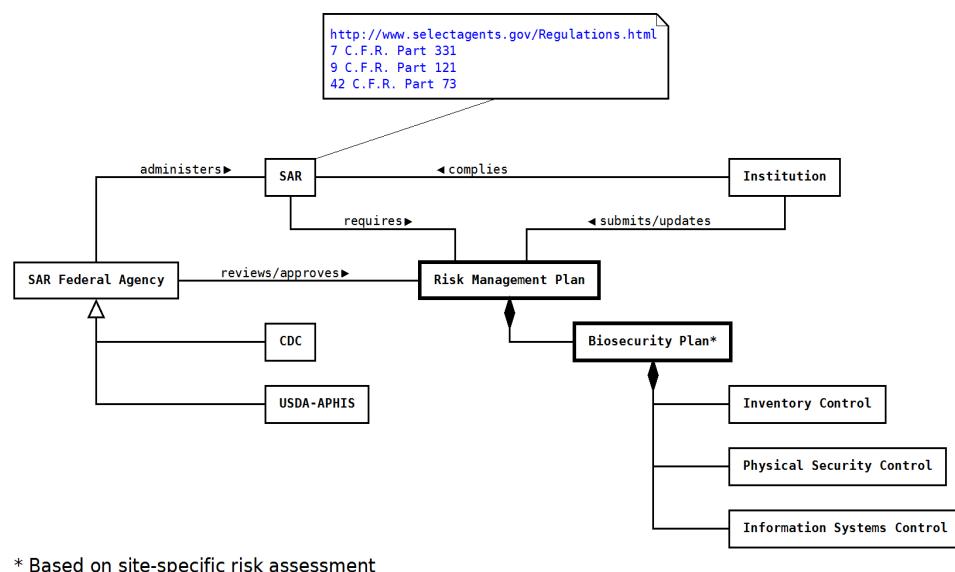


\* Based on site-specific risk assessment

**Figure 3-27 Risk Management Plan Composition**

A major condition in satisfying the SAR registration requirements is the development and implementation of an official biosecurity plan that fully discloses the policy and procedures established to protect regulated agents. The biosecurity plan should invite site demonstrations confirming graded protection controls are implemented, operational, and maintained. Responsible Officials (RO) may conduct site-specific risk

assessments, and adjust graded protection requirements to ensure critical asset protection and essential mission capabilities are operational. The distinct security provisions of the SAR requires the biosecurity plan address three control mechanisms, which are physical security, information systems control, and inventory control. The high-level interrelationships demonstrating the role of the Risk Management Plan and Biosecurity Plan as shared artifacts between the Institution, the SAR, and SAR Federal Agency subtypes, CDC and USDA-APHIS are depicted in Figure 3-28.



**Figure 3-28 Risk Management Plan Interrelationships**

The findings of the DSR-IS artifacts reinforce the Risk Management Plan and Biosecurity Plan conceptual entity instances should demonstrate that management and leadership within the Institution is committed to the oversight, implementation, training

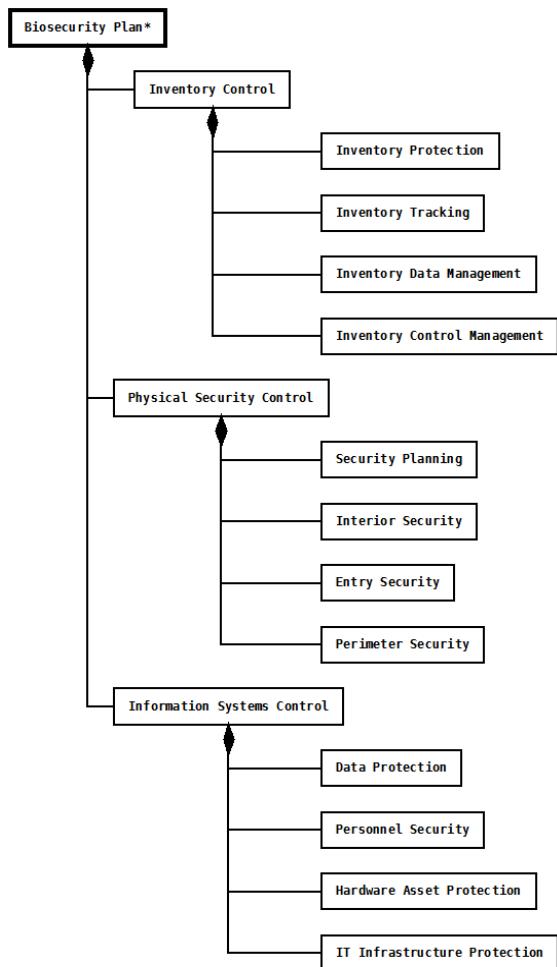
and maintenance of the Plans as part of their overall biosecurity program.<sup>370</sup> Although Biosecurity Plan is a component of the Risk Management Plan entity instance, the interrelationship between both Plans are further bound by Institution, and prescribed by the *BMBL*. For example, the *BMBL* suggests development of the biosecurity plan as part of the biosecurity risk assessment and management process carried out by principal investigators and laboratory directors leads to eventual implementation, and should be supported by Institution management.<sup>371</sup> The role of Institution management would also include identifying unacceptable risks within the Biosecurity Plan, and how those risks will be mitigated from standard operating procedures, the Incident Response Plan, and as training protocols for personnel.<sup>372</sup> The DSR-IS artifact representing the composition of the Biosecurity Plan in Figure 3-29 shows the extensive attributes that form the interrelationship with Risk Management Plan.

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<sup>370</sup> Although there are DSR-IS artifacts containing “Management” conceptual entity instances, the author determined that previous artifacts capturing the composition of Institution would suffice.

<sup>371</sup> *BMBL*, 107-109.

<sup>372</sup> *Ibid.*



\* Based on site-specific risk assessment

**Figure 3-29 Biosecurity Plan Composition**

The three categories comprising the Biosecurity Plan are Inventory Control, Physical Security Control, and Information Systems Control and are summarized in Table 3-4.

**Table 3-4 Examples of Biosecurity Plan Controls**

<b>Composition of Inventory Control Examples</b>
<b>Inventory Tracking</b> - chain-of-custody controls, quantities stored, inspections, and audits
<b>Inventory Protection</b> - electronic monitoring (interrelated with Inventory Tracking)
<b>Inventory Data Management</b> - logical data storage, transaction log-book, and destruction records
<b>Inventory Control Management</b> - inventory control manager, inventory policy, and training
<b>Composition of Physical Security Control</b>
<b>Security Planning</b> - Standard operating procedures for physical security breaches, escorting of visiting individuals
<b>Interior Security</b> - badge and/or PIN access to compartmentalized laboratories within building, video recording of laboratory activities conducted by personnel
<b>Entry Security</b> - badge and/or PIN access to building entrances, video recording of badge entrance/exits, physical disabling of building entry and exit points
<b>Perimeter Security</b> - badge and/or PIN access to campus grounds, lockdown procedures to prevent entering/exiting of campus
<b>Composition of Information Systems Control</b>
<b>Data Protection</b> - data encryption, remote access protocols, data cleansing and sanitation, security of select agent inventories
<b>Personnel Security</b> - background check for IT staff, product and equipment vendors, dedicated information security manager
<b>Hardware Asset Protection</b> – datacenter protection, office assets protection, property pass and badging controls, safeguarding of sensitive information
<b>Information Technology (IT) Infrastructure</b> - firewall protection, antivirus protection, application usage policy enforcement, unauthorized software detection, identity access management, two or three factor authentication

Documentation and observable implementations of the three components of the Biosecurity Plan itemized in Table 3-4 are reviewed collectively, and clearly address additional elements, such as access control to BSAT materials, routine cleaning procedures and maintenance of BSAT storage and laboratory areas, reporting of suspicious persons, protocols for intra-entity transfers, security escorts and training drills and exercises. Not shown in DSR-IS artifact in Figure 3-29 is an “Operational Security” composition entry under Biosecurity Plan, which may overlap with the Physical Security

Control entity instance. Operational security addresses functions such as general staff training, escorting procedures of non-resident institution visitors, techniques to identify suspicious persons or activities, PIN or badge access control access management. In March 2007, the CDC and USDA-APHIS acknowledged the complexities and confusion that research institutions may have when developing a biosecurity plan that satisfies SAR requirements, and furnished a security information guidance document and a security plan template online to assist standardization and guide what information to furnish.<sup>373</sup>

Figure 3-30 captures the main review activities carried out by either the CDC or USDA-APHIS, as a subtype of SAR Federal Agency, when granting a Certificate of Registration (COR) to an entity pursuing authorization to possess, use, or transfer BSAT materials. The interrelationships in Figure 3-30 between a SAR Federal Agency and an Institution focuses on the latter recognizing the composition of the SAR to initiate high level submission and review processes requested from the former, which are 1) review/approval of the Registration Application (Form-1) and the physical security components, 2) review/approval of the Risk Management Plan, including the Biosecurity Plan, Biosafety Plan, and Incident Response Plan, and 3) review/approval of the Security Inspection Report.<sup>374</sup> Among the three review activities, the criticality of the Risk

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<sup>373</sup> For the “Select Agents and Toxins Security Information Document”, see also [http://www.selectagents.gov/ARCHIVE\\_2014/resources/Security%20Information%20Document.pdf](http://www.selectagents.gov/ARCHIVE_2014/resources/Security%20Information%20Document.pdf); For the “Select Agents and Toxins Security Plan Template”, see also [http://www.selectagents.gov/resources/Security\\_Plan\\_Template\\_Final\\_APHIS-CDC-English.pdf](http://www.selectagents.gov/resources/Security_Plan_Template_Final_APHIS-CDC-English.pdf)

<sup>374</sup> APHIS/CDC Form 1 is comprised of seven sections and was previously available as a single document. Currently, submission of APHIS/CDC Form 1 requires downloading several dozen files, composed of PDF or Microsoft Excel files, in order to complete an application. For “APHIS/CDC Form 1 Help (Functionality)”, See [http://www.selectagents.gov/resources/APHIS-CDC\\_Form\\_1\\_Functionality\\_HELP\\_Guide-English.pdf](http://www.selectagents.gov/resources/APHIS-CDC_Form_1_Functionality_HELP_Guide-English.pdf); For instructions to complete “Application for Registration for Possession, Use, and Transfer of Select Agents and Toxins (APHIS/CDC Form 1)”, see

Management Plan and Biosecurity plan is underscored where an entity, either as an Institution or an individual, “cannot receive a Certificate of Registration without government approval of their security plan.”<sup>375</sup>

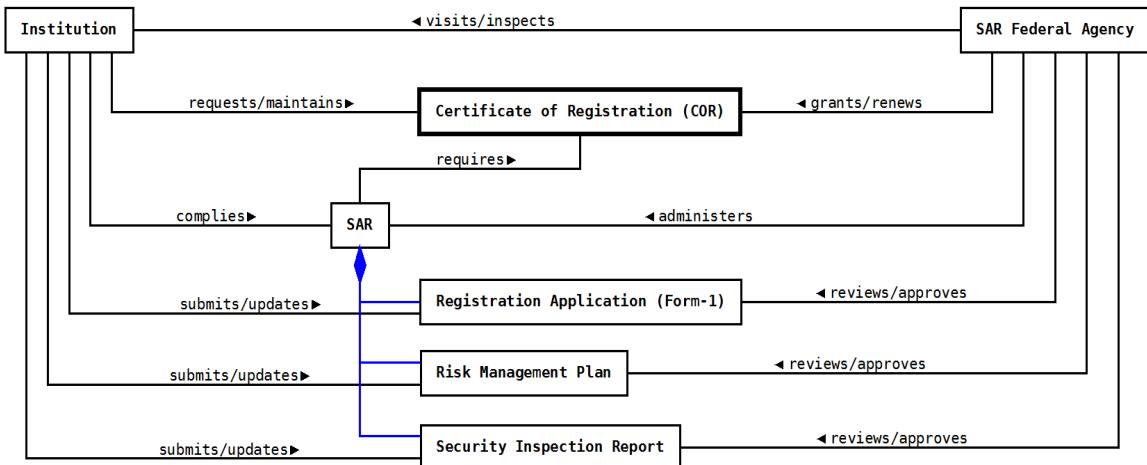
The SAR security requirements mandate site inspection of institutions or individuals requesting BSAT registration prior to being granted a COR to confirm facility operations are consistent with the information submitted in their Registration Application (Form 1), and that procedures and processes are established to ensure compliance. A major objective of the site inspection will also confirm graded protection schemes supporting risks posed by regulated biological agents handled at the requesting Institution are operational and properly maintained. The outcome of a site assessment contributes in creating the Security Inspection Report that will be reviewed with Registration Application (Form-1) and Risk Management Plan when granting new or renewing CORs. An Institution or individual issued the COR is recognized by the Federal Select Agent Program as a Registered Entity, and must permit unannounced inspections by either SAR Federal Agency, the CDC or USDA-APHIS.<sup>376</sup> Unless prescriptive security requirements are afforded, the Institution or individual seeking a COR being granted faces the burden in demonstrating all SAR compliance requirements are met.

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also [http://www.selectagents.gov/resources/APHIS\\_CDC\\_Form\\_1\\_Instructions\\_v1.3\\_061815.pdf](http://www.selectagents.gov/resources/APHIS_CDC_Form_1_Instructions_v1.3_061815.pdf); To access all “APHIS/CDC Form 1” sections links, see <http://www.selectagents.gov/form1.html>

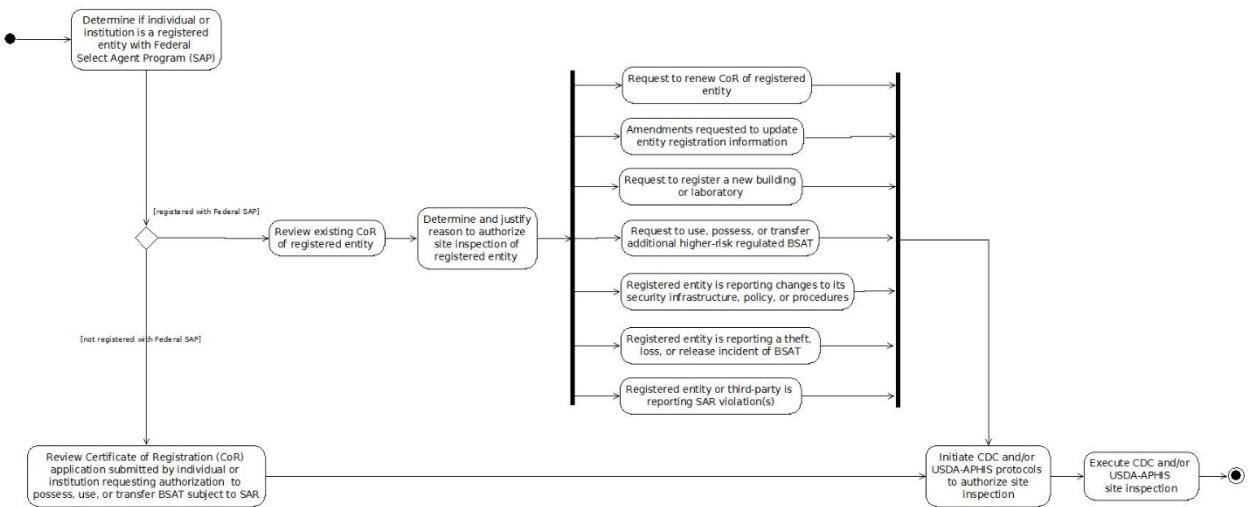
<sup>375</sup> *Report of the Working Group on Strengthening the Biosecurity*, 54.

<sup>376</sup> Site inspection triggers are captured by a separate DSR-IS artifact, and will be discussed in Chapter 3.



**Figure 3-30 Certificate of Registration Request/Review Interrelationships**

While the FSAP requires a site inspection for new COR applications and the COR renewal process, there are several scenarios that may trigger site inspections at research institutions on to satisfy SAR conditions. For example, site inspections may be triggered if a Registered Entity is requesting authorization to possess, use, or transfer additional regulated agents not previously inventoried, or as follow-up investigation procedures in response to either possible SAR violations or reported theft, loss, or release of BSAT. The UML activity diagram DSR-IS artifact in Figure 3-31 summarizes the end-to-end process when a site inspection is triggered.



**Figure 3-31 SAR Site Inspection Triggers**

### 3.7.2 SAR Inventory Management Entity Instances

The SAR poses requirements for Registered Entities regarding the inventory management of BSAT materials. The DSR-IS artifacts have found that events triggering changes to BSAT inventories at Registered Entities from the transport or receipt of new BSAT materials, or from the addition or subtraction of existing regulated agents reveals the interrelationships critical with biorisk oversight. The event triggers correlate with specific SAR provisions where Registered Entities are required to 1) ensure BSAT materials are transferred to Registered Entities authorized to possess specific BSAT materials when advanced approval is granted by either the CDC or USDA-APHIS select agent program, 2) execute incident notification procedures to the CDC or USDA-APHIS select agent programs due to theft, loss, or release of BSAT, and 3) maintain accounting records, such as inventory access records, safety plans, inter/intra-transfer records, and BSAT disposal records that itemize quantities destroyed of regulated biological agents.

for three years.<sup>377</sup> The former two SAR provisions are captured as DSR-IS artifacts, and will be discussed in subsequent sections of Chapter 3. The SAR regulations presume BSAT inventories could potentially be held in long term storage, which the site inspection for SAR Certification of Registration application or renewal would assess to ensure viability for future use, such as in a laboratory freezer or lyophilized materials. While there are multiple types of storage use-cases recognized by the SAR, the inventory management of all BSAT materials should follow the accounting and record keeping guidance in Table 3-5: <sup>378</sup>

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<sup>377</sup> Intra-transfer records of BSAT materials applies to Registered Entities or individuals covered by the same SAR Certification of Registration.

<sup>378</sup> *Report of the Working Group on Strengthening the Biosecurity*, 24-25.; There are many variations of storage requirements afforded to Registered Entities by the SAR. The objective when examining inventory and storage management schemes were to identify requirements applicable to all select agents and toxins. For additional types of storage guidance, See <http://www.selectagents.gov/compliance.html>

**Table 3-5 Accounting Information of BSAT Inventory<sup>379</sup>**

<b>Inventory information required - all select agent materials in long-term storage (Section 17(a)(1) of the Select Agent Regulations)</b>
<ul style="list-style-type: none"><li>a. The name and characteristic (e.g., strain designation, GenBank Accession number)</li><li>b. The quantity acquired from another individual or entity (e.g., containers, vials, and tubes), date acquisition, and the source</li><li>c. Where stored (e.g., building, room, and freezer)</li><li>d. When moved from storage and by whom and when returned to storage and by whom</li><li>e. The select agent or toxin used and purpose of use</li><li>f. Records created under Section 16 of 7 CFR Part 331, 9 CFR Part 121, and 42 CFR Part 73 (Transfers)</li><li>g. For intra-entity transfers (sender and the recipient are covered by the same certificate of registration), the select agent or toxin, the quantity transferred, the date of transfer, the sender, and the recipient</li><li>h. Records created under Section 19 of 7 CFR Part 331, 9 CFR Part 121, and 42 CFR Part 73 (Notification of Theft, Loss, or Release)</li></ul>
<b>Inventory information required - all select toxin materials (Section 17(a)(3) of the Select Agent Regulations)</b>
<ul style="list-style-type: none"><li>a. The name and characteristics</li><li>b. The quantity acquired from another individual or entity (e.g., containers, vials, tubes, etc.), date of acquisition, and the source</li><li>c. The initial and current quantity amount (e.g., milligrams, milliliters, grams, etc.)</li><li>d. The toxin used and purpose of use, quantity, date(s) of the use and by whom</li><li>e. Where stored (e.g., building, room, and freezer)</li><li>f. When moved from storage and by whom and when returned to storage and by whom, including quantity amount</li><li>g. Records created under section 16 (Transfers)</li><li>h. For intra-entity transfers (sender and the recipient are covered by the same certificate of registration), the toxin, the quantity transferred, the date of transfer, the sender, and the recipient</li><li>i. Records created under section 19 (Notification of theft, loss, or release)</li><li>j. If destroyed, the quantity of toxin destroyed, the date of such action, and by whom</li></ul>

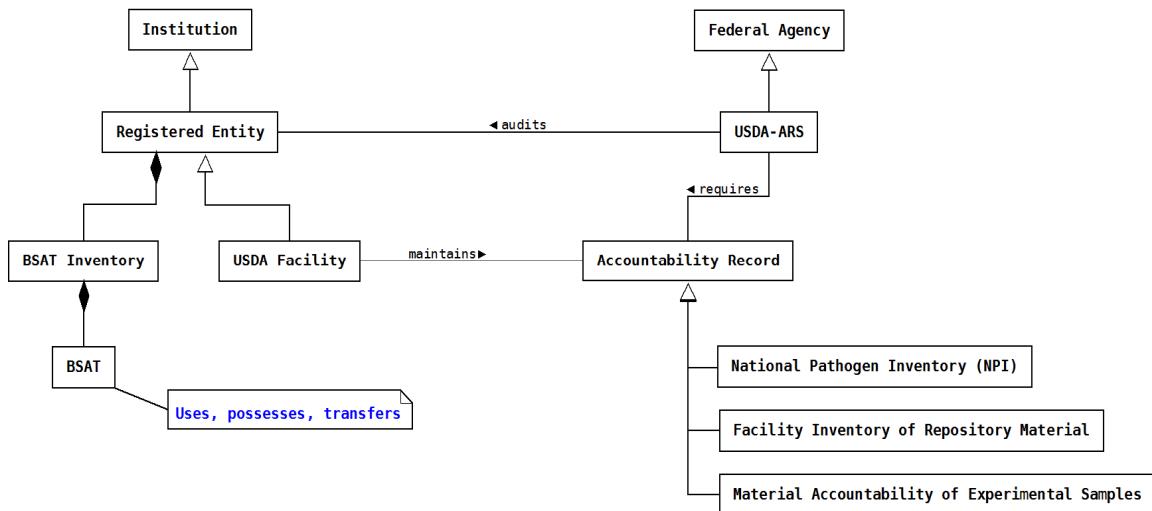
The USDA Agricultural Research Service (USDA-ARS) defines inventory record types that augment the information requirements itemized in Table 3-5 on behalf of the USDA-APHIS select agent program. The Accountability Record entity instance applies

<sup>379</sup> Federal Select Agent Program. 'Guidance on the Inventory of Select Agents and Toxins'. Accessed July 19, 2015, [http://www.selectagents.gov/resources/Long\\_Term\\_Storage\\_version\\_5.pdf](http://www.selectagents.gov/resources/Long_Term_Storage_version_5.pdf)

to each USDA Facility that is also a Registered Entity with the Federal Select Agent Program.<sup>380</sup> The three subtypes of Accountability Record are National Pathogen Inventory (NPI), Facility Inventory of Repository Material (FIRM), and Material Accountability of Experimental Samples, and represented by the DSR-IS artifact in Figure 3-32. The former two entity subtypes of Accountability Record are associated with autonomous inventory management systems, and are archived and updated independently. Collectively, the Accountability Record entity subtypes affords each registered USDA Facility to track current or previously stored pathogens in inventory, correlates pathogens stored and used by resident scientists, and observe of the lifecycle and movement of pathogens via inactivation/destruction or authorized shipment to another FSAP-registered facility.

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<sup>380</sup> *Report of the Working Group on Strengthening the Biosecurity*, 25.; U.S. Department of Agriculture. Agriculture Research Service. *USDA Security Policies for Biosafety Level -3 Facilities*. August 30, 2002. Available online at: [http://www.ocio.usda.gov/sites/default/files/docs/2012/DM9610-001\\_0.pdf](http://www.ocio.usda.gov/sites/default/files/docs/2012/DM9610-001_0.pdf) (accessed March 31, 2013)



**Figure 3-32 USDA-ARS Accountability Record**

The NPI entity subtype aggregates the summary inventory from each USDA Facility, and affords the capability to query which registered facilities have specific agents in storage. The summary inventory furnished by each registered USDA Facility will typically be implemented as subset of a local inventory database that only publishes records to the NPI, but also empowers laboratory directors or institution management to locate pathogens published by member facilities.<sup>381</sup> Inventory records published to the NPI from each USDA Facility must include four fields, which are “Agent Name”, “Agency/Location/Laboratory”, “Person Responsible for pathogenic material”, and “Contact Information”.<sup>382</sup>

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<sup>381</sup> A subsequent analysis of the literature considers the local inventory database that publishes summary inventory reports to the NPI provided by the “Facility Inventory of Repository Material”. No DSR-IS artifact was created as there are no actual means to confirm the interrelationship or if registered USDA facilities adopt multiple local databases to create summary NPI records.

<sup>382</sup> “Person Responsible for pathogenic material” is commonly the Laboratory Director or Supervisor, which is mapped to the “Contact Information” in the local NPI record.

The Facility Inventory of Repository Material (FIRM) entity subtype is described as a master database that only records the management units for each pathogen stored at each facility, but also archives the historical logging of current and previously used pathogens at the facility. Table 3-6 captures the list of fields prescribed by USDA-ARS that should comprise a sample record or afforded by the FIRM database at each USDA Facility. The FIRM retention requirement for inactive pathogen records is five years. The Laboratory Director of each USDA Facility is required to annually review retention of BSL-3 pathogens, and queries the local FIRM database to accomplish that obligation.

**Table 3-6 Firm Inventory of Repository Material**<sup>383</sup>

<b>Facility Inventory of Repository Material (Information to include)</b>
<b>Agent</b> - scientific and common name and strain where applicable
<b>Amount</b> - number of vials or contains inventoried)
<b>Biosafety Level</b> - BSL-2/ABSL-2, BSL-3/ABSL-3 or BSL-4/ABSL-4
<b>Agent Type</b> - bacteria, virus, or toxin
<b>Storage location</b> - building, room number, or freezer number
<b>Storage Conditions</b> - refrigerator, freezer, -70oC, -20oC, or liquid N2
<b>Date of Change of Status</b> - removal or change of custody
<b>Site of Usage</b> - pinpoint to discrete locations such as building numbers and possibly room numbers
<b>Disposition</b> - shipping information if removed from inventory, method of destruction if disposed/inactivated
<b>Scientist Contact Information</b> - name, telephone number, and address of researcher or diagnostician

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<sup>383</sup> USDA, *USDA Security Policies for Biosafety Level -3 Facilities*, 13-14.

The final Accountability Record entity subtype is the Material Accountability of Experimental Samples, which are non-standardized documents to record repository stock reserved for experimental purposes. Laboratory record entries are loosely tracked by laboratory notebooks, laptops, computer tablets, various electronic or facility-specific information systems. Unlike the previous two Accountability Record entity subtypes, the procedures and record formats are non-standardized and may be inconsistent across registered USDA facilities. As research experiments are completed, the condition of the pathogens used, and confirmation of the disposal methods requires signature of the researcher or diagnostician.<sup>384</sup>

The Accountability Record and its entity subtypes are part of the additional inventory control procedures imposed upon USDA Facilities/Registered Entities by the USDA-ARS, which include reconciling physical inventory with inventory records, storage security, pathogen disposal and inactivation, and internal transfers associated with chain of custody processes.<sup>385</sup> USDA-ARS inventory control procedures to reconcile physical inventory with inventory records are ensure accuracy of the summary records published to the NPI, and the FIRM database for each USDA Facility entity instance. Individual researchers that access regulated pathogens are responsible for ensuring databases and laboratory notebook records are accurate. Mild oversight is demonstrated by the Laboratory Director or authorized auditors conducting annual reviews, which includes physical counting BSAT inventory, verifying subsets of records, or statistical

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<sup>384</sup> Ibid., 13-16.

<sup>385</sup> Ibid., 15-16.

sampling of repository materials. Resident biosafety officers are also authorized to randomly conduct inventory audits annually, which implies biological inventories may be reviewed at twice annually.<sup>386</sup>

Storage security as part of inventory management applies to all pathogens stored in secured freezers with limited access permissions, and directly corresponds with BSL containment conditions and risks of the agent. The pathogen with the highest risk within a storage unit determines the biosafety level risk group or biosafety category of that storage unit.<sup>387</sup> Inventory control procedures addressing pathogen disposal and inactivation may include autoclaving, thermal inactivation technologies, or chemical treatments. Aside from approval by Lab Director, internal transfers within the same USDA Facility entity instance have to satisfy three conditions. First, the current biosafety level containment of the pathogens being transferred needs to match its destination. Secondly, the level of experience and the competencies of the receiving laboratory must be maintained. Finally, the receiving scientist within the same facility must consent in being added as the responsible party in the FIRM database, ensure all inventory records are updated, and complete all administrative procedures to terminate the inventory transaction.<sup>388</sup> In cases where USDA laboratories carry limited inventory of agents designated as CDC select agents, the shipping and tracking of select agents will follow CDC regulations defined by 42 CFR Part 72.<sup>389</sup> Regulations imposed by the Department of Commerce (DOC), such as export permit requirements for pathogenic

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<sup>386</sup> Ibid., 13-16.

<sup>387</sup> Ibid.

<sup>388</sup> Ibid.

<sup>389</sup> Ibid.

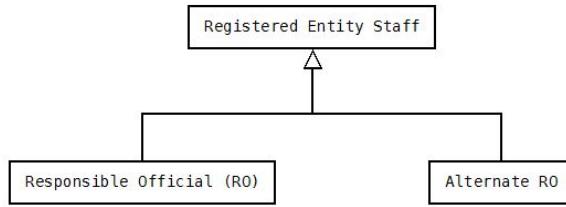
materials, must also be satisfied and subjected to internal reviews of inventory transactions.<sup>390</sup> For example, resident biosafety officers are required to review shipping records in the FIRM database annually to demonstrate SAR compliance.

### **3.7.3 Personnel Security Entity Instances**

The SAR poses requirements that ensure Registered Entities remains compliant once the Certification of Registration is obtained. The Responsible Official and Alternate Responsible Official entity instances are resident staff members of an individual Registered Entity, and represented by the DSR-IS artifact in Figure 3-33. The Responsible and Alternate Responsible Official are appointed by the Registered Entity, and empowered to ensure SAR compliance procedures, processes, and reporting requirements are maintained. The role of the Responsible Official entity instance also establishes implied interrelationships with previous entity instances subjected to SAR compliance processes, such as inventory management and control procedures, registration of BSAT materials, and observing authorized physical access to regulated agents.

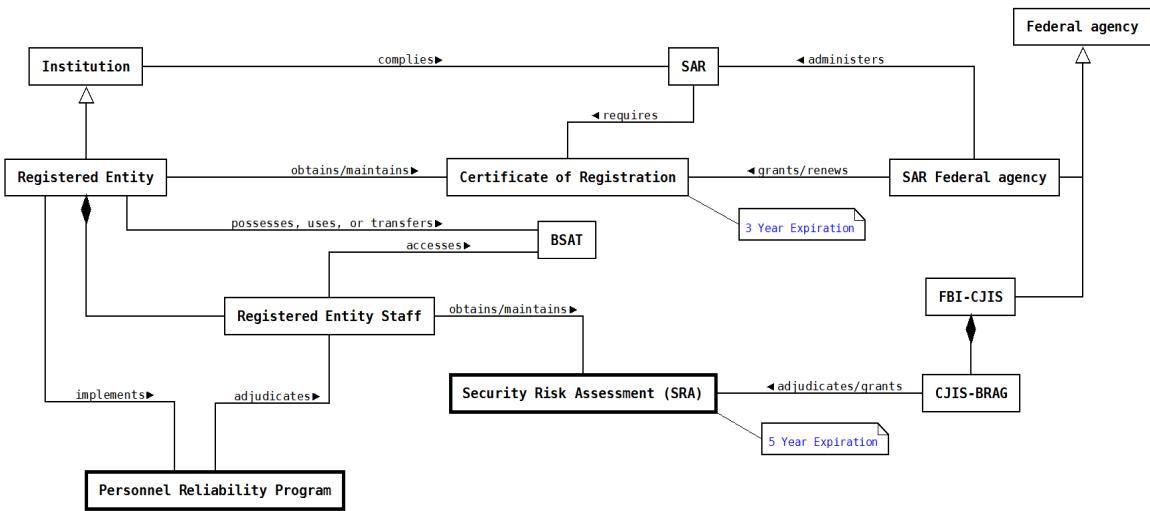
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<sup>390</sup> The dissertation acknowledges the Department of Commerce, and its role regarding the international exports of select agents. There are no DSR-IS artifacts representing the entity instances or activities between U.S. Registered Entities and international research laboratories. However, future studies focusing on international biorisk management should be considered separately.



**Figure 3-33 Responsible and Alternate Responsible Official Entity Instances**

Personnel security is a major element of the SAR, and the policies implemented were designed to not only block unauthorized individuals from possessing select agents and toxins for possible misuse, but also assist with the periodic checking of authorized access via personnel screening programs. The artifact in Figure 3-34 reinforces the placement of the Certificate of Registration (COR) within the interrelationships among local and federal entity instances that monitor or determine authorized access to BSAT materials as part of personnel security management. The COR applies to research institutions, which demonstrates the “Registered Entity” label recognized by the Federal Select Agent Program. The interrelationships with Responsible Official are established as a subtype of Registered Entity Staff subjected to indirect SAR requirements, such as the Security Risk Assessment (SRA) and Personnel Reliability Program (PRP).



**Figure 3-34 Entity Interrelationship between PRP and SRA for BSAT Access**

### 3.7.3a Security Risk Assessment

The Security Risk Assessment (SRA) entity instance is a federal personnel security program managed by the FBI. The SAR requires all individuals authorized to work with BSAT have an active security risk assessment credential, which must be renewed every five years starting from the original date of issuance. The design of the SRA program leverages law enforcement resources in preventing unauthorized persons from select agents and toxins that could be misdirected towards harmful purposes. Law enforcement resources, such as federal databases to examine the criminal history of any SRA applicant, if any, prescreens whether or not a candidate should be granted authorized access to BSAT materials.

The Federal Bureau of Investigation (FBI) is the core federal agency that either authorizes or confirms persons have the need to access BSAT materials. The FBI Criminal Justice Information Service (FBI-CJIS), Bioterrorism Risk Assessment Group

(CJIS-BRAG) supports FSAP by identifying individuals prohibited from accessing to BSAT based on the restrictions identified in the USA PATRIOT Act. The FBI-CJIS conducts security risk assessments for all persons justifying access to regulated biological agents, including Responsible and Alternate Responsible Officials, biosafety officers, principal investigators, laboratory directors, and all non-government entities.<sup>391</sup> The FBI-CJIS executes the background checks and investigations, and adjudicates applicants requiring access to at registered entities as part of the security risk assessment process. Once the necessary background security checks and investigations are completed, FBI-CJIS either denies or grants a favorable SRA to authorize physical access to BSAT materials. Individuals with an active SRA are authorized to handle select agents at the research institution recognized as the registered entity.<sup>392</sup>

Authorization from the Responsible Official (RO) is required to initiate an SRA for persons needing access to BSAT materials in the same Registered Entity, which is not depicted in Figure 3-34. The interrelationship with the RO and the Security Risk Assessment entity instance is tightly coupled during the submission process.<sup>393</sup> The former requests a Department of Justice ID (DOJ ID) number for each person requiring a security risk assessment by submitting an amendment to the APHIS/CDC Form1 that is

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<sup>391</sup> Federal Bureau of Investigation form FD-961 is used conduction a security risk assessment. See also <https://www.fbi.gov/about-us/cjis/bioterrorism-security-risk-assessment-form/bioterrorism-security-risk-assessment-form>

<sup>392</sup> The FBI-CJIS is authorized to conduct security risk assessments for individuals with an active security risk assessment as renewals are needed every five years. The FD-961 application is used for new and active applicants, with the former required to submit fingerprint cards to the FBI Bioterrorism Risk Assessment Group (BRAG). See also <https://www.fbi.gov/about-us/cjis/bioterrorism-security-risk-assessment-form/bioterrorism-security-risk-assessment-form/bioterrorismfd961>

<sup>393</sup> See also <http://www.selectagents.gov/risk.html>

registered with either the CDC or USDA-APHIS select agent program to include the applicants' information.<sup>394</sup> Each applicant is required to complete FBI form FD-961 for signature approval by the RO, and will use the DOJ ID forwarded from the CDC or USDA-APHIS. Two fingerprint cards may be requested by the RO for each applicant subjected to the SRA for package submission. An SRA package consists of completed fingerprint cards, full disclosure of known criminal history, disclosure of substance abuse of illicit drugs, evaluations of mental health records, and if the applicant with U.S. military service was honorably discharged. The background investigation process commences as FBI-CJIS receives a SRA packages, which is a completed FD-961 form and fingerprint cards, from each applicant. The outcomes of each SRA is considered by FSAP, which decides if the corresponding applicant will be granted authorized access to BSAT.

### **3.7.3b Personnel Reliability Program**

Unlike the SRA entity instance, a personnel reliability program (PRP) is specific to the registered entity, but could adopt programs established by a different agency. There is neither a federal mandate nor SAR requirement to standardize a PRP, but individual research institutions have developed their own PRP system to augment personnel security, and ensure laboratory, operations, and administrative staff acknowledge the reliability standards practiced. In the context of biorisk oversight, an

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<sup>394</sup> APHIS/CDC Form 1 is represented by the Registration Application (Form-1) previously introduced.

institution-managed PRP applies to individuals that physically access or perform work with BSAT materials, and personnel supporting the operations and facilities storing BSAT. Individual research institutions determine the applicability of the PRP whereas the SRA is required for all persons that will be physically access BSAT materials. For this reason, the PRP is considered a local oversight mechanism independent from the SRA, and imposes an additional requirement for individuals that will access select agents.

Table 3-7 identifies the roles that a research institution may reasonably consider to have access direct or indirect access to BSAT, and subject to a PRP system (if implemented).<sup>395</sup>

**Table 3-7 Potential Institution Roles Subjected to PRP**

**Research Institution Roles Subjected to PRP for Biorisk Oversight**

- Research or laboratory operations staff who regularly require direct access to BSAT, such as scientists, laboratory directors, principal investigators, biosafety officers, and other technical personnel.
- Physical security management or SAR compliance staff, such as the RO/ARO whose duties grant authorized access to BSAT inventory via badge programming, access codes, or freezer/storage keys.
- Facility and security escort personnel of Registered Entities.
- Commercial couriers who transport BSAT to/from Registered Entities.
- Logistics staff who receive shipments of BSAT from Registered Entities.
- Animal care staff whose duties include access to BSAT.
- IT providing Operations and Sustainment (O&S) of databases reflecting BSAT inventory and scientific data.
- All facility maintenance and janitorial staff with access to interstitial space of laboratories or mechanical rooms supporting BSAT activities.

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<sup>395</sup> Report of the Working Group on Strengthening the Biosecurity, 39.

The roles identified does not imply all institution staff requires SRA approvals or PRP participation, but rather suggestions to FSAP-registered research institutions.<sup>396</sup> The DSR-IS artifact in Figure 3-35 depicts the PRP entity instance and the various subtypes spanning across sectors. Among the PRP subtypes, the Federal PRP is the most common since they generally augment security program requirements, such as security clearance and periodic reinvestigations. The Federal PRP imposes additional personnel security requirements that go beyond SRA requirements, and applies to research institution staff previously described in Table 3-7. The research institutions appoints either Certifying Officials (CO) or personnel security officers to conduct or collect test evaluation results information, such as health reviews and initial or random drug screening results, to complete initial suitability assessments for individuals needing approved access to BSAT.

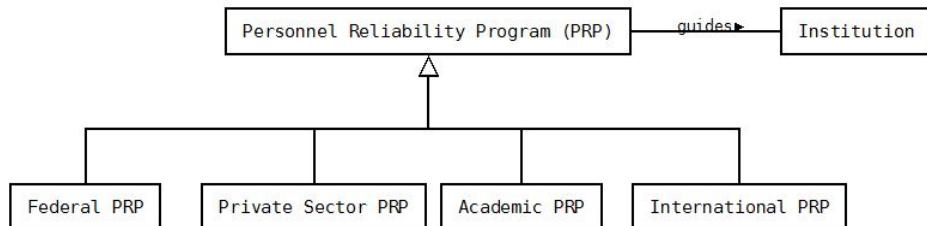


Figure 3-35 Personnel Reliability Program Entity Subtypes

Subtypes of the Federal PRP entity instance include federal agencies with established personnel reliability programs, such as the Department of Defense (DOD),

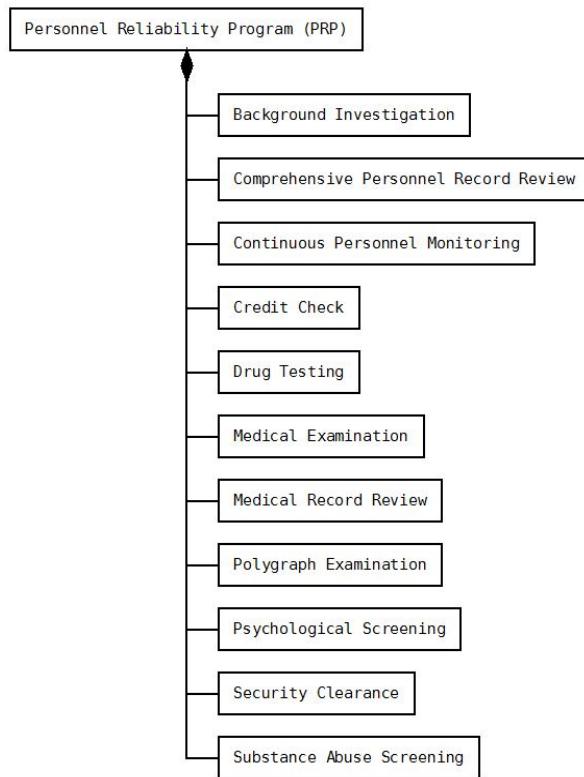
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<sup>396</sup> Ibid.

Department of Energy (DOE), National Institutes of Health (NIH), Center for Disease Control and Prevention (CDC), the United States Department of Agriculture (USDA), and Department of Homeland Security (DHS).<sup>397</sup> Federal PRP entity subtypes, such as the Biological Personnel Reliability Program (BPRP) by the DOD, are applicable to the dissertation. Figure 3-36 illustrates the composition of a PRP that lists the common, but not mutually exhaustive components employed by individual research institutions. The findings determined that each federal agency may have a customized PRP borrowing components, such as background investigations, drug testing, and psychological screening with non-standard implementations of said components.

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<sup>397</sup> Ibid., 39-41.



**Figure 3-36 General Composition of Personnel Reliability Program**

By default all registered entities recognized by the Federal Select Agent Program will have its institution staff subjected to the SRA process as a requirement to maintain the Certificate of Registration. All research institutions subjected to a Federal PRP systems may require security and possibly a suitability determination programs aligned with the Office of Personnel Management (OPM) position risk designation model.<sup>398</sup> The security determination signifies security clearance investigation process that evaluates the loyalty, character, trustworthiness and reliability to ensure that the

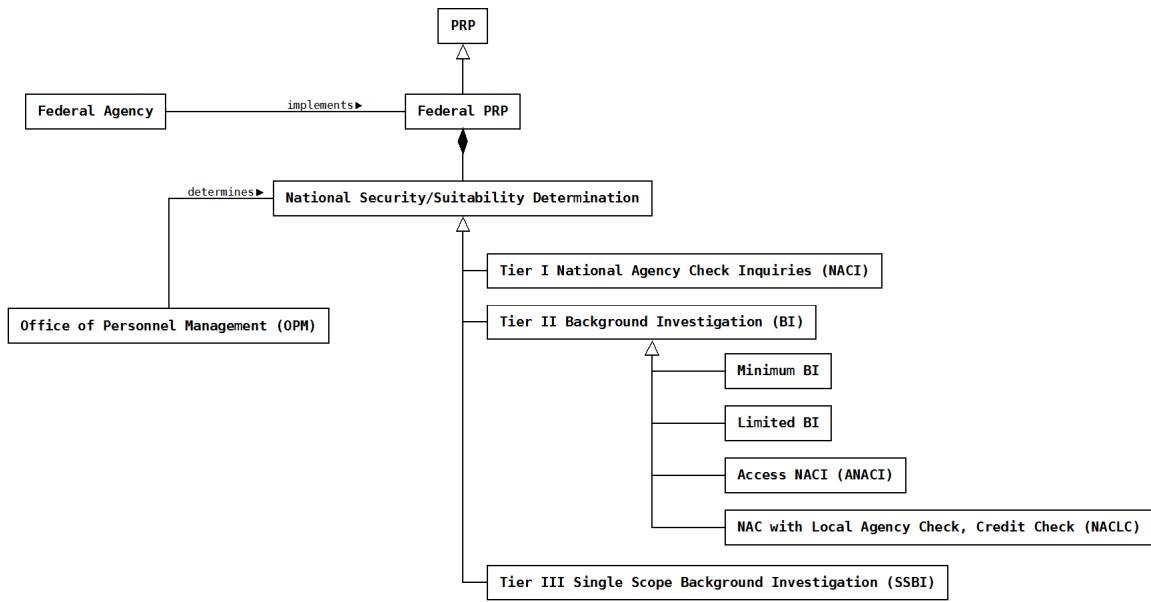
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<sup>398</sup> Ibid., 39-40.

individual is eligible to access sensitive or classified information. The suitability determination questions the position of trust by investigating the identifiable character traits and demeanor to resolve whether the employment history or continued employment would safeguard the integrity or promote the efficiency of the services conducted by the individual considered. The DSR-IS artifact represented by Figure 3-37 reveals the National Security/Suitability Determination entity as not only an attribute of Federal PRP, but also having several entity subtypes describing the types of investigations. Each entity subtype of National Security/Suitability Determination, such as Tier II Background Investigation (BI) or Tier III Single Scope Background Investigation (SSBI) affords the techniques and procedures to produce the security and suitability determinations for any individual subjected to a Federal PRP imposed by the research institution.<sup>399</sup>

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<sup>399</sup> The types of federal secret clearances, their applicability, and level of access of security clearances are beyond the scope of the dissertation.



**Figure 3-37 OPM National Security/Suitability Position Risk Designation Model**

### 3.7.4 BSAT Transportation Security Overview

The transportation security of BSAT materials is interrelated with personnel security where the mechanics of the former may “possess and transfer”, and the latter may “possess, use, or transfer” regulated agents.<sup>400</sup> The interrelationship between transportation security and personnel security is demonstrated by satisfying three conditions when requesting BSAT transfers between Registered Entities. The first condition confirms authorized access of the personnel that will physically transport BSAT, and is satisfied where those individuals from the sending and receiving Registered Entities hold active SRA credentials. The second condition addresses whether or not the receiving entity, is a Registered Entity with a valid Certificate of Registration. An

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<sup>400</sup> Personnel security addresses the authorization of registered entities to “possess, use, and transfer” BSAT materials to another FSAP-registered entity.

Institution must have a COR to be a Registered Entity, and BSAT is only authorized Registered Entity-to-Registered Entity. Finally, the third condition confirms the receiving Registered Entity is authorized to possess, use, or transfer the BSAT materials from the sending Registered Entity.

The transportation security requirements imposed by the SAR mandates all Registered Entities that possess, use, or transfer BSAT to satisfy several conditions before, during, and after transport transactions. The primary transportation security conditions to satisfy are a shared responsibility between SAR Federal Agency subtypes, the CDC and USDA-APHIS, and Registered Entities. Prior to a transfer transaction, the sending and receiving research institutions need to have coordination procedures that ensures BSAT materials are transferred among Registered Entities that are authorized to possess the agents being moved. The CDC and/or USDA-APHIS share this responsibility by granting approval of BSAT transfer between sending and receiving Registered Entities. During the transfer transaction, if either the sending or receiving research institutions discover the theft, loss, or release of BSAT materials, notification to the appropriate select agent program, the CDC or USDA-APHIS, is required and should be coordinated between the involved Registered Entities. Post-BSAT transfer transaction procedures entail updating the appropriate inventory access records, BSAT transfer logs, and safety plans, which require a three-year retention period by sending and receiving Registered Entities. It should be noted that the transfer of BSAT materials is interrelated with the inventory management and control procedures discussed previously since increases or decreases imply updating the appropriate Accountability Record subtypes.

### **3.7.4a Department of Transportation and Department of Homeland Security**

The transportation security of infectious and regulated biological agents is afforded layered oversight by several Federal Agency entity instances. The SAR transportation security requirements for the physical movement of BSAT materials are regulated by the Department of Transportation (DOT). The DOT offers secondary oversight to the FSAP via interagency coordination with the CDC, USDA-APHIS, and the FBI as needed. The DOT ensures commercial transportation carriers of BSAT materials satisfy DOT regulations, and hold a valid COR linked to a valid security risk assessment (SRA).<sup>401</sup> The DOT and CDC-APHIS track the transfer of BSAT materials between registered entities, and the latter provides three functions. First, the CDC-APHIS answers DOT queries by confirming a transportation provider has a valid COR and if the couriers hold current SRA credentials. Secondly, the DOT and CDC-APHIS share the responsibility in tracking the inter-transfer of BSAT materials between sending and receiving registered entities, and confirms the points of contacts of the involved registered entities hold a valid SRA. Finally, the DOT assists the CDC-APHIS by investigating incidents resulting from failed inter-transfer transactions of BSAT materials. Inter-transfer incidents between registered entities include theft, loss, damage, or accidental spillage of BSAT materials.

The DOT child agency, the Pipeline and Hazardous Materials Safety Administration (PHMSA), maintains and updates the U.S. Hazardous Materials Regulations (HMR), which sets the regulation requirements for commercial

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<sup>401</sup> *BMBL*, Appendix C---Transportation of Infectious Substances.

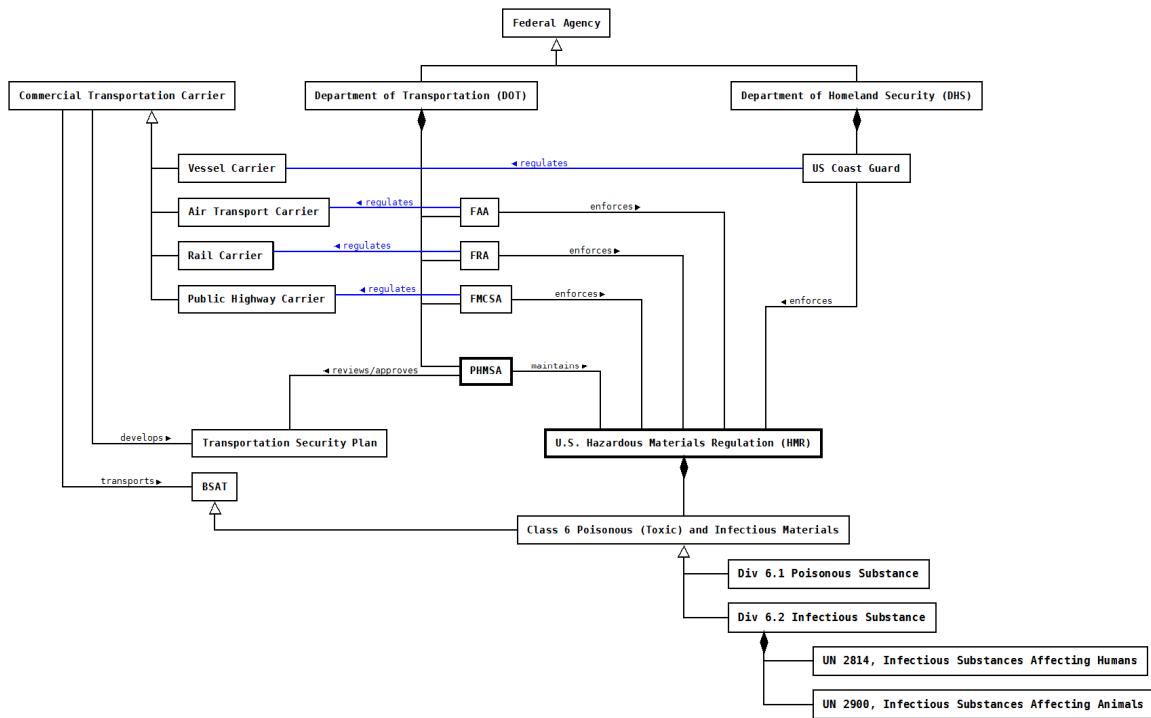
transportation providers to physically move BSAT materials entering, leaving and within the United States.<sup>402</sup> The HMR imposes packaging and shipment requirements to all materials considered by the DOT to pose unreasonable risk to health, safety, and property when transported in commerce via motor vehicle, railcar, vessel, or aircraft.

National oversight of the HMR is accomplished by several DOT child agencies that specialize in the secure transport of hazardous materials (HAZMAT) via public highway, rail, vessel, and air. The DOT sub-agencies assisting the enforcement authority of PHMSA regarding the transport of HAZMAT include the Federal Motor Carrier Safety Administration (FMCSA), Federal Railroad Administration (FRA), the United States Coast Guard (USCG), and the Federal Aviation Administration (FAA). The DOT child agencies collectively enforce the HMR by observing the logistic processes, labelling and classification of materials, packaging, handling, storage, loading and unloading aspects applicable to a national HAZMAT transportation system, but within the jurisdiction of the applicable type of transportation. The interrelationships between the PHMSA, DOT child agencies, and commercial transportation carriers are captured in DSR-IS artifacts Figure 3-38 and Figure 3-39.<sup>403</sup>

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<sup>402</sup> The Pipeline and Hazardous Materials Safety Administration (PHMSA) is a child agency of the Department of Transportation, see also <http://www.phmsa.dot.gov/home>; See also [https://hazmatonline.phmsa.dot.gov/services/publication\\_documents/HowToUse0507.pdf](https://hazmatonline.phmsa.dot.gov/services/publication_documents/HowToUse0507.pdf)

<sup>403</sup> The dissertation author acknowledges the PHMSA will occasionally consider harmonizing the HMR with international regulations and standards. However, the interrelationships with overseas or international entities are beyond the scope of the dissertation, and should be considered in a future study.



**Figure 3-38 US Department of Transportation and BSAT Transport Security**

The PHMSA acknowledges BSAT materials defined by SAR, and classifies BSAT as either Division 6.1 Poisonous Substance or Division 6.2 Infectious Substance under the HMR.<sup>404</sup> An infectious substance is considered material known or suspected to contain a pathogen. Pathogens may cause disease in human or animals, and include bacteria, viruses, parasites, and fungi. The Division 6.2 Infectious Substance entity may further be categorized as either “UN 2814, Infectious Substances Affecting humans,” or “UN 2900, Infectious Substances Affecting Animals,” which are known to cause to permanent disability or life-threatening diseases when exposed to healthy humans or

<sup>404</sup> For more information about the Hazardous Materials Regulations (HMR) Classification System, see [http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title49/49cfrv2\\_02.tpl](http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title49/49cfrv2_02.tpl)

animals. The HMR for Division 6.2 Infectious Substances are designed to protect the public, transportation workers and the environment by preventing the release of these materials in transit through stringent packaging requirements and hazard communication, and awareness of the regulation requirements. Hazard communication is afforded by precise shipping papers, clearly marked labels and classification markings on packaging materials to enable transport workers and emergency response personnel to accurately identify hazardous materials. The PHMSA requires commercial transportation carriers to be trained on HMR to recognize and respond to the risks posed by compromised materials, as well as ensure administrative compliance. If a release occurs during BSAT transport, the Commercial Transportation Carrier must notify the DOT or CDC immediately upon discovery followed by incident report submission to the PHMSA within 30 days from the date of incident notification. Since the SAR requires the CDC or USDA-APHIS to respond to incidents, there is no requirement of the PHMSA to track orphaned packages containing BSAT materials under the HMR to avoid duplication of incident response.

DOT regulations require commercial BSAT transportation carriers to have a security plan, depicted by the Transportation Security Plan entity instance that addresses risks from unauthorized access to the hazardous biological materials being transported. The Transportation Security Plan must address personnel security, unauthorized access and en route security, and an assessment security risks and appropriate countermeasures. Other requirements for commercial transportation carriers by the HMR includes proof of security awareness training that reflects the Transportation Security Plan furnished to its

employees handling and transport BSAT materials. The PHMSA is afforded inspection and enforcement resources that grades the compliance of HMR safety and training standards of transport carriers, transportation vehicle manufacturers, and transportation repair service vendors offering the transport of hazardous materials or manufacture, recertify, rebuild, repair, recondition, or retest packaging used to transport hazardous materials.

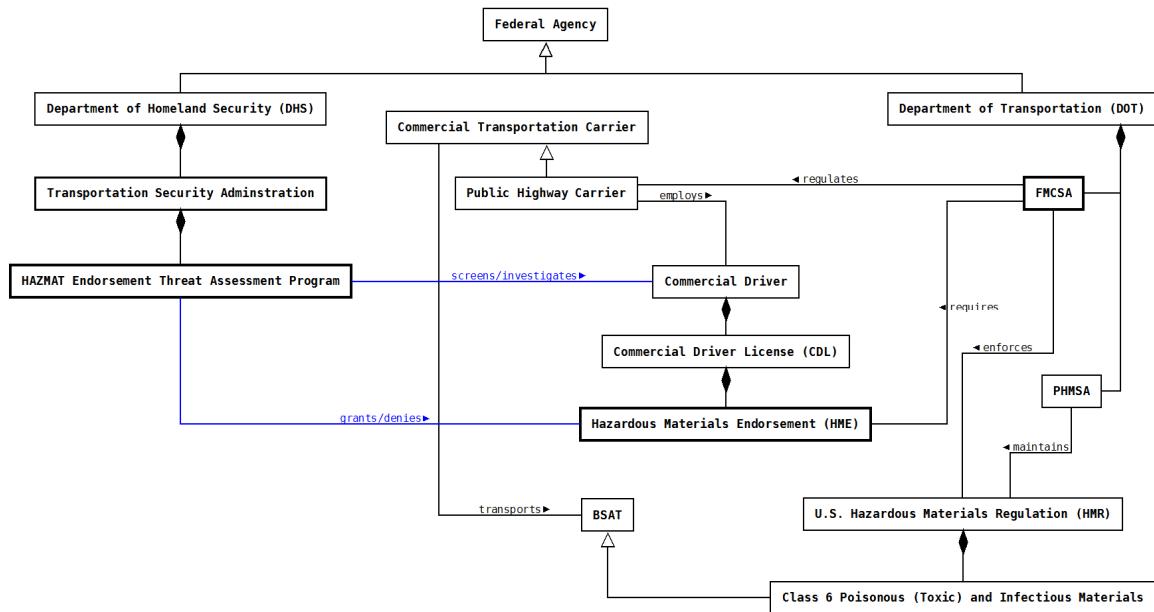
The role of DHS in monitoring BSAT transport not only comes from HMR enforcement of shipping vessels via the U.S. Coast Guard, but also its personnel security assistance support to the DOT. The FMCSA, a DOT child agency, requires drivers with a valid Commercial Driver's License (CDL) to also obtain the Hazardous Materials Endorsement (HME). The HME imposed by FMCSA requirement is specific to CDL drivers authorized for BSAT transport.<sup>405</sup> In Figure 3-39, the DHS Hazardous Materials Endorsement Threat Assessment Program as defined by the Transportation Security Administration (TSA) conducts security threat assessments and background checks for drivers requesting to obtain, renew, or transfer a Hazardous Materials Endorsement (HME) on a state-issued Commercial Driver's License (CDL).<sup>406</sup> The HME credential is linked to the CDL, and ensures states do not authorize the interstate and intrastate transport of hazardous materials unless the holder of the CDL passes a TSA security threat assessment, which determines the driver does not pose a national security risk. The interrelationship between the DOT and DHS is evident where the former augments

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<sup>405</sup> The HME requirement to commercial drivers is akin to Registered Entities requiring Security Risk Assessments (SRA) to staff that will possess, use, or transfer BSAT within a research institution.

<sup>406</sup> See <https://www.tsa.gov/stakeholders/hazmat-endorsement-threat-assessment-program>

oversight of vessel transport, and adjudicates drivers affording the public highway transport of BSAT of imported biological agents.



**Figure 3-39 HAZMAT Endorsement Threat Assessment Program**

### 3.7.4b BSAT Transport Process – Domestic and Import Transfers

The layered oversight of transportation security established by DOT regulations and followed by DOT child agencies regulate the physical transport of BSAT and imported biological materials. The interrelationships between DOT child agencies and Registered Entities are created when the former is either receiving or sending BSAT or imported biological agents, which requires CDC or USDA-APHIS authorization under the SAR. Authorized BSAT transfers by the CDC or USDA-APHIS is the SAR mechanism that affords tracking the physical movement of BSAT between domestic

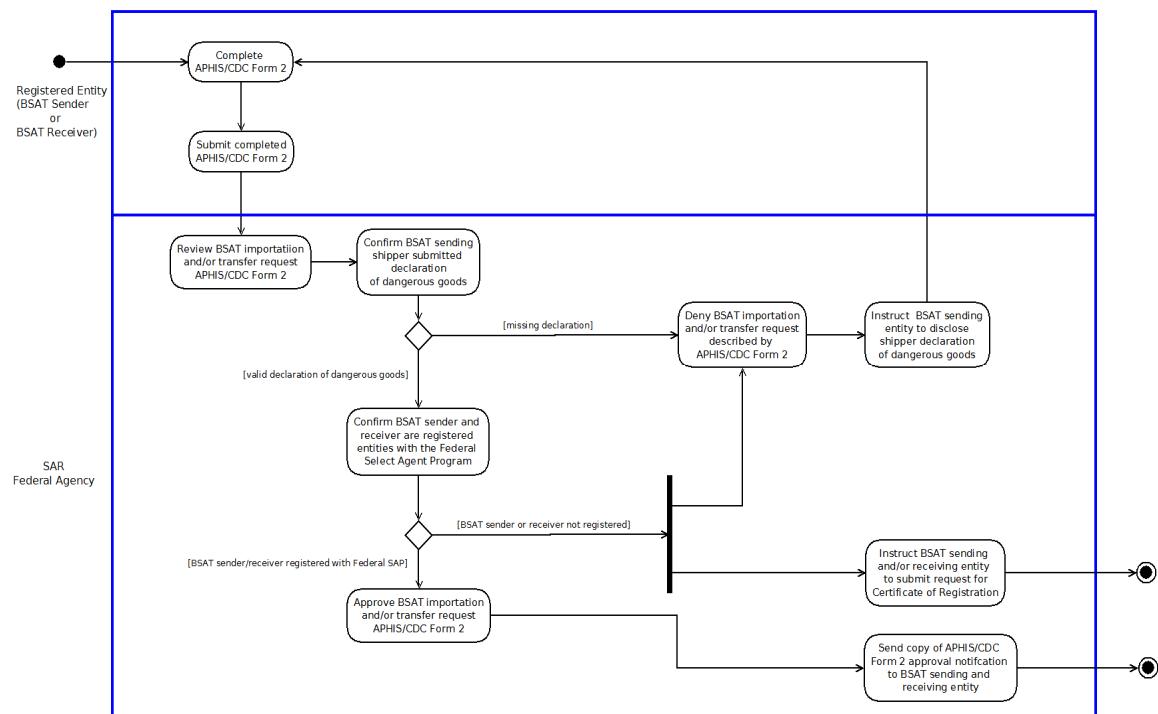
Registered Entities and directly from international sources, and is an accounting safeguard to ensure the National Pathogen Inventory (NPI) accurately reflects the locations for all pathogens reported. The DSR-IS artifacts in Figure 3-40 and Figure 3-41 are UML activity diagrams demonstrating how Registered Entities may obtain BSAT transfer authorization from a SAR Federal Agency entity, and the notification mechanisms to execute physical movement of regulated biological materials.

Figure 3-40 illustrates the initiation process to BSAT transfer authorization. The SAR requires that sending and receiving Registered Entities specify an authorized person holding an active SRA, which is the individual securing the BSAT packages prior to shipment by the sending Registered Entity and after delivery confirmation by the receiving Registered Entity. The BSAT transfer authorization process starts with the submission of APHIS/CDC Form 2 by the receiving Registered Entity.<sup>407</sup> If either the sending or receiving entity does not possess an active Certificate of Registration, precursor SAR requirements must be satisfied. All BSAT transfer authorization requests require APHIS/CDC Form 2 submission, which includes domestic transport of BSAT materials between Registered Entities, and the importation of known BSAT into the United States prior to each planned importation. The commercial shipping vendor must provide an emergency telephone number at its facility that responds to calls 24-hours a

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<sup>407</sup> APHIS/CDC Form 2 is the “Request to Transfer Select Agents and Toxins”, see also [http://www.selectagents.gov/resources/APHIS-CDC\\_Form\\_2\\_Request\\_to\\_Transfer\\_Select\\_Agents\\_and\\_Toxins\\_Fillable-English.pdf](http://www.selectagents.gov/resources/APHIS-CDC_Form_2_Request_to_Transfer_Select_Agents_and_Toxins_Fillable-English.pdf)

day on the Shipper's Declaration for Dangerous Goods form.<sup>408</sup> Once BSAT transfer authorization is granted, the approval is valid for 30 days from the date of authorization.<sup>409</sup> However, the authorized person holding an active SRA that is appointed by the sending Registered Entity must secure all BSAT packages prior to transport until an authorized courier is available.



**Figure 3-40 BSAT Transfer Authorization Request to SAR Federal Agency**

<sup>408</sup> The Shipper's Declaration for Dangerous Goods form is a non-standard form that commercial transportation providers use to identify HAZMAT materials, and acknowledges the risks in handling while moving between sending and receiving destinations.

<sup>409</sup> The SAR tracks BSAT transfers by granting a “transfer authorization number”, which may be reused before its 30 day expiration date. See also <http://www.selectagents.gov/faq-transfers.html>

Figure 3-41 captures BSAT transport process once a transfer authorization is granted by the FSAP. The sending Registered Entity coordinates BSAT transport dates with the receiving Registered Entity to ensure delivery within 48 hours. Once the BSAT package or imported biological agents are delivered, the authorized person at the receiving Registered Entity confirms receipt by notifying the Responsible Official of the sending Registered Entity and either the CDC or USDA-APHIS within 48 hours of receipt via fax or electronic messaging after completing the APHIS/CDC Form 2 linked to the BSAT transfer transaction. If there are BSAT transfer exceptions, such as the receiving Registered Entity not possessing BSAT packages within 48 hours after the anticipated delivery time or the release of BSAT through damage during transport, the SAR afford incident report procedures. The receiving Registered Entity must immediately notify the CDC or USDA-APHIS Select Agent Program upon realizing failed delivery of BSAT packages or accidental release of BSAT or imported pathogens. Submission of APHIS/CDC Form 3 must be executed by the receiving Registered Entity within seven days from the date of its initial incident notification to the CDC or USDA-APHIS.<sup>410</sup> The CDC or USDA-APHIS will determine the appropriate action after reviewing the incident details captured by APHIS/CDC Form 3. Appropriate actions taken upon the Federal Select Agent Program may include additional inquiries of the reported incident, administrative actions, and site inspections at sending or receiving Registered Entity facilities or transport vendor facility. In cases where there public health

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<sup>410</sup> APHIS/CDC Form 3 is the “Report of Theft, Loss, or Release of Select Agents and Toxins”. See also [http://www.selectagents.gov/resources/APHIS-CDC\\_Form\\_3\\_Notification\\_of\\_Theft\\_Loss\\_or\\_Release\\_Fillable-English.pdf](http://www.selectagents.gov/resources/APHIS-CDC_Form_3_Notification_of_Theft_Loss_or_Release_Fillable-English.pdf)

is at risk or threatened from the potential release of pathogens, the CDC will lead notification efforts to local, state, and federal public health agencies. If criminal activity is suspected, escalation or referral to the FBI may be warranted for additional investigation expertise.

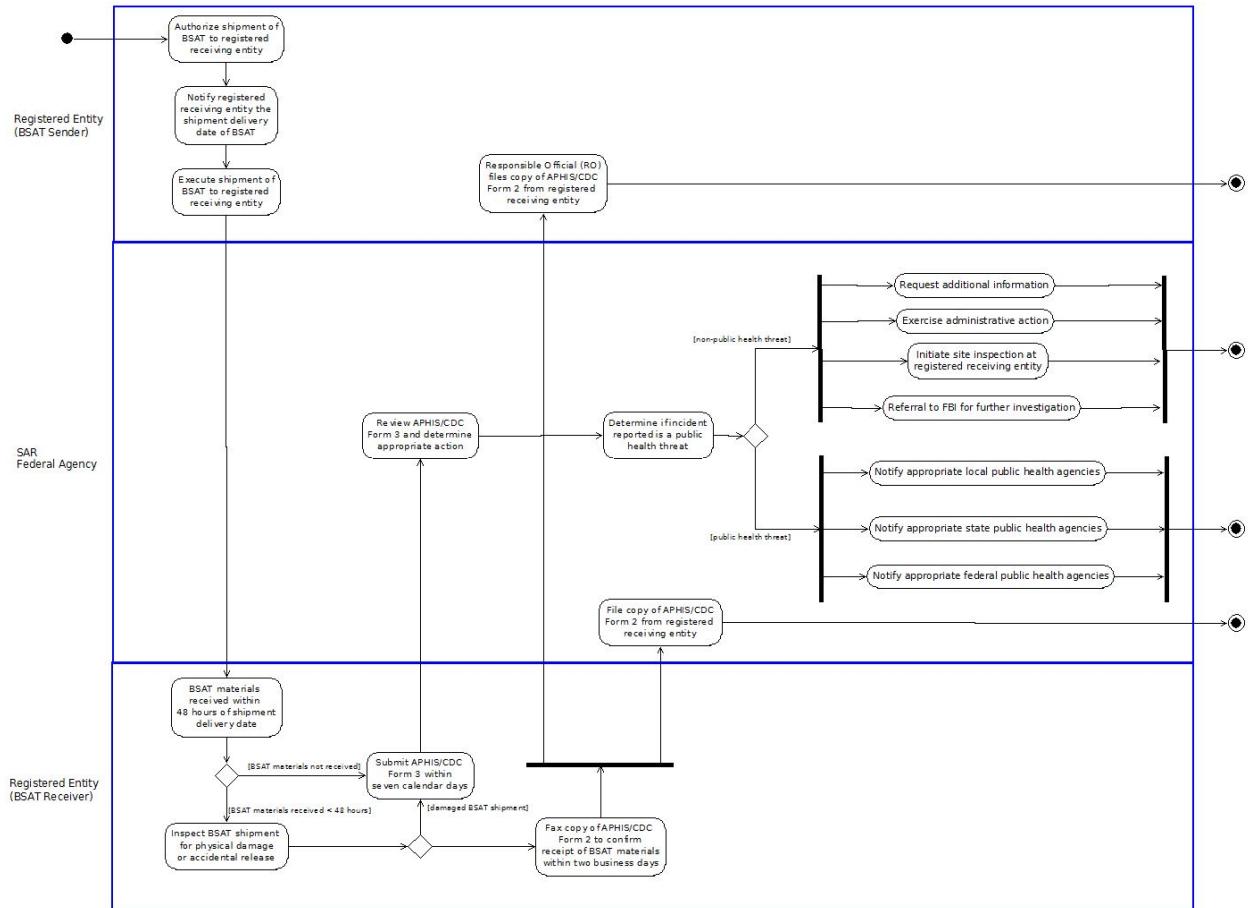
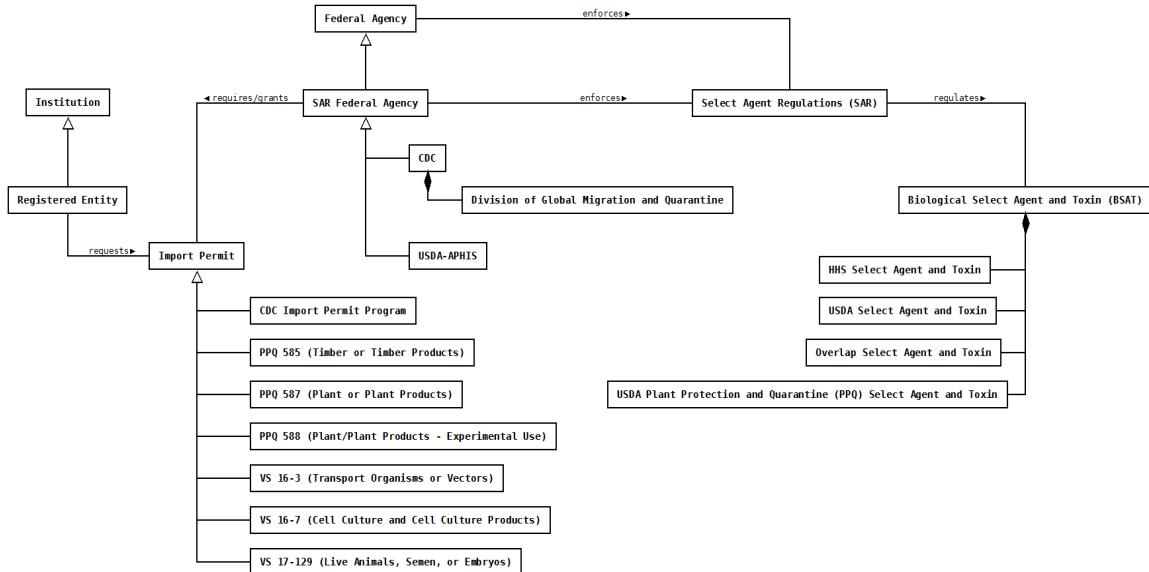


Figure 3-41 BSAT Transport Process – Approved BSAT Transfer Authorization

### **3.7.4c CDC and USDA-APHIS Import Permits**

Another element of transportation security deals with importing plants, animals and genetically engineered organisms. Since non-indigenous biological agents have the potential to introduce risks of transmission, risk assessment should consider the endemic origin of biological agents that may potentially spread new infectious human or animal diseases from foreign countries. The CDC and the USDA-APHIS issue import permits granting the importation of microorganisms that could possibly cause diseases in livestock and poultry, known vectors of livestock and poultry pathogens, and organisms or vectors that were exposed to animals or animal products outside of the United States. The CDC has established the Import Permit Program (IPP), which authorizes the importation of etiological agents of human disease. Likewise, the USDA-APHIS has established specialized permits authorizing the importation of etiological agents specific to plants, livestock, poultry and other animal diseases. Figure 3-42 illustrates the insertion of import permits issued by the CDC or USDA-APHIS, which would be considered a type of biosecurity artifact along with a Security Risk Assessment and Certificate of Registration credentials (not shown). The presence of Import Permit entity instance reinforces the interrelationships among transportation security and personnel security entities via inventory management and control procedures specific to authorized transfer, authorized access, and authorized storage of endemic agents. The Department of Commerce becomes involved in cases where a registered entity needs to import or export regulated agents from/to another country. The importation of agents from other

countries may also require permits from the CDC and/or USDA. This dissertation and the DSR-IS artifacts linked to BSAT transfers focused on domestic transfers of agents.



**Figure 3-42 CDC and USDA-APHIS Import Permits Associated with SAR**

The CDC Import Permit Program (IPP) oversees the importation of endemic infectious biological agents and vectors of human disease into the United States.<sup>411</sup> Requesting Registered Entities submit applications to the IPP for review, and are subjected to inspections to confirm the appropriate containment and safety measures furnished in the IPP application are operational and adequate for working safely with imported infectious biological agents or vectors. The reach of the IPP is advanced by its

<sup>411</sup> Center for Disease Control and Prevention, 'CDC – IPP - Introduction'. Accessed July 26, 2015, <http://www.cdc.gov/od/eaipp/>

internal collaboration with the CDC Division of Global Migration and Quarantine (DGMQ), which is chartered with a public health and regulatory mission. The regulatory mission of the DGMQ is assisted by the U.S. Customs and Border Protection, which is to prevent the introduction, transmission, and interstate spread of communicable diseases from foreign countries into the United States and its territories.<sup>412</sup>

The USDA-APHIS has established specialized permits required for infectious agents of livestock, poultry, and biological materials containing animal material.<sup>413</sup> Since the importation of etiologic agents raises the potential risk of inserting exotic animal diseases in the United States, the USDA controls tissue culture materials and suspension-grown cell culture viruses or etiologic agents carrying cattle or livestock growth stimulants. The various USDA-APHIS import permits in Table 3-8 are a subset of the total population of permits afforded by the USDA, but are relevant to the dissertation. Not represented in any DSR-IS artifact are the state requirements and regulations to import an animal or animal product into each of the U.S. state and territory, which is beyond the scope of the dissertation.<sup>414</sup>

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<sup>412</sup> Center for Disease Control and Prevention, 'Division of Global Migration and Quarantine'. Accessed July 27, 2015, <http://www.cdc.gov/ncecid/dgmq/>

<sup>413</sup> USDA Animal and Plant Health Inspection Service, 'USDA APHIS | Permits and Certification'. Accessed July 26, 2015, [http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/animalhealth/sa\\_import\\_into\\_us/lut/p/a1/ZJLU4MwFIV\\_i4suaa5AC7ij2qetOnbUwiYTIEAUkhhsA\\_31pkxdah0uzC53vpOckxMUoxWKOXliBdFMcFLt9nEfzy4n9vEA7Ol4GQxhenE7Wvhzz7mcuAaIDHA6DieuNwcA17dhejaYnHnBAmDa\\_0l\\_h2IUp1xLxaKlyJI1OBVcU65xxRFJ1LYDDcFirXAu0nXT7ghnNalwSUml3bCaimUxoXrgd8gKautESksqaqZbnY3yZRIKMqDjEKWgpUFfmq5tt23kow41rHdy3v9PHFyL90ngy9WCL9K9g4ZDwcGGc2vvPOZDee9PfDd47XANx4iY9L70kXgouUfu89-UbitFqeLwhxLdGgxngu0OqigHR1WYNTs\\_vExDk3pu5qfNVr9c-smUVGJpP3MUcgTxzfWFc2poqq7VmZcai2bkw50YLPZdAshiop2U1F\\_JihFYyx\\_4GR9U\\_vO1nq49sHpVfdb52VO78KjV5BhYKM!/?1dmy&urle=wcm%3apath%3a%2Faphis\\_content\\_library%2Fsa\\_resources%2Fsa\\_epermits%2Fct\\_eearn\\_epermits](http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/animalhealth/sa_import_into_us/sa_apply_for_permits/lut/p/a1/ZJLU4MwFIV_i4suaa5AC7ij2qetOnbUwiYTIEAUkhhsA_31pkxdah0uzC53vpOckxMUoxWKOXliBdFMcFLt9nEfzy4n9vEA7Ol4GQxhenE7Wvhzz7mcuAaIDHA6DieuNwcA17dhejaYnHnBAmDa_0l_h2IUp1xLxaKlyJI1OBVcU65xxRFJ1LYDDcFirXAu0nXT7ghnNalwSUml3bCaimUxoXrgd8gKautESksqaqZbnY3yZRIKMqDjEKWgpUFfmq5tt23kow41rHdy3v9PHFyL90ngy9WCL9K9g4ZDwcGGc2vvPOZDee9PfDd47XANx4iY9L70kXgouUfu89-UbitFqeLwhxLdGgxngu0OqigHR1WYNTs_vExDk3pu5qfNVr9c-smUVGJpP3MUcgTxzfWFc2poqq7VmZcai2bkw50YLPZdAshiop2U1F_JihFYyx_4GR9U_vO1nq49sHpVfdb52VO78KjV5BhYKM!/?1dmy&urle=wcm%3apath%3a%2Faphis_content_library%2Fsa_resources%2Fsa_epermits%2Fct_eearn_epermits)

<sup>414</sup> USDA-APHIS, 'State Regulations for Importing Animal', Accessed July 26, 2015, [http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/animalhealth/sa\\_import\\_into\\_us/lut/p/a1/rVHLboMwEPyWHhp](http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/animalhealth/sa_import_into_us/lut/p/a1/rVHLboMwEPyWHhp)

**Table 3-8 USDA-APHIS Import Permits**

**USDA Animal and Plant Health Inspection Service (USDA-APHIS) Import Permits**

- PPQ 585 - Permit to Import Timber or Timber Products
- PPQ 587 - Permit to Import Plants or Plant Products
- PPQ 588 - Permit to Import Plants or Plant Products for Experimental Purposes
- VS 16-3 - Permit to Import Controlled Material or Transport Organisms or Vectors
- VS 16-7 - Permit to Import Cell Cultures and Their Products (Supplements VS 16-3)
- VS 17-129 - Import or in Transit Permit (for Live Animals, Semen or Embryos)

### **3.7.5 Observations of Conceptual Biosecurity Entity Instances**

The conceptual entity instances of biosecurity are various, but focuses on multilayered oversight and registration requirements. The collaboration among federal agencies implement the former, and registration requirements afford the tracking of authorized access or transport via asset management and tracking, personnel security risk assessments, personnel reliability programs, and oversight of commercial transport carriers. The knowledge and experience in creating the DSR-IS artifacts categorizes the biosecurity entities into several categories associated with SAR registration and inventory management, personnel security, and BSAT transport.

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[EXswzR\\_ICEmgqRWkDF8s1OLgCm4ATlX9fB\\_VSVUITqXvb1ezszgzK0Q7lgp75gSouBa0vfe6S5TrC5gRwHG7Gc4gfnxepn3jWOrIIINOAArhEtpcAgO1jiGeTaOaNU4DYvW8frlQAv-2\\_oBzhVCtqlBG24r3pJBCIUKRmr92tPt4gJ4Seeolk8WpHzoqeENrUpW0VtUw4U0rO0W4UJKcgtnW\\_C9ZmQlY67pGC5Qati-Zxu-g\\_cGw9h33cLcm4WFlnelxF06TQ-alqrK4IJjtPt5VuP42\\_GYB1rSRcS7Qrt\\_0zQ49e3PcD7Rfy6SJ2-1xLBByvgC3whwAN9LKdJzeVSvGNtr80du22W4b33Lqc8I2sUGzYDT6BAFyHMc!/?1dmy&urile=wcm%3apath%3a%2Faphis\\_content\\_library%2Fsa our focus%2Fsa animal health%2Fsa import into us%2Fsa entry requirements%2Fct us%2Bstate and territory animal import regulations">EXswzR\\_ICEmgqRWkDF8s1OLgCm4ATlX9fB\\_VSVUITqXvb1ezszgzK0Q7lgp75gSouBa0vfe6S5TrC5gRwHG7Gc4gfnxepn3jWOrIIINOAArhEtpcAgO1jiGeTaOaNU4DYvW8frlQAv-2\\_oBzhVCtqlBG24r3pJBCIUKRmr92tPt4gJ4Seeolk8WpHzoqeENrUpW0VtUw4U0rO0W4UJKcgtnW\\_C9ZmQlY67pGC5Qati-Zxu-g\\_cGw9h33cLcm4WFlnelxF06TQ-alqrK4IJjtPt5VuP42\\_GYB1rSRcS7Qrt\\_0zQ49e3PcD7Rfy6SJ2-1xLBByvgC3whwAN9LKdJzeVSvGNtr80du22W4b33Lqc8I2sUGzYDT6BAFyHMc!/?1dmy&urile=wcm%3apath%3a%2Faphis\\_content\\_library%2Fsa our focus%2Fsa animal health%2Fsa import into us%2Fsa entry requirements%2Fct us%2Bstate and territory animal import regulations](https://www.aphis.usda.gov/ice/permits/import-permits)

### **3.7.5a SAR Registration and Inventory Management**

The DSR-IS biosecurity artifacts detected entity interrelationships during the SAR registration process that were unexplained. For example, no data was found describing the procedures, timelines and collective review steps by either the CDC or USDA-APHIS once an Institution submits the three deliverables when either renewing or applying for a new Certification of Registration (COR). Although SAR registration requires a site inspection for all COR applicants, there were no indications of any feedback mechanisms or timelines provided to correct flaws in the Risk Management Plan or Security Inspection Report, and if resubmission of COR application materials are required. A separate study focusing on the SAR registration process would be ideal in identifying questionable applicants, as well as the implementation of a knowledge base that uses a historical log of findings and corrective actions to refine oversight.

The inventory management and controls specified by USDA-APHIS are unclear. Further examination of the literature demonstrates confusion between the terms “record” versus “database”. For example, the USDA-ARS prescribes three types of Accountability Records, of which two are characteristics of a relational database. The National Pathogen Inventory (NPI) is a shared database to all registered USDA Facility, and the Facility Inventory of Repository Material (FIRM) is a local database to a registered USDA Facility. A survey of the literature neither determined the systematic process in how the shared NPI and distinct FIRM databases are updated, nor could determine if there were reconciliation procedures between the NPI and FIRM by each Registered Entity aside from its annual inventory review. The Material Accountability of

Experimental Samples is the third subtype of the Accountability Record entity instance that employs non-standardized documents to record repository stock aliquots used for experimental purposes. Laboratory record entries are loosely tracked by laboratory notebooks, various electronic or facility-specific information systems. Unlike the previous two Accountability Record entity subtypes, the procedures and record formats are non-standardized and may be inconsistent across registered USDA facilities.

The USDA-ARS inventory control procedures requiring annual physical reconciling of inventory is flawed. The description of the Material Accountability of Experiment Samples implies decentralized and autonomous record keeping of BSAT materials at USDA facilities. This model is the reverse of publishing summary records to the NPI that allows member USDA facilities to query a shared database, or the FIRM database that is maintained by local IT staff. Mitigation strategy may involve electronic publishing of records from non-standard inventory systems, scanning hardcopy record logs, laptops, and computer tablets into the FIRM database. Another strategy may involve phasing out this type of Accountability Record. A separate study should defend and evaluate how non-standardized inventory tracking using various data sources are tracked efficiently.

### **3.7.5b PRP and SRA Personnel Security**

Personnel security programs, such as the Security Risk Assessment (SRA) and Personnel Reliability Program (PRP) are independent from one another, and the combined effectiveness will depend on augmented oversight measures. Unlike the SRA,

a PRP is specific to each agency and will impose different screening requirements. For example, not all agencies may require polygraphs in its PRP. Likewise, not all polygraphs will be administered in the same manner across agencies.<sup>415</sup> Non-standardized PRP based on agency-specific requirements and inconsistent enforcements make performance assessment difficult since personnel screening will vary across agencies.<sup>416</sup> A future study that evaluates whether or not PRP systems with stringent requirements deter prospective research would have the same effect of restricting scientific publication should be considered. Similarly, the reach of the SRA applies to persons justifying the need to access, use, or transfer BSAT materials. The SRA is not required when persons are employed at research institutions that exclusively possess or use non-regulated biological agents, or if the research institution is not a registered entity. SAR applicability are towards registered entities that possess, use, or transfer regulated BSAT materials. The limited scope of SRA screening and SAR applicability means biosecurity oversight focuses on persons that can justify access to regulated BSAT materials that are stored, used, and transferred among registered entities.

The personnel security tandem of SRA and PRP is not foolproof. The concept of insider threats in a secured facility, such as BSL-3 and BSL-4 hosted research institutions are an established problem with the burden of not overly restricting the activities of

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<sup>415</sup> The dissertation author is cognizant of the different types of polygraphs, such counterintelligence (CI) polygraphs, lifestyle polygraphs, and full-scope polygraphs (FSP).

<sup>416</sup> The dissertation author holds a security clearance and is cognizant that approaches to complete background investigations has varied over the years as an IT government contractor. “Inconsistent implementations” means a PRP may similar requirement, but its approach is identical across agencies. For example, a background investigation may be a PRP requirement, but the approach and requirements in what is considered a “completed background investigation” is unique.

researchers while providing safeguards to prevent theft, loss, deliberate release or misuse of BSAT materials, equipment or scientific information. Consequently, it was not possible to develop DSR-IS artifacts addressing either insider threats or the dual-use dilemma since proving intent cannot be modeled. Since SRA and PRP screenings are specific to individuals, imposing accountability towards supervisory personnel is highly recommended to augment oversight. Local oversight entities, such as the Principal Investigator, Responsible Official, Lab Directory, or the Institutional Biosafety Committee (IBC) emphasize compliance and risk assessment/management with heavy reliance on site security staff or technical engineering security controls. However, neither site security staff nor technical engineering controls have the reach or access permissions when compared to supervisory personnel that oversee staff handling BSAT materials, equipment, or scientific information.

Overall, the limited applicability of SAR registration and SRA screening introduces several oversight gaps. Non-registered entities may legally avoid *BMBL* and *NIH Guidelines* compliance if completely supported by private funds. This loophole empowers private research institutions outside the FSAP to possess, use, or transfer non-regulated, but otherwise dangerous biological agents and toxins exempt from SAR. Privately funded research institutions would also be afforded the option to loosely follow or ignore *BMBL* guidelines. Furthermore, non-registered entities experimenting with non-regulated BSAT materials are not required to have personnel to hold an SRA, which bypasses FBI screening. Persons working in privately funded non-registered research

institutions equipped with sophisticated biotechnologies are able to use, manipulate, or transport alternative pathogens without having to satisfy federal funding conditions.

### **3.7.5c BSAT Transport**

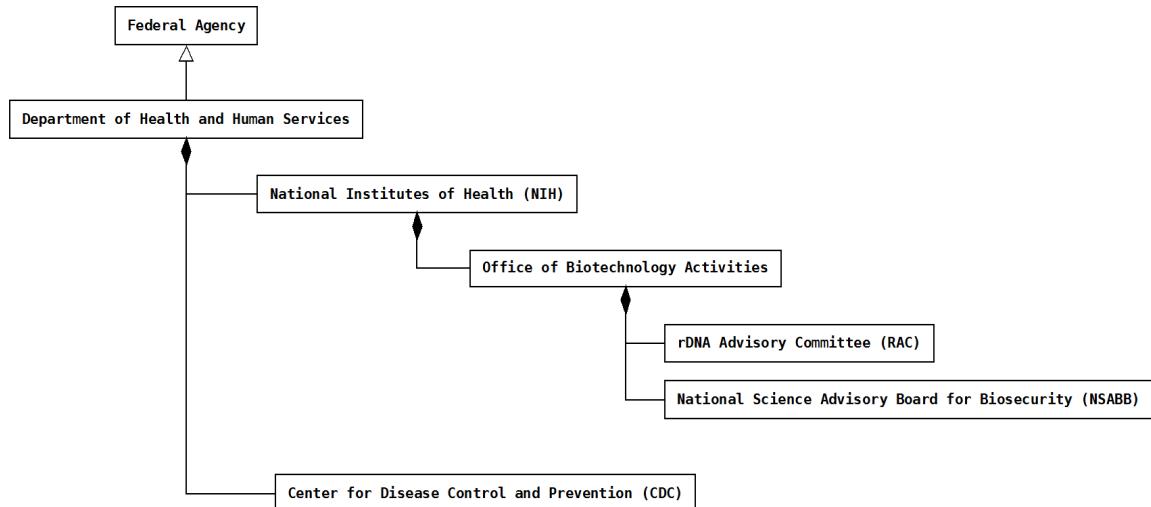
The Phase I biosecurity artifacts tied to BSAT transport found existing reportable artifacts that could be reused multiple times for end-to-end tracking. For example, the APHIS/CDC Form 2 submitted by Registered Entities generates a BSAT Transfer Authorization Number artifact is linked to the APHIS/CDC Form 2 paperwork exchanged between sending and receiving Registered Entities. The Transfer Authorization Number artifact could be leveraged for tracking and historical logging for future analysis, and sets the expiration window of 30 days from date of issuance. The DSR-IS artifacts could not deduce from literature how the FSAP ensures multiple Registered Entities are not issued a duplicate Transfer Authorization Number. Additional reportable artifacts that could be tracked when BSAT is transferred between Registered Entities include the Certification of Registrations of involved Registered Entities, APHIS/CDC Form 2, BSAT Transfer Authorization Number, the DHS-TSA HME credential linked to CDL holders, and the Shipper's Declaration of Goods. For example, if there are delivery exceptions from BSAT transfers en route, there is no HMR requirement to recover or track lost packages to avoid duplication of efforts of by the CDC/USDA-APHIS, which conduct this function under the SAR. No literature suggests leveraging HMR-regulated artifacts (DHS-TSA HME to CDL assignment, and Shipper's Declaration of Goods) involved with SAR-regulated artifacts (e.g., APHIS/CDC Form 2

and Transfer Authorization Number) uniquely associated with BSAT transfers. Another tracking source includes the NPI, which applies to domestic BSAT transfer and importation of biological agents, but may be leveraged to auditing end-to-end BSAT transfers to ensure physical inventories are keeping pace with agents received by Registered Entities.

### **3.8 NIH Guidelines and Recombinant DNA Research Entity Instances**

The *NIH Guidelines* is a federal document maintained by HHS child agency, the National Institutes of Health (NIH), which specifies the laboratory and research practices for the construction and handling of recombinant and nucleic acid molecules, synthetic nucleic acid molecules, and cells, organisms and viruses holding either recombinant or synthetic nucleic acid molecules. The roles and responsibilities of various entities associated with recombinant DNA research, including within institutions, and within the NIH will be discussed for the remainder of Chapter 3. The DSR-IS artifact represented by Figure 3-43 depicts the composition of NIH, and the internal agency entities associated with the *NIH Guidelines*. The NIH Office of Biotechnology Activities (NIH-OBA) develops policies addressing biosafety of NIH-funded research, biosecurity, dual-use research oversight, clinical trials involving recombinant and synthetic nucleic acid molecules, and registration of new stem cell lines. The policies developed by NIH-OBA are specific to the science, safety, and ethics of the following focus areas, which are

biosafety (*NIH Guidelines* and IBC guidance), biosecurity, and biomedical technology assessment (human gene transfer research and stem cell research).<sup>417</sup>



**Figure 3-43 HHS Federal Agency Composition linked to NIH Guidelines**

The Recombinant DNA Advisory Committee (RAC) is the main federal advisory body that advises the NIH Director NIH-OBA about the issues, concerns, and oversight of basic and clinical rDNA research.<sup>418</sup> The NIH-RAC is the authoritative agency setting the mandatory guidelines only for research institutions receiving NIH funding for recombinant DNA research, which have become the de facto standard for genetic

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<sup>417</sup> For more information about the focus areas driving the policies developed by NIH-OBA, see <http://osp.od.nih.gov/office-biotechnology-activities>

<sup>418</sup> rDNA research is scientific research involving recombinant or synthetic nucleic acid molecules. See also <http://osp.od.nih.gov/office-biotechnology-activities/biomedical-technology-assessment/hgt/rac>

recombination and synthetic biology research.<sup>419</sup> The authoritative influence and respect for the NIH-RAC is indicated where private companies and institutions not receiving NIH funds follow its guidelines.<sup>420</sup> Supporting the NIH Director and NIH-OBA in this manner empowers the NIH-RAC to recommend changes to the *NIH Guidelines*. The initial and public review of research proposals involving human gene transfer research and non-exempt experiments are considered high-visibility functions of the RAC. Up until May 2014, all human gene transfer trials conducted at or sponsored by institutions receiving NIH funds for rDNA research required submission to NIH-OBA for NIH-RAC review.<sup>421</sup>

The National Science Advisory Board for Biosecurity (NSABB) is considered a federal advisory body under NIH-OBA that reviews and addresses biosecurity concerns, such as dual-use research of concern and the dual-use dilemma to all federal departments and agencies as requested by the USG.<sup>422</sup> The NSABB faces the burden of prioritizing national security issues against the needs of the scientific community when formulating strategies or recommendations to accomplish the operational oversight of federally

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<sup>419</sup> Resnik. 2010. “*Can Scientists Regulate the Publication of Dual Use Research?*”, 3.; See also <http://osp.od.nih.gov/office-biotechnology-activities/biomedical-technology-assessment/hgt/rac>

<sup>420</sup> Resnik. 2010. “*Can Scientists Regulate the Publication of Dual Use Research?*”, 3.

<sup>421</sup> In May 2014, Dr. Francis S. Collins, NIH Director, issued a public statement in response to the National Academies of Sciences Institute of Medicine (IOM) report that concludes gene therapy research is no longer considered novel, and recommends special protocol oversight review by the RAC is redundant and no longer needed since institutional review boards, Institutional Biosafety Committee, various institutional ethics boards, and the U.S. Food and Drug Administration review that type of research. Dr. Collins agreed to the IOM recommendation, but indicated the NIH Director/RAC will retain the flexibility to choose protocols for public review that raise societal or ethical concerns. For the public statement by the NIH Director, see [http://www.nih.gov/about/director/05222014\\_statement\\_iom\\_rac.htm](http://www.nih.gov/about/director/05222014_statement_iom_rac.htm); For the IOM report, see <http://iom.nationalacademies.org/Reports/2013/Oversight-and-Review-of-Clinical-Gene-Transfer-Protocols.aspx>

<sup>422</sup> For more information about the additional functions, services, and activities offered by the NSABB, see <http://osp.od.nih.gov/office-biotechnology-activities/biosecurity/nsabb>

funded or managed dual-use research in the microbiological and biomedical sciences.

Although the NSABB affords expertise towards the development of national policies for the oversight of dual-use research of concern, no legal authorization is afforded to deny or block approval of scientific experiments.

### **3.8.1 Relevance of National Science Advisory Board for Biosecurity (NSABB)**

Again, applying the DSR-IS framework to analyze is not practical due to the limited data available and the recently established USG DURC policies that will promote future studies. While analysis of DURO and the challenges of DURC were not afforded in this dissertation, the role of the NSABB cannot be overlooked. The lessons, experience, and gradual role taken by the United States to lead DURO originated from older approaches addressing recombinant DNA research concerns raised during the Asilomar Conference in 1975.<sup>423</sup> The reputable Fink Report echoed the concepts from Asilomar Conference, and argued the need to monitor the potential misuse of biotechnology.<sup>424</sup> The Fink Report not only conceptualized the advisory body that evolved into the National Science Advisory Board for Biosecurity (NSABB), but also proposed uniting DURO into the existing system of review by Institutional Biosafety

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<sup>423</sup> Smith III and Kamradt-Scott, 2014, *Antipodal biosecurity? Oversight of dual use research in the United States*, 1.

<sup>424</sup> Harris, 2007. "Dual Use Biotechnology Research: The Case for Protective Oversight.", 116-119.

Committees and the National Institutes of Health (NIH) Recombinant DNA Advisory Committee (RAC).<sup>425</sup>

The United States assembled the NSABB in 2003 to provide leadership regarding the biosecurity oversight of dual-use research, and was chartered in March 2004 *inter alia* to provide outreach, development of a non-binding system of institutional review, and guidelines to identify DURC.<sup>426</sup> However, the role of NSABB served strictly an advisory body on biosecurity issues to the USG with no legal power over scientists intending to publish their work without remorse.<sup>427</sup> While recent USG DURC policies were afforded in 2012 and 2014, these limitations imposed on the NSABB remain intact.

### **3.8.2 NIH Guidelines Research Experiment Entity Instances**

The *NIH Guidelines* prescribes the laboratory and research practices for experiments involving recombinant and nucleic acid molecules, synthetic nucleic acid molecules, or human gene transfer. Figure 3-44 captures the Nucleic Acid Molecule Experiment entity instance, and the three subtypes: 1) Recombinant Nucleic Acid, 2) Synthetic Nucleic Acid, and 3) Human Gene Transfer Experiment. The *NIH Guidelines* defines recombinant nucleic acids as molecules that are constructed by joining nucleic

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<sup>425</sup> Harris, 2007. "Dual Use Biotechnology Research: The Case for Protective Oversight.", 116-119.; Smith III and Kamradt-Scott, 2014, *Antipodal biosecurity? Oversight of dual use research in the United States*, 1.

<sup>426</sup> National Science Advisory Board for Biosecurity. *Proposed Framework for the Oversight of Dual Use Life Sciences Research: Strategies for Minimizing the Potential Misuse of Research Information* (2007).; U.S. Congressional Research Service. *Oversight of Dual-Use Biological Research: The National Science Advisory Board for Biosecurity* (RL33342; Apr. 27, 2007), by Dana A. Shea.; Aken. 2006. *When risk outweighs benefit*, S12.; Koblentz, 2010. *Biosecurity Reconsidered: Calibrating Biological Threats and Responses*, 106.

<sup>427</sup> Aken. 2006. *When risk outweighs benefit*, S12-S13.; Resnik. 2010. "Can Scientists Regulate the Publication of Dual Use Research?", 2.

acid molecules and can replicate in a living cell, or molecules that result from the construction of recombinant nucleic acid molecules.<sup>428</sup> Synthetic nucleic acids are molecules that are either chemically or artificially synthesized, or molecules resulting from the replication of synthetic nucleic molecules.<sup>429</sup> Synthetic nucleic acids also include chemically or artificially modified nucleic acid molecules that can base pair with naturally occurring nucleic acid molecules.<sup>430</sup> Human gene transfer experiments involve the intentional transfer into human subjects of either recombinant or synthetic nucleic acid molecules, or DNA or RNA derived from either recombinant or synthetic nucleic acid molecules.<sup>431</sup> Synthetic nucleic acid molecules or DNA or RNA derived from synthetic nucleic acid molecules used in human gene transfer experiments may satisfy any of the following conditions, which are 1) contains more than 100 nucleotides, 2) possesses biological properties allowing integration into the genome, 3) could potentially replicate in a cell, or 4) could be translated or transcribed.<sup>432</sup>

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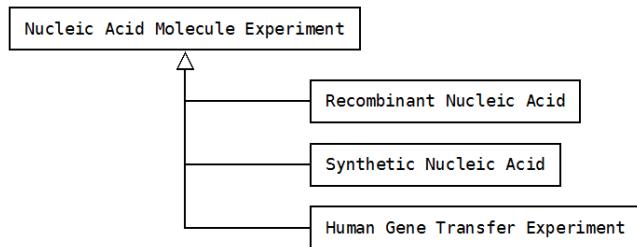
<sup>428</sup> NIH Guidelines, 10.

<sup>429</sup> Ibid.

<sup>430</sup> Ibid.

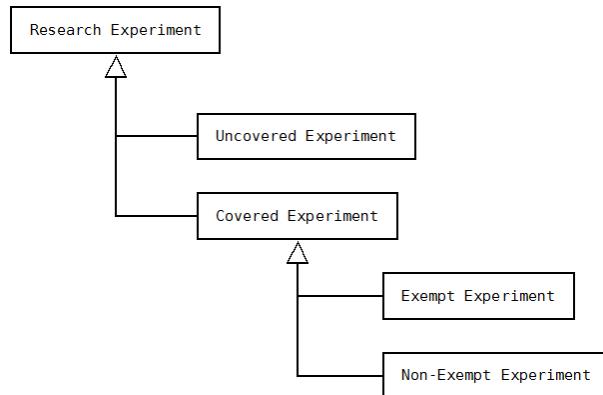
<sup>431</sup> Ibid., 17.

<sup>432</sup> Ibid.



**Figure 3-44 Nucleic Acid Molecule Experiment and Subtypes**

The *NIH Guidelines* applies to certain types of research experiments, which are categorized into specific classes of experiments. Generally, research experiments are either “covered” and applicable to *NIH Guidelines* or not applicable at all.<sup>433</sup> The former, represented as the Covered Experiment entity instance in Figure 3-45 may further be categorized as either a Non Exempt-Experiment or Exempt Experiment subtype.



**Figure 3-45 Research Experiments Covered by NIH Guidelines**

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<sup>433</sup> Ibid., 15.

The *NIH Guidelines* specifies classes of notification and approval schemes for recombinant and synthetic nucleic acid molecule (rDNA) and human gene transfer research experiments. The notification and approval schemes are itemized in Table 3-9.

**Table 3-9 Notification and Approval Schemes of Research Experiments**

<b>NIH Guidelines - Classes of Notification Schemes for Research Experiments</b>
<ul style="list-style-type: none"><li>• <b>Class I</b> - Experiments that require Institutional Biosafety Committee (IBC) approval, RAC review completion, and approval from NIH Director before initiation</li><li>• <b>Class II</b> - Experiments that require approvals from NIH-OBA and IBC approval before initiation</li><li>• <b>Class III</b> - Experiments that require approvals from IBC and Institutional Review Board (IRB) and RAC review completion before research participant enrollment</li><li>• <b>Class IV</b> - Experiments that require approval from IBC approval before initiation</li><li>• <b>Class V</b> - Experiments that require IBC notification simultaneous with initiation</li><li>• <b>Class VI</b> - Experiments that are exempt from the <i>NIH Guidelines</i></li></ul>

The DSR-IS artifact shown in Figure 3-46 reflects the composition of a Covered Experiment, which captures the characteristics of Exempt Experiment and Non-Exempt Experiment subtypes. Planned changes to containment levels deviating from those specified in the *NIH Guidelines* may not be initiated without formal approval of NIH-OBA. The Non-Exempt Experiment subtype of Covered Experiment for rDNA research emphasizes notifications and approvals from the individual research institution and NIH, requires IBC registration with NIH, and is represented by Class I-V Experiments. All entity subtypes of Non-Exempt Experiment require IBC review as defined by the *NIH Guidelines*. However, the participation and required approvals from certain entities under NIH depend on the notification schemes for each class of experiment.

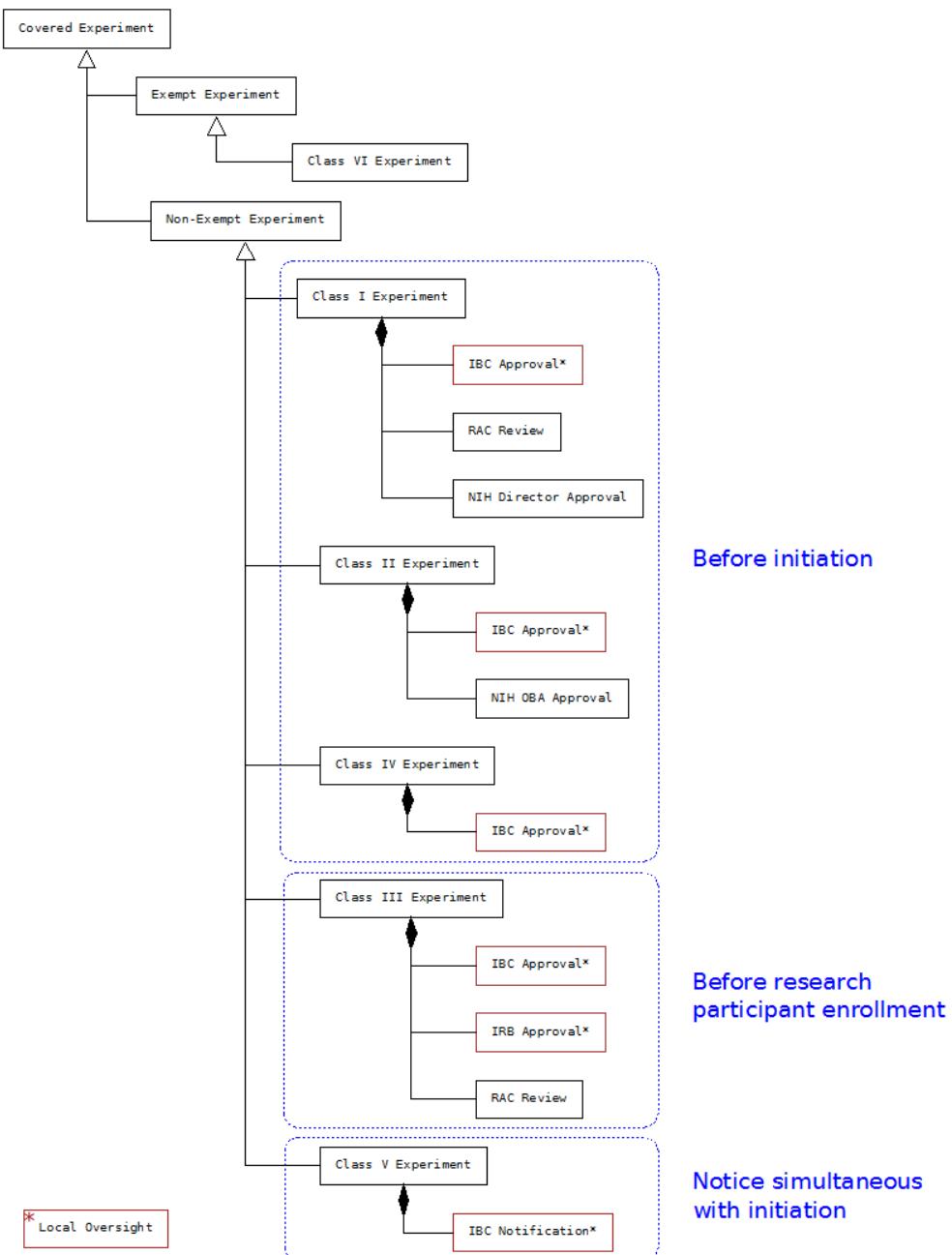


Figure 3-46 NIH Guidelines Classes of Covered Experiments with rDNA

The *NIH Guidelines* acknowledges exempt experiments, which is represented by the Class VI Experiment entity subtype. Institutions hosting exempt experiments that employ recombinant or synthetic nucleic acid molecules are not required to have an NIH-registered IBC, but remain subjected to biosafety standards specific to life science research, such as the *BMBL*.<sup>434</sup> The conditions explaining what makes a research experiment “exempt” is tied to the recombinant or synthetic nucleic acid molecules also being “exempt”. The *NIH Guidelines* itemizes the Class VI Experiment entity subtype into eight categories where the combinations of recombinant and/or synthetic nucleic acid molecules are exempt.<sup>435</sup> The categories of Class VI Experiment entity subtype, and their descriptions are captured in Table 3-10.

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<sup>434</sup> Ibid., 23-24.

<sup>435</sup> Ibid.

**Table 3-10 NIH Guidelines - Categories of Exempt Experiments**

<b>NIH Guidelines - Category Types of Class VI Exempt Experiments</b>
• <b>Exempt Category I</b> - Experiments where synthetic nucleic acids (1) can neither replicate nor generate nucleic acids that would replicate in any living cell, and (2) are not designed to integrate into DNA, (3) cannot produce a toxin that is lethal for vertebrates at an LD50 of less than 100 nanograms per kilogram body weight, and (4) does not involve the deliberately transfer of recombinant or synthetic nucleic acid molecules, or DNA or RNA derived from recombinant or synthetic nucleic acid molecules into one or more human research participants.
• <b>Exempt Category II</b> - Experiments where recombinant or synthetic nucleic acids are not in organisms, cells, or viruses and have not been modified or manipulated to make them capable of penetrating cellular membranes.
• <b>Exempt Category III</b> - Experiments where recombinant or synthetic nucleic acids consist only of the exact recombinant or synthetic nucleic acid sequence from a single source that exists mutually in nature.
• <b>Exempt Category IV</b> - Experiments where recombinant or synthetic nucleic acids consist entirely of nucleic acids from a prokaryotic host, including its original plasmids or viruses when propagated only in that host, a closely related strain of the same species or when transferred to another host by proven physiological processes.
• <b>Exempt Category V</b> - Experiments where recombinant or synthetic nucleic acids consist entirely of nucleic acids from a eukaryotic host including its chloroplasts, mitochondria, or plasmids (but excluding viruses) when propagated only in that host or a closely related strain of the same species.
• <b>Exempt Category VI</b> - where recombinant or synthetic nucleic acids consist completely of DNA segments from different species that exchange DNA by known physiological processes, though one or more of the segments may be a synthetic equivalent.
• <b>Exempt Category VII</b> - where genomic DNA molecules have acquired a transposable element that does not contain any recombinant and/or synthetic DNA.
• <b>Exempt Category VIII</b> - where recombinant or synthetic nucleic acids do not pose a significant risk to health or the environment as determined by the NIH Director after consulting the RAC.

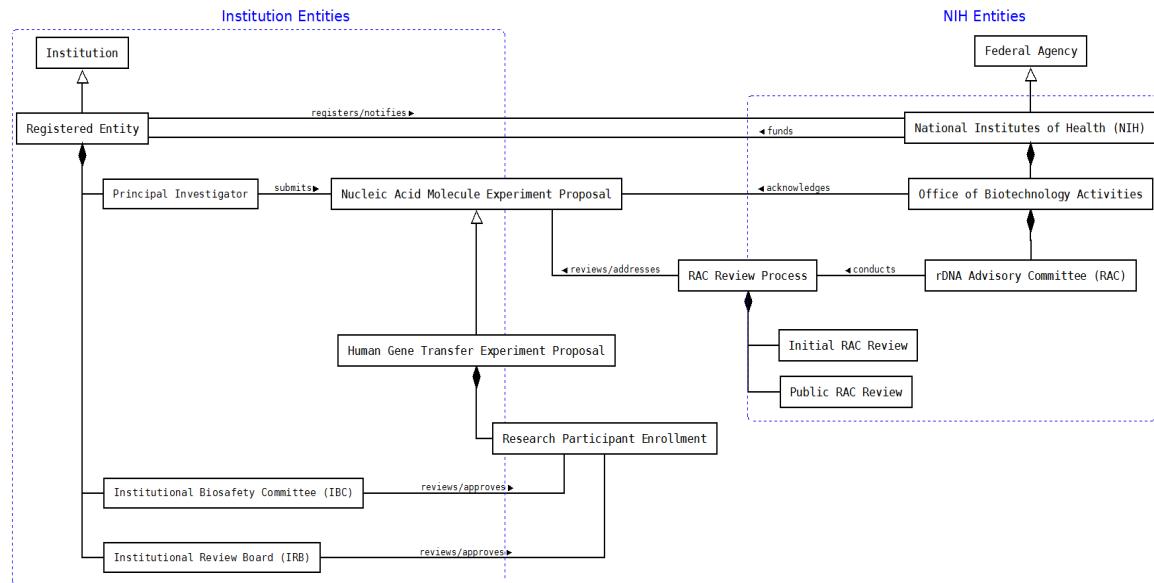
### **3.8.3 Interrelationships with Non-Exempt Experiment Proposal Submission**

The submission of non-exempt experiment proposals from an Institution to the NIH forms the dynamic interrelationships among entities within the former, and from the former to the NIH. The DSR-IS artifact in Figure 3-47 infers Nucleic Acid Molecule Experiment Proposal and Human Gene Transfer Experiment Proposal are subtypes of a Non-Exempt Experiment Proposal (not shown). The Initial and Public RAC Review of all Non-Exempt Experiment proposals involving nucleic acid molecules and/or human gene transfer research are high-visibility services of the RAC, and NIH Office of

Biotechnology Activities. The main Institution Entities involved are the Principal Investigator (PI), the Institution Biosafety Committee (IBC), and Institution Review Board (IRB) where the PI creates a protocol package for internal review and approval by the IBC and IRB. A protocol is akin to an application package submitted by the principal investigator(s) on behalf of the research institution. The protocol is a collection of signed approval letters from the Institutional Review Board and Institutional Biosafety Committee members, signed regulatory authorization forms, scientific and non-scientific abstracts, and relevant documentation directly associated with a research experiment proposal.<sup>436</sup> Other artifacts include curriculum vitae of the principal investigators, and completion of a questionnaire prescribed by the *NIH Guidelines*. Upon received IBC and IRB approval, the PI submits the Non-Exempt Experiment Proposal (not shown) represented by Nucleic Acid Molecule Experiment Proposal for RAC Review and approval (if applicable).

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<sup>436</sup> Ibid., 101.



**Figure 3-47 Institution, NIH Entities, and RAC Review Process**

All Non-Exempt Experiment Proposal subtypes, such as the Nucleic Acid Molecule Experiment Proposal and Human Gene Transfer Experiment Proposal, are subjected to the Initial RAC Review under the RAC Review Process. The RAC determines which submitted non-exempt experiment research proposals warrant Public RAC Review, which is organized as an open forum that discusses the science, safety, and ethics of rDNA research associated with the submitted proposals.<sup>437</sup> The Public RAC Review analyzes clinical gene transfer protocols and safety information, analyzes whether or not ethical and social issues raised are resolved, and serves as a forum to discuss observations and general findings important to rDNA or gene therapy research.

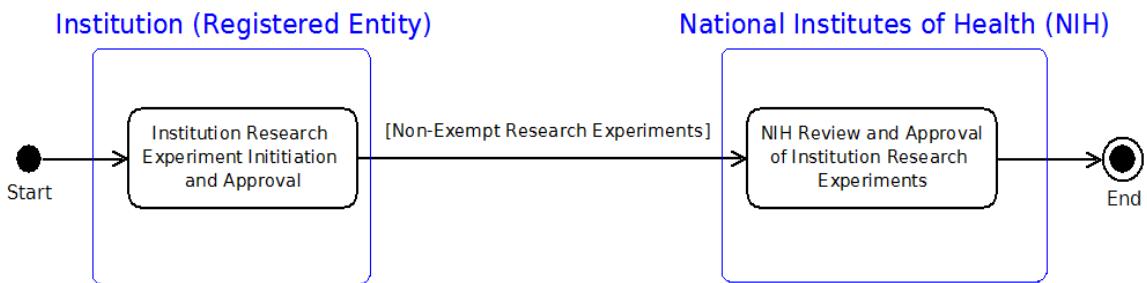
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<sup>437</sup> The NIH-RAC provides an online web application, the Genetic Modification Clinical Research Information System (GeMCRIS) that affords information about human gene transfer trials registered with the National Institutes of Health. For information about GeMCRIS, see [http://www.gemcris.od.nih.gov/Contents/GC\\_HOME.asp](http://www.gemcris.od.nih.gov/Contents/GC_HOME.asp)

However, the Public RAC Review is neither considered an official approval process nor a decision making forum for proposed research experiments discussed, but rather part of the RAC Review Process entity. It is the “completion” of any of the RAC Review Process combinations, which is Initial RAC Review or Initial and Public RAC Review that signals whether or not a submitted rDNA or gene therapy research proposal is permitted.

### **3.8.4 Non-Exempt Experiment Proposal Submission and RAC Review Process**

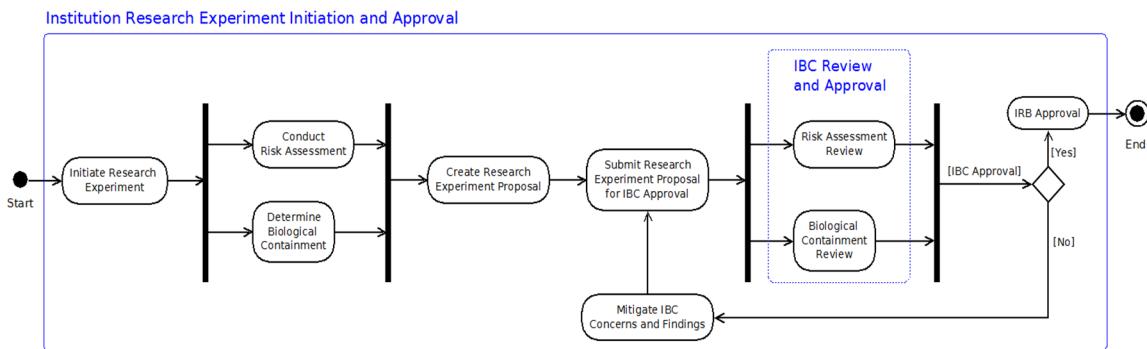
The DSR-IS artifact in Figure 3-48 is an abstraction of Figure 3-47 examine the granular interrelationships within the Institution and within NIH where the former is submitting a Non-Exempt Experiment Proposal. The following two DSR-IS artifacts represented by Figure 3-49 to Figure 3-50 illustrates the internal activities of an Institution in the former and the NIH in the latter. Thus, the interpretation of the end-to-end activities starts with the internal activities leading to research experiment proposal within the Institution (Figure 3-49) to the receipt, RAC review, and acknowledgement of research experiments by the NIH (Figure 3-50).



**Figure 3-48 Institution Submission of Non-Exempt Research Experiments to NIH**

The UML activity diagram in Figure 3-49 starts once a research experiment is initiated. The principal investigator (PI – not shown) considers the research experiment proposed, conducts reiterative risk assessments, determines the appropriate biological containment, and assembles a formal research experiment proposal. The formal research experiment proposal, also referenced as the research experiment protocol, is eventually submitted to the IBC for review and approval. The *NIH Guidelines* consider the IBC as the main institution entity responsible for biosafety issues associated with rDNA research. The IBC reviews the research experiment protocol is examined by its committee members, including the risk assessment grades and biological containment requirements and conditions prescribed by the PI. Once an IBC approval is granted, the PI and IBC escalates the IBC-approved research experiment protocol for IRB review and approval. If the IRB determines an additional risk assessment and/or biological containment analysis is necessary, the PI is required to address IRB concerns and resubmit an updated research experiment protocol for IBC and IRB reviews and approvals. Eventually, the IRB will approve the research experiment protocol where the PI prepares formal submission to the NIH Office of Biotechnology Activities to request a

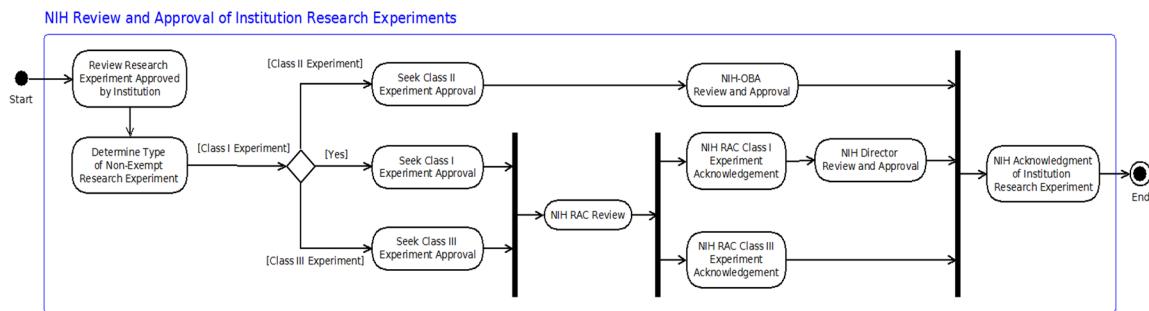
RAC Review. The *NIH Guidelines* allow Class IV and Class V Experiment entity instances to forego NIH notification even though they are not considered subtypes of Exempt Experiment.



**Figure 3-49 Institution Research Experiment Initiation and Approval Process**

Figure 3-50 resumes submissions of IRB-approved research experiment protocols submitted by the PI of an individual research institution. All research experiment protocols involving rDNA materials are submitted to NIH, which are routed to the Office of Biotechnology Activities (NIH-OBA, not shown) to be scheduled for RAC review. The NIH-OBA confirms IBC and IRB approvals of submitted research experiment protocols, and determines whether or not the protocol is a Class I, Class II, or Class III Experiment. Class II Experiment entity instances require only NIH-OBA review, do not require NIH RAC Review. Class I and Class III Experiment entity instances are subjected to the NIH RAC Review where the latter accomplishes RAC Review completion without further requirements. Class I Experiment requires NIH-RAC

acknowledgement, NIH Director Review and Approval to accomplish RAC Review completion. The NIH Acknowledgement of Institution Research Experiment process terminates, and triggers notification to the PI submitting research experiment protocols on behalf of an Institution.



**Figure 3-50 NIH RAC Review– NIH Approval of Institution Research Experiments**

The NIH RAC Review may impose an Initial RAC Review and a Public RAC Review. The former affords a preliminary determination on whether there are properties of the proposed human gene transfer that warrant escalation to the Public RAC Review. As part of the Initial RAC Review process, committee members may direct NIH-OBA to have the principal investigators provide additional information of the protocol on behalf of their research institution before deciding to complete the Initial RAC Review or escalating to the Public RAC Review.<sup>438</sup> The RAC members collectively analyze the scientific rationale and technical details of the proposed experiment, and determine if relevant social and ethical concerns are addressed to determine whether a Public RAC

<sup>438</sup> NIH Guidelines, 102.

Review is warranted.<sup>439</sup> Although the NIH-RAC may escalate an initial review at their discretion, proposed human gene transfer experiments are strongly considered for Public RAC Review if any of the following characteristics are evident: 1) a new vector/new gene delivery system, 2) new clinical applications, or 3) novel application of gene transfer.<sup>440</sup> According to *NIH Guidelines*, completion of the Initial RAC Review is within 15 business days once a complete submission is acknowledged, and is followed by NIH OBA written notification to the principal investigator(s) on whether the proposed experiment is exempt or requires Public RAC Review.<sup>441</sup> For a Human Gene Transfer Experiment Proposal, Research Participant Enrollment is not permitted until four conditions are satisfied. Research Participant Enrollment (human) requires 1) completion of the RAC Review Process, 2) official approval from the IBC, 3) official approval from the IRB, and 4) all relevant regulatory authorization(s) are obtained.<sup>442</sup>

The Public RAC Review discusses human gene transfer experiments initiated by either the NIH Director or the NIH-OBA Director on behalf of NIH-OBA.<sup>443</sup> The latter will initiate the Public RAC Review if three or more NIH-RAC members request public review or on behalf of a federal agency other than NIH.<sup>444</sup> Unless trade secrets or confidential commercial information are indicated by the submitting principal investigators, Public RAC Review meetings are open to the public. Once a proposed human gene transfer experiment has been formally addressed from the Public RAC

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<sup>439</sup> Ibid.

<sup>440</sup> Ibid.

<sup>441</sup> Ibid.

<sup>442</sup> Ibid.

<sup>443</sup> Ibid.,103.

<sup>444</sup> Ibid.

Review process, major comments and recommendations regarding the protocol from the NIH-RAC are summarized in an official letter that is sent by NIH-OBA to the NIH Director, the principal investigator(s), the sponsoring research institution, and other HHS components (if appropriate). Unless there are extraordinary conditions, the NIH-OBA sends the official NIH-RAC summary letter to the submitting principal investigator(s) within 10 business days after the Public RAC Review date that formally addressed the rDNA experiment. The RAC Review is considered complete when the principal investigator(s) confirms receipt of the official letter from NIH-OBA stating either the submission does not warrant public RAC review or the summarized findings and possible recommendations following a Public RAC Review entity.<sup>445</sup>

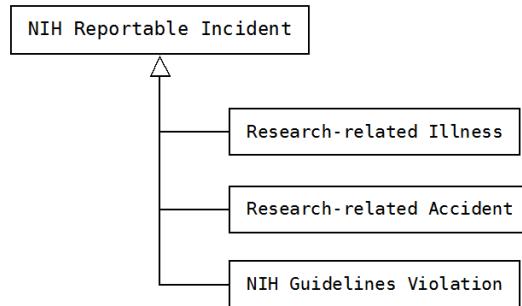
### **3.8.5 NIH Biosafety Incident Reporting Activity Artifacts**

According to the Trans-Federal Report on Biosafety, an incident is a laboratory event involving exposure of infectious, potentially infectious, or zoonotic agents to research institution staff or the general public from various scenarios. The scenarios include an environmental release of a biological hazard, escape of infected animals or vectors, accidental spills of a biohazard outside its primary containment, the theft, loss or release of biohazardous agents and other loss of containment, biohazards caused by equipment failure leading to the release of a hazardous agent within and outside the laboratory research workspaces, or compromised personal protection equipment (PPE) and/or not following prescribed biosafety-specific practices leading to laboratory

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<sup>445</sup> Ibid.,102-103.

acquired infections (LAI). The scenarios could generally be categorized as one of the entity subtypes under NIH Reportable Incident in Figure 3-51, which are Research-related Illness, Research-related Accident, and *NIH Guidelines* Violation.<sup>446</sup>



**Figure 3-51 NIH Reportable Incident Entity Instance**

Any of the three entity subtypes of NIH Reportable Incident may trigger the institution to follow the general biorisk incident reporting processes to the NIH Office of Biotechnology Activities. Not shown in Figure 3-51 are the potential interrelationships between NIH Guideline Violation and either Research-related Illness or Research-related Accident. An example of the Research-related Illness subtype is the LAI, which may result if biosafety practices under the *NIH Guidelines* for rDNA research are not followed. Compliance with the *NIH Guidelines* applies to all NIH-funded projects involving rDNA research and all non-NIH funded projects involving rDNA research

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<sup>446</sup> The entity instance was initially categorized as biorisk, but has been changed to “NIH Reportable Incident” after careful re-analysis of the *NIH Guidelines*. Special thanks to Dr. Koblentz for discerning the reporting requirements of an institution under the *NIH Guidelines* are not specific to biorisk, but rather reportable incidents tied to biosafety or violations of the *NIH Guidelines*.

sponsored by an institution receiving NIH funds for projects involving nucleic acid molecules. When the *NIH Guidelines* Violation is evident from non-compliance, NIH may suspend, restrict, or terminate funding for non-compliant NIH-funded research projects and for other recombinant or synthetic nucleic acid molecule research at the institution. If the NIH suspends, restricts, or cuts off funding due to non-compliance of the *NIH Guidelines*, applicable procedures to notify the Department of Health and Human Services and public health service entities are considered. The NIH may also impose prior approval requirements of any or all recombinant or synthetic nucleic acid molecule projects at the non-compliant institution. The reporting of *NIH Guidelines* Violation or non-compliance may come from any individual, and should notify the NIH Office of Biotechnology Activities and the institution in question.

The biorisk incident reporting interrelationships in Figure 3-52 is relevant when any of the NIH Reportable Incident subtypes are reported to the Institution entity instance and NIH-OBA entity. Within the Institution instance, the Principal Investigator or IBC may spearhead the investigation, review the NIH Reportable Incident entity instance, and document findings subjected to IBC review. The Principal Investigator and the IBC are accountable for reporting any risk assessment or containment concerns, violations or non-compliance of *NIH Guidelines*, and all significant research-related accidents and illnesses to the appropriate institutional authority and NIH-OBA within 30 days, but the former may also notify the Biological Safety Officer (not shown in Figure 3-52) and the

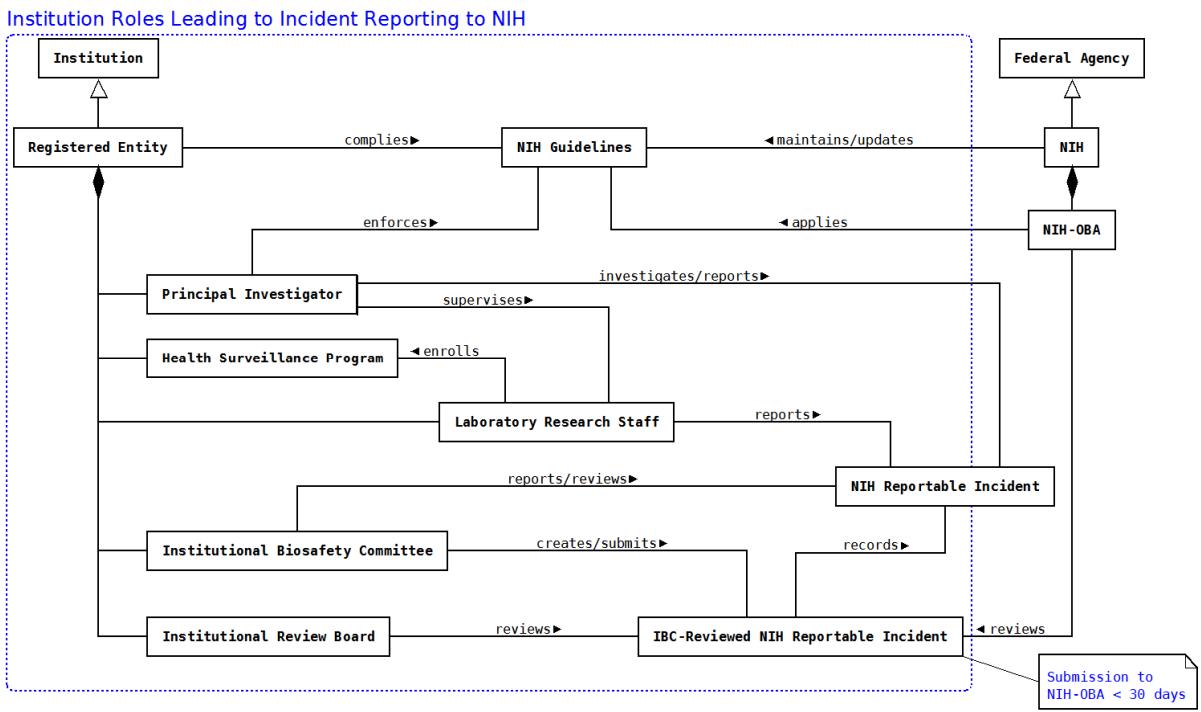
Greenhouse/Animal Facility Director (not shown in Figure 3-52) if applicable.<sup>447</sup> The IBC will not notify the NIH-OBA if the Principal Investigator has filed an incident report accordingly. The incident findings are represented by the IBC-Reviewed NIH Reportable Incident report that records incident details and recommended appropriate actions of the Institution, which are forwarded to NIH-OBA.

As an internal member of the IBC, the Biological Safety Officer assists with the institution in establishing and maintaining a Health Surveillance Program for Laboratory Research Staff conducting large-scale research activities involving microorganisms containing recombinant or synthetic nucleic acid molecules that require BSL-3 containment. The services of the Health Surveillance Program specific to NIH Reportable Incident reporting are its provisions affording the investigation of any serious, unusual, or extended illnesses of research and non-research staff to determine possible root cause and incident origin.<sup>448</sup> Not shown in Figure 3-52 is the submission of the complete IBC-Reviewed NIH Reportable Incident report to the NIH-OBA entity, which may recommend further actions if needed. For example, response actions to biorisk incidents resulting from compromised biological containment, spills, accidents, or potential exposures to infectious disease may require immediate notification to institutional authorities and public health authorities, such as the Department of Health and Human Services, USDA, and local and state health authorities.

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<sup>447</sup> NIH Guidelines, 28-29.; An institution may have multiple biosafety officers on staff, but the Biosafety Officer serving on the IBC is the implied notification point of contact to the Principal Investigator reporting a biorisk incident.

<sup>448</sup> NIH Guidelines, 91.



**Figure 3-52 Institution Roles Addressing NIH Reportable Incident Entity Instances**

### 3.8.6 Institutional Biosafety Committee Entity Instance

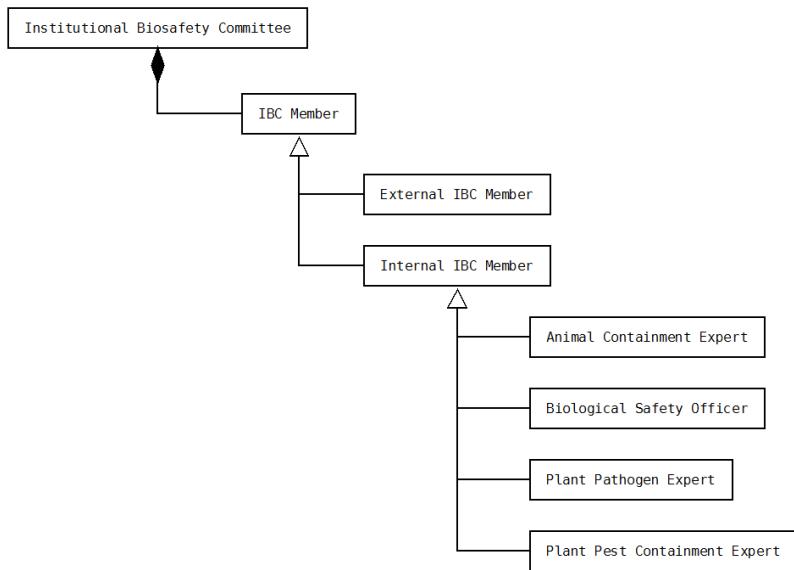
The Institutional Biosafety Committee (IBC) of a research institution assists with rDNA research oversight, but neither focuses on dual-use research oversight nor address the dual-use dilemma. The composition of the Institutional Biosafety Committee entity instance in Figure 3-53 reflects the requirements of the *NIH Guidelines* where there are at least five members assembled with collective experience to not only understand recombinant or synthetic nucleic acid molecule technologies, but also the expertise to assess the biosafety practices and identify any potential risk to public health or the

environment involving rDNA research.<sup>449</sup> Apart from IBC membership, the *NIH Guidelines* specify at least external two members not be affiliated with the institution, but who represent the interest of public health and protection of the surrounding community. The External IBC Member composition entry under the Institutional Biosafety Committee entity instance may represent state or local public health officials, representatives from state or local environmental protection agencies, or active individuals addressing medical, occupational health, or environmental concerns of the local community.<sup>450</sup> The Internal IBC Member composition entry captures the relevant subtypes defined by the *NIH Guidelines*, which requires at least one member and appropriate expertise serving the role of Biosafety Officer, Plant Pathogen Expert, Plant Pest Containment Expert, and Animal Containment Expert.

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<sup>449</sup> Ibid., 26.

<sup>450</sup> Ibid.



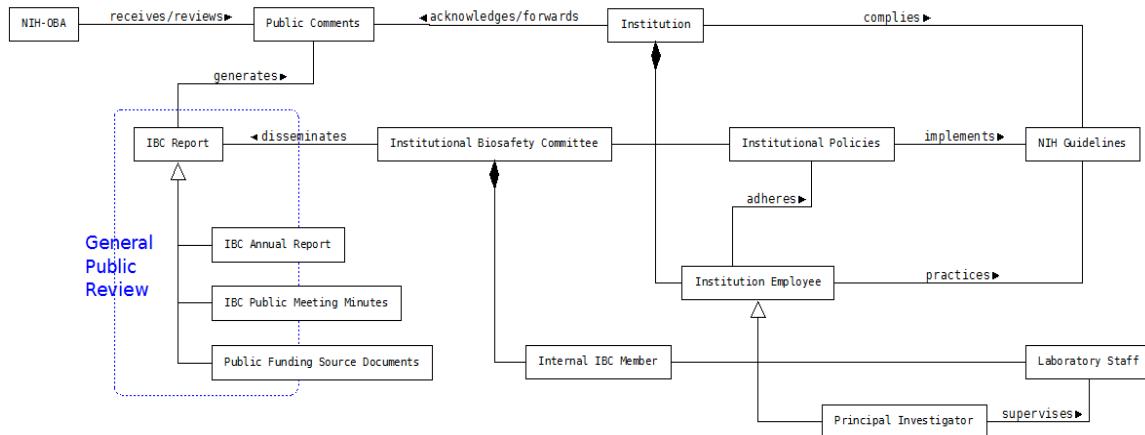
**Figure 3-53 Institutional Biosafety Committee Entity Instance Composition**

The IBC carries out administrative functions by disseminating several types of reports or documents, such as the IBC Annual Report, IBC Public Meeting Minutes, and Public Funding Source Documents depicted by the DSR-IS artifact in Figure 3-54. The IBC Annual Report affords a roster of all IBC members, including the roles and biographical sketches of internal and external members.<sup>451</sup> The institution may also provide IBC Public Meeting Minutes upon request for open review of discussion points and IBC actions related to rDNA research and non-rDNA research activities specific to the individual research institution. The Public Funding Source Documents managed by the IBC includes any reports or documents submitted to or received from funding agencies, and must also be available to the public. All IBC Report subtypes must be furnished for public review if requested, and any public comments generated about IBC

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<sup>451</sup> Ibid., 27.

actions and the corresponding IBC responses shall be forwarded to NIH-OBA for review and guidance by the associated institution.<sup>452</sup>



**Figure 3-54 IBC Report Dissemination and Interrelationships**

The Institution Employee entity in Figure 3-54 and Figure 3-55 instance depicts three subtypes, which are Internal IBC Member, Principal Investigator, and Laboratory Staff. These interrelationships are important to note since it clearly shows the Principal Investigator as a subtype of Institution Employee serving in a supervisory role.

The IBC carries out various functions on behalf of the Institution, but is primarily responsible for selectively approving proposed research projects that demonstrate *NIH Guidelines* compliance, and then periodically reviewing recombinant or synthetic nucleic acid molecule research conducted at or sponsored by the Institution to ensure continued compliance. The IBC review includes unbiased evaluation of the required containment

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<sup>452</sup> Ibid.

levels set by the *NIH Guidelines* for all proposed research, including assessment of the facilities, procedures, practices, and training and expertise of personnel involved in rDNA research. Evaluations by the IBC are also applicable in grading assessments made by the Principal Investigator involving human gene therapy research. For example, the IBC may subsequently review how the Principal Investigator addressed all aspects in the design and submission of protocols for the transfer of recombinant or synthetic nucleic molecules into one or more human research participants prior to NIH-OBA review.

The IBC affords local oversight on behalf of the Institution and NIH-OBA by confirming research participants are not enrolled in a human gene transfer experiment until completion of the RAC Review Process, confirming approval from the clinical trial site and Institutional Review Board, and ensuring all required regulatory authorizations were obtained.<sup>453</sup> If there are human gene transfer protocols selected for public RAC review, the IBC will identify additional issues raised and formulate further suggestions based on the responses from the Principal Investigator to NIH-RAC recommendations. Once the RAC Review Process is completed for a proposed rDNA experiment, the final IBC approval is granted with notification to the Principal Investigator of its review and approval of research proposals.<sup>454</sup> Approved rDNA research experiments conducted at the institution are periodically reviewed by the IBC to ensure ongoing compliance with the *NIH Guidelines*, which includes all surveillance, data reporting, and adverse event

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<sup>453</sup> The *NIH Guidelines* defines enrollment as the “process of obtaining informed consent from a potential research participant, or a designated legal guardian of the participant, to undergo a test or procedure associated with the gene transfer experiment.”

<sup>454</sup> *NIH Guidelines*, 27.

reporting requirements.<sup>455</sup> The restriction is evident where the IBC may not authorize initiation of experiments that are not explicitly covered by the *NIH Guidelines* until containment requirements are established by the RAC.<sup>456</sup>

The Biosafety Officer, the Internal IBC Member subtype, is responsible for developing the Emergency Plan that affords biosafety procedures for accidental spills and personnel contamination resulting from rDNA research.<sup>457</sup> The *Laboratory Safety Monograph* (not shown in Figure 3-55), with the assistance of the NIH and CDC, is another supplemental document providing guidance for developing specific procedures dealing with major spills of potentially hazardous materials in the laboratory, including information and references about decontamination and emergency plans. The *Laboratory Safety Monograph* also prescribes the shipping requirements that the Principal Investigator must comply. The Emergency Plan affords guidance to the Institution with the reporting of research-related illnesses or LAIs considered hazardous to public health and surrounding community, and the notification procedures to local and state public health agencies.<sup>458</sup> The Emergency Plan entity instance afforded by the IBC and Biosafety Officer is applicable to the Principal Investigator and Laboratory Staff when resolving accidental spills and personnel contamination.<sup>459</sup>

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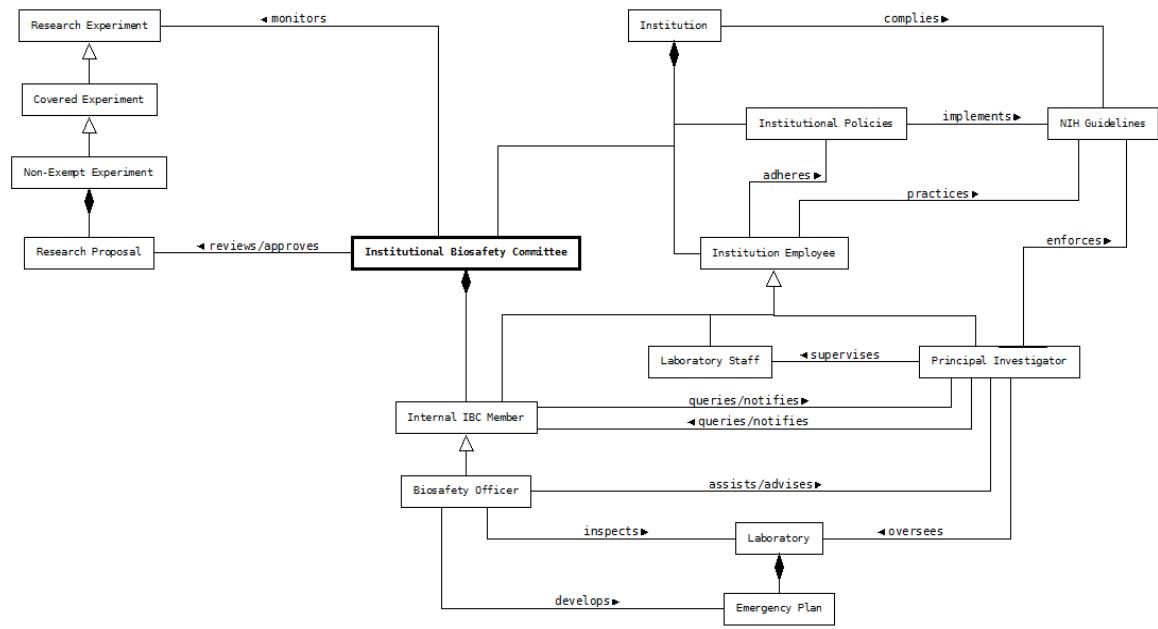
<sup>455</sup> Ibid.

<sup>456</sup> Ibid., 28.

<sup>457</sup> Ibid.

<sup>458</sup> Ibid.

<sup>459</sup> Ibid., 29.



**Figure 3-55 General IBC Oversight Responsibilities and Interrelationships**

### 3.8.7 Principal Investigator Entity Instance

The Principal Investigator (PI) entity instance in Figure 3-56 captures the direct interrelationships with the Laboratory, Laboratory Staff, Biosafety Officer, and *NIH Guidelines* entity instances. The PI ensures full compliance with the *NIH Guidelines* by monitoring the Laboratory and Laboratory Staff conducting recombinant or synthetic nucleic acid molecule research.<sup>460</sup> The PI may delegate his/her reporting responsibilities for human gene transfer research to a third party, such as a sponsoring research entity via

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<sup>460</sup> Ibid.

written notification to the NIH-OBA, but remains accountable for any reporting lapses made by the third party.<sup>461</sup>

The interrelationships between the PI and the IBC require the former to correctly confirm proposed research experiments are applicable to *NIH Guidelines* and apply the notification schemes of research experiments to the latter. For example, after confirming a proposed research experiment is a Covered Experiment entity instance, the PI cannot initiate or propose modifications of rDNA research experiments without obtaining IBC approval prior to initiation until that research or proposed modifications have been approved by the IBC and meets requirements set by the *NIH Guidelines*.<sup>462</sup> After submitting the initial research experiment protocol, the PI may propose new changes, such as modifications to the source of DNA or host-vector system for a Covered Experiment entity instance to obtain IBC approval or disapproval.<sup>463</sup>

Other functions of the PI involving the IBC include the former following the *NIH Guidelines* in setting specific microbiological practices and laboratory techniques for certain research experiments as needed to Laboratory Staff, and submitting initial risk assessment requirements of physical and biological containment for proposed research experiments.<sup>464</sup> The principal investigator has been proposed by the 2014 Institutional Oversight of Dual-Use Research of Concern, along with the establishment of an institutional review entity (IRE). However, the guidelines leave it up to the Institution regarding implementation of the USG DURC 2014 policy.

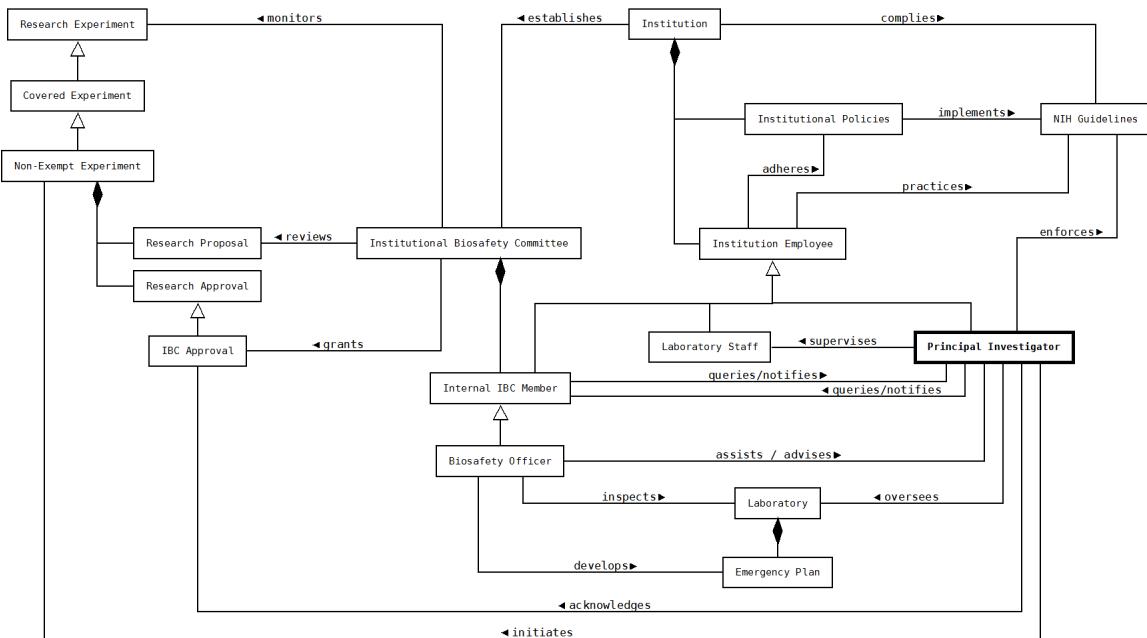
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<sup>461</sup> Ibid.

<sup>462</sup> Ibid.

<sup>463</sup> Ibid., 30.

<sup>464</sup> Ibid.



**Figure 3-56 Principal Investigator Responsibilities and Interrelationships**

The PI is burdened with ensuring compliance of the *NIH Guidelines* on behalf of the Institution, and engages frequently with the NIH-OBA (not shown in Figure 3-56), and may report new information relevant to the *NIH Guidelines* to the IBC and NIH-OBA.<sup>465</sup> The PI frequently interacts with the NIH-OBA on behalf of the Institution. For example, the PI may certify new host-vector systems of the Institution and submit associated certification documents to the NIH-OBA. Functions related to research experiments may involve the PI to submit proposed exemptions of the *NIH Guidelines* to the NIH-OBA after notifying the IBC. Other notifications from the PI to the NIH-OBA includes approval to conduct research experiments covered by *NIH Guidelines*, and

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<sup>465</sup> Ibid., 29.

requests from the NIH-OBA to determine containment for experiments escalated by the PI that are covered and not covered by *NIH Guidelines*.

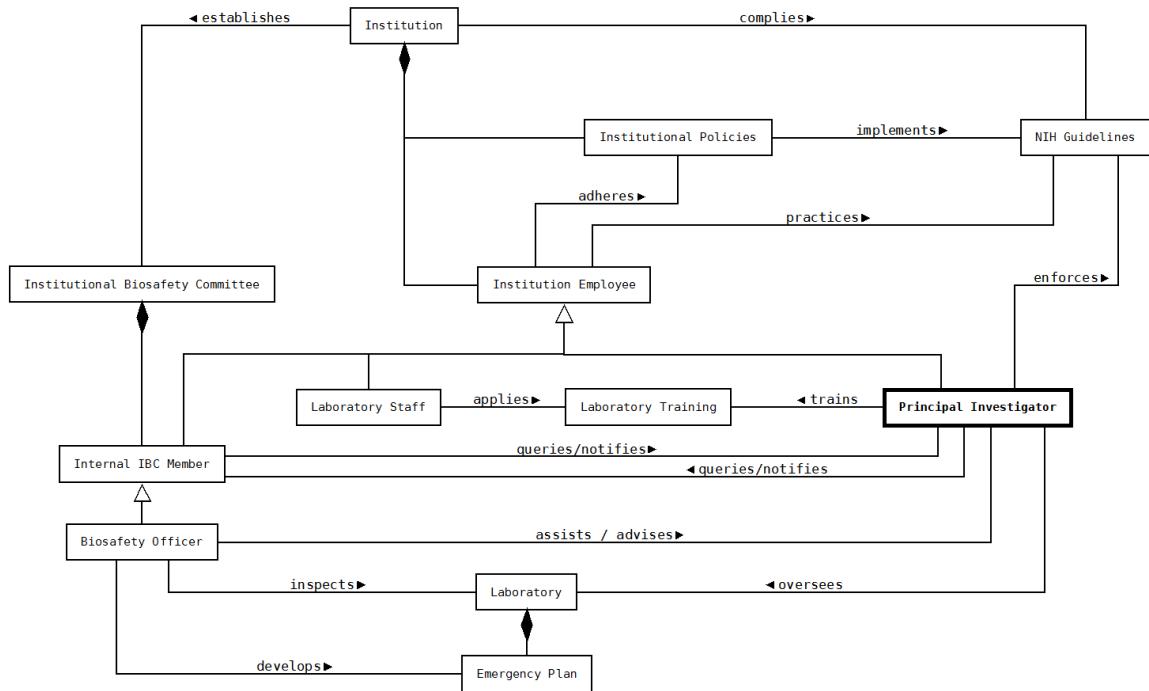
### **3.8.7a PI Responsibilities and Interrelationships – Prior to Initiating Research**

The supervisory role of the PI is demonstrated prior to initiating research and during research. Figure 3-57 represents the DSR-IS artifact depicting the responsibilities of the PI prior to initiating research. In this capacity, the PI applies the knowledge acquired from completing risk assessments and reviewing containment requirements for proposed research experiments. Prior to initiating research, the PI ensures all protocols describing potential biohazards and precautions to acknowledge are made available to all Laboratory Staff.<sup>466</sup> The PI also instructs and trains Laboratory Staff with the required practices and techniques to ensure biosafety, procedures for handling accidents or incidents.<sup>467</sup> The Laboratory Staff entity instance illustrates the proxy relationship between the PI and Laboratory Staff where latter applies the instruction and techniques by the former. Finally, the PI may consult the Biosafety Officer or members of the IBC, and provide additional guidance regarding the provisions of any precautionary medical practices and techniques advised or requested, such as vaccinations or serum collection.

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<sup>466</sup> Ibid., 30-31.

<sup>467</sup> Ibid.

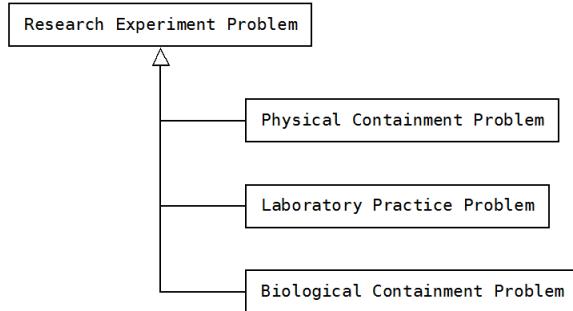


**Figure 3-57 Principal Investigator Responsibilities – Prior to Initiating Research**

### 3.8.7b PI Responsibilities and Interrelationships – During Research

The *NIH Guidelines* indicates there are reporting requirements that must be fulfilled by the PI, which are specific to human gene transfer experiments. The Research Experiment Problem entity instance in Figure 3-58 is investigated by the Principal Investigator where the latter will collaborate with the Institutional Biosafety Committee (IBC) to resolve “work errors and conditions” that compromise physical or biological containment during research. If the PI is unable to resolve any research experiments

problems that may potentially lead to the release of recombinant or synthetic nucleic acid molecule materials, the PI is authorized to suspend the research experiment.<sup>468</sup>



**Figure 3-58 Research Experiment Problem and Subtypes during Research**

The placement of the Research Experiment entity instance, and its interrelationships with the IBC, PI, and Laboratory Staff are illustrated in Figure 3-59. During research experiments, the PI supervises the biosafety performance of the Laboratory Staff, and ensures the required biosafety practices and techniques briefed prior to initiating research are applied.<sup>469</sup> To ensure the integrity of containment barriers during research experiments, the PI inspects physical containment barriers, such as biological safety cabinets, and biological containment barriers, such as purity, genotypic and phenotypic characteristics holding nucleic acid molecules.<sup>470</sup> The PI may also investigate any of the subtypes of Research Experiment Problem (Figure 3-58) during research through discovery or notification from Laboratory Staff. If there is Research

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<sup>468</sup> Ibid., 31.

<sup>469</sup> Ibid.

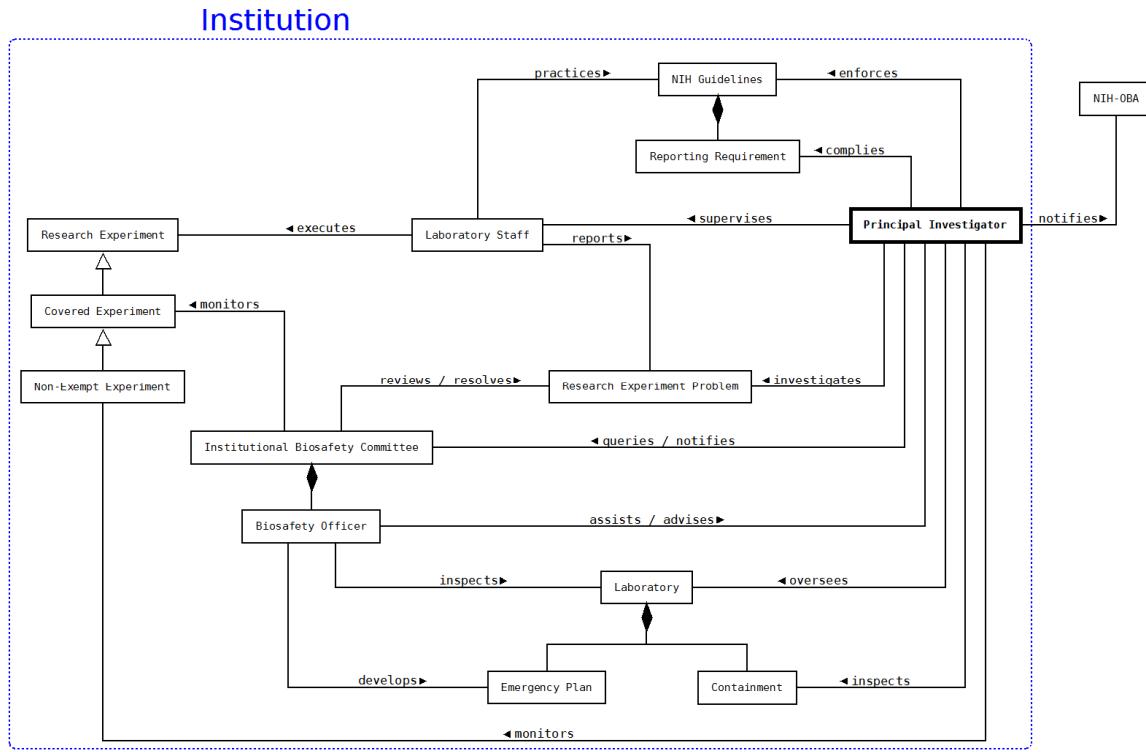
<sup>470</sup> Ibid.

Experiment Problem involving the operation and implementation of containment practices and procedures, the PI is required to notify the Biological Safety Officer (where applicable), IBC and NIH-OBA. If applicable, the PI will notify the Greenhouse/Animal Facility Director and external authorities with guidance from the IBC and/or the NIH-OBA.<sup>471</sup> If there are containment errors or conditions that might trigger the unwanted release of recombinant or synthetic nucleic acid molecules, the PI ensures said errors and conditions are corrected with guidance from the Biosafety Officer and/or IBC.<sup>472</sup>

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<sup>471</sup> Ibid.

<sup>472</sup> Ibid.



**Figure 3-59 Principal Investigator Responsibilities – During Research**

### 3.8.8 NIH Office of Biotechnology Activities and Recombinant Advisory Committee

The previous sections analyzing experiment proposal submission and review processes, biorisk incident reporting, IBC and PI interrelationships focused on the responsibilities of the research institution. Although the NIH Recombinant Advisory Committee (RAC) was introduced in previous sections, its responsibilities within the National Institutes of Health (NIH) will be reviewed. The focus of Chapter 3 will focus on the NIH Office of Biotechnology Activities (NIH-OBA), NIH-RAC and the NIH Director.

The NIH-OBA is the conduit of public information and data management regarding recombinant or synthetic nucleic acid molecule activities, and is an advisory body to NIH staff, research institutions, biosafety officers and principal investigators, federal, state and local agencies.<sup>473</sup> The NIH-OBA also advises private research institutions seeking guidance on rDNA and human gene transfer research. For example, the NIH -OBA may collaborate with principal investigators, IBC members, Institutional Review Boards, and peer HHS child agencies, such as the Food and Drug Administration (FDA) and the Office for Human Research Protections, to ensure registration and reporting compliance of human gene transfer experiments.<sup>474</sup>

The NIH Director determines the tasks and core functions of the NIH-OBA, which are administrative in nature.<sup>475</sup> The general administrative functions of the NIH-OBA includes administering the annual data reporting requirements and follow-up reviews of human gene transfer experiments, and compiling public comments and NIH-RAC recommendations from public NIH-RAC discussions of novel human gene transfer experiments for dissemination to the NIH Director, principal investigators involved, the sponsoring research institution, and all other relevant stakeholders, and the review and approval of IBC membership applications from individual research institutions seeking NIH-registration.<sup>476</sup> The main administrative functions of the NIH-OBA specifically assisting the NIH Director and NIH-RAC includes the planning and announcement of Gene Therapy Policy Conferences with tentative agendas, announcing NIH-RAC

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<sup>473</sup> Ibid., 34-35.

<sup>474</sup> Ibid.

<sup>475</sup> Ibid.

<sup>476</sup> Ibid.

meetings with tentative agendas, submitting proposed Major Action entries to be reviewed at planned NIH-RAC meetings and for public comment solicitation in the Federal Register.<sup>477</sup>

The NIH-RAC is associated with the NIH-OBA, but is responsible for executing the technical provisions defined in the *NIH Guidelines*, and takes its direction from the NIH Director and the Secretary of Health and Human Services.<sup>478</sup> Members of the NIH-RAC are appointed via procedures defined by NIH, and its parent federal agency the Department of Health and Human Services (HHS).<sup>479</sup> The NIH-RAC consists of voting and non-voting members as described by DSR-IS artifact in Figure 3-60 where the majority of voting members represents technical scientific fields, such as molecular genetics, molecular biology and rDNA research, also non-technical scientific disciplines, such as public health, biosafety and laboratory practices, occupational health, human subjects research, environmental protection, ethics, law, and related fields in the social sciences.<sup>480</sup> Non-voting members of the NIH-RAC are typically comprised of external federal agency representatives.<sup>481</sup>

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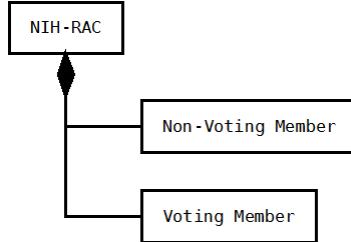
<sup>477</sup> Ibid.

<sup>478</sup> Ibid., 33-34.

<sup>479</sup> Ibid.

<sup>480</sup> Ibid.

<sup>481</sup> Ibid.



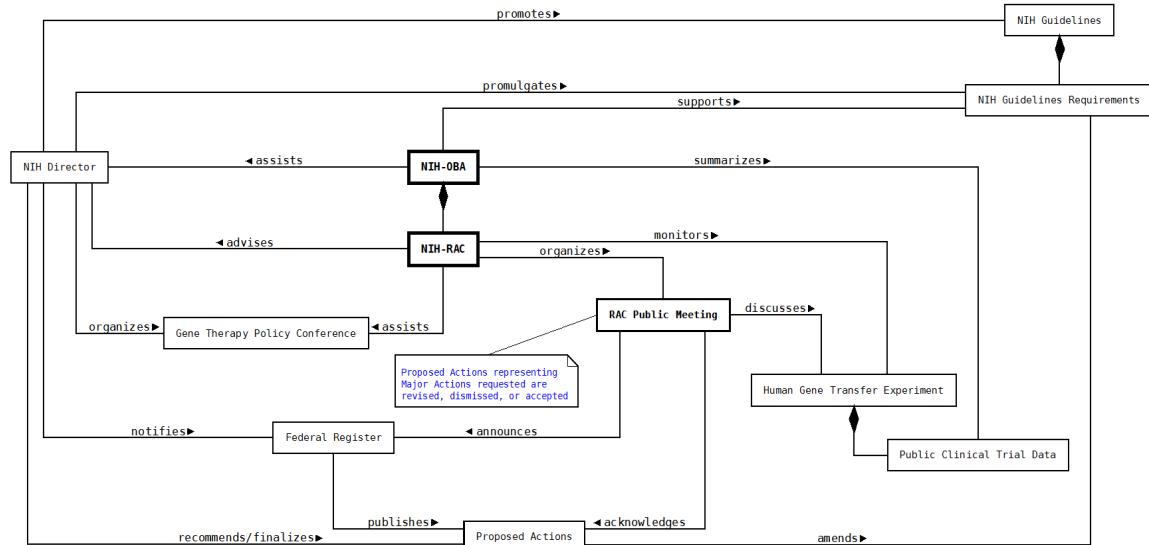
**Figure 3-60 NIH-RAC Voting vs. Non-Voting Member Composition**

The internal functions of the NIH-RAC includes advising response actions of the NIH Director to certify new host-vector systems, adopt changes to the *NIH Guidelines*, assign or change biological containment levels, approve experiments considered Major Actions, and identify which classes of recombinant or synthetic nucleic acid molecules will be exempt from the *NIH Guidelines*.<sup>482</sup> The NIH-RAC may proactively present comments and recommendations of specific human gene transfer experiments, or a category of human gene transfer experiments to the NIH Director for review. The outward facing services of the NIH-RAC includes providing public discussion of identified novel human gene transfer experiments, public review of human gene transfer clinical trial data that is summarized by NIH-OBA to satisfy annual data reporting requirements, identifying broad scientific, safety, social, and ethical issues relevant to gene therapy research as potential Gene Therapy Policy Conference topics, and public discussions of novel scientific and safety issues of the human applications of gene transfer and the corresponding guidance with the design and submission of human gene

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<sup>482</sup> Ibid.

transfer clinical trials.<sup>483</sup> The DSR-IS artifact in Figure 3-61 presents the high-level interrelationships of the NIH-OBA and RAC aligned with supporting the NIH Director.



**Figure 3-61 NIH-OBA and NIH-RAC Interrelationships**

### 3.8.9 NIH Director

Under the *NIH Guidelines*, the responsibilities of the NIH Director formulates the interrelationships among the NIH-OBA and RAC, and its individual role with the latter pair. The NIH Director is considered the main authority in not only maintaining the NIH-OBA and RAC, but also setting their responsibilities, functions and services within NIH and to external institutions.<sup>484</sup> As previously explained, the core responsibilities of the

<sup>483</sup> Ibid.

<sup>484</sup> Ibid., 31.

NIH-OBA under the *NIH Guidelines* are administrative support to the NIH Director and RAC. In contrast, the NIH-RAC is the prevalent NIH entity providing scientific, technical, and ethical guidance to the NIH Director, and Institution entities, such as the IBC and the PI. The interrelationship between the NIH Director and the *NIH Guidelines* is demonstrated where the former serves as the authoritative source in the final interpretation of the latter through revisions, and overseeing its implementation.<sup>485</sup> Aside from organizing Gene Therapy Policy Conferences, the outward facing functions of the NIH Director towards institutions includes providing and supporting Lab Safety Training Programs for IBC, Biosafety Officers, Principal Investigators, and Laboratory Staff.

### **3.8.9a Major Actions and Minor Actions**

The NIH Director is responsible for reviewing and executing submitted proposed actions, which are derived from Major Actions. Under the *NIH Guidelines*, the NIH Director or an appointed deputy conducts appropriate analysis and consultation for each proposed action. The objectives are to determine whether or not proposed actions submitted comply with *NIH Guidelines* and if there are significant risks to health or the environment posed. Unlike the Major Action entity, a Minor Action is considered less critical by the NIH Director and does not require the subject matter expertise afforded by NIH-RAC members. A Minor Action entity may be delegated to the NIH-OBA by the NIH Director. Figure 3-62 captures the high-level interrelationships introduced, and the placement of Proposed Actions and Minor Action entity relative to the NIH Director.

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<sup>485</sup> Ibid.

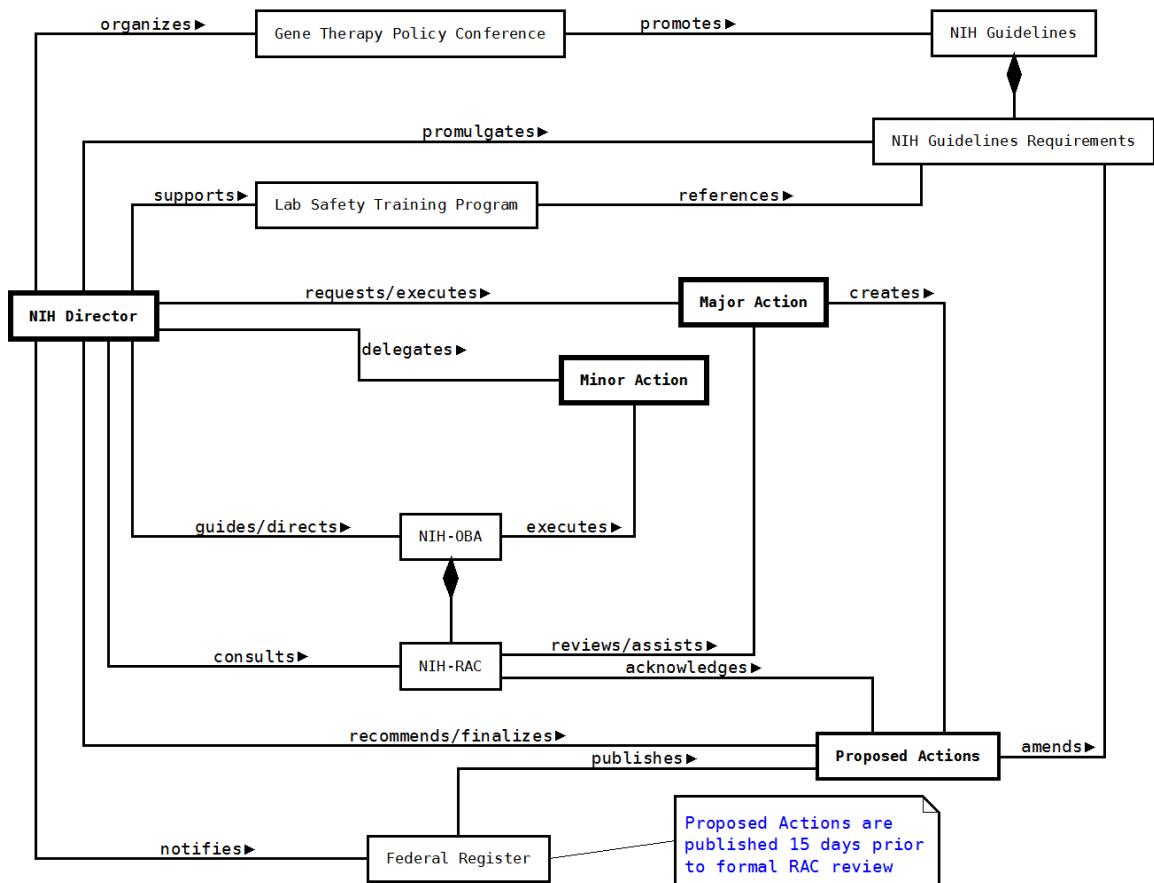


Figure 3-62 NIH Director Responsibilities and Interrelationships

When considering whether or not to execute a Major Action, the NIH Director may consult the NIH-RAC and invite comments from the public and external federal agencies.<sup>486</sup> If the NIH Director seeks public comment, a Notice of Meeting (not shown in Figure 3-62) and the Proposed Action entries are published in the Federal Register at least 15 days prior to formal RAC Review. At the discretion of the NIH Director, the

<sup>486</sup> Ibid., 32.

Federal Register may publish initial decisions and recommendations of Proposed Action entries up to 15 days for public comment before finalizing actions to be executed. Final decisions and recommendations of Proposed Action entries from the NIH Director, and their comments from the public will eventually be published in the Federal Register.<sup>487</sup> Formal notification to the NIH-RAC and NIH-registered IBC Chairpersons (not shown in Figure 3-62) are made for any of the following six Major Action decisions:<sup>488</sup>

- a. Change containment levels for experiments covered by *NIH Guidelines* when a Major Action is involved
- b. Assigning containment levels for experiments that are not explicitly covered by *NIH Guidelines* when a Major Action is involved
- c. Identifying a list of classes of recombinant or synthetic nucleic acid molecules to be exempt from *NIH Guidelines* because they consist entirely of DNA segments from species that exchange DNA by known physiological processes or otherwise do not present a significant risk to health or the environment.
- d. Permitting experiments that require IBC approval, RAC review, and NIH Director approval before initiation.
- e. Certifying new host-vector systems with the exception of minor modifications of already certified systems as specified by *NIH Guidelines*.
- f. Adopting other changes in the *NIH Guidelines*.

The NIH Director delegates Minor Action decisions to NIH-OBA, and latter executes Minor Action decisions on behalf of the former. On behalf of the NIH Director, NIH-OBA shall execute Minor Action entries. The NIH-OBA may consult with the NIH-RAC Chair or NIH-RAC members as needed to clarify Minor Action

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<sup>487</sup> Ibid.

<sup>488</sup> Ibid.

requirements or conditions for completion. Notification of Minor Action completions to the NIH-RAC and NIH-registered IBC Chairpersons (not shown in Figure 3-62) are made for any of the following actions:<sup>489</sup>

- a. Change in containment levels for experiments covered by *NIH Guidelines*.
- b. Assignment of containment levels for experiments that are not explicitly covered by *NIH Guidelines*.
- c. Revisions to the “Classification of Etiologic Agents” as required by the *NIH Guidelines*.
- d. Interpretation of the *NIH Guidelines* for experiments to which the *NIH Guidelines* do not specifically assign containment levels.
- e. Setting containment for experiments using Risk Group 2, Risk Group 3, Risk Group 4, or restricted agents are cloned into non-pathogenic prokaryotic or lower eukaryotic host-vector systems.
- f. Approving minor modifications to currently certified host-vector systems.
- g. Decertifying currently certified host-vector systems.
- h. Adding new entries to the list of molecules toxic for vertebrates.
- i. Determining appropriate containment conditions for experiments according to case precedents developed for the “Classification of Etiologic Agents”.

### **3.8.10 Observations of Entity Instances Associated with *NIH Guidelines***

The entities associated with the *NIH Guidelines* indicate counterpart relationships within research institutions and the NIH. The primary entities within a research institution subjected to *NIH Guidelines* compliance are the IBC and Principal Investigator (PI) entity instances. Within the NIH, the main entities are the NIH Office of Biotechnologies (NIH-OBA), the Recombinant Advisory Committee (RAC), and the NIH Director. The visible interrelationships between research institution and NIH entities are triggered when research experiment proposals submitted from a PI are

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<sup>489</sup> Ibid., 32-33.

subjected to an Initial RAC Review with possible escalation to a Public RAC Review.

The observations of the interrelationships for research institution and NIH entities comprise the remainder of the chapter.

### **3.8.10a NIH Entity Instances Administering *NIH Guidelines***

According to the *NIH Guidelines*, completion of the public RAC review is required for certain types of experiments as opposed to a public approval or disapproval. This requirement implies research proposals may be backlogged if the NIH-RAC either aborts or deliberately postpones executing the remaining steps to complete the review process. The RAC review process raises inefficiencies due to manual acknowledgement of research proposal submissions. For example, there is a minimum eight week submission to schedule an initial RAC review. According to the *NIH Guidelines*, research proposals submitted less than eight weeks before a planned RAC review meeting automatically requires a public review.<sup>490</sup> Likewise, proposed human gene transfer experiments submitted less than eight weeks before a scheduled RAC review meeting may further be deferred to the following scheduled RAC review meeting. Although no data was available, the eight-week requirement creates a model that backlogs research protocols without conveying mechanisms to prioritize proposed experiments from multiple research institutions. A study focusing on the effectiveness of the RAC review process, the average number of proposed research experiments submitted from different research institutions, and the types of the research experiments may identify additional

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<sup>490</sup> Ibid., 102.

biorisk oversight metrics. For example, metrics identifying which research institutions submit certain types of research experiments, or which research institutions submit the most research experiment proposals may be correlated with funding and/or resources allocated to institutions or for certain rDNA experiments.

### **3.8.10b Institutional Entity Instances Following NIH Guidelines**

The research notification schemes imposed upon individual IBC and PI entity instances are confusing. The notification schemes for Covered/Non-Exempt Experiment instances are susceptible to error, which may delay acceptance by the NIH-OBA. If the capability to track resubmitted experiments from research institutions is afforded, the opportunity to forecast planned experiments at certain research institution may be reused to identify research priorities at individual research institutions. The burden to correctly execute the notification schemes of covered research experiments may encourage proposed experiments to be written in a manner that favors a notification scheme considered most convenient by PI and/or IBC to streamline NIH-OBA acceptance and subsequent RAC review. Written notification of research experiments from the PI or IBC entity instances to the NIH-OBA is the current model. This approach is outdated considering the available software and distributed systems technologies that specialize in alert notifications. The alert notification platform may afford unofficial metrics in tracking the number of research experiments submitted versus the number of research experiments acknowledged by the NIH-OBA, and scheduled for RAC review meetings.

## **CHAPTER 4. DSR-IS PHASE II**

Chapter four presents the results of the data mining and extraction from U.S. Biological Weapons Convention-Confidence Building Measures (BWC-CBM) reports and analysis of Phase I artifacts to formulate the architecture of a notional Biorisk Oversight BSL (BOBSL) Registry. The two goals of Chapter 4 are to discuss the approaches employed by the methodology, and the presentation of DSR-IS Phase II artifacts. First, the methodology carried out provides a high-level overview describing the how the BOBSL Registry database tables were developed. Finally, the findings from the sample BWC-CBM reports and the gap analysis between the findings of the sample reports and Phase I artifacts to architect a preliminary DSR-IS Phase II BOBSL Registry artifact.

Chapter four is organized by discussing the high-level approach of DSR-IS Phase II, the order the Phase II artifacts created, how the artifacts were created, and then assembly of the accumulated artifacts relevant to forward-engineer a conceptual BOBSL Registry. Although the centerpiece artifact is a relational database instance that is interactive and accepts SQL commands, the tone of the chapter is non-technical. There is neither any discussion of the mathematics associated with relational databases, such as set theory, relational calculus and relational algebra nor details of design semantics, such as normalization, functional dependencies, table constraints, or referential integrity. The actual implementation and re-engineering the database tables for subsequent testing with broader data sets may warrant systems engineering discussions to evaluate BOBSL Registry functionality, but that is beyond the scope of the dissertation.

## **4.1 DSR-IS Phase II Objectives and High-Level Approach**

DSR-IS Phase II broadened the analysis of the unique and common entities discovered from Phase I by comparing the types of data provided from U.S. BWC-CBM reports spanning multiple years with the data that could be extrapolated from Phase I artifacts. The DSR-IS artifacts created in Phase II reflects suitable data from the U.S. BWC-CBM reports demonstrating BWC compliance, and the inherent properties of the unique entities and non-unique entity instances from Phase I artifacts to formulate the database tables and relevant columns to create a notional BOBSL Registry. Several DSR-IS artifacts were created in chapter four, but only the visual models will be presented. While the centerpiece of DSR-IS Phase II are the derived database tables from U.S. CBM reports and Phase I artifacts to establish BOBSL Registry, emphasis on the data from U.S. CBM reports and Phase I DSR-IS artifacts employed to forward-engineer the logical data structures, and how the formulated database tables organizes the data are discussed. Phase II contributes in answering the main research question by accomplishing four major objectives.

The first objective in Phase II involves deriving the logical database tables from U.S. BWC-CBM reports via iterative analysis, data mining and extraction followed by data population to afford direct analysis by issuing database queries. The initial database tables derived from U.S. BWC-CBM reports will identify the relevant data that would be

stored in a notional BOBSL Registry.<sup>491</sup> The extracted data will also populate the first set of derived tables to afford additional metrics that cannot be easily gleaned from reports by issuing SQL queries. Technical terminology associated with relational databases, such as primary and foreign keys, the normalization forms or functional dependencies are not afforded.

The second objective executes a gap analysis of the data afforded by the U.S. BWC-CBM reports with the data that could be extracted from Phase I artifacts. Although data extraction form the U.S. BWC-CBM reports provides material to analyze the biological research programs, laboratories, and vaccine production facilities reported by the United States, the focus of Phase II DSR-IS artifacts emphasizes the data definitions to design a national BOBSL Registry as opposed whether or not the U.S. BWC-CBM reports satisfy BWC compliance reporting. Thus, the value of Phase II artifacts are demonstrated by discovering “what” and “how much” data should be reported by examining the structure of the BWC-CBM reports as opposed to the actual data submitted by the United States, and also the data properties of the entities from Phase I artifacts.

The third objective synthesizes the results of the first and second objectives by engineering the logical database tables relevant to the BOBSL Registry from Phase I artifacts, and augmenting the derived tables BWC-CBM reports. The iterative process of reviewing the Phase I artifacts establishes the second set of derived tables that would

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<sup>491</sup> Data definition language will implement the data structures and the schema to create the derived tables and database instance. Extracted CBM data will be formatted as raw data records, then parsed into individual SQL insertion entries.

comprise a BOBSL Registry. The second set of derived tables created from Phase I artifacts implements the “missing data” that should be reported as part of a national BOBSL, but was not afforded from the first set of derived tables reflecting the U.S. BWC-CBM reports.

The final objective applies the knowledge in completing the previous Phase II objectives by assembling the comprehensive set of derived tables from BWC-CBM reports and Phase I artifacts into the conceptual BOBSL Registry. The MySQL Workbench database designer was employed to create the visual relationships of the full set of derived tables, and will be presented accordingly. The dissertation author acknowledges the MySQL Workbench database designer affords implementing a semantically correct BOBSL Registry. However, the notional BOBSL Registry established by DSR-IS Phase II neither follows strict database normalization rules nor should be implemented in its current state without modifications to the DDL source to ingest actual data from disparate sources. Phase II emphasizes the conceptual table structures developed from the U.S. BWC-CBM reports, and then leverages Phase I artifacts to either augment the table structures or create new table structures to support a national BOBSL Registry as opposed to a production-ready national database.

## **4.2 DSR-IS Phase II Methodology**

DSR-IS Phase II focused on data mining and data extraction as the starting point for a notional BOBSL Registry. The adopted approach of DSR-IS Phase II created an initial set of database tables based on the sample U.S. BWC-CBM reports to store the

relevant data extracted, and then augmentation of the BOBSL Registry from either implicit tables derived or insertion of additional table columns from Phase I artifact gap analysis. The initial database tables stored extracted data from U.S. BWC-CBM reports, followed by iterative examination of the entities, entity attributes, and their interrelationships in the context of biorisk regulations, biosafety, biosecurity, and the *NIH Guidelines* to determine the oversight metrics to operationalize a BOBSL Registry.<sup>492</sup> The approach to first implement the kernel registry tables, populate the tables, and then iteratively examine the sample BWC-CBM reports and Phase I artifacts with the BOBSL Registry structure furnished the missing data relevant to continuous biorisk oversight reporting. The constraint of database tables specified identifying the minimum entity attributes to conceptualize a BOBSL Registry that could evolve into data warehouse if published as an open source platform.<sup>493</sup>

#### **4.2.1 Phase II Artifacts Produced**

The second DSR-IS phase produced three artifacts, which were the prototype Biorisk Oversight BSL (BOBSL) registry, the gap analysis table between sample U.S. BWC-CBM reports and Phase I artifacts, and the software source code that extracted and populated the BWC-CBM data into the initial tables of the conceptual BOBSL Registry.

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<sup>492</sup> Data definition language will implement the data structures and the schema to create a database instance. Extracted CBM data will be formatted as raw data records, then parsed into individual SQL insertion entries.

<sup>493</sup> A data warehouse consolidates a collection of data repositories that focuses on query and analysis as opposed to the high-volume transaction processing typically implemented by relational database management systems. See also The Data Warehousing Institute (TDWI) at <https://tdwi.org/portals/data-warehousing.aspx>

DSR-IS Phase II applied the UML diagrams and catalog of entity attributes from Phase I to identify the minimum attributes to augment the initial database tables created. The BOBSL Registry artifact implemented a non-production prototype database instance to understand the shared data and reporting requirements aligned with biorisk oversight objectives. The open architecture invites systems architects and database administrators to examine the data definition language (DDL) source to recreate a separate BOBSL Registry instance to experiment with business rules, and modify the table constraints, database triggers, and referential integrity rules as biorisk management policies or oversight objectives change over time.

The gap analysis table artifact quantifies “what” and the minimum data relevant for continuous biorisk oversight reporting from iterative analysis. To be sure, the structure and data extracted from the sample BWC-CBM reports, the data properties of the entities comprising Phase I artifacts, and the initial table schemas that represent the BWC-CBM records were compared against Phase I artifacts to identify additional data relevant to shared oversight. The gap analysis table determined the missing data to create the additional set of tables not afforded from the sample BWC-CBM reports by examining the entity interrelationships and the implied time based metrics that characterize continuous biorisk oversight and reporting. The need for time based metrics are justified where biorisk oversight objectives and the associated policies are subject to change over time.

The data extraction, transformation, and loading (ETL) software artifact was developed to parse unstructured text files and populate the initial database tables before

identifying the additional entity attributes to create the BOBSL Registry. The ETL software implemented two functions, which were data extraction from the sample BWC-CBM government reports, and then dynamic formulation of SQL commands for data population into the database tables. The ETL software also created a logical map between the values of the US BWC-CBM reports, and the entity attributes that represent the columns of database tables. The ETL programming logic to implement the mapping process between extracted BWC-CBM data and table columns were tightly coupled with the US BWC-CBM reports.

#### **4.2.2 Phase II Activities**

The main activities that comprised DSR-IS Phase II involved indexing relevant data for extraction, developing the DDL scripts to create the initial database tables, programming and testing the ETL software against sample BWC-CBM reports, and repetitive analysis of the BWC-CBM reports with the Phase I DSR artifacts to determine relevant biorisk data needed to conceptualize the prototype BOBSL Registry. Before the ETL software source was finalized, the U.S. BWC-CBM reports were converted from PDF files to Microsoft Word documents to read the raw data programmatically. The newly created Microsoft Word documents served as the raw sources for data mining and extraction. The practical extraction and reporting language (PERL) software programming language was employed to develop the ETL software against the BWC-CBM Microsoft Word documents. Once BWC-CBM data extraction was completed, a separate data formatter and loader was implemented via PERL to populate the initial

database tables of the BOBSL Registry. The actual instance of the BOBSL was implemented using Oracle MySQL open source database software to test ETL cycles, and map the table structures with the dynamic SQL queries for data loading.

#### **4.2.3 Phase II Data, Tools or Technologies Employed**

The prototype BOBSL Registry analyzed DSR-IS Phase I artifacts after the initial database tables storing extracted CBM data were examined. The prototype BOBSL Registry was developed using free DIA open source software, and implemented with a registered copy of Oracle MySQL server database software.<sup>494</sup> The sample US BWC-CBM transparency reports submitted to the United Nations provided the datamining sources populating the initial database pre-BOBSL analysis. A combination of the PERL software and SQL languages implemented the application programming scripts for BWC-CBM data extraction and database loading functions.<sup>495</sup> The tools that created the artifacts for DSR-IS Phase II also necessitated building a custom integrated development environment (IDE) that installed and configured the Komodo Edit source code editor, the PERL software programming language, and the Comprehensive PERL Archive Network (CPAN) database interface modules to connect to Oracle MySQL database software.<sup>496</sup>

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<sup>494</sup> For more information about the Oracle MySQL database software, see <http://www.oracle.com/us/products/mysql/overview/index.html>; For more information about the free DIA wire diagram software, see <http://dia-installer.de/>

<sup>495</sup> The SQL language may implement syntax specific to the database vendor. The SQL used in the methodology is based on Oracle software syntax. For more information, see [http://docs.oracle.com/cd/B28359\\_01/server.111/b28286/toc.htm](http://docs.oracle.com/cd/B28359_01/server.111/b28286/toc.htm); For more information about the PERL programming language, see <http://www.perl.org/>

<sup>496</sup> For more information on the Comprehensive PERL Archive Network, see <http://www.cpan.org/>; For more information about the PERL database interface API, see

## **4.3 Analysis of the U.S. BWC-CBM Report Content Structure**

The U.S. BWC-CBM reports covering years 2011-2013 provided the main source of data to analyze. The rationale for employing these reports as inputs for analysis affords a broad set of data spanning multiple years, a consistent format structure where changes in report content could easily be detected, and an easy data extraction source suitable for text manipulation and database table population. The U.S. BWC-CBM reports are comprise of seven sections, and each section represents a confidence building measure as depicted in Table 4-1.

**Table 4-1 BWC-CBM Report Sections**

<b>Confidence Building Measure (CBM)</b>	<b>CBM Objective</b>
A, Part 1	Exchange of data on research centers and laboratories
A, Part 2	Exchanges of information on national biological defense research and development programs (i) Declaration (ii) Description (iii) Facilities
B	Exchange of information on all outbreaks of infectious diseases and similar occurrences caused by toxins (i) Background information (ii) Information on occurrences that seem to deviate from the norm
C	Encouragement of publication of results and promotion of use of knowledge
D	Active promotion of contacts
E	Declaration of legislature, regulations, and other measures
F	Declaration of past activities in offensive and/or defensive biological research and development programs
G	Declaration of vaccine production facilities

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<http://dbi.perl.org/> ; For more information about the free Komodo Edit open source software, see <http://komodoide.com/komodo-edit/>

There were minor changes in the U.S. BWC-CBM reports where report section CBM-D, “Active promotion of contacts” was discontinued after 2011, which did not impact analysis to complete DSR-IS Phase II. Interestingly, the page count of each U.S. BWC-CBM had dropped each year, 2011 (296), 2012 (276), and 2013 (237), which is explained by section CBM-A, Parts 1-2. For example, the page count CBM-A, Parts 1-2 from the 2011 BWC-CBM report starts on page 4 and ends on page 225. The page count for section CBM-A, Parts 1-2 significantly decreases over the years where by 2013, the section starts on page 4 and ends on page 187.<sup>497</sup> Iterative reviews of the U.S. BWC-CBM reports covering 2011 to 2013 determined the relevant report sections for data extraction where CBM-A Part 1 (“Exchange of data on research centers and laboratories”), CBM-A Part 2 (“Exchanges of information on national biological defense research and development programs, (i) Declaration, (ii) Description, and (iii) Facilities”), and CBM-G (“Declaration of vaccine production facilities”). The DSR-IS artifacts employed the Perl programming language to implement the data mining and extraction of the U.S. BWC-CBM reports, which were converted into ASCII text files to afford fieldname indexing, and programmatically generating key-value data pairs. This approach was used to mirror data extraction logic for the unique sections of the CBM data files. The Perl source code representing the artifact is provided in Appendix A, “BOBSL Registry Data Mining and Extraction Source Code”.

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<sup>497</sup> The 2014 U.S. BWC-CBM report was examined, but not analyzed as part of DSR-IS Phase II. The trend where there is less to report on research centers and biodefense research programs declared is consistent. The 2014 report indicates section CBM-A, Parts 1-2 starts on page 4, and ends on page 137.

## **4.4 Derived BOBSL Registry Tables from U.S. BWC-CBM Reports**

The iterative analysis, data mining and extraction from the U.S. BWC-CBM reports provides the knowledge to forward-engineer a subset of the database tables supporting the BOBSL Registry. The initial database tables derived from U.S. BWC-CBM reports will identify the relevant data that would be stored in a notional BOBSL Registry. The fieldname indexing reflecting the key-value data pairs as part of the data mining and extract artifact provided guidance to forward-engineer the first set of derived database tables needed for the BOBSL Registry. The initial set of derived database tables reflects the three U.S. BWC-CBM report sections affording relevant data to the BOBSL, which were sections CBM-A Part I, CBM-A Part II, and CBM-G. Figure 4-1 depicts the derived database tables from the aforementioned BWC-CBM report sections. Since the derived tables represent a subset of the U.S. BWC-CBM reports, analysis was needed to establish Institution ID, (e.g., implemented as INST\_ID) as the shared attribute among the otherwise unique data entries extracted from each section. The create\_date, uscbm\_report, uscbm\_submit\_date, and uscbm\_form\_section columns were added as metadata attributes to afford auditing, and references the U.S. BWC-CBM report providing the data.

The figure shows three database tables from CBM Data Extraction:

- cbm\_bioresearch\_labs** (Left):
 

Column	Type
uscbm_form_ap1_id	INT(11)
INST_ID	VARCHAR(100)
FSAP_COR_ID	VARCHAR(100)
create_date	VARCHAR(26)
uscbm_report	VARCHAR(40)
uscbm_submit_date	VARCHAR(26)
uscbm_form_section	VARCHAR(26)
facility_name	VARCHAR(180)
street_city	VARCHAR(180)
state	VARCHAR(2)
zipcode	VARCHAR(13)
funding_src	VARCHAR(60)
lab_space	VARCHAR(60)
- cbm\_bioresearch\_programs** (Middle):
 

Column	Type
uscbm_form_ap2_id	INT(11)
INST_ID	VARCHAR(100)
FSAP_COR_ID	VARCHAR(100)
create_date	VARCHAR(26)
uscbm_report	VARCHAR(40)
uscbm_submit_date	VARCHAR(26)
uscbm_form_section	VARCHAR(26)
facility_name	VARCHAR(180)
street_city	VARCHAR(180)
state	VARCHAR(2)
zipcode	VARCHAR(13)
bsl2_m2	INT(11)
bsl3_m2	INT(11)
bsl4_m2	INT(11)
total_bsl_m2	INT(11)
total_personnel	INT(11)
mil_personnel	INT(11)
civ_personnel	INT(11)
total_scientist	INT(11)
total_engineer	INT(11)
total_technician	INT(11)
total_admin	INT(11)
funding_src	VARCHAR(60)
research_funding	VARCHAR(18)
dev_funding	VARCHAR(18)
testeval_funding	VARCHAR(18)
total_funding	VARCHAR(18)
research_obj	TEXT
agents_toxin	TEXT
TOTAL_SRA HOLDER	INT(11)
- cbm\_vaccine\_prod\_centers** (Right):
 

Column	Type
uscbm_form_g_id	INT(11)
INST_ID	VARCHAR(100)
FSAP_COR_ID	VARCHAR(100)
create_date	VARCHAR(26)
uscbm_report	VARCHAR(40)
uscbm_submit_date	VARCHAR(26)
uscbm_form_section	VARCHAR(26)
facility_name	VARCHAR(180)
street_city	VARCHAR(180)
state	VARCHAR(2)
zipcode	VARCHAR(13)
research_focus	TEXT
vaccine_dev	TEXT

**Figure 4-1 Database Tables from CBM Data Extraction**

The SQL source used to express the data definition language (DDL) needed to create derived database tables from BWC-CBM reports is provided in Appendix B, “BOBSL Registry DDL Source”. The SQL source to execute insert queries for data population from formatted text data input files are provided in Appendix B, “CBM Bioresearch Lab Table – Data Extraction Entries” and “CBM Bioresearch Programs and Vaccine Prod Centers – SQL Insert Source”. The derived database tables introduced by

Figure 4-1 represent the independent BWC-CBM sections applicable to a BOBSL Registry. The CBM\_RESEARCH\_LABS table depicted by Table 4-2 reflects what the U.S. BWC-CBM reports consider individual biological research laboratories, and the field names representing the columns of the table store physical and intangible attributes associated with laboratories. The main table column describing the physical attribute is labspace, and affords the data to track research capacity grouped by BSL. The facility\_name, responsible\_org and funding\_src columns represent the intangible attributes.

**Table 4-2 CBM Bioresearch Laboratories Table**

Column Name	Description
uscbm_form_ap1_id	Primary key, unique ID of CBM section A (part I) entry.
INST_ID	Foreign key to institution_directory table.
FSAP_COR_ID	Foreign key to fsap_cor_registry table.
create_date	Date row was inserted into table.
uscbm_report	Name of U.S. BWC-CBM report source.
uscbm_submit_date	Submission date of U.S. BWC-CBM report.
uscbm_form_section	BWC-CBM report section reference.
facility_name	Name of facility or institution; akin to INST_NAME.
responsible_org	Name of responsible organization accountable for biorisk incidents.
street_city	Street and city of facility or institution.
state	State location of facility or institution.
zipcode	Zip code of facility or institution.
funding_src	Types or name of funding sources to bioresearch laboratory.
lab_space	Laboratory spaces reported (square meters)

The CBM\_RESEARCH\_PROGRAMS table depicted by Table 4-3 reflects section CBM-A Part 2 within the U.S. BWC-CBM reports, which records the declaration, description, and facilities of national biodefense research and development programs.

The individual biodefense research and development records captured in CBM\_RESEARCH\_PROGRAMS are independent from the CBM\_RESEARCH\_LABORATORIES, but are interconnected by physical facility hosting the operations of the biodefense programs (e.g., referenced by facility\_name). The data extracted from section CBM-A Part 2 affords several biorisk oversight metrics, which are headcounts of personnel and their roles, research capacity (square meters) categorized by BSL, and categories of biodefense research and development funding.

Personnel metrics are afforded by the total\_personnel, mil\_personnel, civ\_personnel, total\_scientist, total\_engineer, total\_technician, and total\_admin columns were afforded by the U.S. BWC-CBM reports. An additional column, TOTAL\_SRA HOLDER, was added to afford the auditing needed to cross-check personnel at a physical biodefense research facility with security risk assessment (SRA) records maintained by the FBI Criminal Justice Information Services (FBI-CJIS).

Research capacity metrics are afforded by the aggregation of the bsl2\_m2, bsl3\_m2 and BSL-4\_m2 into a fourth column, total\_bsl\_m2. The funding sources and total funding in U.S. dollars are represented by the funding\_src and total\_funding columns, and aggregated by the research\_funding, dev\_funding, and testevel\_funding columns. Data extracted from research\_obj column affords the actual research and development goals and statements disclosed to the United Nations from the U.S. BWC-CBM reports. The data extracted from the U.S. BWC-CBM reports to populate the agents\_toxin column neither specified the exact biological agents and toxins nor indicate whether or not nucleic acid molecules (e.g., rDNA research) were employed. Declarations about agents

and toxins disclosed were ambiguous, and includes examples such as "Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)", "HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)", or "Overlap Select Agents (Including NIAID Category A Priority Pathogens)".

**Table 4-3 CBM Bioresearch Programs Table**

Column Name	Description
uscbm_form_ap2_id	Primary key, unique ID of CBM section A (part II) entry.
INST_ID	Foreign key to institution_directory table.
FSAP_COR_ID	Foreign key to fsap_cor_registry table.
create_date	Date row was inserted into table.
uscbm_report	Name of U.S. BWC-CBM report source.
uscbm_submit_date	Submission date of U.S. BWC-CBM report.
uscbm_form_section	BWC-CBM report section reference.
facility_name	Name of facility or institution; akin to INST_NAME.
street_city	Street and city of facility or institution.
state	State location of facility or institution.
zipcode	Zip code of facility or institution.
bsl2_m2	BSL2 laboratory space (square meters)
bsl3_m2	BSL3 laboratory space (square meters)
bsl4_m2	BSL4 laboratory space (square meters)
total_bsl_m2	Total BSL laboratory space (square meters)
total_personnel	Total personnel disclosed at facility or institution.
mil_personnel	Total military personnel disclosed at facility or institution.
civ_personnel	Total civilian personnel disclosed at facility or institution.
total_scientist	Total scientific personnel disclosed at facility or institution.
total_engineer	Total engineering personnel disclosed at facility or institution.
total_technician	Total technician personnel disclosed at facility or institution.
total_admin	Total administrative personnel disclosed at facility or institution.
funding_src	Funding source of bioresearch program.
research_funding	Research funding disclosed (U.S. dollars).
dev_funding	Development funding disclosed (U.S. dollars).
testeval_funding	Test and evaluation funding disclosed (U.S. dollars).
total_funding	Total funding disclosed (U.S. dollars).
research_obj	Research objective of bioresearch program.
agents_toxin	Biological agents and/or toxins used in bioresearch program.
TOTAL_SRA HOLDER	Total personnel holding active security risk assesment.

The CBM\_VACCINE\_PROD\_CENTERS table depicted by Table 4-4 reflects section CBM-G within the U.S. BWC-CBM reports, which records the declaration of vaccine production centers disclosed to demonstrate BWC compliance. The table structure is similar to CBM\_BIORESEARCH\_LABS, but with specific columns associated with vaccine production as described by the U.S. BWC-CBM reports. The research\_focus column describes the specialized areas of vaccine development of the facility. The vaccine\_dev column itemizes the pharmaceutical names of vaccines developed, such as "Anthrax Vaccine Adsorbed - BioThrax", "Tetanus and Diphtheria Toxoids Adsorbed", "Influenza A (H1N1) 2009 Monovalent Vaccine Influenza Vaccine Live, Intranasal - FluMist", "BCG Live vaccine - BCG Vaccine; TICE BCG", and "Smallpox (Vaccinia) Vaccine, Live - ACAM2000".

**Table 4-4 CBM Vaccine Production Centers Table**

Column Name	Description
uscbm_form_g_id	Primary key, unique ID of CBM section G entry.
INST_ID	Foreign key to institution_directory table.
FSAP_COR_ID	Foreign key to fsap_cor_registry table.
create_date	Date row was inserted into table.
uscbm_report	Name of U.S. BWC-CBM report source.
uscbm_submit_date	Submission date of U.S. BWC-CBM report.
uscbm_form_section	BWC-CBM report section reference.
facility_name	Name of facility or institution; akin to INST_NAME.
street_city	Street and city of facility or institution.
state	State location of facility or institution.
zipcode	Zip code of facility or institution.
research_focus	Research focus areas of vaccines development.
vaccine_dev	Names of the vaccines developed at production center.

## **4.5 Gap Analysis of U.S. BWC-CBM Reports and Phase I Artifacts**

The iterative gap analysis of the data extracted from U.S. BWC-CBM reports and the schemas of the initial set of derived tables representing CBM records are compared against Phase I artifacts to determine the additional data that could be extracted. The gap analysis is guided by discovering “what” and “how much” data should be reported by examining the first set of derived tables, the structure of the BWC-CBM reports, the unstructured data responses within the sample BWC-CBM report sections submitted by the United States, and the data properties of the entities comprising Phase I artifacts. The missing data to create the additional set of tables not afforded from the sample BWC-CBM reports by examining the entity interrelationships and the implied time based metrics that characterize continuous biorisk oversight and reporting are afforded. The applicability of time based metrics were evident where biorisk oversight objectives were subject to change over time from changes in existing or creation of new federal policies, and periodic review of research facilities in the BWC-CBM reports. The findings of the gap analysis are captured in Table 4-5.

The gap analysis approach involved multiple analysis of the entire set of DSR-IS artifacts in Phase I and then recording which artifacts were applicable. The relevant artifacts were identified by Figure number and recorded in the “Phase I DSR-IS Artifact” column. The “Derived/Reportable Entities/Attributes (Non-Repeating)” column identifies the entity captured by the artifact listed the “Phase I DSR-IS Artifact” column. The “Non-Repeating” description indicates that the entities listed may appear in subsequent DSR-IS artifacts (e.g., Figure numbers), but will not be re-listed. The

“Extrapolated Data” column suggests the field attribute or column name that will map to specific instances of the entity. For example, an Institution entity instance will be identified by an Institution ID, which is implemented as the INST\_ID column of a database table. Likewise, a Principal Investigator instance may be referenced by the PI\_ID, which is implemented as a column of a database table. The “BOBSL Registry Table” column suggests name of the derived table to support the extrapolated data, such as INST\_ID and PI\_ID, as part of the notional BOBSL Registry.

**Table 4-5 Gap Analysis-Phase I Artifacts and Sample BWC-CBM Reports**

Phase I DSR-IS Artifact	Derived Reportable Entities/Attributes (Non-Repeating)	Extrapolated Data	BOBSL Registry Table
Figure 3-2	Institution, Registered Entity, Principal Investigator, IBC, Biosafety Officer	Institution (INST_ID), Registered Entity (FSAP_COR_REGISTRATION_ID), Principal Investigator (PI_ID), IBC (IBC_ID), Biosafety Officer (BSO_ID)	INSTITUTION_DIRECTORY PRINCIPAL_INVESTIGATOR_DIRECTORY BIOSAFETY_OFFICER_DIRECTORY
Figure 3-5	DOL-OSHA Regulation DOT Regulation DOC Regulation HHS-FDA Regulation SAR Federal Agency Regulation Federal Agency Inspection Grade Federal Agency Inspector ID	DOL-OSHA Regulation (INSPECTION_DATE) DOT Regulation-N/A DOC Regulation-N/A HHS-FDA Regulation (INSPECTION_DATE) SAR Federal Agency Regulation-N/A Federal Agency Inspection Grade (INSPECTION_GRADE) Federal Agency Inspector ID (FEDAGENCY_INSPECTOR_ID)	FED_AGENCY_INSPECTIONS_LOG NIHGUIDELINES_COMPLIANCE_REGIST RY FSAP_COR_REGISTRY
Figure 3-7	HHS-NIH Guideline HHS-CDC Guideline DOL-OSHA Guideline DOL-OSHA Statute	Derive compliance dates and status	FED_AGENCY_INSPECTIONS_LOG NIHGUIDELINES_COMPLIANCE_REGIST RY FSAP_COR_REGISTRY

Figure 3-8	Risk Assessment Grade	Risk Assessment Grade (RISK_ASSESSMENT_GRADE); Augmentation of CBM data	CBM_BIORESEARCH_PROGRAMS
Figure 3-12	Biological Agent	BSAT_ID (conceptual)	N/A; Tracked by SAR and/or NPI
Figure 3-14	Research Experiment, Plant Experiment, Human Gene Transfer Experiment, Synthetic Nucleic Acid Experiment, Recombinant Nucleic Acid Experiment	NUCLEIC_ACID_MOLECULE_EXPERIMENT (Boolean) HUMAN_GENE_TRANSFER_EXPERIMENT (Boolean)	CBM_BIORESEARCH_PROGRAMS
Figure 3-27	Risk Management Plan, Biosecurity Plan, Incident Response Plan	Risk Management Plan (RISKMGTPLAN_FILENAME), Biosecurity Plan (BIOSECPLAN_FILENAME), Biosafety Plan (BIOSAFPLAN_FILENAME), Incident Response Plan (INCIDRESPPLAN_FILENAME)	FSAP_COR_REGISTRY
Figure 3-30	Certificate of Registration, Registration Application Form-1 Security Inspection Report	Certificate of Registration (FSAP_COR_ID), Registration Application Form-1 (CORAPPFORM1_FILENAME), Security Inspection Report (SECINSPCTRPT_FILENAME)	FSAP_COR_REGISTRY
Figure 3-31	Initial Start SAR Site Inspection Date, Initial Completed SAR Site Inspection Date, SAR Site Inspection Reason, Last SAR Site Inspection Date, SAR Compliance Inspection Grade SAR Agency Executing Inspecting	SAR_INSPECTION_GRADE SAR_INSPECTION_AGENCY SAR_INSPECTION_REASON SAR_INIT_INSPECTION_START_DATE SAR_INIT_INSPECTION_COMPLETION_DATE SAR_LAST_INSPECTION_COMPLETION_DATE	FED_AGENCY_INSPECTIONS_LOG
Figure 3-32	USDA Facility, Accountability Record, National Pathogen Inventory, Facility Inventory of Repository Material, Material Accountability of Experimental	USDA Facility (USDA_FACILITY_ID), Accountability Record (LAST_AUDIT_DATE_ACCOUNTABILITY_RECORD) National Pathogen Inventory (LAST_AUDIT_DATE_NPI)	USDA_FACILITY_DIRECTORY

	Samples		
Figure 3-33	Responsible Official, Alternate Responsible Official	Responsible Official (RO_ID), Alternate Responsible Official	RESP_OFFICIAL_DIRECTORY
Figure 3-34	Security Risk Assessment (SRA), Personnel Reliability Program (PRP), TBD - SRA of PI, IBC members, and RO/ARO are relevant.	Security Risk Assessment (SRA_ID), Security Risk Assessment Grant Date (SRA_GRANT_DATE), Security Risk Assessment Renewal Date (SRA_RENEWAL_DATE), Security Risk Assessment Status (SRA_STATUS) - e.g., Active/Expired/Revoked	N/A
Figure 3-42	Import Permit	Import Permit (FSAP_IMPORT_PERMIT_NUMBER)	FSAP_COR_REGISTRY
Figure 3-44	Nucleic Acid Molecule Experiment, Human Gene Transfer Experiment, Synthetic Nucleic Acid Experiment, Recombinant Nucleic Acid Experiment	NUCLEIC_ACID_MOLECULE_EXPERIMENT (Boolean) HUMAN_GENE_TRANSFER_EXPERIMENT (Boolean)	CBM_BIORESEARCH_PROGRAMS

Figure 3-46	Covered Non-Exempt Experiment Class Type, Covered Non-Exempt IBC Approval, Covered Non-Exempt IBC Approval Date, Covered Non-Exempt NIH Director Approval, Covered Non-Exempt NIH Director Approval Date, Covered Non-Exempt NIH OBA Approval, Covered Non-Exempt NIH OBA Approval Date, Covered Non-Exempt IRB Approval, Covered Non-Exempt IRB Approval Date, Covered Non-Exempt IBC Notification, Covered Non-Exempt IBC Notification Date	COVERED_NON_EXEMPT EXPERIMENT_CLASS_TY PE IBC_APPROVAL_REQUIRED (BOOLEAN) IBC_APPROVAL_DATE IBC_NOTIFICATION_DATE IRB_APPROVAL_REQUIRED (BOOLEAN) IRB_APPROVAL_DATE NIH_DIRECTOR_APPROVAL_REQUIRED (BOOLEAN) NIH_DIRECTOR_APPROVAL_DATE NIH_OBA_APPROVAL_REQUIRED (BOOLEAN) NIH_OBA_APPROVAL_DATE RAC REVIEW_COMPLETION_DATE	CBM_BIORESEARCH_PROGRAMS
Figure 3-50	See Figure 3-46; derived RAC Review attributes from Figure 3-47 are applicable.	COVERED_NON_EXEMPT EXPERIMENT_CLASS_TY PE IBC_APPROVAL_REQUIRED (BOOLEAN) IBC_APPROVAL_DATE IBC_NOTIFICATION_DATE IRB_APPROVAL_REQUIRED (BOOLEAN) IRB_APPROVAL_DATE NIH_DIRECTOR_APPROVAL_REQUIRED (BOOLEAN) NIH_DIRECTOR_APPROVAL_DATE NIH_OBA_APPROVAL_REQUIRED (BOOLEAN) NIH_OBA_APPROVAL_DATE RAC REVIEW_COMPLETION_DATE	CBM_BIORESEARCH_PROGRAMS

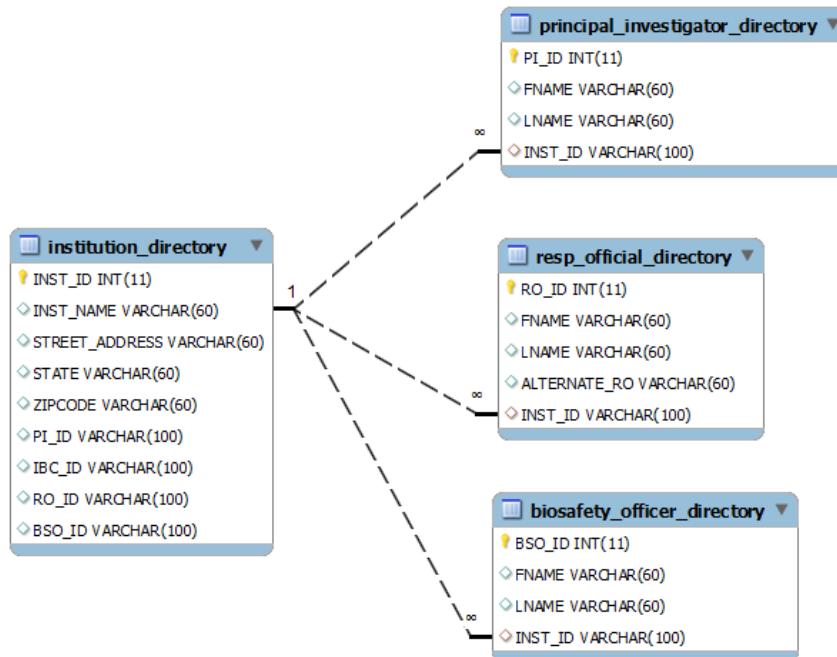
## **4.6 Derived BOBSL Registry Tables from Phase I**

The creation of the first set of BOBSL tables from the U.S. BWC-CBM reports and the results of the gap analysis captured in Table 4-5 afford the knowledge to derive the remaining tables needed to support a conceptual national BOBSL Registry. The structure of the derived tables reflecting sections within the U.S. BWC-CBM reports are considered during the iterative reviews of the Phase I artifacts to identify the “missing data” applicable to national BOBSL Registry, but not afforded by the U.S. BWC-CBM reports. The findings of the iterative gap analysis produced subsequent tables reflecting local oversight of individual research institutions and federal biorisk oversight entities. The iterative analysis also identified data that neither warrants creating a new table, but rather augmentation to tables derived from U.S. BWC-CBM reports.

### **4.6.1 Institution and Local Oversight Database Tables**

The unique entities and non-unique entity instances associated with the local oversight of research institutions afforded by DSR-IS Phase I comprise the tables in Figure 4-2. The four tables produced from DSR-IS Phase I identifies the three major local oversight entity instances, which are Principle Investigator, Responsible Official, and Biosafety Officer. The institution\_directory represents the fourth entity instance, which interconnects the aforementioned tables via the INST\_ID column. There is an additional entity instance (not shown), which is the Institutional Biosafety Committee (IBC). The National Institutes of Health, Office of Biotechnology Activities (NIH-OBA) has established the IBC Registration Management System, which could be integrated

with the conceptual BOBSL Registry if access permissions were granted.<sup>498</sup> Information technology integration between the notional BOBSL Registry and the IBM Registration Management Systems is beyond the scope, but could be revisited in a subsequent study to enhance biorisk oversight reporting between local and federal entity instances.



**Figure 4-2 Derived Institution and Local Oversight Tables**

The Institution Directory table, which is implemented as institution\_directory is the main table within the BOBSL Registry that affords correlation with the tables derived from DSR-IS Phase I artifacts. Table 4-6 Institution Directory Table captures the data

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<sup>498</sup> The IBC Registration Management System may be accessed online at [https://ibc-rms.od.nih.gov/Contents/IBC\\_HOME.aspx](https://ibc-rms.od.nih.gov/Contents/IBC_HOME.aspx).

structure of the Institution Directory table, which shows the Institution Name (INST\_NAME) and address information (STREET\_ADDRESS, STATE, and ZIPCODE) as native attributes. The remaining columns, Principal Investigator ID (PI\_ID), Institutional Biosafety Committee ID (IBC\_ID), Responsible Official ID (RO\_ID), and Biosafety Officer ID (BSO\_ID) are the conceptual foreign keys to the corresponding tables within the BOBSL Registry.

**Table 4-6 Institution Directory Table**

Column Name	Description
INST_ID	Primary key, unique ID number of institution.
INST_NAME	Name of institution.
STREET_ADDRESS	Street address of institution.
STATE	State location of institution.
ZIPCODE	Zip code of institution.
PI_ID	Principal investigator ID
IBC_ID	Institution Biosafety Committee ID
RO_ID	Responsible official ID
BSO_ID	Biosafety officer ID

The tables representing Principal Investigator Directory (Table 4-7), Biosafety Officer Directory (Table 4-8), and Responsible Officer Directory (Table 4-9) capture the logical structures derived from DSR-IS Phase I artifacts. The data structures of each table emphasize recording the minimum contact information needed to identify a specific Principal Investigator, Biosafety Officer, and Responsible Officer. Thus, combining the primary key (PI\_ID, BSO\_ID, or RO\_ID) from each table with the First Name (FNAME), Last Name (LNAME) attributes with the Institution ID (INST\_ID) associates

an individual based on role to an Institution Instance. Additional table columns to capture phone number, email address, or a Security Risk Assessment ID may be considered if additional contact information requirements are warranted. The Alternate Responsible Official (ALTERNATE\_RO) column in the Responsible Official Directory is a logical Boolean data type to indicate if the individual is not the Responsible Official.

**Table 4-7 Principal Investigator Directory Table**

Column Name	Description
PI_ID	Primary key principal investigator ID of Principal Investigator Directory table
FNAME	First name of principal investigator
LNAME	Last name of principal investigator
INST_ID	Foreign key to institution_directory table

**Table 4-8 Biosafety Officer Directory Table**

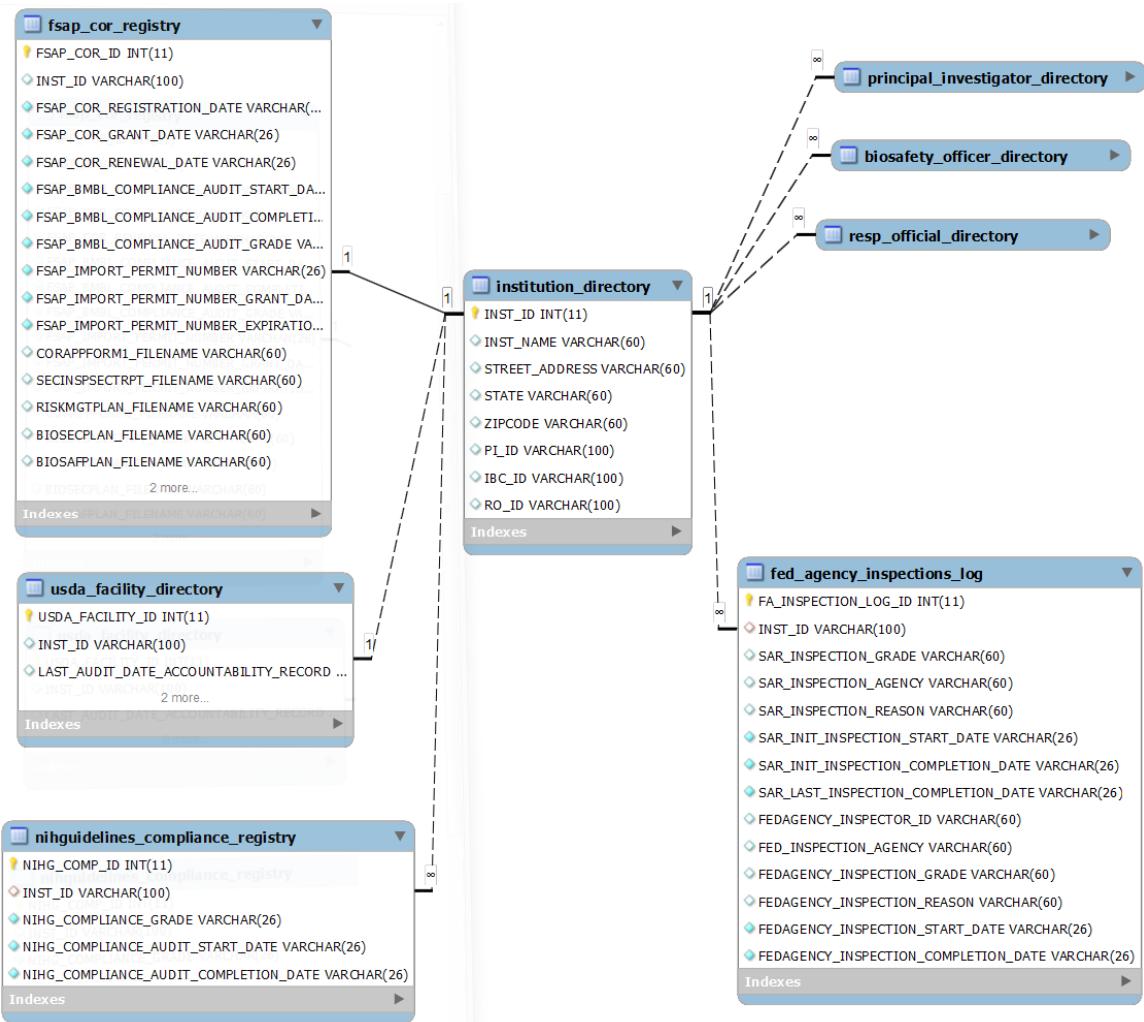
Column Name	Description
BSO_ID	Primary key biosafety officer ID of Biosafety Officer Directory table
FNAME	First name of principal investigator
LNAME	Last name of principal investigator
INST_ID	Foreign key to institution_directory table

**Table 4-9 Responsible Official Directory Table**

Column Name	Description
RO_ID	Primary key biosafety officer ID of Biosafety Officer Directory table
FNAME	First name of biosafety officer
LNAME	Last name of biosafety officer
ALTERNATE_RO	Alternate responsible official
INST_ID	Foreign key to institution_directory table

#### **4.6.2 Federal Biorisk Oversight Database Tables**

The unique entities and non-unique entity instances associated with federal biorisk oversight identified from DSR-IS Phase I artifacts comprise the tables in Figure 4-3. The tables produced from DSR-IS Phase I identifies the four major federal agency oversight functions, which is the Federal Select Agent Program Certificate of Registration Registry (fsap\_cor\_registry table), Federal Agency Inspections Log (fed\_agency\_inspections\_log table), USDA Facility Directory (usda\_facility\_directory table), and conceptual NIH Guidelines Compliance Registry (nihguidelines\_compliance\_registry table). The interrelationship between local and federal biorisk oversight within the BOBSL Registry is implemented by inserting the institution\_directory table to interconnect the tables via the INST\_ID column.



**Figure 4-3 Derived Federal Biorisk Oversight Tables**

The tables representing Federal Select Agent Program Certificate of Registration Registry (Table 4-10), Federal Agency Inspections Log (Table 4-11), USDA Facility Directory (Table 4-13), and conceptual NIH Guidelines Compliance Registry (Table 4-12) reflects the federal oversight entities derived from DSR-IS Phase I artifacts. The data structures of each table focuses on specific areas of biorisk oversight, but extrapolates the attributes of the federal entities associated. The focus area of each table

associated with federal biorisk oversight is discussed, along with a brief explanation of the relevant attributes affording the reporting capabilities to accomplish oversight.

The Federal Select Agent Program Certificate of Registration Registry table depicted in Table 4-10 tracks research institutions subjected to the Select Agent Regulations (SAR). The attributes are grouped to track Certificate of Registration (COR) date and timestamps, *BMBL* compliance, FSAP import permit information, and the documentation, reports and completed forms submitted that granted the COR. The FSAP\_COR\_ID is the primary key that uniquely identifies the population of CORs granted, and the corresponding registered of each COR.

**Table 4-10 FSAP-COR Registry Table**

Column Name	Description
FSAP_COR_ID	Primary key to Federal Select Agent Program-Certificate of Registration Table (FSAP-COR) Registry table
INST_ID	Foreign key to institution_directory table
FSAP_COR_REGISTRATION_DATE	FSAP-COR Registration Date of Registered Entity (Permanent historical date)
FSAP_COR_GRANT_DATE	FSAP-COR Grant Date of Registered Entity (Permanent historical date)
FSAP_COR_RENEWAL_DATE	FSAP-COR Renewal Date of Registered Entity (periodically updated)
FSAP_BMBL_COMPLIANCE_AUDIT_START_DATE	(updated)
FSAP_BMBL_COMPLIANCE_AUDIT_COMPLETION_DATE	FSAP BMBL Compliance Audit Completion Date (periodically updated)
FSAP_BMBL_COMPLIANCE_AUDIT_GRADE	FSAP BMBL Compliance Audit Grade (periodically updated)
FSAP_IMPORT_PERMIT_NUMBER	FSAP Import Permit Number
FSAP_IMPORT_PERMIT_NUMBER_GRANT_DATE	FSAP Import Permit Number Grant Date (periodically updated)
FSAP_IMPORT_PERMIT_NUMBER_EXPIRATION_DATE	FSAP Import Permit Number Expiration Date (periodically updated)
CORAPPFORM1_FILENAME	Certificate of Registration(COR) Application Form-1 Filename
SECINSPECTRPT_FILENAME	Security Inspection Report Filename (submitted with COR Application Form-1)
RISKMGTPPLAN_FILENAME	Risk Management Plan Filename (submitted with COR Application Form-1)
BIOSECPLAN_FILENAME	Biosecurity Plan Filename (submitted with COR Application Form-1)
BIOSAFPLAN_FILENAME	Biosafety Plan Filename (submitted with COR Application Form-1)

The Federal Agency Inspections Log table shown in Table 4-11 augments the Federal Select Agent Program Certificate of Registration Registry table by recording the coordinated efforts of federal agencies to physically inspect or audit the practices of research institutions subjected to the Select Agent Regulations (SAR). The attributes emphasize date and timestamps and implies a grading scale to be implemented, which are represented by SAR\_INSPECTION\_GRADE and FEDAGENCY\_INSPECTION\_GRADE table columns. The implementation of inspections log table is designed to assist multiple federal agencies coordinate their

physical and auditing efforts by affording the start and completion dates, and justifications for site inspection of assets, personnel or biorisk controls. Table columns prefixed with “SAR\_” are associated with either the CDC or USDA-APHIS federal agencies. Columns prefixed with “FED\_” or “FEDAGENCY\_” coordinates the inspection activities of federal agencies aware of the SAR, such as the Department of Transportation, Department of Labor, or Federal Bureau of Investigation that are imposed upon registered research institutions.

**Table 4-11 Federal Agency Inspections Log Table**

Column Name	Description
FA_INSPECTION_LOG_ID	Primary key to Federal Agency Inspection Log Table
INST_ID	Foreign key to institution_directory table
SAR_INSPECTION_GRADE	Select Agent Regulations (SAR) Inspection Grade (Periodically updated)
SAR_INSPECTION_AGENCY	Federal agency conduction SAR inspection on behalf of FSAP (Periodically updated)
SAR_INSPECTION_REASON	Justification of federal agency conducting SAR inspection (Periodically updated)
SAR_INIT_INSPECTION_START_DATE	SAR Initial Inspection Start Date (Permanent historical date)
SAR_INIT_INSPECTION_COMPLETION_DATE	SAR Initial Inspection Completion Date (Permanent historical date)
SAR_LAST_INSPECTION_COMPLETION_DATE	SAR Initial Inspection Completion Date (Periodically updated)
FEDAGENCY_INSPECTOR_ID	Conceptual foreign key identifying the contact information of the person that carried out site inspection on behalf of federal agency (periodically updated)
FED_INSPECTION_AGENCY	Federal agency that is requiring site inspection (periodically updated)
FEDAGECNY_INSPECTION_GRADE	Federal inspection grade (periodically updated)
FEDAGECNY_INSPECTION_REASON	Justification of the federal agency requiring site inspection (periodically updated)
FEDAGECNY_INSPECTION_START_DATE	Federal inspection start date (periodically updated)
FEDAGECNY_INSPECTION_COMPLETION_DATE	Federal inspection completion date (periodically updated)

The NIH Guidelines Compliance Registry table depicted in Table 4-12 acknowledges the *NIH Guidelines* as a separate entity having compliance different

requirements from the *BMBL* and Federal Select Agent Program. The attributes also require establishing a grading scale to measure degree of *NIH Guidelines*, and implements a date and timestamp columns to schedule audits in observing rDNA or human gene transfer experiments. The NIHG\_COMP\_ID is the primary key that uniquely maps the *NIH Guidelines* compliance grade to research institutions linked to its INST\_ID.

**Table 4-12 NIH Guidelines Compliance Registry Table**

Column Name	Description
NIHG_COMP_ID	Primary key to NIH Guidelines Compliance Registry table
INST_ID	Foreign key to institution_directory table
NIHG_COMPLIANCE_GRADE	NIH Guidelines compliance grade
NIHG_COMPLIANCE_AUDIT_START_DATE	NIH Guidelines compliance audit start date
NIHG_COMPLIANCE_AUDIT_COMPLETION_DATE	NIH Guidelines compliance audit completion date

The USDA Facility Directory table represented in Table 4-13 is specific to the Accountability Record entity instance and its subtypes discovered from DSR-IS Phase I. The USDA\_FACILITY\_ID identifies registered entities recognized by USDA-APHIS subjected to the additional BSAT inventory management and record keeping. The INST\_ID column is used to retrieve additional information from the Institution Directory table in use cases where USDA-APHIS is querying the annual audit requirements of a registered entity via the LAST\_AUDIT\_DATE\_ACCOUNTABILITY\_RECORD column.

**Table 4-13 USDA Facility Directory Table**

Column Name	Description
USDA_FACILITY_ID	Primary key to USDA Facility Directory table
INST_ID	Foreign key to institution_directory table
LAST_AUDIT_DATE_ACCOUNTABILITY_RECORD	Last audit date of USDA accountability records (periodically updated)

#### **4.6.3 CBM\_RESEARCH\_PROGRAMS Database Table Augmentation**

The gap analysis between the derived tables from the BWC-CBM reports and Phase I artifacts has identified additional data attributes considered relevant to biorisk oversight. Although the extra data attributes identified could augment tables derived from Phase I artifacts or tables derived from the U.S. BWC-CBM reports, several considerations favored expanding what was afforded by BWC-CBM reporting. Among the tables created from BWC-CBM reports, the CBM\_BIORESEARCH\_PROGRAMS table neither indicated which federal agencies were sanctioning the research nor specify dates when each program was audited. Thus, modifying the data definition of the CBM\_BIORESEARCH\_PROGRAMS table was practical for two reasons. First, inserting fields into the CBM\_BIORESEARCH\_PROGRAMS promotes BWC-CBM awareness to NIH by accommodating to rDNA or human gene transfer research reviewed by the NIH-OBA. Second, recording dates of audits and the federal agency that reviewed the biological research program demonstrates accountability of biological research programs disclosed as BWC-CBM. The additional data attributes are implemented as new fields in the CBM\_RESEARCH\_PROGRAMS table in Figure 4-4 with descriptions of each new field in Table 4-14.

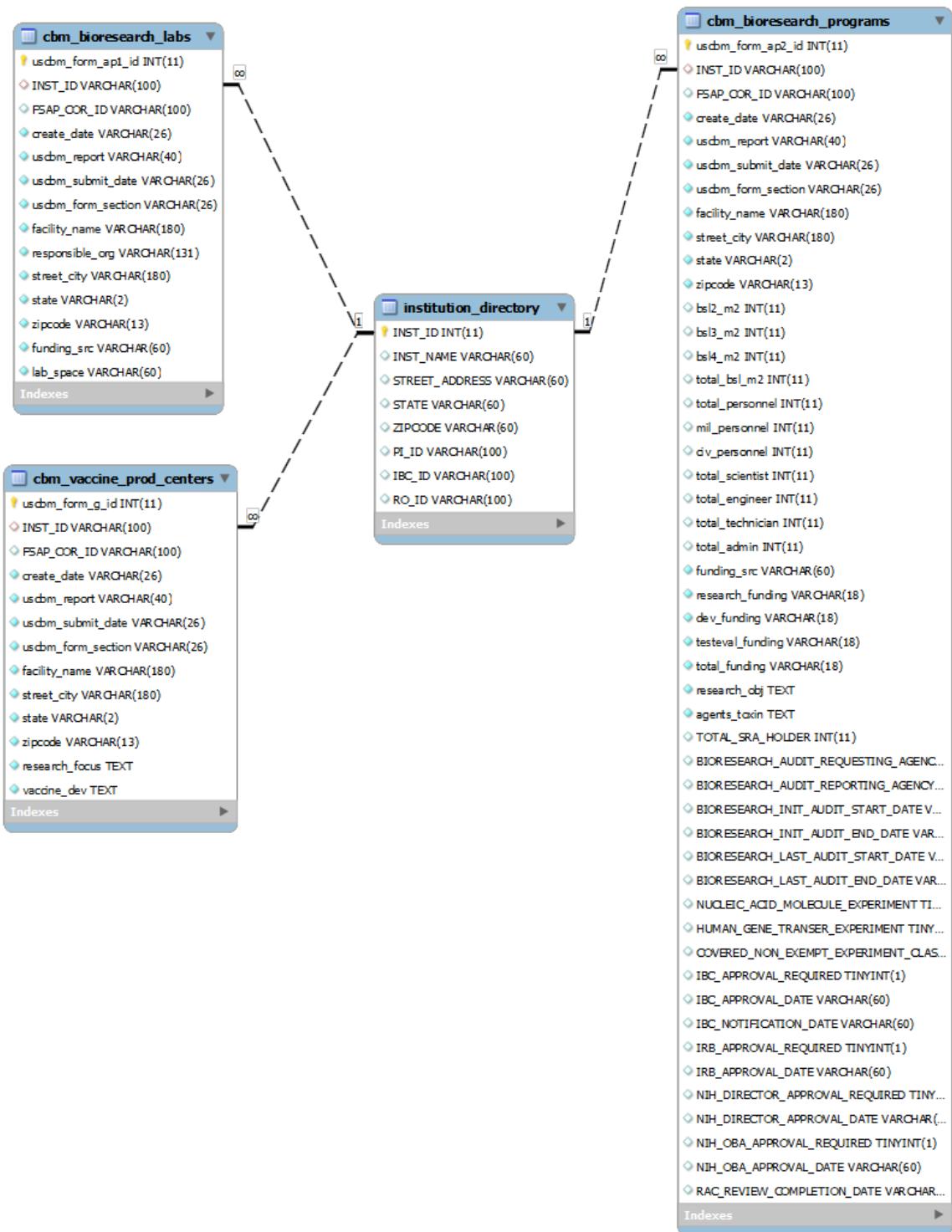


Figure 4-4 Augmented CBM\_BIORESEARCH\_PROGRAMS Table

**Table 4-14 CBM Bioresearch Program Table (Augmented)**

Column Name	Description
uscbm_form_ap2_id	Primary key, unique ID of CBM section A (part II) entry.
INST_ID	Foreign key to institution_directory table.
FSAP_COR_ID	Foreign key to fsap_cor_registry table.
create_date	Date row was inserted into table.
uscbm_report	Name of U.S. BWC-CBM report source.
uscbm_submit_date	Submission date of U.S. BWC-CBM report.
uscbm_form_section	BWC-CBM report section reference.
facility_name	Name of facility or institution; akin to INST_NAME.
street_city	Street and city of facility or institution.
state	State location of facility or institution.
zipcode	Zip code of facility or institution.
bsl2_m2	BSL2 laboratory space (square meters)
bsl3_m2	BSL3 laboratory space (square meters)
bsl4_m2	BSL4 laboratory space (square meters)
total_bsl_m2	Total BSL laboratory space (square meters)
total_personnel	Total personnel disclosed at facility or institution.
mil_personnel	Total military personnel disclosed at facility or institution.
civ_personnel	Total civilian personnel disclosed at facility or institution.
total_scientist	Total scientific personnel disclosed at facility or institution.
total_engineer	Total engineering personnel disclosed at facility or institution.
total_technician	Total technician personnel disclosed at facility or institution.
total_admin	Total administrative personnel disclosed at facility or institution.
funding_src	Funding source of bioresearch program.
research_funding	Research funding disclosed (U.S. dollars).
dev_funding	Development funding disclosed (U.S. dollars).
testeval_funding	Test and evaluation funding disclosed (U.S. dollars).
total_funding	Total funding disclosed (U.S. dollars).
research_obj	Research objective of bioresearch program.
agents_toxin	Biological agents and/or toxins used in bioresearch program.
TOTAL_SRA HOLDER	Total personnel holding active security risk assessment.
BIORESEARCH_AUDIT_REQUESTING_AGENCY	Federal agency requesting the bioresearch program audit
BIORESEARCH_AUDIT_REPORTING_AGENCY	Federal agency reporting the bioresearch program audit findings
BIORESEARCH_INIT_AUDIT_START_DATE	Initial start date of bioresearch program audit (Permanent historical date)
BIORESEARCH_INIT_AUDIT_END_DATE	Initial end date of bioresearch program audit (Permanent historical date)
BIORESEARCH_LAST_AUDIT_START_DATE	Last start date of bioresearch program audit (Periodically updated)
BIORESEARCH_LAST_AUDIT_END_DATE	Last end date of bioresearch program audit (Periodically updated)
NUCLEIC_ACID_MOLECULE_EXPERIMENT	Indicates if bioresearch program involves rDNA research
HUMAN_GENE_TRANSFER_EXPERIMENT	Indicates if bioresearch program involves rDNA research involving human gene transfer testing
COVERED_NON_EXEMPT_EXPERIMENT_CLASS	Indicates whether if bioresearch experiment is a Class I, II, III, VI, or V experiment as defined by the NIH Guidelines
IBC_APPROVAL_REQUIRED	Acknowledges IBC approval
IBC_APPROVAL_DATE	IBC approval date on record
IBC_NOTIFICATION_DATE	IBC notification date on record
IRB_APPROVAL_REQUIRED	Acknowledges IRB approval (if applicable)
IRB_APPROVAL_DATE	IRC approval date on record (if applicable)
NIH_DIRECTOR_APPROVAL_REQUIRED	Acknowledges NIH Director approval (if applicable)
NIH_DIRECTOR_APPROVAL_DATE	NIH Director approval date on record (if applicable)
NIH_OBA_APPROVAL_REQUIRED	Acknowledges NIH-OBA approval (if applicable)
NIH_OBA_APPROVAL_DATE	NIH-OBA approval date on record (if applicable)
RAC REVIEW_COMPLETION_DATE	Recombinant Advisory Committee (RAC) review completion date on record (if applicable)

New column added (database table augmentation)

## **4.7 Conceptual Biorisk Oversight BOBSL Registry**

The conceptual BOBSL Registry is depicted in Figure 4-5 and shows how the artifacts from DSR-IS Phases I-II are implemented as database tables. The top-right corner shows tables directly derived from the U.S. BWC-CBM reports, CBM\_BIORESEARCH\_LABS, CBM\_BIORESEARCH\_PROGRAMS and CBM\_VACCINE\_PROD\_CENTERS reflecting the U.S. BWC-CBM reports. The middle set of tables, PRINCIPAL\_INVESTIGATOR\_DIRECTORY, BIOSAFETY\_OFFICER\_DIRECTORY and RESP\_OFFICIAL\_DIRECTORY implements the local oversight tables produced from the gap analysis between U.S. BWC-CBM reports and Phase I artifacts. The bottom-right corner implements the federal oversight tables determined from the same gap analysis to identify local oversight tables. The INSTITUTION\_DIRECTORY is considered the primary table not afforded by the U.S. BWC-CBM reports, but identified during the gap analysis that would be shared between local and federal entities to perform biorisk oversight. All tables have a conceptual relationship to the INSTITUTION\_DIRECTORY table, which is vital in establishing the BOBSL Registry and are depicted by the dotted lines in Figure 4-5.

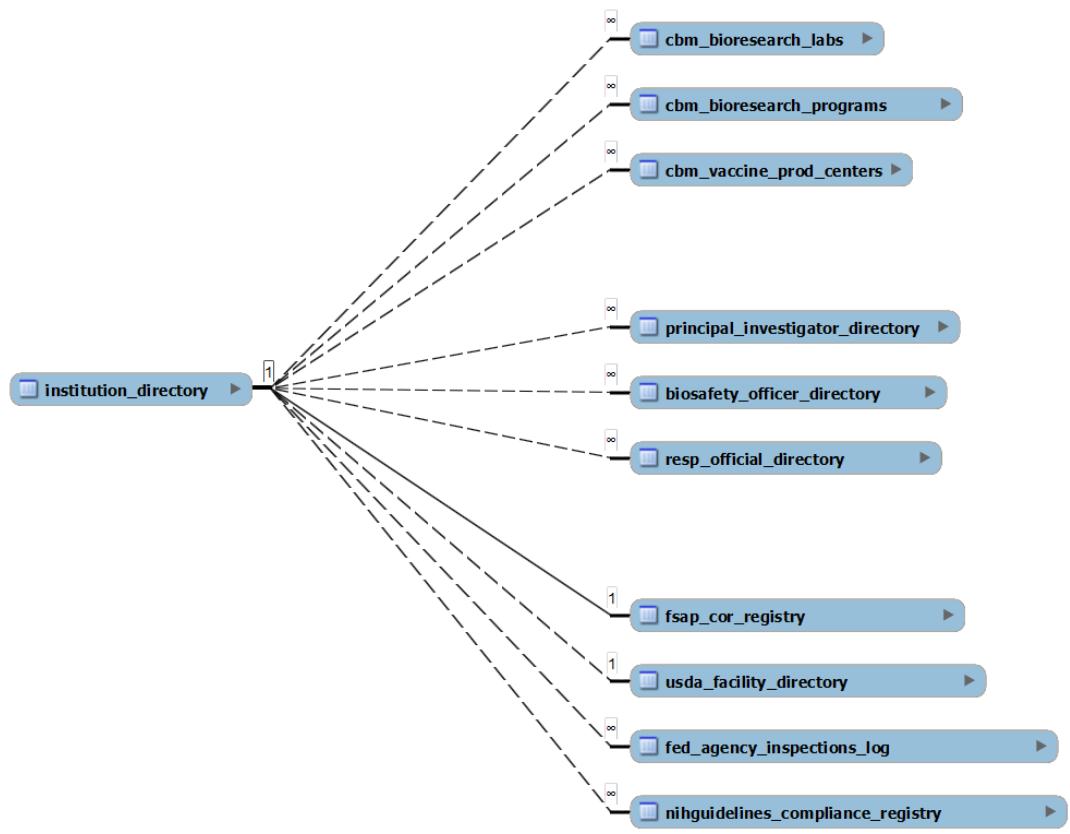


Figure 4-5 Phase II Artifact– formulated notional Biorisk Oversight BSL Registry

## **CHAPTER 5. ANALYSIS OF DSR-IS PHASES I-II ARTIFACTS**

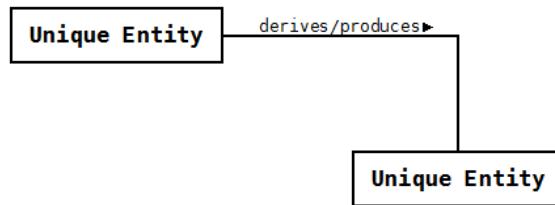
Chapters 3 and 4 provided the underlying interrelationships among the common entity instances and unique entities within the biorisk domains. There are three objectives that will be accomplished by Chapter 5 in analyzing the artifacts produced from Phases I and II. First, the visual discovery of three distinct categories of biorisk oversight entities from Phase I will be presented, and affords the prerequisite context to understand the interrelationships among entities. The second objective makes it clear that the structure and limited content of U.S. BWC-CBM reports are not suitable to assess biorisk oversight by providing noticeable examples relevant to the dissertation, but will not offer an exhaustive list of shortcomings that could be derived from extensive analysis. The final objective considers the flaws from second objective and presents how auditable biorisk oversight metrics, such as date, time, and status fields implemented in the BOBSL Registry artifact not only boost the biorisk oversight of facilities and research programs declared, but also strengthens the credibility of certain confidence building measure (CBM) sections of the U.S. BWC-CBM Reports. The concepts afforded by Chapter 5 provides the foundation to understand the biorisk oversight patchwork map (BOPM) created from DSR-IS Phase III.

### **5.1 DSR-IS Phase I: Unique, Non-Unique and Shared Entities**

The biorisk oversight entities identified by the DSR-IS Phase I artifacts representing federal regulations, biosafety, biosecurity, and the NIH Guidelines may be grouped into three distinct categories. The biorisk oversight entities (persons, objects,

places, or events) captured by the Phase I artifacts are categorized as unique, non-unique or shared, and establishes the foundation of the biorisk oversight patchwork map. Since the idea that every person, object, place, or event could be argued as “unique”, the concepts of the three entity categories are explained from the perspective of hypothetical oversight bodies seeking to understand the complex processes and interrelationships specific to the biosafety and biosecurity controls and practices in life sciences research.

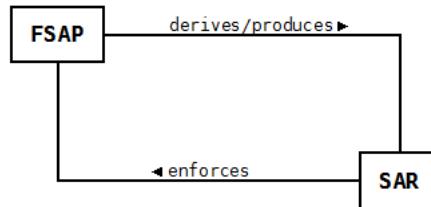
A unique entity is the only person, object, place, or event having specific characteristics, properties, or roles associated with biosafety, biosecurity, or rDNA research. The Phase I artifacts consider specific federal agencies, programs, and regulations explicitly chartered with the oversight of safety, security or funding of research within the life sciences as unique entities. The chief attribute of a unique entity is demonstrated where either tangible or conceptual objects produced by a unique entity inherit the same treatment and is depicted in Figure 5-1.



**Figure 5-1 Unique Entity as Tangible or Conceptual Object**

The concepts of established unique entities and the conceptual or tangible objects produced to derive new or additional unique entities are afforded by examples in Figure

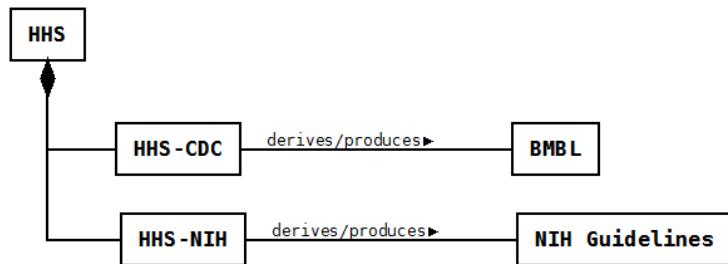
5-2 and Figure 5-3. The Federal Select Agent Program (FSAP) and the applicable Select Agent Regulations (SAR) are jointly managed by the Center for Disease Control and Prevention Division of Select Agents and Toxins (CDC-DSAT) and the USDA Animal and Plant Health Inspection Service (USDA-APHIS). Figure 5-2 demonstrates the FSAP as a unique federal program specific to tracking biological select agents and toxins (BSAT). Likewise, the SAR are a distinct subset of federal regulations enforcing the FSAP on behalf of CDC-DSAT and USDA-APHIS, which are unique federal agency entities. The notion where either tangible or conceptual objects derived or produced by a one or more unique entities inherits the same treatment is evident where the FSAP, a conceptual unique entity, derives the SAR, another conceptual entity.



**Figure 5-2 FSAP and SAR as Conceptual Unique Entities**

The diagram in Figure 5-3 demonstrates the concept of derived unique entities that are tangible. The CDC and National Institutes of Health (NIH) are considered unique federal agencies that produce electronic or hardcopy documents that are openly published and referenced by researchers and laboratory administrators to implement at their institution. Not shown in Figure 5-2 and Figure 5-3 are the dependencies among

unique entities. The SAR exists because its purpose is to enforce the provisions imposed upon research institutions by the FSAP. The *BMBL* and the *NIH Guidelines* are tangible unique entities, but were created by the CDC and the NIH as guidelines for researchers in the life sciences and microbiology.



**Figure 5-3 BMBL and NIH Guidelines as Tangible Unique Entities**

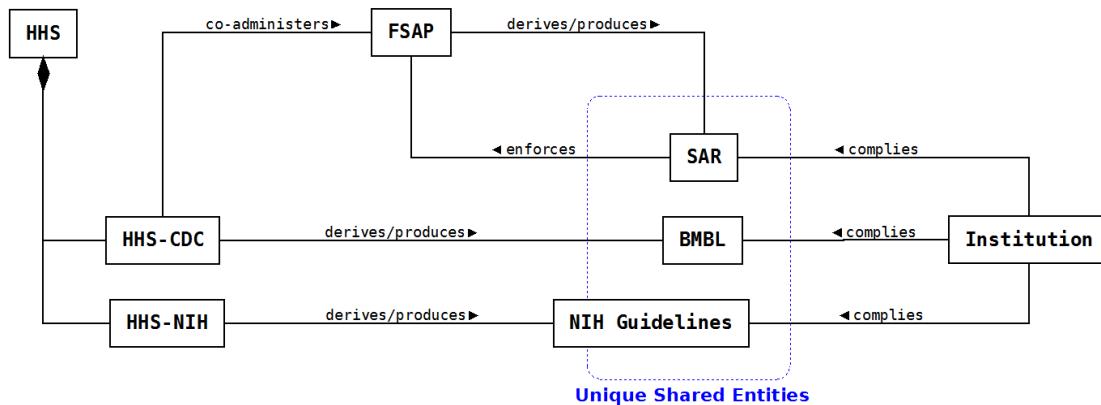
Non-unique entity instances are associated with individual research institutions, and the composition of entities (persons, objects, places, or events) within or about a research institution. The chief characteristic of non-unique entities is evident where its number of occurrences may be created from multiple sources. A research institution (e.g., Institution entity instance) may employ several principal investigators (e.g., Principal Investigator entity instance) via external hiring or internal promotions from current staff. Similarly, each Principal Investigator entity instance may compile multiple Risk Assessment entity instances on behalf of the Institution entity instance over time. The number of occurrences created from multiple sources are bidirectional where many principal investigators will compile risk assessments, and where risk assessments may be compiled by one to many principal investigators employed by an individual research

institution. Following the example, the Federal Select Agent Program is the authoritative unique entity that advises the many non-unique entity instances comprised of research institutions, principal investigators, or risk assessments. Figure 5-3 reinforces the inverse concept where established unique entities, such as the CDC and NIH, may produce additional unique entities, such as the *BMBL* and *NIH Guidelines*. While older versions of the *BMBL* and *NIH Guidelines* exist where one could argue the semantics implying there are multiple instances of each document, the undisputed knowledge that the *BMBL* and *NIH Guidelines* are conceptual unique entities exclusively produced by unique federal agencies, the CDC and NIH, remains intact.

Iterative analysis of the Phase I artifacts discovered a third category, which are shared entities. Identifying the shared entities associated with biorisk oversight, and their purpose partially explains the interrelationships among federal agencies, research institutions, and from research institutions to federal agencies. Unlike an established unique entity or non-unique entity instance, a shared entity is an object or item that is either produced or derived by another entity. In the context of biorisk oversight, the existence and purpose of a shared entity is dependent on its creation by preexisting federal agencies, federal programs, and research institutions. Shared entity objects or items may also inherit the unique, non-unique, tangible, or conceptual attributes of the original entity. Figure 5-4 and Figure 5-5 illustrate the characteristics of unique and non-unique shared entities.

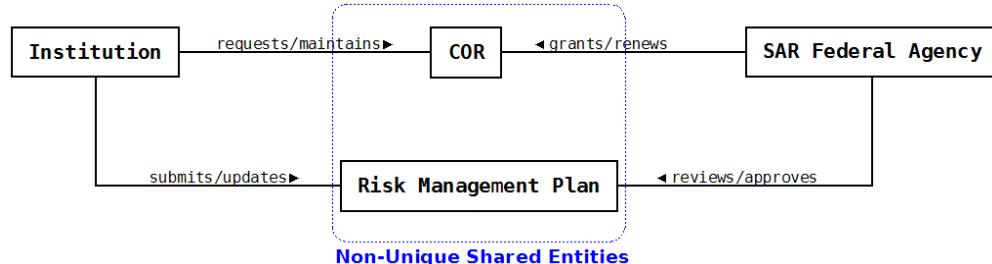
Figure 5-4 continues with the visual examples introduced previously to explain unique shared entities. The SAR is a conceptual shared unique entity imposed upon

research institutions, and derived by the FSAP. Although the interrelationships are different with the FSAP and numerous research institutions, the shared characteristic is evident where the SAR enforces FSAP requirements and research institutions comply with SAR. The SAR is a subset of federal regulations, which are intangible and establishes the conceptual characteristic. The *BMBL* and *NIH Guidelines* are tangible shared entities (e.g., electronic or hardcopy documents) that originate from the CDC and NIH (e.g., unique federal agencies) and acknowledged by research institutions that implement the guidance and procedures set by the federal documents. The tangible characteristics of the *BMBL* and *NIH Guidelines* are inherited by its practical treatment as a physical object, such as a hardcopy document that is shared by researchers in a laboratory or as a deskside manual commonly found inside the offices of principal investigators or biosafety officers.



**Figure 5-4 Examples of Unique Shared Entities**

Figure 5-5 demonstrates the concepts of non-unique shared entities that are acknowledged by both a unique entity, SAR Federal Agency, and a non-unique entity instance, Institution. The Risk Management Plan and Certificate of Registration (COR) are considered non-unique shared entities in biorisk oversight because both objects are derived from many Institution entity instances. For example, a single Institution may have unique COR, but a population of research institutions that possess, use, or transfer regulated BSAT also implies a corresponding number of COR entity instances. This maxim applies to Risk Management Plan entity instances since initial COR application approvals require a vetted Risk Management Plan of the requesting research institution.



**Figure 5-5 Examples of Non-Unique Shared Entities**

The concepts explaining shared entities, such as federal regulations or guidelines, may be considered either tangible or conceptual objects that are acknowledged among unique entities or non-unique entity instances as part of operational processes. In contrast, shared entities that are represented as reportable forms, documents, correspondence, or notification schemes are treated as auditable objects or items that are

passed among or between federal entities and individual research institutions.<sup>499</sup> The biorisk oversight patchwork map (BOPM) in Chapter 6 focuses on the shared entities represented as reportable forms, documents, correspondence, or notification schemes that are passed among or between federal agencies and research institutions to understand the complex interrelationships within biosafety, biosecurity and rDNA research.

## **DSR-IS Phase II: Biorisk Oversight Metrics**

The analysis of the BOBSL Registry artifact affords the final two objectives of Chapter 5, which scrutinizes the incompleteness of the U.S BWC-CBM reports, and then applies the limitations to present how the oversight metrics are implemented in the notional BOBSL Registry could bolster the credibility of certain confidence building measure (CBM) sections in the reports. Unlike the discussion in Chapter 4 that presents the notional BOBSL Registry and the approach to formulate the dependent DSR-IS Phase II artifacts, the knowledge learned from creating Phase I and II artifacts are applied to suggest general content changes and insertion of time-based metrics into the BWC-CBM reports to enhance national biorisk oversight. First, the general shortcomings of the U.S. BWC-CBM reports are described without extensive analysis, but makes the case that additional information is needed if prioritizing biorisk oversight of the declared laboratory facilities and research programs declared. Finally, the concepts of non-unique

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<sup>499</sup> DSR-IS Phase I identified artifacts that are not shared and owned only by the Institution, such as the Facility Inventory of Repository Material and Material Accountability of Experimental Samples. Review of the open source materials suggests that requesting institution-owned artifacts would be invasive. For the purposes in creating the biorisk management patchwork map in Chapter 6, shared artifacts and the notification schemes that reference those artifacts are key.

entity instances, unique and shared entities from Phase I are considered when reanalyzing the sample U.S. BWC-CBM reports to formulate meaningful biorisk oversight metrics that could raise the credibility of the confidence building measure (CBM) entries within the U.S. BWC-CBM Reports.

### **5.1.1 Incompleteness and Limitations of Sample U.S. BWC-CBM Reports**

The approach to analyze published U.S. BWC-CBM reports spanning multiple years from 2011-2013 was intended to afford a larger data sample. Iterative reviews of the U.S. BWC-CBM reports regardless of the year published concluded the structure and content presented offers limited practical data to fully evaluate the biorisk oversight of BSL laboratories disclosed from two observations. First, the structure of the U.S. BWC-CBM reports emphasizes general disclosure and transparency of biological research programs, but presents inconsistent level of detail in its various report sections to correlate perceived interrelationships among CBM entries. Second, revising the BWC-CBM reports by inserting time-based metrics mapped to itemized biorisk oversight criteria is needed to monitor facilities, research programs, and conduct meaningful site inspections. The remainder of this section presents several examples where there are limitations in the BWC-CBM reports, and also suggestions where possible.

The level of detail for individual entries declared under BWC-CBM Section Form A were inconsistent. For example, CBM Form A Part 2 (iii) “Exchanges of information on national biological defence research and development programmes” for facilities asks for the organizational structure and reporting relationships of either the facility or

research program being declared. The high-level organizational structures afforded were noticeably unclear where the functions or purpose of internal departments presented are not explained. Likewise, inconsistencies are observable where not all facilities declared will present reporting relationships. If the reporting relationships are provided for a facility or research program, no notification schemes or explanation of the types of data or information explain their interactions. For example, the content describing "Biological Countermeasures Program in the Science and Technology (S&T) Directorate of the Department of Homeland Security (DHS)" proclaims its reporting relationships with "Collaborating Federal Agencies", "Private Sector", and "Universities", but does not clarify if the reasons for those relationships are different, if the types of data are filtered or restricted, and the origination points of data exchanged.

The funding amounts disclosed under CBM Form A (ii) do not indicate how long the life of a research program will be extended, or how the dollar amounts are prorated in the following fiscal years. Research programs have an age, which implies its existence largely depends on adequate funding. These are practical biorisk oversight metrics where the lack of funding implies a research program may be suspended, terminated, or has ample funds to prolong research efforts. Since there are no CBM reporting requirements for research programs that were terminated via completion or via lack of funding, this oversight gap implies BWC-CBM reports may overlook research programs declared from prior years that were terminated. Equally concerning, there are no points of contact of the declared facilities that would afford auditors or regulatory agencies to inquire about the processes, operations, BSAT inventory, or research programs relevant to biorisk

oversight. Inserting a single point of contact for each facility and research program declared not only adds credibility to the U.S. BWC-CBM report, but also promotes the spirit of BWC compliance by inviting direct inquiries.

The entries captured in CBM Form B in the sample U.S. BWC-CBM reports, “Information on outbreaks of infectious diseases and similar occurrences that seem to deviate from the normal pattern” provides no correlation or link with either the facilities or the biological research programs presented in the U.S. BWC reports. To be sure, the exposures to infectious diseases that could result in outbreaks described in the U.S. BWC-CBM reports needs to reference facility or research programs entries afforded in the BWC-CBM report in the current or previous year. This incompleteness raises many questions, including the possibility that the “causative agents” presented as the source may have come from biosafety or biosecurity breaches from facilities not actually listed in the current U.S. BWC-CBM report.

The entries disclosed CBM Form E, “Declaration of legislature, regulations, and other measures” provides good information on changes and updates to U.S. regulations and legislations relevant to life sciences research. However, a suggestion to improve to the U.S. BWC-CBM reports would be to report on facilities and research programs that have violated those provisions to federal regulations or legislations, and the date entry of the violation. Itemizing federal violations linked to the declared entries in the U.S. BWC-CBM reports not only affords tracking of the offending facilities and research programs in subsequent years, but also imposes pressure to ensure federal regulations aligned with BWC-CBM are enforced. Two time-based metrics could be the month and

year, such as 6/2013, to report dates indicating when the violation was recorded, and when the violation was corrected or considered resolved by the inspecting agency.

The repetitive entries presented each year for research institutions and laboratories previously reported compounds the inefficiencies and incompleteness of the BWC-CBM content. For example, repetitive annual reporting of the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) and Viral Immunology Center – National B Virus Resource Laboratory were found consistent under CBM Form A, Part 1(i) for U.S. BWC-CBM from 2011-2013. The annual declaration of previously reported facilities and research programs are understandable and satisfies the BWC-CBM reporting requirement, but contributes in the bulkiness of the report content. A suggestion to insert a section of the U.S. BWC-CBM reports that distinguishes new from previously reported facilities would draw attention to facilities never reported, and boosts the intent of BWC compliance when an explanation for its inclusion is afforded in the year reported.

Incompleteness of the BWC-CBM content is noticeable where declared facilities listed are knowingly excluding public known research facilities. For example, the National Center for Biodefense and Infectious Diseases (NCBID) at George Mason University is rated at BSL-3/ABSL-3 containment and collaborates with the U.S. Army Medical Research Institute and Infectious Diseases (USAMRIID). Further review of the GMU NCBID website indicates a Certificate of Registration (COR) was granted by the Federal Select Agent Program (FSAP) on February 27, 2012 and should have been reported as a "new" facility in either the U.S. BWC-CBM 2012 or 2013 reports. Interestingly, a review of the adjunct faculty members indicates current employment with

federal biomedical research laboratories (BRL), such as USAMRIID, thus calling into question the personnel headcount metrics provided by the U.S. BWC-CBM reports. For example, a researcher at a federal BRL could conceivably be declared as a researcher at a university BRL, which overstates the number of unique individuals accessing BSAT.

Creation of the DSR-IS Phase I artifacts emphasized identifying the visual interrelationships among unique and non-unique instances associated, which revealed the prevalent roles of the NIH, CDC, and USDA towards research institutions. Although the sample U.S. BWC-CBM reports declare facilities and research programs associated with the aforementioned federal agencies, the timeliness and accuracy of the data is called into question for the reported year. Since BWC-CBM reports are submitted annually, ensuring up-to-date CBM entries for the reported year are settled by inserting dates indicating when the data was confirmed from either the HHS, USDA, or federal agency sponsoring the research program. For example, none of the CBM Form sections provide indicators describing when any of the separate entries for each CBM section was last updated. Federal agencies outside the HHS and USDA, such as USAMRIID reported total BSL-4 laboratory space 1093 m<sup>2</sup> in 2011, 1186 m<sup>2</sup> in 2012, and 1186 m<sup>2</sup> in 2013 to disclose the increase in BSL-4 m<sup>2</sup> after 2011. A section that concisely summarizes year-to-year changes in information of previously reported facilities would streamline the U.S. BWC-CBM report. The practice of recording date and time stamp entries affords auditable entries to inquire about changes or modifications made to published or shared

reports and is observable in professional disciplines, such as network management and cybersecurity operations.<sup>500</sup>

### **5.1.2 Continuous Oversight and Time-Based Table Columns**

The previous established the shortcomings of the structure and content of U.S. BWC-CBM reports by pointing out examples incompleteness, lack of data correlation among entries presented in multiple CBM Form sections, and suggested how the entries and content structure afforded could enhance biorisk oversight. The concepts learned from Phase I describing whether entities are unique, non-unique, or shared were revisited post-creation of Phase II artifacts, and reanalysis of the sample U.S. BWC-CBM reports. The remainder of the chapter expands on the concepts of shared entities previously introduced, but explains how auditable oversight metrics, such as date, time, and status fields implemented in the BOBSL Registry artifact would be considered shared attributes of entries declared in the BWC-CBM reports. The objective in discussing the insertion of time-based metrics specifically linked to an individual facility or research program declared in the U.S. BWC-CBM reports not only affords external regulatory and inspecting agencies to confirm dates of resolution relevant to biorisk oversight, but also strengthens the credibility of certain confidence building measure (CBM) sections of the U.S. BWC-CBM Reports submitted to the United Nations.

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<sup>500</sup> The author is an IT professional with experience exceeding 20 years developing, integrating, and supporting distributed hardware and software solution for the USG and the private sector, and has specific expertise with network management, cybersecurity operations, endpoint security, virtualization, and data center infrastructure.

The need to implement shared entity attributes as specialized columns of the derived BOBSL Registry tables reflects the incompleteness of the U.S. BWC-CBM reports. Unlike the CBM Form sections in the BWC-CBM reports that emphasize declaration of facilities, research programs, and national efforts demonstrating BWC compliance, the activities associated with biorisk oversight are inherently a continuous process by federal agencies (e.g., unique entity) and individual research institutions (e.g., non-unique entity instance). Thus, categorizing the entity types as unique, non-unique, or shared is the foundation in understanding the architecture of the BOBSL Registry. For Phase I artifacts, the entity categories are implemented where individual research institution oversight tables represent non-unique entity instances, and the federal biorisk oversight tables reflect unique entities. The shared entity tables from Phase I also inherently represent the unique federal oversight entities, which were the fsap\_cor\_registry, nihguidelines\_compliance\_registry, and fed\_agency\_inspections\_log tables. Similar to the Phase I artifacts that bundle unique and share entity table to align with federal biorisk oversight, all derived tables from the BWC-CBM reports are considered unique and shared entities. To be sure, the sample U.S. BWC-CBM reports are considered one of a kind since a single version is submitted to the United Nations each year, and is shared to all countries participating in the international Biological and Toxin Weapons Convention (BWC). Table 5-1 summarized the tables that comprise the BOBSL Registry (DSR-IS Phase II), which identifies unique/shared entity tables and non-unique entity instance tables.

**Table 5-1 Mapping of Oversight Metrics to Time-Based Table Columns**

BMBSL Registry Table (DSR-IS Phase II)	Data Source to Derive	Entity Category	Shared Attributes (Time-Based Table Columns)	Table Reference for Description
cbm_bioresearch_labs	U.S. BWC-CBM sample reports	Unique/Shared Entity	create_date uscbm_submit_date	Table 4-2
cbm_bioresearch_programs	U.S. BWC-CBM sample reports	Unique/Shared Entity	create_date uscbm_submit_date BIORESEARCH_INIT_AUDIT_START_DATE BIORESEARCH_INIT_AUDIT_END_DATE BIORESEARCH_LAST_AUDIT_START_DATE BIORESEARCH_LAST_AUDIT_END_DATE IBC_APPROVAL_DATE IBC_NOTIFICATION_DATE IRB_APPROVAL_DATE NIH_DIRECTOR_APPROVAL_DATE NIH_OBA_APPROVAL_DATE RAC REVIEW COMPLETION DATE	Table 4-14
cbm_vaccine_prod_centers	U.S. BWC-CBM sample reports	Unique/Shared Entity	create_date uscbm_submit_date	Table 4-4
fsap_cor_registry	DSR-IS Phase I	Unique/Shared Entity	FSAP_COR_REGISTRATION_DATE FSAP_COR_GRANT_DATE FSAP_COR_RENEWAL_DATE FSAP_BMBL_COMPLIANCE_AUDIT_START_DATE FSAP_BMBL_COMPLIANCE_AUDIT_COMPLETION_DATE FSAP_IMPORT_PERMIT_NUMBER_GRANT_DATE FSAP_IMPORT_PERMIT_NUMBER_EXPIRATION_DATE	Table 4-10
fed_agency_inspections_log	DSR-IS Phase I	Unique/Shared Entity	SAR_INIT_INSPECTION_START_DATE SAR_INIT_INSPECTION_COMPLETION_DATE SAR_LAST_INSPECTION_COMPLETION_DATE FEDAGENCY_INSPECTION_START_DATE FEDAGENCY_INSPECTION_COMPLETION_DATE	Table 4-11
nihguidelines_compliance_registry	DSR-IS Phase I	Unique/Shared Entity	NIHG_COMPLIANCE_AUDIT_START_DATE NIHG_COMPLIANCE_AUDIT_COMPLETION_DATE	Table 4-12
usda_facility_directory	DSR-IS Phase I	Unique/Shared Entity	LAST_AUDIT_DATE_ACCOUNTABILITY_RECORD	Table 4-13
institution_directory	DSR-IS Phase I	Non-Unique Entity Instance	None	Table 4-6
principal_investigator_directory	DSR-IS Phase I	Non-Unique Entity Instance	None	Table 4-7
biosafety_officer_directory	DSR-IS Phase I	Non-Unique Entity Instance	None	Table 4-8
resp_official_directory	DSR-IS Phase I	Non-Unique Entity Instance	None	Table 4-9

The data extracted from the sample U.S. BWC-CBM reports affords several metrics relevant biorisk oversight, such as square footage of lab space for the different BSL facilities, occupational categories explaining the number of personnel at a facility (e.g., researcher, engineer, or administrative staff), funding sources, and the biological research program. However, the limited data extracted from the U.S. BWC-CBM reports were inadequate to architect a notional BOBSL Registry that necessitates time-based metrics relevant to biorisk oversight. For example, the first entry in Table 5-1 presented “create\_date” and “uscbm\_submit\_date” as time-based table column attributes of the

cbm\_bioresearch\_labs table that not were afforded in the sample BWC-CBM reports.

The graphic in Figure 5-6 recognizes biorisk oversight as a shared responsibility that is continuous, and warrants the insertion of time-based metrics. The example in Figure 5-1 would afford biorisk oversight analysts the capability to analyze time-based attributes of a research institution (e.g., “facility\_name”), such as initial disclosure date into BWC-CBM reports, missing submission date gaps into BWC-CBM reports, or historical comparisons of disclosed research institutions each year.

**Time-Based Metrics**

```
22 • use biodj;
23 • select * from cbm_bioresearch_labs;
24 • desc cbm_bioresearch_labs;
25 • select distinct uscbm_submit_date, create_date, facility_name, responsible_org, funding_src from cbm_bioresearch_labs;
```

uscbm_submit_date	create_date	facility_name	responsible_org	funding_src
April 15, 2011	August 29, 2015	Viral Immunology Center - National B Virus Resource Laboratory	Georgia State University	U.S. Department of Defense (DOD)
April 15, 2011	August 29, 2015	Viral Immunology Center - National B Virus Resource Laboratory	Georgia State University	National Institutes of Health (NIH)
April 15, 2011	August 29, 2015	Viral Immunology Center - National B Virus Resource Laboratory	Georgia State University	Georgia Research Alliance
April 15, 2011	August 29, 2015	The Betty Slick and Lewis J. Mooman Jr. Laboratory Complex - Department of Viral Immunology	Southwest Foundation for Biomedical Research	National Institutes of Health (NIH)
April 15, 2011	August 29, 2015	The Betty Slick and Lewis J. Mooman Jr. Laboratory Complex - Department of Viral Immunology	Southwest Foundation for Biomedical Research	U.S. Department of Defense (DOD)
April 15, 2011	August 29, 2015	The Betty Slick and Lewis J. Mooman Jr. Laboratory Complex - Department of Viral Immunology	Southwest Foundation for Biomedical Research	U.S. Department of Homeland Security (DHS)
April 15, 2011	August 29, 2015	The Betty Slick and Lewis J. Mooman Jr. Laboratory Complex - Department of Viral Immunology	Southwest Foundation for Biomedical Research	Private Sector Companies
April 15, 2011	August 29, 2015	The Betty Slick and Lewis J. Mooman Jr. Laboratory Complex - Department of Viral Immunology	Southwest Foundation for Biomedical Research	Private Donors
April 15, 2011	August 29, 2015	Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory	The University of Texas Medical Branch	National Institutes of Health (NIH)
April 15, 2011	August 29, 2015	Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory	The University of Texas Medical Branch	U.S. Department of Homeland Security (DHS)
April 15, 2011	August 29, 2015	Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory	The University of Texas Medical Branch	U.S. Department of Defense (DOD)
April 15, 2011	August 29, 2015	Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory	The University of Texas Medical Branch	U.S. Department of Energy (DOE) / Pharmaceutical
April 15, 2011	August 29, 2015	Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory	The University of Texas Medical Branch	Private Foundations
April 15, 2011	August 29, 2015	Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory	The University of Texas Medical Branch	U.S. Department of Agriculture (USDA) / University
April 15, 2011	August 29, 2015	Plum Island Animal Disease Center (PIADC) Declared in accordance with Form A ...	U.S. Department of Homeland Security Science and Technology Directorate	U.S. Department of Homeland Security (DHS)
April 15, 2011	August 29, 2015	Plum Island Animal Disease Center (PIADC) Declared in accordance with Form A ...	U.S. Department of Homeland Security Science and Technology Directorate	U.S. Department of Agriculture (USDA)
April 15, 2011	August 29, 2015	U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) Declared...	U.S. Army Medical Research and Materiel Command	U.S. Department of Defense (DOD)
April 15, 2011	August 29, 2015	CDC Office of Infectious Diseases (OID) Declared in accordance with Form A P...	Centers for Disease Control and Prevention	U.S. Department of Health and Human Services
April 15, 2011	August 29, 2015	CDC Office of Infectious Diseases (OID) Declared in accordance with Form A P...	Centers for Disease Control and Prevention	U.S. Department of Health and Human Services
April 15, 2011	August 29, 2015	CDC Office of Infectious Diseases (OID) Declared in accordance with Form A P...	U.S. Department of Homeland Security (DHS)	U.S. Department of Homeland Security (DHS)

**Figure 5-6 Time-Based Metrics Implementation in BOBSL Registry**

Since the sample BWC-CBM reports did not provide time-based metrics, the approach to link database tables derived from the sample BWC-CBM reports with database tables derived from Phase I artifacts was sensible. In this way, the shared

attributes identified from the Phase I artifacts could identify declared entries within tables derived from the sample BWC-CBM reports. The example time-based table columns in Figure 5-7 representing “COR ID”, “COR Registration Date”, “COR Grant Date”, “COR Renewal Date”, “BMBL Compliance Audit Start Date”, and “BMBL Compliance Audit End Date” were necessary to examine specific research institutions via “Institution ID” as part of the continuous biorisk oversight process.

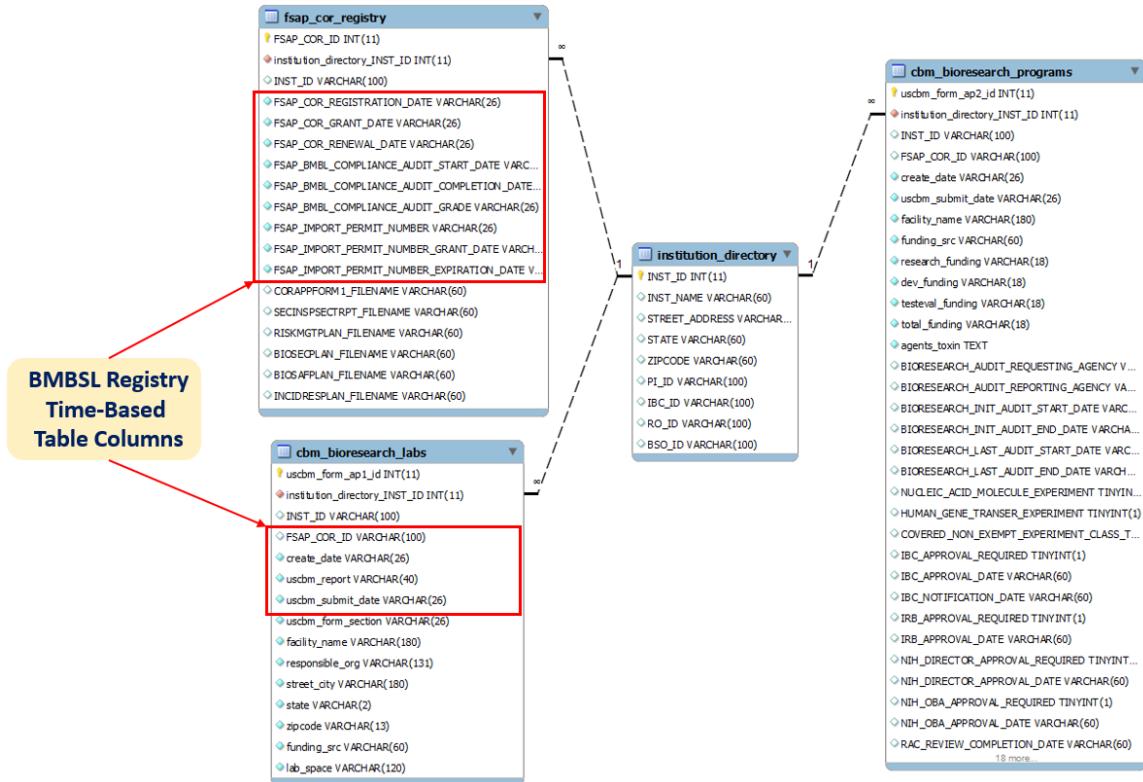


Figure 5-7 Biorisk oversight -- Example Correlation of BOBSL Registry Tables

The example from Figure 5-7 depicts the continuous biorisk oversight metrics to track the registration, grant, and renewal dates for the Federal Select Agent Program (FSAP) Certification of Registration (COR), or inspection dates and inspection grades by federal agencies to examine compliance for research institutions. The relational joins between BOBSL Registry tables derived from sample BWC-CBM reports and Phase I artifacts would empower analysts to study time gaps, such as the date when a research institution was initially granted the COR versus the date the institution was first declared in the U.S. BWC-CBM report.<sup>501</sup> This type of analysis is not afforded by examining the U.S. BWC-CBM reports without consulting CDC or USDA-APHIS.

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<sup>501</sup> Relational joins are specific to relational database management systems (RDBMS) where “joins” are implemented via the columns from multiple tables as “foreign keys” to return rows from “joined tables” that match SQL filtering criteria.

## **CHAPTER 6. DSR-IS PHASE III**

Chapter 6 presents findings of DSR-IS Phase III, and applies the knowledge learned from analyzing the DSR-IS artifacts created from Phases I-II. The concepts describing entities that are unique, non-unique or shared are organized to understand the reporting requirements imposed by federal agencies, and follows the data and notification schemes among and between individual research institutions and federal agencies involved with biorisk oversight. This approach afforded creation of the Biorisk Oversight Patchwork Map (BOPM) during DSR-IS Phase III, which is the original design artifact motivating the dissertation research. The BOPM categorizes the roles of the federal government agencies involved with biorisk management, and identifies the notional data represented as shared artifacts to enhance national biorisk oversight. There are two major objectives of Chapter 6 afforded to appreciate the contributions of DSR-IS Phase III and the original BOPM artifact produced. First, the methodology carried out will provide a high-level overview describing the how the accumulated DSR-IS artifacts were examined to create the BOPM. Finally, the architecture the BOPM will be presented by reintroducing the relevant DSR-IS artifacts from Phase I and the associated shared entities as a set of specialized biorisk oversight tables representing federal regulations and guidelines, biosafety, biosecurity, and the *NIH Guidelines*.

## **6.1 DSR-IS Phase III Artifact Overview**

DSR-IS Phase III exemplifies the spirit of design science by introducing an original artifact, which is the biorisk oversight patchwork map (BOPM) representing the centerpiece of the dissertation. The BOPM categorized the elements of biorisk management afforded by the DSR-IS artifacts created, and maps the shared entities applied by federal agencies with their corresponding general oversight functions. The shared entities afford the minimum notional data to observe biorisk, and were identified as original or derived entities from Phases I and II before correlation with the oversight functions of federal agencies. The notional BOPM artifact is intended to consolidate the technical and data requirements to design a shared national biorisk oversight model that is conceptualized by federal agencies, but never implemented.

### **6.1.1 Phase III Artifacts Produced**

Phase III produced several federal agency oversight tables that collectively comprise the BOPM. The federal agencies accountable for biorisk management and the corresponding shared entities afford the reportable data to increase oversight visibility of the relevant federal regulations and guidelines, biosafety, biosecurity, and the NIH Guidelines that describe the BOPM artifact. Iterative analysis established the logical mapping between shared entities, biorisk oversight objectives, and federal agency roles to prescribe the data requirements to develop the BOPM artifact. Each iteration of analysis examined the visual UML decomposition and activity artifacts created from DSR previous phases to identify the shared entities that were either aligned with an oversight

role, or considered relevant to auditing and regulatory bureaus. To be sure, the tables comprising the BOPM artifact were populated by itemizing the applicable shared entities associated with biorisk regulations or guidelines, biosafety, biosecurity, and the *NIH Guidelines* from DSR-IS Phases I and II, and then subsequently mapping the oversight functions of the federal agencies consistent with the visual interrelationships depicted from Phase I artifacts. The design of the BOPM artifact will deliberately afford ample details to invite information systems researchers and engineers to untangle the functional dependencies of reportable data needed to architect a business intelligence solution that affords proof of concept or mock national biorisk oversight reports.

### **6.1.2 Phase III Activities**

DSR-IS Phase III comprised three major activities to develop the BOPM artifact. The first activity subsequently applied the concepts learned from Phases I and II to group the entities as unique, non-unique, or shared entity categories. The comprehensive listing of shared entities was further categorized as either conceptual or tangible shared entities. Conceptual shared entities are referenced or acknowledged by federal agencies and research institutions. In contrast, tangible shared entities are reportable objects that passed or modified when passed among or between federal agencies and research institutions. The first activity also tracked which DSR-IS artifacts reference each shared entity, and the corresponding federal oversight entities. The second activity groups the comprehensive listing of shared entities by the DSR-IS artifacts to create the initial BOPM tables. The specialized BOPM tables were established, but not yet populated with

row entries. The processes in the second activity presents the structure of the BOPM artifact as four tables, which are “Shared Entities - Federal Regulations and Guidelines”, “Shared Entities – Biosafety”, “Shared Entities – Biosecurity”, and “Shared Entities – NIH Guidelines and rDNA Research”.

The final activity involved repetitive analysis of the Phase I and Phase II artifacts. The objective of the final activity is to initially populate each of the BOPM tables, and then repeat additional analysis cycles to ensure the shared entities listed for each table row referenced the applicable oversight entities. Each itemized shared entity was reviewed by examining the DSR-IS artifact figure number to map the associated oversight entities, the interrelationships with other shared entities, federal agencies, or research institutions. The iterative analysis was considered critical since biorisk oversight objectives, oversight functions of the federal agencies, and placement of the shared entities describing its purpose were superimposed to evaluate consistency between previous DSR-IS Phases and BOPM table row entries. This process of critical and crosschecking analysis was repeated for all shared entities, both conceptual and tangible, for each table comprising the BOPM artifact.

### **6.1.3 Phase III Data, Tools or Technologies Employed**

DSR-IS Phase III employed artifacts accumulated from previous phases, such as entity instance and UML activity diagrams to understand the interrelationships (Phase I), the gap analysis and derived tables comprising the notional BOBSL Registry (Phase II),

and application of the concepts that identify shared entities applicable to the BOPM. The federal agencies involved with biorisk oversight are linked by the shared entities captured from DSR artifacts produced, and confirmed by reviewing additional open source literature as needed. Aside from a licensed Microsoft Excel 2013 software application, no other special software or tools were employed. The attributes of shared entities and roles of federal oversight entities were correlated manually with Phase I and II artifacts, and had undergone between 36 to 40 iterative analysis cycles before finalizing the BOPM.<sup>502</sup> A visual review of each artifact in Phases I and II to reconcile all entries that populate the BOPM tables is counted as one iteration.

## **6.2 Architecture of Biorisk Oversight Patchwork Map (BOPM)**

The Biorisk Oversight Patchwork Map (BOPM) is comprised of four tables reflecting the DSR-IS artifacts produced from Phases I and II, and the analysis afforded in Chapter 5. Thus, each BOPM table focuses on specific biorisk oversight objectives, which reflect the relevant federal regulations and guidelines (Table 6-1), biosafety (Table 6-2), biosecurity (Table 6-3), and the *NIH Guidelines* (Table 6-4). The tables reference the applicable entity and UML diagram artifacts created from Phase I, entity attributes from Phase II (e.g., represented as columns from BOBSL Registry tables), and placement of the shared entities between federal agencies and individual research institutions. The

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<sup>502</sup> Microsoft Excel 2013 and previous versions allows implementing Visual Basic Extensibility (VBE) software objects. VBE is a supported built-in application programming interface (API) to customize Microsoft Office software, such as customizing Excel worksheets to create macros that correlate counting the number of times a file is read with the number of times a cell is added, updated, or deleted.

BOPM applies the concepts from Chapter 5 to identify conceptual and tangible shared entities learned from the federal regulations and guidelines, biosafety, biosecurity, and the *NIH Guidelines*. To be sure, the artifacts created from previous DSR-IS phases are tightly coupled, and allows the BOPM to not only identify shared entities, but also understand how each shared entity is considered or applied among the relevant federal agencies (e.g., unique entity) and research institutions (e.g., non-unique entity instances).

Interpreting the BOPM is afforded by Figure 6-1, which explains the table structure by listing each column name and a brief description outlining its purpose. The “DSR-IS artifact” column name maps the applicable artifacts from Phase I whereas the “Shared Entity” column applies the concepts inspired from Phase II and analyzed in Chapter 5 to understand the interrelationships among and between federal agencies and research institutions. The design of the BOPM emphasizes mapping shared entities and accountable entities by general biorisk oversight objectives. The corresponding DSR-IS artifact for each table row empowers readers to review the interrelationships of the involved federal agencies and research institutions that handle or consider the shared entities.

BMPM Column Name	Description
DSR-IS Artifact	The diagram referenced by the figure number. For example, 3-30 indicates the DSR-IS artifact represented by Figure 3-30 in the dissertation.
Caption	Caption label of the DSR-IS artifact, which is linked to the figure number.
Shared Entity	The conceptual or tangible entity that is either acknowledged or shared between a unique entity (e.g., federal agency and its derived entities) and non-unique entity instance (research institution and its derived entities).
Oversight Entity	The primary oversight entity employing the shared entity to carry out oversight functions. In most cases, the BMPM considers federal oversight as primary, but will list non-unique research institution entities if federal oversight is secondary.
Biorisk Management Oversight Objective	Brief description indicating the role of the shared entity, and how the primary oversight entities employ the shared entity carry out biorisk management.

**Figure 6-1 Table Column Descriptions of BOPM**

An example explaining how to use the BOPM is presented in Figure 6-2 and Figure 6-3. The general interpretation for any BOPM table row will be: “The **Biorisk Oversight Objective** involves **Shared Entities**, which are monitored by **Oversight Entity** where their interrelationships may be visualized by **DSR-IS Artifact**.” The example entry in Figure 6-2 indicates five shared entities mapped to four primary oversight entities representing federal agencies or federal programs. The “\*\*” prepended to the Select Agent Regulations shared entity as “\*\*SAR” indicates the entity is conceptual, and is acknowledged by federal agencies and research institutions. Therefore, translating the example entry in Figure 6-2 expresses the general statement as:

*“Federal Select Agent Program (FSAP) and BMBL compliance of research institutions subjected to SAR requires a Certificate of Registration (COR), Registration Application Form-1, Risk Management Plan, and Security Inspection Report, which are monitored by the CDC Division Select Agents and Toxins (CDC-DSAT) and USDA Animal and Plant*

*Health Inspection Service (USDA-APHIS) where their interrelationships may be visualized by DSR-IS Artifact Figure 3-30.”*

DSR-IS Artifact	Caption	Shared Entity	Oversight Entity (Unique Entity / Non-Unique Entity Instance)	Biorisk Oversight Objective
<b>DSR-IS Biosecurity Artifacts</b>				
3-30	Certificate of Registration Request/Review Interrelationships	**SAR Certificate of Registration, Registration Application Form-1 Risk Management Plan Security Inspection Report	FSAP HHS-CDC CDC-DSAT USDA-APHIS	FSAP and BMBL compliance.  Federal review of individual research institutions registering into the FSAP to be subjected to SAR.

**Figure 6-2 BOPM Shared Entity Example**

The visual diagrams reinforce learning the dependent interrelationships among federal agencies and research institutions when a shared entity is initially referenced, and is followed by examining the relevant DSR-IS artifact referenced on each BOPM table row. The graphic in Figure 6-3 continues with example from Figure 6-2, and is provided to understand the visual placement and purpose of the shared entities by examining the high-level biorisk oversight objective. In this case, the DSR-IS Phase I artifact referenced is Figure 3-30, which is annotated in Figure 6-3 to point out the placement of shared entities relative to federal agencies and research institutions. As can be seen from the example, Institution either requests or maintains a COR, complies with the SAR, and either submits or updates the remaining shared entities. Not shown in Figure 6-3 are the specific federal agencies, HHS-CDC and USDA-APHIS, which are derived from SAR Federal Agency. In contrast, the SAR Federal Agency representing either HHS-CDC or

USDA-APHIS either grants or renews the COR, administers the SAR, and reviews and approves the remaining shared entities.

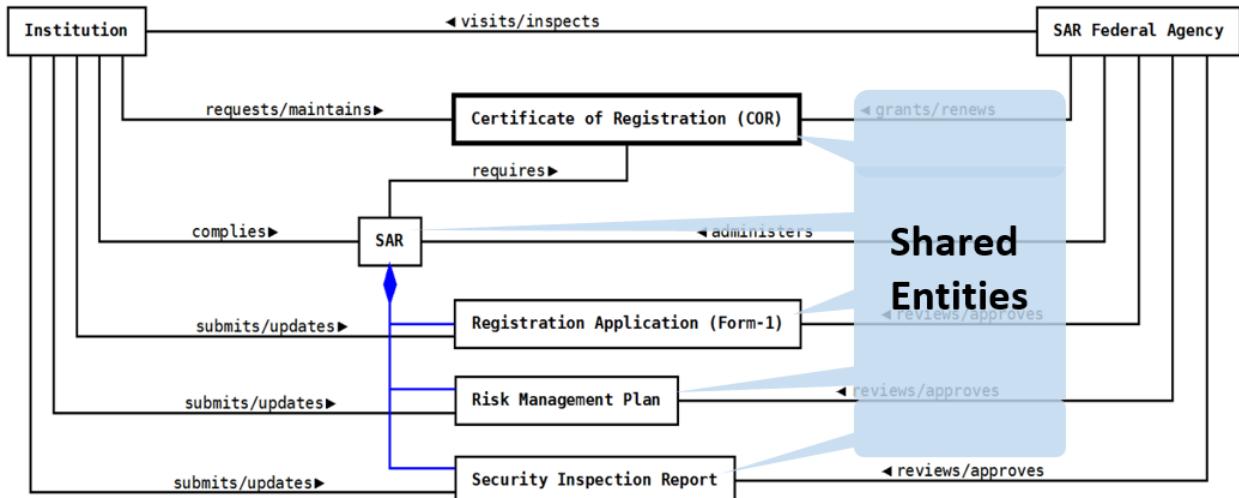


Figure 6-3 Shared Entities Identified by DSR-IS Artifact (e.g., Figure 3-30)

The BOPM also maps back to specialized tables in the BOBSL Registry (Phase II) to not only record historical compliance and inspection findings of research institutions, but also implements the periodic review tracking that characterizes biorisk oversight as a continuous practice. The “Biorisk Oversight Objective” column in Figure 6-2 indicates “FSAP and BMBL compliance” by which the BOBSL Registry affords the time-based columns introduced in Table 5-1. Continuing with the example started by Figure 6-2, the time-based columns implemented in the `fsap_cor_registry` and `fed_inspections_log` tables afford the time-based metrics implied by the “FSAP and BMBL compliance” biorisk oversight objective. The example workflow process

described to map biorisk oversight objectives that necessitate periodic review (e.g., time-based metrics) as prescribed in the BOPM is depicted in Figure 6-4.

DSR-IS Artifact	Caption	Shared Entity	Oversight Entity (Unique Entity / Non-Unique Entity Instance)	Biorisk Oversight Objective
<b>DSR-IS Biosecurity Artifacts</b>				
3-30	Certificate of Registration Request/Review Interrelationships	**SAR Certificate of Registration, Registration Application Form-1 Risk Management Plan Security Inspection Report	FSAP HHS-CDC CDC-DSAT USDA-APHIS	FSAP and BMBL compliance. Federal review of individual research institutions registering into the FSAP to be subjected to SAR.

**Table 5-1 Oversight Metrics Implemented as Time-Based Table Columns**

BMBL Registry Table (DSR-IS Phase II)	Data Source to Derive	Entity Category	Shared Attributes (Time-Based Table Columns)	Table Reference for Description
cbm_bioresearch_labs	U.S. BWC-CBM sample reports	Unique/Shared Entity	create_date uscbm_submit_date	Table 4-2
cbm_bioresearch_programs	U.S. BWC-CBM sample reports	Unique/Shared Entity	uscbm_submit_date BIORESEARCH_INIT_AUDIT_START_DATE BIORESEARCH_INIT_AUDIT_END_DATE BIORESEARCH_LAST_AUDIT_START_DATE BIORESEARCH_LAST_AUDIT_END_DATE IBC_APPROVAL_DATE IBC_NOTIFICATION_DATE IRB_APPROVAL_DATE NIH_DIRECTOR_APPROVAL_DATE NIH_OBA_APPROVAL_DATE RAC REVIEW COMPLETION DATE	Table 4-14
cbm_vaccine_prod_centers	U.S. BWC-CBM sample reports	Unique/Shared Entity	create_date uscbm_submit_date	Table 4-4
fsap_cor_registry	DSR-IS Phase I	Unique/Shared Entity	FSAP_COR_REGISTRATION_DATE FSAP_COR_GRANT_DATE FSAP_COR_RENEWAL_DATE FSAP_BMBL_COMPLIANCE_AUDIT_START_DATE FSAP_BMBL_COMPLIANCE_AUDIT_COMPLETION_DATE FSAP_IMPORT_PERMIT_NUMBER_GRANT_DATE FSAP_IMPORT_PERMIT_NUMBER_EXPIRATION_DATE	Table 4-10
fed_agency_inspections_log	DSR-IS Phase I	Unique/Shared Entity	SAR_INIT_INSPECTION_START_DATE SAR_INIT_INSPECTION_COMPLETION_DATE SAR_LAST_INSPECTION_COMPLETION_DATE FEDAGENCY_INSPECTION_START_DATE FEDAGENCY_INSPECTION_COMPLETION_DATE	Table 4-11
nihguidelines_compliance_registry	DSR-IS Phase I	Unique/Shared Entity	NIHG_COMPLIANCE_AUDIT_START_DATE NIHG_COMPLIANCE_AUDIT_COMPLETION_DATE	Table 4-12
usda_facility_directory	DSR-IS Phase I	Unique/Shared Entity	LAST_AUDIT_DATE_ACCOUNTABILITY_RECORD	Table 4-13
institution_directory	DSR-IS Phase I	Non-Unique Entity Instance	None	Table 4-6
principal_investigator_directory	DSR-IS Phase I	Non-Unique Entity Instance	None	Table 4-7
biosafety_officer_directory	DSR-IS Phase I	Non-Unique Entity Instance	None	Table 4-8
resp_official_directory	DSR-IS Phase I	Non-Unique Entity Instance	None	Table 4-9

FSAP and BMBL compliance requires periodic review

Time-based metrics relevant to periodic review of FSAP and BMBL compliance for Shared Entities

**Figure 6-4 Biorisk Oversight Objective and Time-Based Metrics**

DSR-IS Phase III presents the BOPM artifact intended to clarify the oversight complexities carried out by federal agencies to review and audit the shared artifacts represented as the reportable forms, documents, correspondence, and notification schemes that are referenced or passed among and between federal entities and individual research institutions. There are four categories of BOPM tables reflecting the Phase I

artifact, which are “Federal Regulations and Guidelines” (Table 6-1), “Biosafety” (Table 6-2), “Biosecurity” (Table 6-3), and “NIH Guidelines” (Table 6-4) comprise the remainder of Chapter 6. The remainder of Chapter 6 presents each of the BOPM tables in the order described.

## 6.3 BOPM - Federal Regulations and Guidelines Shared Entities

**Table 6-1 Shared Entities - Federal Regulations and Guidelines**

\* Not an original DSR-IS artifact

\*\* Conceptual shared entity

DSR-IS Artifact	Caption	Shared Entity	Oversight Entity (Unique Entity / Non-Unique Entity Instance)	Biorisk Oversight Objective
<b>DSR-IS Federal Regulations and Guidelines</b>				
*3-1	Levels of Biosafety and Biocontainment Oversight	**All Federal Guidelines and Regulations relevant to life sciences research, laboratory operations, and security of biological agents and personnel.	OSHA DOT DOC HHS-CDC CDC-DSAT HHS-FDA HHS-NIH USDA USDA-APHIS	Compliance of federal regulations, policies, and guidelines
3-2	Entity Instances Associated with Institution and Local Oversight	Institution, Registered Entity, Principal Investigator, IBC, Biosafety Officer	NONE	Compliance of institutional policies, and operational practices aligned with federal regulations, policies, and guidelines
3-3	Entity Instances Associated with Federal Oversight and Federal Guidelines	BMBL, NIH Guidelines, **USDA/APHIS Regulations, **Select Agent Regulations (SAR), **General Duty Clause, **Ancillary Federal Regulations	HHS-CDC HHS-FDA EPA OSHA DOC DOT USDA-APHIS	Compliance of federal regulations, policies, and guidelines. In some cases, conditional funding of research programs.
*3-4	Regulations, Standards, and Guidelines (Biological Containment)	**All Workplace Hazards, Certain Infectious Agents, Select Agents, Recombinant DNA, Infectious Agents	OSHA DOT DOC HHS-CDC CDC-DSAT HHS-FDA HHS-NIH USDA USDA-APHIS	Compliance of federal regulations, policies, and guidelines.
3-5	Composition of Federal Oversight and Entity Instances of Regulation	**DOL-OSHA Regulation, **DOT Regulation, **DOC Regulation, **HHS-FDA Regulation, **CDC Select Agent Regulation (SAR Federal Agency Regulation), **USDA-APHIS Select Agent Regulation (SAR Federal Agency Regulation)	DOL-OSHA DOC DOT-PHMSA HHS-FDA HHS-CDC USDA-APHIS	Compliance of federal regulations, policies, and guidelines.
3-6	Regulation Entity Instance with Entity Subtypes	**DOL-OSHA Regulation, **DOT Regulation, **DOC Regulation, **HHS-FDA Regulation, **SAR Federal Agency Regulation	DOL-OSHA DOC DOT HHS-FDA	Compliance of federal regulations, policies, and guidelines.
3-7	Composition of Federal Oversight with Guideline and Statute Entity Instances	NIH Guidelines for Research Involving Recombinant DNA Molecules (HHS-NIH Guideline), BMBL (HHS-CDC Guideline), Safety and Health Information Bulletin (DOL-OSHA Guideline), Safety and Health Topics Pages-Biological Agents (DOL-OSHA Guideline), Hospital eTool: Laboratory Module (DOL-OSHA Guideline), General Duty Clause (DOL-OSHA Statute)	HHS-NIH HHS-CDC USDA-APHIS DOL-OSHA	Compliance of federal regulations, policies, and guidelines.

## 6.4 BOPM - Biosafety Shared Entities

**Table 6-2 Shared Entities - Biosafety**

\*\* Conceptual shared entity

DSR-IS Artifact	Caption	Shared Entity	Oversight Entity (Unique Entity / Non-Unique Entity Instance)	Biorisk Oversight Objective
<b>DSR-IS Biosafety Artifacts</b>				
3-8	Interrelationships with Risk Assessment Entity Instance	IBC, Principal Investigator, Lab Director, Biological Agent, **Lab Procedure, **Hazard, **Biosafety Level, **Containment, **Risk Assessment	NONE	Institutional review of risk assessment, containment, biosafety level, lab procedures, and hazards when examining the biological agents handled at facility research spaces.
3-9	Biosafety Stratification and Bioterrorism Stratification Entity Subtypes	**Biosafety Level (Containment Stratification), **Agricultural Biosafety Level (Containment Stratification), NIH Guidelines Risk Group (Risk Stratification), **CDC Stratification of Potential Biological Terrorism Agents (Bioterrorism Stratification), **DHS Bioterrorism Risk Assessment (Bioterrorism Stratification), **HSPD-9 National Veterinary Stockpile (Bioterrorism Stratification)	HHS-CDC USDA USDA-APHIS DHS DOD	Review of stratification schemes when assessing the biosafety requirements and bioterrorism analysis of biological agents.
3-10	Hazard Entity Instance with Agent Hazard and Lab Hazard Entity Subtypes	Genetically Modified Agent (Agent Hazard), Lab Acquired Infection (Agent Hazard), Cell Culture (Agent Hazard), Safety Equipment (Lab Hazard), **Facility Safeguard (Lab Hazard), **Work Practice (Lab Hazard)	NONE	Institutional review of risk assessment, containment, biosafety level, lab procedures, and hazards when examining the biological agents handled at facility research spaces.
3-11	Biosafety Stratification Entity Instance with Entity Subtypes	**Biosafety Stratification, **Containment Stratification, **Risk Stratification	HHS-CDC USDA-APHIS	Periodic review of federal biosafety stratification schemes. Institutional practices to implement biosafety stratification schemes when assessing containment and risk analysis of biological agents.
3-12	Composition of Biological Agent Entity Instance	Biological Agent	HHS-CDC USDA-APHIS	Tracking of BSAT (regulated) and registration of research institutions in Federal Select Agent Program.
3-13	Containment Entity Instance and Interrelationships	Laboratory **Research Experiment, **Containment, **Biosafety Level, **Hazard	HHS-CDC USDA-APHIS DOL-OSHA	BMBL compliance. Institutional practices to implement biosafety stratification schemes when assessing containment and risk analysis of biological agents.
3-14	Research Experiment Entity Instance with Subtypes	Research Experiment, Plant Experiment, Human Gene Transfer Experiment, Synthetic Nucleic Acid Experiment, Recombinant Nucleic Acid Experiment	HHS-NIH HHS-CDC USDA-APHIS	BMBL and NIH Guidelines compliance.

3-15	Composition of Containment Entity Instance – Neutral Biosafety Level	BMBL, **Biosafety Level, **Containment, **Risk Assessment	HHS-NIH HHS-CDC USDA-APHIS DOL-OSHA	BMBL and OSHA General Duty Clause compliance.
3-16	Specialized Lab Practice Correlation to Biosafety Level	BMBL, **Biosafety Level, **Containment, **Risk Assessment	HHS-NIH HHS-CDC USDA-APHIS DOL-OSHA	BMBL and OSHA General Duty Clause compliance.
3-17	BSL-1 Containment Composition	BMBL, **Biosafety Level, **Containment, **Risk Assessment	HHS-NIH HHS-CDC USDA-APHIS DOL-OSHA	BMBL and OSHA General Duty Clause compliance.
3-18	BSL-2 Containment Composition	BMBL, **Biosafety Level, **Containment, **Risk Assessment	HHS-NIH HHS-CDC USDA-APHIS DOL-OSHA	BMBL and OSHA General Duty Clause compliance.
3-19	BSL-3 Containment Composition	BMBL, **Biosafety Level, **Containment, **Risk Assessment	HHS-NIH HHS-CDC USDA-APHIS DOL-OSHA	BMBL and OSHA General Duty Clause compliance.
3-20	BSL-4 Containment Composition	BMBL, **Biosafety Level, **Containment, **Risk Assessment	HHS-NIH HHS-CDC USDA-APHIS DOL-OSHA	BMBL and OSHA General Duty Clause compliance.
3-21	Bioterrorism Stratification Entity Instance with Subtypes	**CDC Stratification of Potential Biological Terrorism Agents, **DHS Bioterrorism Risk Assessment (BTRA)	HHS-CDC USDA-APHIS DHS	Review of stratification schemes when assessing the biosafety requirements and bioterrorism analysis of biological agents.
3-22	Bioterrorism Stratification Subtype, WMD MCM Subcommittee	NONE - no shared entity established	NONE	Analysis to resolve weaknesses of countermeasure development against specific animal pathogens.
3-23	Bioterrorism Stratification Subtype, National Veterinary Stockpile	National Veterinary Stockpile (Bioterrorism Stratification)	USDA USDA-APHIS	The major objective of National Veterinary Stockpile was to attain countermeasures for animal diseases.
3-24	Bioterrorism Threat Assessment, DOD and DHS	DOD-Chemical and Biological Defense Program, DHS-National Biodefense Analysis and Countermeasures Center (NBACC)	DOD DHS	Federal programs supporting bioterrorism analysis of biological agents.
3-25	Bioterrorism Threat Assessment, Health and Human Services	Bioterrorism Threat Assessment, National Institute of Allergy and Infectious Diseases (NIAID), Laboratory Response Network (LRN), Office of Biomedical Advance Research and Development Authority (BARDA)	HHS-NIH HHS-CDC HHS-Office of the Assistant Secretary for Preparedness and Response (HHS-ASPR)	Federal programs supporting R&D of medical countermeasures to diagnose, prevent, treat emerging and reemerging infectious diseases (ERID), rapid response capabilities to biological, chemical and radiological threats, and the bioterrorism threat assessments of biological agents.
3-26	Bioterrorism Threat Assessment, USDA	USDA-APHIS (Animal and Plant Health Inspection Service), USDA-ARS (Agricultural Research Service), USDA-FSIS (Food Safety and Inspection Service)	USDA USDA-APHIS USDA-ARS USDA-FSIS	Federal programs assessing bioterrorism threats specific to animals, plants, and agriculture.

## 6.5 BOPM - Biosecurity Shared Entities

**Table 6-3 Shared Entities - Biosecurity**

\* Not an original DSR-IS artifact

\*\* Conceptual shared entity

DSR-IS Artifact	Caption	Shared Entity	Oversight Entity (Unique Entity / Non-Unique Entity Instance)	Biorisk Oversight Objective
<b>DSR-IS Biosecurity Artifacts</b>				
3-27	Risk Management Plan Composition	**SAR, Risk Management Plan, Biosecurity Plan, Biosafety Plan, Incident Response Plan	Federal Select Agent Program (FSAP) HHS-CDC CDCO-DSAT USDA-APHIS	FSAP and BMBL compliance.
3-28	Risk Management Plan Interrelationships	Risk Management Plan, Biosecurity Plan	FSAP HHS-CDC CDCO-DSAT USDA-APHIS	FSAP and BMBL compliance. FSAP review of Risk Management Plan entity instances submitted by individual research institutions.
3-29	Biosecurity Plan Composition	Inventory Control (Biosecurity Plan), Physical Security Control (Biosecurity Plan), Information Systems Control (Biosecurity Plan)	FSAP HHS-CDC CDC-DSAT USDA-APHIS	FSAP and BMBL compliance. FSAP review evaluating how individual research institutions address biosecurity controls as part of a comprehensive Risk Management Plan.
3-30	Certificate of Registration Request/Review Interrelationships	**SAR Certificate of Registration, Registration Application Form-1 Risk Management Plan Security Inspection Report	FSAP HHS-CDC CDC-DSAT USDA-APHIS	FSAP and BMBL compliance. Federal review of individual research institutions registering into the FSAP to be subjected to SAR.
3-31	SAR Site Inspection Triggers	COR, Initial SAR Site Inspection Date, SAR Site Inspection Reason, Last SAR Site Inspection Date, SAR Compliance Inspection Status (e.g., PASS/FAIL), SAR Agency Executing Inspecting	FSAP HHS-CDC CDC-DSAT USDA-APHIS	FSAP and BMBL compliance. Site inspection of individual research institutions for reasons and conditions specified by SAR.
3-32	USDA-ARS Accountability Record	National Pathogen Inventory (Accountability Record), Facility Inventory of Repository Material (Accountability Record), Material Accountability of Experimental Samples (Accountability Record)	FSAP USDA-ARS USDA-APHIS	FSAP and BMBL compliance. On behalf of USDA-APHIS, the USDA-ARS oversight of additional inventory management of select agents of USDA-registered facilities.
3-33	Responsible and Alternate Responsible Official Entity Instances	Responsible Official (RO), Alternate Responsible Official (ARO)	FSAP HHS-CDC CDC-DSAT USDA-APHIS FBI-CIIS (SRA)	FSAP compliance on behalf of CDC and/or USDA-APHIS at individual research institutions, including personnel security and accounting of individuals holding a non-expired Security Risk Assessment (SRA).
3-34	Entity Interrelationship between PRP and SRA for BSAT Access	**SAR, COR, BSAT, Security Risk Assessment (SRA), Personnel Reliability Program (PRP)	FSAP HHS-CDC CDC-DSAT USDA-APHIS FBI-CIIS (SRA) CIIS-BRAG	Focus on personnel security. Accounting of individual holding a non-expired SRA, and administration of agency-specific PRP. SRA accounting includes ensuring registered entity staff, PI, IBC members, and RO/ARO have non-expired credentials.
3-35	Personnel Reliability Program Entity Subtypes	**Federal PRP, **Private Sector PRP, **Academic PRP, **International PRP	PRP is specific to either an individual research institution or agency-implementation. PRP implementation may be modified to include or exclude personnel security conditions.	Personnel security and administration of PRP at individual research institutions.

3-36	General Composition of Personnel Reliability Program	<b>**PRP composition describing possible elements as part of a personnel security program</b>	PRP is specific to either an individual research institution or agency-implementation. PRP implementation may be modified to include or exclude personnel security conditions.	Personnel security and administration of PRP at individual research institutions.  Access to Institution-managed PRP attributes are unlikely shared, such as polygraph results to external entities, and dates of last PRP screenings (Institution), Federal PRP are more accessible (Federal)
3-37	OPM National Security/Suitability Determination Position Risk Designation Model	Federal PRP, National Security/Suitability Determination, Tier I National Agency Check Inquiries (NACI), Tier II Background Investigation (BI), Tier III Single Scope Background Investigation (SSBI)	Office of Personnel Management (OPM) Multiple federal agencies, including the DOD, DHS, FBI, DOE, and agencies of the Intelligence Community	Personnel security and administration of PRP at individual research institutions.
3-38	US Department of Transportation and BSAT Transport Security	<b>**U.S. Hazardous Materials Regulation (HMR)</b> Commercial Transportation Carrier, Transportation Security Plan	DOT DOT-PHMSA DOT-FMCSA DOT-FRA DOT-FAA DHS-USCG	Federal oversight regarding the transportation security of BSAT by rail (Federal Railroad Administration), air (Federal Aviation Administration), commercial vehicle (Federal Motor Carrier Safety Administration), and by sea-vessel (U.S. Coast Guard). Primary DOT child agency monitoring transportation security is the Pipeline and Hazardous Materials Safety Administration.
3-39	HAZMAT Endorsement Threat Assessment Program	<b>**U.S. Hazardous Materials Regulation (HMR)</b> Commercial Transportation Carrier, HAZMAT Endorsement Threat Assessment Program, Commercial Driver License (CDL), Hazardous Material Endorsement (HME)	DOT DOT-PHMSA DOT-FMCSA DHS DHS-TSA	Federal oversight regarding the personnel and transportation security of BSAT by commercial vehicle (Federal Motor Carrier Safety Administration) where commercial drivers have a valid Commercial Driver License (CDL), and a Hazardous Materials Endorsement (HME) to move BSAT or infectious agents. The Transportation Security Administration (TSA) grants HME credentials to holders of a valid CDL.
3-40	BSAT Transfer Authorization Request to SAR Federal Agency	<b>**SAR, COR, APHIS/CDC Form 2, SRA</b>	FSAP HHS-CDC CDC-DSAT USDA-APHIS	FSAP requirements to approve BSAT transfer request among FSAP-registered entities in context of transportation security, inventory security, and personnel security.
3-41	BSAT Transport Process – Approved BSAT Transfer Authorization	<b>**SAR, COR, APHIS/CDC Form 2, APHIS/CDC Form 3, SRA</b>	FSAP HHS-CDC CDC-DSAT USDA-APHIS Local and state public health agencies, and law enforcement agencies (e.g., criminal theft of BSAT materials)	FSAP requirements to approve BSAT transfer request among FSAP-registered entities in context of transportation security, inventory security, and personnel security, and the notification schemes and reporting protocols in the event of the theft, loss, or release of BSAT materials.
3-42	CDC and USDA-APHIS Import Permits Associated with SAR	<b>**SAR, COR, SRA, CDC Import Permit Program (Import Permit), PPQ 585 Timber or Timber Products (Import Permit), PPQ 587 Plant or Plant Products (Import Permit), PPQ 588 Plant/Plant Products Experimental Use (Import Permit), VS 16-3 Transport Organisms or Vectors (Import Permit), VS 16-7 Cell Culture and Cell Culture Products (Import Permit), VS 17-129 Live Animals, Semen or Embryos (Import Permit)</b>	FSAP HHS-CDC CDC-DSAT CDC-DGMQ (Division of Global Migration and Quarantine) USDA-APHIS	FSAP requirements and oversight to import plants, animals and genetically engineered organisms to ensure transportation, personnel, and inventory security controls are not compromised to/from FSAP-registered entities.

## 6.6 BOPM - NIH Guidelines Shared Entities

**Table 6-4 Shared Entities - NIH Guidelines and rDNA Research**

\*\* Conceptual shared entity

DSR-IS Artifact	Caption	Shared Entity	Oversight Entity (Unique Entity / Non-Unique Entity Instance)	Biorisk Oversight Objective
<b>DSR-IS NIH Guidelines and Recombinant DNA Research Artifacts</b>				
3-43	HHS Federal Agency Composition linked to NIH Guidelines	NIH Guidelines, HHS composition	HHS HHS-NIH NIH-RAC NIH-OBA	N/A; DSR-IS artifact depicts HHS and child agencies Office of Biotechnology Activities (NIH-OBA) and rDNA Advisory Committee (NIH-RAC) as main entities observing NIH Guidelines requirements and compliance.
3-44	Nucleic Acid Molecule Experiment and Subtypes	NIH Guidelines, Human Gene Transfer Experiment (Nucleic Acid Molecule Experiment), Synthetic Nucleic Acid Experiment (Nucleic Acid Molecule Experiment), Recombinant Nucleic Acid Experiment (Nucleic Acid Molecule Experiment)	HHS HHS-NIH NIH-RAC NIH-OBA	NIH Guidelines compliance and conditional funding (if applicable).
3-45	Research Experiments Covered by NIH Guidelines	NIH Guidelines, **Uncovered Experiment, **Exempt Experiment (Covered Experiment), **Non-Exempt Experiment (Covered Experiment)	HHS HHS-NIH NIH-RAC NIH-OBA IBC (Institution) IRB (Institution)	NIH Guidelines compliance and conditional funding (if applicable).
3-46	NIH Guidelines Classes of Covered Experiments with rDNA	NIH Guidelines, **Class VI Exempt Experiment, **Class I Non-Exempt Experiment, **Class II Non-Exempt Experiment, **Class IV Non-Exempt Experiment (Before initiation), **Class III Non-Exempt Experiment (Before research participant enrollment), **Class V Non-Exempt Experiment (Notice simultaneous with initiation), IBC Approval (All Experiment Classes), IBC Notification (Class V Experiment), IRB Approval (Class II Experiment), RAC Review (Class I and Class III Experiments), NIH Director Approval (Class I Experiment), NIH OBA Approval (Class II Experiment)	HHS HHS-NIH NIH-RAC NIH-OBA IBC (Institution) IRB (Institution)	Track reportable attributes of notification and approval schemes: Covered Non-Exempt Experiment Class Type, Covered Non-Exempt IBC Approval, Covered Non-Exempt IBC Approval Date, Covered Non-Exempt NIH Director Approval, Covered Non-Exempt NIH Director Approval Date, Covered Non-Exempt NIH OBA Approval, Covered Non-Exempt NIH OBA Approval Date, Covered Non-Exempt IRB Approval, Covered Non-Exempt IRB Approval Date, Covered Non-Exempt IBC Notification, Covered Non-Exempt IBC Notification Date
3-47	Institution, NIH Entities, and RAC Review Process	NIH Guidelines, Nucleic Acid Molecule Experiment Proposal, Human Gene Transfer Experiment Proposal, Recombinant Nucleic Acid Experiment, Initial RAC Review (RAC Review Process), Public RAC Review (RAC Review Process)	HHS HHS-NIH NIH-RAC NIH-OBA IBC (Institution) IRB (Institution) PI (Institution)	Track reportable attributes of RAC Review Process: Nucleic Acid Molecule Experiment Proposal, Human Gene Transfer Experiment Proposal, Recombinant Nucleic Acid Experiment, RAC Review Status (e.g., Initial, Public, Completed) Initial RAC Review Date, Public RAC Review Date, RAC Completion Date
3-48	Institution Submission of Non-Exempt Research Experiments to NIH	NIH Guidelines, Non-Exempt Experiment (Covered Experiment)	HHS HHS-NIH NIH-RAC NIH-OBA IBC (Institution) IRB (Institution) PI (Institution)	Track Non-Exempt Experiments (Covered Experiment) submitted from research institutions to NIH.
3-49	Institution Research Experiment Initiation and Approval Process	NIH Guidelines, Risk Assessment, Containment, Research Experiment Proposal, IBC Approval, Risk Assessment Review, Containment Review, IRB Approval	No HHS-NIH Oversight IBC (Institution) IRB (Institution) PI (Institution)	NIH Guidelines compliance and conditional funding (if applicable).
3-50	NIH RAC Review and NIH Approval of Institution Research Experiments	NIH Guidelines, IBC Approval, IRB Approval, Class I Experiment Approval, Class II Experiment Approval, Class III Experiment Approval, RAC Review, NIH OBA Review, NIH OBA Approval, NIH Director Review, NIH Director Approval	HHS HHS-NIH NIH-RAC NIH-OBA IBC (Institution) IRB (Institution) PI (Institution)	NIH Guidelines compliance and conditional funding (if applicable).
3-51	Biorisk Incident Entity Instance	NIH Guidelines, Research-related Illness (NIH Reportable Incident), Research-related Accident (NIH Reportable Incident), NIH Guidelines Violation (NIH Reportable Incident)	HHS HHS-NIH NIH-OBA IBC (Institution) IRB (Institution) PI (Institution) Laboratory Research Staff (Institution)	NIH Guidelines compliance and conditional funding (if applicable). Accountability of NIH Reportable Incidents at research institutions.

3-52	Institution Roles for Biorisk Incident Reporting to NIH	NIH Guidelines, **NIH Reportable Incident, IBC-Reviewed NIH Reportable Incident	No HHS-NIH Oversight IBC (Institution) IRB (Institution) PI (Institution) Laboratory Research Staff (Institution)	NIH Guidelines compliance and conditional funding (if applicable). Accountability of NIH Reportable Incidents at research institutions.
3-53	Institutional Biosafety Committee Entity Instance Composition	NIH Guidelines, External IBC Member (IBC), Internal IBC Member (IBC)	External Federal Agencies via External IBC Member entity instance IBC (Institution)	NIH Guidelines compliance and conditional funding (if applicable). Oversight of IBC oversight, participation in research experiment reviews, recordkeeping of IBC meeting minutes, and responses to issues and concerns involving rDNA experiments or proposal at the research institution.
3-54	IBC Report Dissemination and Interrelationships	IBC Annual Report (IBC Report), IBC Public Meeting Minutes (IBC Report), Public Funding Source Documents (IBC Report)	NIH-OBA IBC (Institution)	NIH Guidelines compliance and conditional funding (if applicable). Research institution dissemination of IBC Annual Report (Institution), IBC Public Meeting Minutes (Institution), and Public Funding Source Documents (Institution) for NIH-OBA review and generating public comments.
3-55	General IBC Oversight Responsibilities and Interrelationships	NIH Guidelines, Emergency Plan (Institution), **Non-Exempt Experiment (Covered Experiment), Research Experiment Proposal	No HHS-NIH Oversight IBC (Institution) PI (Institution)	NIH Guidelines compliance and conditional funding (if applicable). IBC oversight of rDNA experiments or proposals, adherence of institutional policies, and correspondence with principal investigator within the research institution.
3-56	Principal Investigator Responsibilities and Interrelationships	NIH Guidelines, Emergency Plan (Institution), Non-Exempt Experiment (Covered Experiment), Research Experiment Proposal	No HHS-NIH Oversight IBC (Institution) PI (Institution)	NIH Guidelines compliance and conditional funding (if applicable). PI oversight of all research experiments (including rDNA experiments or proposals), adherence of institutional policies, and correspondence with IBC members within the research institution.
3-57	PI Responsibilities and Interrelationships – Prior to Initiating Research	NIH Guidelines, Emergency Plan (Institution), **Laboratory Training	No HHS-NIH Oversight IBC (Institution) PI (Institution) BSO (Institution)	NIH Guidelines compliance and conditional funding (if applicable). PI oversight of all research experiments (including rDNA experiments or proposals) prior to initiating research, and alignment with institutional policies, correspondence with IBC members, and training of laboratory staff within the research institution.
3-58	Research Experiment Problem and Subtypes during Research	BMBL, NIH Guidelines, **Physical Containment Problem (Research Experiment Problem), **Laboratory Practice Problem (Research Experiment Problem), **Biological Containment Problem (Research Experiment Problem)	No HHS-NIH Oversight IBC (Institution) PI (Institution) Laboratory Staff (Institution)	NIH Guidelines compliance and conditional funding (if applicable). PI oversight of all research experiments (including rDNA experiments or proposals) prior and during research, risk assessment and mitigation of Research Experiment Problem entity instances, and alignment with institutional policies, correspondence with IBC members, and training of laboratory staff within the research institution.
3-59	Principal Investigator Responsibilities – During Research	NIH Guidelines, Emergency Plan (Institution), **Non-Exempt Experiment (Covered Experiment), Research Experiment Proposal, **Research Experiment Problem	No HHS-NIH Oversight IBC (Institution) PI (Institution) Laboratory Staff (Institution)	NIH Guidelines compliance and conditional funding (if applicable). PI oversight of all research experiments (including rDNA experiments or proposals) prior and during research, risk assessment and mitigation of Research Experiment Problem entity instances, and alignment with institutional policies, correspondence with IBC members, and training of laboratory staff within the research institution.
3-60	NIH-RAC Voting vs. Non-Voting Member Composition	NIH Guidelines, Non-Voting Member (NIH-RAC), Voting Member (NIH-RAC)	HHS NIH-OBA NIH-RAC	NIH Guidelines compliance and conditional funding (if applicable). Composition of unique NIH-RAC entity and role of Non-Voting and Voting Members when reviewing rDNA research experiment proposal, and responses to comments during Initial RAC Review and Public RAC Review sessions.
3-61	NIH-OBA and RAC Interrelationships	NIH Guidelines, Gene Therapy Policy Conference, RAC Public Meeting, Federal Register, Proposed Actions, Public Clinical Trial Data (Human Gene Transfer Experiment)	HHS NIH Director NIH-OBA NIH-RAC	Review of NIH Guidelines, and possible discussion to update NIH Guidelines Requirements. Interrelationships among unique entities NIH-RAC, NIH-OBA and NIH Director in organizing RAC Public Meeting sessions, Gene Therapy Policy Conference, notification and announcements of NIH activities, such as RAC Public Meeting topics (e.g., Human Gene Transfer Experiment and Public Clinical Trial Data) and Proposed Actions in the Federal Register.
3-62	NIH Director Responsibilities and Interrelationships	NIH Guidelines, Lab Safety Training Program, Major Action, Minor Action, Proposed Actions, Federal Register	HHS NIH Director NIH-OBA NIH-RAC	Review of NIH Guidelines, and possible discussion to update NIH Guidelines Requirements. Oversight of NIH Director roles in formulating Minor and Major Action suggestions as part of Proposed Actions that may lead to revising the provisions of NIH Guidelines Requirements, and also supporting responsibilities in organizing Gene Therapy Policy Conference and review of a general Lab Safety Training Program as part of NIH Guidelines Requirements, notification and announcements of NIH activities and Proposed Actions in the Federal Register.

## **CHAPTER 7. CONCLUSION**

The application of DSR-IS artifacts were intended to present a set of tools that could educate regulatory and auditors understand the oversight complexities of biosafety and biosecurity. The conclusion represents DSR-IS Phase IV and applied the findings of the previous DSR-IS phases to address the supporting research questions that collectively answer the core research question. The structure of Phase IV revisits the research problem by pointing out several root causes that impair national biorisk oversight, and then summarizes the findings of each DSR-IS phase corresponding to the interconnected secondary questions that collectively answer the core research question, “How do the interrelationships between the problem domains of biosafety and biosecurity affect oversight of biorisks?” Upon answering the core and supporting research questions, Chapter 7 presents the policy and technical recommendations to advance biorisk management and oversight studies.

### **7.1 Recap of Biorisk Oversight Challenges and Biosecurity Trends**

Chapter 1 afforded the background of the research problem, and the sources that complicate federal biorisk management and oversight. The proliferation of high and maximum containment biological laboratories was sparked by the anthrax letter cases following the 9/11 terrorist attacks. The boom in biodefense spending that fueled the proliferation of BSL3-4 laboratories scrutinized why federal capabilities and resources were not keeping pace with biorisk oversight needs. The federal reports and congressional testimony by the Government Accountability Office (GAO) in October

2007 raised oversight gaps revealing there is no single federal agency tracking the population of laboratories or national capabilities to assess the aggregate biorisks associated with the proliferation of the laboratories. Recommendations from the GAO reports and congressional testimonies makes it clear that establishing a national biorisk oversight strategy requires not only widening oversight to include non-federally funded research institutions, but also depth of interrelationships among biorisk entities.

The relevant federal biorisk regulations imposed upon research institutions are complicated, and requires tight interagency communication and cooperation to be effective. The complications of shared oversight were evident where internal entities of research institutions do not prioritize the security requirements of federal agencies. Even if the shared oversight responsibilities between research institutions and federal agencies were consistently lockstep, the Biorisk Oversight Challenge (BOVC) variables introduced in Chapter 1 explained the “Poor Execution”, “Limited Applicability”, and “Limited Visibility” handicaps that omit private institutions completely independent from government funding to be fully autonomous. The inability of the USG to ensure research institutions consistently prioritize security and oversight, widen the scope of existing USG regulations to include private research institutions, and determine the aggregate biorisks of FSAP-registered and private institutions comprise the main biorisk oversight gaps.

Chapter 1 introduced the Biosecurity Trend (BT) variable to acknowledge how interrelated changes to the biosecurity environment, such as advances in science and technology, globalization, and the changing nature of conflict may increase the risks

posed by biological threats. Although biosecurity trends are independent from the biorisk oversight challenges introduced, the presence of those trends may complicate how research institutions or federal agencies approach biorisk oversight as a shared responsibility. Thus, recommendations to enhance national biorisk oversight, such as a establishing a lead federal agency and implementing a national BSL-3 and BSL-4 registry would also be limited without increasing the applicability of regulations to include private institutions, mastery of the interrelationships between safety and security entities, and acknowledging the biosecurity trends that affects shared oversight.

## **7.2 Revisiting the Main and Secondary Research Questions**

The main research question was considered interdisciplinary and divided it into a series of interconnected research questions that build upon each other. The first and second research questions posed were "what are the unique and non-unique entities (persons, objects, places, or events), and their attributes (i.e., characteristics or properties) within the problem domains of biosafety and biosecurity?" and "what are the relationships among entities and their attributes between the problem domains of biosafety and biosecurity?" The third question research question asked "what are the roles and responsibilities (i.e., the business rules) of the federal agencies in the problem domains of biosafety and biosecurity oversight?" Lastly, the question identifying the correspondence between the biorisk models developed from research problems 1-2 and the biorisk oversight patchwork model in research problem 3 was addressed.

### **7.2.1 Do the interrelationships between safety and security affect oversight?**

This dissertation applied DSR-IS to produce original artifacts that build upon each other to answer the chief research question explaining "how do the interrelationships between the problem domains of biosafety and biosecurity affect the oversight of biorisks?" The artifacts from DSR-IS Phases I and II were analyzed to answer the initial questions posed, which were "what are the unique and non-unique entities and their characteristics or properties within the safety and security biorisk domains?" and "what are the interrelationships among the unique and non-unique entities and their attributes within the biorisk domains?" Phase I in Chapter 3 established the notion that research and federal oversight entities may be examined as either unique or non-unique entities where federal agencies are considered unique, and research institutions are non-unique. Subsequent analysis discovered shared entities as products created from the entity interrelationships and processes part of biosafety and biosecurity considered vital to biorisk oversight. The vital shared entities derived from the *BMBL* were Risk Assessment, Containment, and Biosafety Level (BSL). The Risk Assessment and Containment biosafety shared entities were observed by local oversight entities at research institutions and federal agencies that review proposed research experiments. Unlike the conceptual Containment and BSL entities linked to BMBL compliance, Risk Assessment is non-standardized across research institutions, and underscores the shared oversight responsibility between research institutions and federal agencies. While the interrelationships among and between federal agencies and research institutions were

better understood, neither the data sources employed for Phase I nor the resulting artifacts provided insight about the continuous monitoring processes of biorisk oversight.

Phase II in Chapter 4 recognized the criticality of time-based metrics absent from Phase I, and developed specific tables within the BOBSL Registry to afford the periodic review functions associated with biorisk oversight. The visual interrelationships learned from Phase I argue biorisk oversight is a continuous process that necessitates organized tracking of findings, such as compliance violations and questionable processes, and corresponding periodic reviews that would be answered from time-based metrics.<sup>503</sup> The use of time-based metrics to track shared entities are critical where continuous monitoring is required, and affords analysts to passively monitor shared assets of interests. For example, the practice of cybersecurity and computer network defense infrastructure services (CNDIS) is similar to biorisk oversight where shared entities, such as computer systems, networks, enterprise software, databases, and digital assets require continuous monitoring.<sup>503</sup> Following the CNDIS example, time-based metrics affords cybersecurity engineers and cyber-forensics analysts the means to passively monitor the activities, usage, and access patterns of applicable shared entities. The need for time-based metrics were further realized upon examining the compliance and inspection triggers, and the notification and approval schemes of federal agency entities that lacked follow-up explanations. Unfortunately, no data was found describing how biorisk oversight findings were recorded, tracked, and periodically reviewed if no mitigating

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<sup>503</sup> The author is an IT professional and Certified Information Systems Security Professional (CISSP License #59760) with over 22 years experience, but has been specializing in cybersecurity since 2011.

explanation was available during a site or compliance check. This dissertation implemented a set of logical time-based metrics capturing the notification and approval schemes of federal agencies into the cbm\_bioresearch\_programs tables to suggest inclusion into future BWC-CBM reports. Thus far, biorisk oversight of biosafety and biosecurity problem domains necessitate examination and review of the shared entities (Phase I) and the corresponding interrelationships (Phase I) that produced the shared entities as a continuous process (Phase II time-based metrics).

The third supporting research question “what are the roles and responsibilities (i.e., the business rules) of the federal agencies in the problem domains of biosafety and biosecurity oversight?” was settled in Chapter 5. The roles and responsibilities of federal oversight for biorisks were ascertained by the shared entities from Phase I. Shared entities were represented as the relevant USG biorisk policies, guidelines, regulations, reportable forms, documents, correspondence, credentials or notification schemes are treated as objects or items that are passed among or between federal entities and individual research institutions involved with biorisk management. The last supporting question “what is the correspondence between the biorisk models developed in supporting questions 1-2 and the oversight model in supporting question 3?” confirmed the correspondence between biorisk oversight models from DSR-IS Phase I (shared entities) and Phase II (BOBSL Registry and time-based metrics) to DSR-IS Phase III (BOPM), and was settled once the shared entities from the interrelationships between federal agency and research institution entities were identified.

Phase III in Chapter 6 demonstrated the interrelationships between biosafety and biosecurity to continuously conduct biorisk oversight were reflected by the interconnected relationships of the DSR-IS artifacts from all phases. Phase III built upon the concepts and findings from Phases I and II to implement the BOPM and biorisk oversight objectives to assess oversight. The architecture of the BOPM incorporated the relevant federal regulations and guidelines, and *NIH Guidelines* along with biosafety and biosecurity to itemize the biorisk oversight objectives considered shared responsibilities. The findings of Phases I and II were mapped to biorisk oversight objectives to highlight shared entities, references to the corresponding interrelationships with federal agencies, and the compliance and inspections tables in the BOBSL Registry. The BOPM reinforced the need for biorisk management analysts to continuously review shared entities and ensure the associated interrelationships reconciles Phase III with Phase I artifacts. Likewise, biorisk management functions to monitor the history of compliance or periodic reviews based on shared entities reconciles Phase III with Phase II references to time-based metrics implemented in the BOBSL Registry. Hence, the answer to the core research question is realized where observing the biosafety and biosecurity problem domains are guided by specific biorisk oversight objectives (Phase III) that necessitate examination and review of the shared entities (Phase I) and the corresponding interrelationships (Phase I) that produced the shared entities as a continuous process (Phase II time-based metrics).

### **7.3 Biorisk Oversight Policy Recommendations**

Past USG reports presenting biorisk management gaps have afforded complementary or overlapping policy recommendations that restrict, quantify, or evaluate sources of biorisks, but requires clarification or lacks actionable next steps to effectively address biorisk oversight challenges as a whole.<sup>504</sup> Equally disconcerting, the “action” timelines posted by the White House Memorandum on October 2015, “*Next Steps to Enhance Biosafety and Biosecurity in the United States*”, itemizes progress of recommendations from November 2015 to December 2018, but offers no options to track specific recommendations.<sup>505</sup> Unlike past policy suggestions to improve biorisk oversight, I will be offering specific “how-to” technical guidance to take action as opposed to emphasizing “what” recommendations are important.

I present seven recommendations that not only factors the “Poor Execution”, “Limited Applicability”, and “Limited Visibility” biorisk oversight challenges, but also incorporates the shared entity and continuous monitoring concepts mapped to biorisk oversight objectives drawn from the original DSR-IS artifacts. The first recommendation prescribes appointing a lead federal agency dedicated to national biorisk management and

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<sup>504</sup> This dissertation examined several USG reports including, but not limited to *The Executive Order 13486 Working Group on Strengthening the Biosecurity of the United States (2009) Report*, and *The Trans-Federal Task Force on Optimizing Biosafety and Biocontainment Oversight report (2009)*.

<sup>505</sup> United States. The White House, “*Next Steps to Enhance Biosafety and Biosecurity in the United States*” (Memorandum) – October 29, 2015. Web.

[https://www.whitehouse.gov/sites/default/files/docs/10-2015\\_biosafety\\_and\\_biosecurity\\_memo.pdf](https://www.whitehouse.gov/sites/default/files/docs/10-2015_biosafety_and_biosecurity_memo.pdf) (accessed January 16, 2016).; United States. The White House, “*Enhancing Biosafety and Biosecurity in the United States*” (Memorandum) – August 18, 2014. Web.

[https://www.whitehouse.gov/sites/default/files/docs/10-2015\\_biosafety\\_and\\_biosecurity\\_memo.pdf](https://www.whitehouse.gov/sites/default/files/docs/10-2015_biosafety_and_biosecurity_memo.pdf) (accessed January 16, 2016).; Federal Experts Security Advisory Panel. Implementation of Recommendations of the Federal Experts Security Advisory Panel (FESAP) and the Fast Track Action Committee on Select Agent Regulations (FTAC-SAR) (October 2015). Available online at: <http://www.phe.gov/s3/Documents/fesap-ftac-ip.pdf> (accessed January 16, 2016)

oversight, and further describes the specialized teams, functions and services for its implementation. The second and third recommendations acknowledge risk assessment as both a reportable artifact and as a process, and argues standardization and mandated biosafety training should also be evaluated. Recommendations four thru six prescribe standardized reporting in the areas of biorisk incident reporting, BSAT transport, and inventory management of BSAT materials. The final recommendation presumes a national BOBSL Registry will eventually become operational and seeks to broaden its scope to include privately funded research facilities, and establishing a professionally accredited biorisk credential that requires USG registration to augment oversight.

### **7.3.1 Lead Federal Agency Dedicated to Biorisk Management and Oversight**

I agree with the recommendation to establish a lead federal agency to spearhead national biorisk management, oversight, and inspection activities as described repeatedly from past USG reports and literature.<sup>506</sup> The emphasis on monitoring life sciences research initiatives also implies tracking research capacity, aggregate risks, compliance with the relevant biorisk regulations, and coordinating site inspection on behalf of the U.S. government.<sup>507</sup> However, I propose the designation of a lead federal agency spearhead national biorisk management, oversight, and inspection activities. This recommendation has been repeated in USG and NGO reports. However, these previous

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<sup>506</sup> Report of the Trans-Federal Task Force on Optimizing Biosafety and Biocontainment Oversight (July 2009); Report of the Working Group on Strengthening the Biosecurity of the United States (October 2009).

<sup>507</sup> GAO, *High-Containment Biosafety Laboratories*, 13-14.

recommendations lacked any details about how such an agency should be organized to continuously assess biorisk management and oversight objectives. As part of my proposal, the lead federal agency should be comprised of two core functional teams having specific focus areas.

The BOPM framework envisions the USG appoint the Department of Health and Human Services (DHHS) and U.S. Department of Agriculture (USDA) to jointly lead national biorisk management and oversight activities. DSR-IS Phase I provided the visual entity interrelationships and processes between FSAP federal agencies and research institutions, which were mapped to specific BOPM objectives and shared entities. This alignment prioritizes continuous review and augmented compliance of USG biorisk and biological containment regulations and guidelines by correlating shared entity artifacts, time-based metrics, and assigned resources to biorisk oversight objectives. Grouping national biorisk oversight objectives with shared entity artifacts and time-based artifacts prescribed by the BOPM also advances the implementation of a hypothetical accreditation system of biosafety management programs at BSL3 and BSL-4 facilities across sectors. Both federal agencies will allocate dedicated resources to assemble two functional teams following a separation of duties approach to focus on biosafety and biosecurity, but not the dual-use dilemma or DURC experiments.<sup>508</sup> To fully operationalize the BOPM, I propose DHHS and USDA allocate personnel assigned to one of two functional teams with specific areas of responsibilities.

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<sup>508</sup> DURC was excluded from analysis in light of the recent USG DURC 2012 and 2014 policies. As the said USG DURC policies mature, more data will be afforded to identify indicators on whether or not the provisions are embraced by research institutions, and how individual institutions have implemented internal review processes mandated by the USG DURC 2014 policy – a future study is warranted.

The first functional team will focus on site inspections that audit the shared entities, ensures the compliance of biorisk regulations, and coordinates and ensures consistent practices during site inspections. Shared entities, such as the Certificate of Registration (COR) affords time-based metrics indicating renewal dates and last inspection dates to trigger compliance and site inspection visits reported in a shared database, such as the BOBSL Registry. Members of the first functional team will also assist with identifying additional methods that ensure the integrity of biosafety controls, containment infrastructure and laboratory equipment at BSL3-4 facilities across sectors.

The second functional team will focus on analysis and reconcile the findings of the shared entities, compliance audits, and site inspection reports periodically with the biorisk oversight objectives. The services of the second functional team would also reexamine the safety and security entity interrelationships and processes afforded by the dissertation to determine if new policies are needed if the findings provided by the first functional team produce common compliance or site inspection violations. Members of the second functional team will not only evaluate if additional biorisk and biological containment regulations, guidelines, or policies are keeping pace, but also reconcile whether or not national biorisk management and oversight objectives require additional granularity based on site audits, compliance findings, and analysis of reports collected from the first functional team. In this way, the second functional team superimposes current regulations and policies against the entity interrelationships and processes afforded by the dissertation when revising or formulating new biorisk management and oversight objectives.

### **7.3.2 Standardized Risk Assessments and Mandated Biosafety Training**

The DSR-IS Phase I biosafety artifacts detected gaps involving the Risk Assessment entity and biosafety training. First, the efficacy of the Risk Assessments (as reportable artifact entities) are dependent on the experience and knowledge base of principal investigators. Secondly, Risk Assessment (as a process and reportable artifact) considers security screening, but does not explain how the biosafety credentials of laboratory staff were graded as part of the evaluation process. I address these findings with recommendations separately in the following sections.

#### **7.3.2a Standardized Risk Assessment as a Process and Reportable Artifact**

The Phase I biosafety artifacts discovered that the Risk Assessment conceptual entity is dependent on the experience of the principal investigator, which invited inconsistent approaches. No data was available that grades the quality of risk assessments produced by principal investigators since years of experience, knowledge base, and areas of research among principal investigators conducting risk assessments as a biosafety practice are inconsistent. Furthermore, no data was available to examine whether or not risk assessments were peer-reviewed by multiple principal investigators within a research institution, or if research institutions have established internal review processes to evaluate risk assessments. At least two implications were drawn based on analysis of the Phase I biosafety artifacts since no external data was available to confirm outcomes. First, partially reviewed risk assessments or produced by lesser experienced

principal investigators may erroneously assign incorrect containment levels or provide inadequate specialized training and laboratory procedures to manipulate certain biological pathogens. Second, non-standard risk assessments provides no means to reliably confirm whether one approach is superior over another at individual research institutions, or if certain research sectors follow a common approach.

I propose the USG examine the feasibility to implement policy that standardizes risk assessment as both a process and as a reportable artifact. The feasibility study will be approached in two phases. The first phase will examine sample risk assessment reports and laboratory facility and biological containment inspections checklists across individual research institutions to identify trends and data relationships that correlate with the experience of principal investigators and laboratory directors. Inconsistent risk assessments invite different approaches depending on the biorisk controls, agents, and maturity of personnel at individual research institutions. While agent stratification may be considered as part of the risk assessment process, other variables of an individual research institution, such as its sector and mission, and conditional funding of proposed experiments should be aggregated for analysis. The first phase of the study will focus on standardizing reports independent of principal investigators or laboratory directors by surveying sample risk assessment reports from FSAP-registered entities and private research institutions to develop modular templates. The second phase of the study will examine risk assessment practices at sample private and NIH or FSAP-registered research institutions in the context of experiments proposed, and consider performance indicators, such as history of biosafety incidents or confirmed exposures to pathogens.

As a process, a uniform risk assessment process would imply a common checklist and set of standard considerations. The second phase should identify unique provisions of Risk Assessment (as processes) from the sample sites, and consider whether to establish a national knowledge base that will be vetted by NIH-registered IBC members to standardize Risk Assessments (as reportable artifacts).

### **7.3.2b Risk Assessment and Mandated Biosafety Training**

I highly recommend the USG investigate the feasibility of integrating SRA data afforded by the FBI-CJIS and agency-specific periodic PRP investigation findings for staff directly accessing biological agents could be maintained independently, but be packaged as reportable artifacts when compiling risk assessments into research experiment protocols for IBC review. This complements the 2015 Federal Experts Security Advisory Panel (FESAP) White House Memorandum to insert a dedicated Responsible Official (RO) as part of an entity's IBC that monitors SAR compliance as well as detecting staff without SRA credentials.<sup>509</sup> Personnel security and screening should be more prominent in the risk assessment process. The current model of checking security risk assessment (SRA) and periodic personnel reliability program (PRP) checks for lab personnel are independent when considering agent and laboratory hazards. Although credentials of laboratory staff were examined as part of the risk assessment

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<sup>509</sup> The White House, “*Next Steps to Enhance Biosafety and Biosecurity in the United States*”, 21; Federal Experts Security Advisory Panel. Implementation of Recommendations of the Federal Experts Security Advisory Panel (FESAP) and the Fast Track Action Committee on Select Agent Regulations (FTAC-SAR), 12.

process, no survey data described how lab personnel or researchers were graded, and if evaluation outcomes warrant biosafety training standardization. Open source literature used to create the DSR-IS artifacts neither provided data on the processes to evaluate biosafety training certifications to conduct experiments nor acknowledged professional biosafety credentials as prerequisites when authorizing laboratory staff to work on biomedical or microbiological experiments. Subsequent creation of DSR-IS artifacts related to personnel reliability programs (PRP) also did not find data specifying requirements related to biosafety training certifications.

I propose establishing a partnership between the USG and professional associations, such as American Biological Safety Association (ABSA), to develop the federal mandate where scientists and non-researchers complete tiered biosafety training with periodic recertification requirements. ABSA provides professional certifications, such as Certified Biological Safety Professional (CBSP) and Registered Biosafety Professional (RBP).<sup>510</sup> Similarly, the American Society for Microbiology (ASM) offers the Specialist Microbiologist (SM) credential, and a National Registry of Certified Microbiologists (NRCM).<sup>511</sup> A partnership between the USG and professional associations in industry is the ideal blueprint and successful model. For example, the DOD partnered with the Information Systems Audit and Control Association (ISACA), the International Information Systems Security Certification Consortium (ISC<sup>2</sup>) and several cybersecurity professional associations to establish DOD Directive 8570.01-M,

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<sup>510</sup> For details about the CBSP and RBP professional licenses, see <http://www.absa.org/biocert.html>

<sup>511</sup> For details about the SM professional license, see [http://www.asm.org/index.php/professional-certification/nrcm?utm\\_source=asm&utm\\_medium=redirect&utm\\_campaign=nrcm](http://www.asm.org/index.php/professional-certification/nrcm?utm_source=asm&utm_medium=redirect&utm_campaign=nrcm)

“Information Assurance Workforce Improvement Program”, which is the USG cybersecurity certification standard required for IT personnel to access digital classified materials.<sup>512</sup> A USG supported biorisk or biosafety professional certification mandate borrowing the concept of DOD Directive 8570 as a condition of employment may not only standardize risk assessments of personnel and researchers, but also encourage adoption as part of a personnel reliability program (PRP). The DOD 8570.01-M mandate requires information assurance (IA) analysts, cybersecurity engineers and managers to be trained and qualified to a DOD-approved baseline requirement, which is implemented by standardized certification with periodic recertification requirements.<sup>513</sup> The tiered approach was designed to address different categories of IA and cybersecurity expertise by functions and roles, specializations, and years of experience to safeguard and maintain the availability of DOD information, information systems, and networks.<sup>514</sup> The DOD 8570.01-M model could serve not only as a blueprint to create tiered biosafety training requirements based on BSL and roles to assess risk and containment, but also as a condition of employment.

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<sup>512</sup> Department of Defense. Defense Technical Information Center. Assistant Secretary of Defense for Networks and Information Integration, Integration/Department of Defense Chief Information Officer, “DoD 8570.01-M Information Assurance Workforce Improvement Program,” <http://www.dtic.mil/whs/directives/corres/pdf/857001m.pdf> (accessed January 26, 2016); For DOD 8570.01-M Information Assurance baseline certifications and requirements, see also <http://iase.disa.mil/iawip/Pages/index.aspx> and <http://iase.disa.mil/iawip/Pages/iabaseline.aspx>; For more information on ISACA, see <https://www.isaca.org/Pages/default.aspx>; For more information on ISC<sup>2</sup>, see <https://www.isc2.org/default.aspx>

<sup>513</sup> *DOD 8570.01-M Information Assurance Workforce Improvement Program*, 12.

<sup>514</sup> Ibid.

### **7.3.3 Standardizing Reporting for Biorisk Oversight**

The DSR-IS artifacts visually depicted the interrelationships of the unique, non-unique, and shared entities that implement multilayered biosafety and biosecurity oversight processes. The artifacts explained the collaboration among federal agencies and research institutions to vet risk assessments, FSAP registration requirements, and the processes spelled out by the *BMBL* and *NIH Guidelines*. However, the iterative analysis and refinements that produced the DSR-IS artifacts confirmed inconsistent reporting and tracking relevant to biorisk oversight. I present several recommendations, which discuss the *NIH Guidelines* Adverse Reporting Template to promote establishing a national safety reporting system (SRS) standard, adoption of standard BSAT transport security forms, and BSAT inventory management.

#### **7.3.3a Adoption of *NIH Guidelines* Adverse Event Report Template**

Proposals to enhance incident and safety reporting system (SRS) relevant to national biorisk management have not yet produced an actionable technical blueprint. The GAO has determined that reporting and analysis is a critical element tied to the program goals and culture of an organization to effectively implement an incident and safety reporting system (SRS). The SRS requirements described by the *NIH Guidelines* are clear, but invites research institutions and principal investigators to report incidents inconsistently. For example, the *NIH Guidelines* expresses “Principal Investigators should adhere to any other serious adverse event reporting requirements in accordance with federal regulations, state laws, and local institutional policies and procedures, as

applicable.”<sup>515</sup> The provision to report incidents described by the *NIH Guidelines* are straightforward, but the reporting requirement imposed by federal and state laws regarding biosafety, and the level of detail to provide will be inconsistent without specific guidance. The language of current statutory or regulatory requirements to guide incident reporting unwittingly provokes clarifying what constitutes a reportable biosafety incident, and injects two implications. First, the uneven interpretation of regulations, standards, and guidance among regulated entities to report accidents, near miss exposures to a biological hazard, or laboratory acquired infections may have excluded incidents from being reported. Second, the lack of timely incident reporting may partially be explained where would-be incident report submitters are lax, and do not make the effort to find out the reporting requirements imposed by additional federal and/or state agencies and departments within their research institution.<sup>516</sup> For example, voluntary participation to report biorisk incidents not only exacerbates the difficulties to quantify biosafety risks, but also poses a formidable challenge in the effectiveness of a national SRS.

I strongly recommend a dedicated study that examines the feasibility to adopt the Adverse Event Reporting Template offered by the *NIH Guidelines* to reduce confusion surrounding incident reporting requirements.<sup>517</sup> A review of the content and format of the Adverse Event Reporting Template openly discloses “Please note that submitting this

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<sup>515</sup> *NIH Guidelines*, 104.

<sup>516</sup> Gryphon Scientific, “Risk and Benefit Analysis of Gain of Function Research, Draft Final Report”, December 2015. Accessed online: <http://www.gryphonscientific.com/wp-content/uploads/2015/12/Final-Gain-of-Function-Risk-Benefit-Analysis-Report-12.14.2015.pdf>

<sup>517</sup> The NIH-OBA suggests an Adverse Event Reporting Template that research institutions may use, but it is not required. The Adverse Event Reporting Template is available online at <http://www.osp.od.nih.gov/sites/default/files/resources/Incident%20Reporting%20Template.doc>; See also FAQs on [http://www.osp.od.nih.gov/sites/default/files/FAQs\\_about\\_Incident\\_Report.pdf](http://www.osp.od.nih.gov/sites/default/files/FAQs_about_Incident_Report.pdf)

completed template to NIH OBA does NOT fulfill the reporting requirements of other agencies. You should verify with the other parties to whom you must report whether the use of this template is acceptable.” The feasibility study would involve a gap analysis of the biorisk reporting requirements by municipal and state governments to assess the level of effort to adopt or modify the NIH template into an all-inclusive standard report format. The analysis for adopting the reporting template may involve surveys to quantify NIH-registered research institutions aware of the template, and also an inquiry to the NIH-OBA to confirm if submitted reporting templates are complete or partially complete. Likewise, the analysis to modify the reporting template may quantify partially completed report submissions to understand which components within the template are commonly applicable and which components are ignored. A follow-on study to measure the efficacy of a revised reporting template would confirm if the common components of the reporting template lead to completed submissions as opposed to partially completed reporting templates submitted.

### **7.3.3b Adoption of Standard BSAT Transport Security Forms**

The burden of biorisk oversight imposed upon federal agencies is complicated where non-standardized reportable artifacts are not understood equally by research institutions, commercial transportation carriers, and non-FSAP federal agencies complementing enforcement the SAR. The FSAP affords the “APHIS/CDC Form 2, Request to Transfer Select Agents and Toxins”, and “APHIS/CDC Form 3, Report of Theft, Loss or Release of Select Agents of Toxins” standard forms, which are

incorporated in the notification schemes that track the movement, theft, loss, or release of regulated agents during BSAT transport among registered entities.<sup>518</sup> The FSAP standard forms are not only well understood by registered entities, but the purpose, reporting and submission instructions of the FSAP forms are consistent.

I propose two recommendations that will be implemented with the reportable artifacts employed by the Federal Select Agent Program (FSAP) and Select Agent Regulations (SAR). First, the FSAP should impose standardized shipping forms employed by commercial transportation carriers to ensure research institutions and non-FSAP federal agencies complement enforcement of SAR. Second, the adoption of standardized pathogen shipping forms should be promoted as part of the *BMBL* guidelines to assist guidance regarding pathogen inventory accounting among research institutions.

The first recommendation requires revising regulations involving the transport of BSAT to incorporate “APHIS/CDC Form 2” and “APHIS/CDC Form 3” into the existing reportable artifacts to promote the elimination of non-standardized shipping forms employed by commercial transportation carriers. For example, the Shipper’s Declaration for Dangerous Goods form is a reportable artifact used by commercial transportation carriers that requires not only the physical accounting of BSAT materials being transported, but also the reconciling of BSAT inventories of registered entities based on itemized entries of those forms. However, the Select Agent Regulations neither suggests

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<sup>518</sup> APHIS/CDC Form 2 and APHIS/CDC Form 3 are freely available online. See <http://www.selectagents.gov/forms.html>

cross checking the Shipper’s Declaration for Dangerous Goods forms with BSAT inventories as post-transaction activities nor imposes record keeping requirements of commercial transportation carriers that could assist regulatory entities or registered entities to quickly detect theft, loss, or resolve discrepancies in the National Pathogen Inventory (NPI). The scope of the NPI applies to the domestic BSAT transfer and importation of biological agents and could be considered an auditable data source examining end-to-end BSAT transfers to confirm post-transaction activities of physical inventories are promptly updated by Registered Entity instances. Other reportable artifacts that could be tracked when BSAT is transferred between Registered Entity instances are Certification of Registration credentials, BSAT Transfer Authorization Number, and the DHS-TSA HME credential linked to the CDL, and the Shipper’s Declaration of Goods.

The second recommendation revises the *BMBL* to promote adopting standard pathogen shipping forms along with the FSAP standard forms, “APHIS/CDC Form 2” and “APHIS/CDC Form 3” as reportable artifacts to clarify the obscure guidance about pathogen inventory record keeping and tracking. This recommendation addresses ambiguity of the *BMBL* describing pathogen inventory accounting post-delivery of the biological materials among research institutions. The *BMBL* suggests research institutions establish transport policies that provide “appropriate documentation and material accountability and control procedures for pathogens in transit between locations”, and measures that ensure “appropriate authorizations have been received and that adequate

communication between facilities has occurred before, during, and after transport of pathogens or other potentially hazardous biological materials".<sup>519</sup>

### **7.3.3c Standardizing BSAT Inventory Management**

The inventory management and controls specified by the *BMBL* and the USDA-APHIS are unclear. Examination of relevant USDA-APHIS literature demonstrates confusion between the terms “record” versus “database”. The USDA-ARS prescribes three types of Accountability Records, of which two are characteristics of a relational database. Equally obscure, the *BMBL* recommends establishing material accountability procedures to track the inventory, storage, use, transfer and destruction of dangerous biological materials and unneeded assets so that research institutions account for the storage, locations, and persons responsible for those biological agents.<sup>520</sup> However, the *BMBL* leaves it up to research institutions to define the biological materials that will be recorded, the records that will be maintained, the periodic update intervals, the record-keeping procedures explaining how materials were identified, used and stored, and finally the documentation and reporting requirements of biological agent inventories.<sup>521</sup>

I highly propose a policy that requires USDA and non-USDA facilities subjected to SAR adopt the concept of operations (CONOPS) and metadata structure of the National Pathogen Inventory (NPI). Since the NPI is a nationally shared database, adopting the structure of the NPI would ensure individual research institutions implement

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<sup>519</sup> *BMBL*, 110.

<sup>520</sup> Ibid.

<sup>521</sup> Ibid.

the standard data requirements based on a nationally shared data source. Phase I artifacts presented the NPI and the Accountability Record subtypes, which confirm research institutions that maintain non-standard inventory systems and local databases will not efficiently keep pace with hardcopy record logs, laptops, and computer tablets. To support the policy, the data definition language (DDL) that implements the metadata structure of the NPI must be openly shared with FSAP-registered entities to efficiently reconcile unstructured data from non-standardized inventory systems and various data sources.

### **7.3.4 Broaden the Applicability of a Conceptual National BOBSL Registry**

My findings agree with passing legislation that mandates all research institutions, USG-funded and private, to become registered entities subjected to national biorisk oversight by DHHS and USDA. The need for a national BSL registry is a well-established recommendation raised during the October 2007 Congressional Hearings that is long overdue.<sup>522</sup> The implications from GAO reports presented at the October 2007 Congressional Hearings confirmed the expansion rate of BSL-3 laboratories exempt from SAR, such as privately funded research institutions were unknown and produced knowingly inconclusive national biorisk assessments. For example, the cumulative attributes of BSL-3 laboratories, such as physical research space (square feet) or its capabilities, such as aerosol studies, are relevant to biorisk oversight, but are dependent on quantifying the population of BSL-3 laboratories.

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<sup>522</sup> Pearson (written statement), *Germs, Viruses, and Secrets*, 18-19.

I propose leveraging the inspection and continuous monitoring attributes from DSR-IS Phase II by examining the feasibility to operationalize the notional BOBSL Registry as a precursor to passing the federal registration mandate towards private research institutions operating BSL-3 laboratories. Extending registration applicability towards private research institutions will examine national licensing approaches, including the Biological Research Security System (BRSS), and necessitates partnerships between the USG and professional associations formed by the scientific community.<sup>523</sup> The previously published BRSS national licensing approach imposed requirements for research facilities and “all scientists, students and technical staff proposing to conduct research covered by the oversight system”.<sup>524</sup> The objectives of the BRSS included ensuring affected individuals were technically qualified, completed biosecurity training, understood the dual-use dilemma of scientific work, satisfied background checks permitting scientific research, and ensures registered research facilities continuously met the relevant USG biorisk standards.

The national licensing requirements envisioned by BRSS are sensible, but did not offer step-by-step concrete technical guidance for its implementation.<sup>525</sup> My approach will encourage the recommendation proposed by Pearson to establish a legally binding requirement for all research institutions, federally funded or private, to unconditionally register with the USG by ensuring the underlying national BOBSL Registry and national

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<sup>523</sup> Harris, 2007. "Dual Use Biotechnology Research: The Case for Protective Oversight.", 118-120.

<sup>524</sup> Ibid.

<sup>525</sup> Ibid., 119.

licensing scheme adopted are interoperable.<sup>526</sup> Currently, FSAP requires registered entities to appoint a Responsible Official (RO) and alternate RO (ARO) empowered to act on behalf of the registered entity to ensure SAR compliance, and may have only one RO and ARO at all times. Unlike the national licensing concepts presented by BRSS, the RO is appointed by its FSAP-registered research institution as opposed to a USG agency.

In order to implement the licensing concepts of the BRSS and extend the reach of the conceptual national BOBSL Registry, I propose a partnership between the USG, the scientific community, and professional associations to establish accredited biorisk certifications to supplement the training requirements comparable to professional biosafety credentials. The accredited biorisk certifications would be tiered and have education and work experience criteria, require registration with eligibility criteria, and issued only by professional associations recognized as industry partners by the USG. I propose the concrete actionable steps below to complete the challenge in widening the applicability of the BOBSL Registry to include privately funded BSL-3 research facilities via establishing professionally accredited biorisk certifications:

- 1) The FSAP partners with professional associations, such as ABSA and ASM, to develop a professionally accredited biorisk credential (“Registered BioRisk Professional – RBRP”) to augment CBSP and RBP biosafety certifications. Persons holding the RBRP credential are qualified to perform local oversight and periodically review of research activities, biosafety and biosecurity practices and

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<sup>526</sup> Pearson (written statement), *Germs, Viruses, and Secrets*, 18-19.

controls, and compliance of SAR and *BMBL* guidelines. Persons with the RBRP credential would also be qualified to revise or create new policy recommendations to enhance oversight of laboratory operations and research programs. The accredited RBRP credential developed by the FSAP, ABSA and ASM will be tracked in a shared RBRP-biosafety-certification registry, and discussed as a separate actionable step.

- 2) The FSAP will accredit CBSP and RBP biosafety certifications offered by ABSA and ASM as required prerequisites of the accredited RBRP credential curriculum.
- 3) On behalf of the CDC and USDA, the USG passes the first federal mandate to require research staff and laboratory operations staff to obtain accredited biorisk (RBRP) or biosafety (CBSP or RBP) certifications to all research institutions with BSL-3 or BSL4 laboratory spaces as a condition of employment.
- 4) The FSAP partners with professional associations, such as ABSA and ASM, to implement a shared RBRP-biosafety-certification registry of persons holding either the accredited biorisk or biosafety credential, which will be used to confirm good standing, review periodic recertification dates, record the research institution as the employer, and indicate if the research institution has BSL-3 and/or BSL-4 laboratory spaces. The shared RBRP-biosafety-certification registry will be jointly managed by NIH and FSAP federal agencies, the CDC and USDA-APHIS as opposed to a single USG agency. The American Society for Microbiology (ASM) has established the National Registry of Certified Microbiologists

(NRCM), which could be modified to implement the DDL requirements of the notional RBRP-biosafety-certification registry.

- 5) On behalf of the CDC and USDA, USG passes a second federal mandate requiring all BSL-3 and BSL-4 research facilities have at least 10% of its laboratory staff hold accredited RBRP or biosafety (CBSP or RBP) credentials as a condition to maintain laboratory operations year-round.
- 6) Finally, the USG passes a third federal mandate that requires all BSL-3 research facilities to register with the national BOBSL Registry, and acknowledges privately-funded research facilities avoiding oversight and compliance imposed by Select Agent Regulations. Since all registered entities authorized to possess, use, or transfer regulated BSAT hold a Certificate of Registration from the Federal Select Agent Program (FSAP), the third federal mandate augments national biorisk oversight by discriminating between FSAP-registered and privately-funded BSL-3 facilities. This approach advances the BOBSL Registry to become the authoritative directory of all BSL-3 and BSL-4 research facilities.

The proposed steps described requires partnership between the USG and professional associations within the scientific community to establish an accredited biorisk certification (RBRP), and accreditation of established CBP and RBSP biosafety certifications. The intent of operationalizing a shared RBRP-biosafety-certification registry affords correlating persons with valid biosafety or biorisk certifications to research institutions, and crosschecking that determines whether or not certain research

institutions receive federal funds, and operate at BSL-3 or BSL-4. The accreditation of the RBRP credential and would-be tracking afforded by a hypothetical RBRP-biosafety-certification registry jointly shared among FSAP, ABSA and ASM was inspired by the concepts of the BRSS national licensing scheme. Unlike the BRSS recommendation, I emphasize the national BOBSL Registry as the core prerequisite and impose three federal mandates to broaden BSL3-4 registration applicability by 1) requiring researchers or laboratory scientists hold accredited biorisk or biosafety certifications as a condition of employment, 2) requiring research institutions ensure a minimum percentage of its staff maintain their accredited biorisk or biosafety credentials to legally operate as a research entity, and 3) requiring registration of all BSL-3 research facilities with the national BOBSL Registry to expand biorisk oversight and visibility into FSAP-registered and privately-funded laboratories.

## **7.4 Links between Recommendations and Biorisk Oversight Challenges**

The relevant USG biorisk regulations imposed upon research institutions are complicated, requires tight interagency communication and cooperation to be effective, and partially explains why federal capabilities and resources are unable to keep pace with biorisk oversight needs. The biorisk oversight challenges posed, which were “Poor Execution”, “Limited Applicability”, and “Limited Visibility” influenced the recommendations in this dissertation, but not explicitly. The “Poor Execution” variable factored heavily with my recommendations emphasizing the standardization of risk assessment as a process and reportable artifact, the adoption of the NIH Guidelines

Adverse Event Report, standard report templates for BSAT transport and inventory management, and mandated biosafety and biorisk training. The specialized functions of a lead federal agency leveraging the Biorisk Oversight Patchwork Map (BOPM) underscored continuous monitoring and compliance auditing affording the oversight objectives for inspection teams to grade the procedures, reporting processes, and biorisk management practices at registered entity sites. This approach addresses the complications of shared oversight where internal entities of research institutions do not prioritize the security requirements of USG agencies. The remaining biorisk oversight challenges, “Limited Applicability” and “Limited Visibility” are tightly coupled, served as chief drivers to broaden the applicability of a notional biorisk oversight BSL (BOBSL) Registry. Establishing an operational BOBSL equips the USG to impose unconditional federal mandates to widen the scope of existing federal regulations to include private research institutions, which affords tracking the population and corresponding aggregate biorisks of FSAP-registered and private institutions. Even though the recommendations prescribed may enhance national biorisk oversight, the efficacy of the individual recommendations are dependent on efficient and consistent execution of those tasks and activities for implementation. The major caveat is the presence of evolving biosecurity trends that may complicate how research institutions and USG agencies approach shared biorisk oversight. While it is difficult to assess “how much” the recommendations presented will improve biorisk oversight, the performance of each recommendation depends on its execution and putting aside competing interests between the security and scientific communities.

## **7.5 Final Thoughts and Contributions**

Biorisk incidents since the 2001 anthrax letter cases have spawned diverse proposals, suggestions, and recommendations to expand oversight. Policy recommendations to strengthen biorisk oversight requires the scientific and security communities to understand the entity interrelationships associated with biosafety and biosecurity, what data is collected, and the shared oversight responsibilities between federal agencies and research institutions. Unlike past biodefense studies, the dissertation contributed by adopting an engineering framework to produce visual artifacts that examine the entity interrelationships explaining the research, security, and oversight resources involved with biorisk management.

## **7.6 Future Research Considerations**

This dissertation made a genuine effort to carry out an objective analysis surrounding the complex interrelationships between the biosafety and biosecurity domains affecting biorisk oversight. However, the dissertation study did not confront two concerns associated with biorisk oversight that should be considered in future studies. First, the dual-use dilemma arguing risks versus benefits, and experiments considered dual-use research of concern (DURC) are well established but remains unsettled between the scientific and security communities. Finally, the concept of do-it-yourself biology (DIYbio) has been an emerging movement providing open access to biological materials, technologies, and equipment to persons interested in modern molecular biology, including synthetic biology.

Recent studies about gain-of-function (GOF) experiments involving influenza viruses, such as the avian influenza H5N1 virus and reconstruction of the 1918 Spanish influenza virus pandemic, repeats the controversy over the biorisks and benefits of DURC experiments that heighten the transmissibility or pathogenicity of potential pandemic viruses.<sup>527</sup> GOF research are experiments that increase the ability of a pathogen to cause disease through modifications that confers new or enhanced activity.<sup>528</sup> The USG recognized the competing interests of DURC and released federal DURC policies in 2012 and 2014. The seriousness of DURC escalated to where the USG has suspended funding for GOF studies effective October 17, 2014.<sup>529</sup> As the adoption of the USG DURC 2012 and 2014 policies mature, policymakers will have to revisit the needs of the research, federal oversight, and scientific publishing communities. While the use of UML and DSR-IS was appropriate in exhibiting the entity interrelationships relevant to biorisk oversight, a separate study that leverages UML as opposed to DSR-IS to examine DURO and the types of DURC experiments, the corresponding shared entities, and the processes that censor, approve conditional publication, or reject open manuscript dissemination should be considered. The critical starting point involves developing accurate UML artifacts of the seven types of DURC experiments, and the corresponding

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<sup>527</sup> Webster, Robert G. 2012. Mammalian-transmissible H5N1 influenza: The dilemma of dual-use research. *mBio* 3, no. 1: 1-2.; Morens et al. 2010. *The 1918 influenza pandemic: lessons for 2009 and the future*, e3-e5.; Taubenberger et al. 2012. *Reconstruction of the 1918 influenza virus: Unexpected rewards from the past*, 1.

<sup>528</sup> U.S. Department of Health and Human Services. National Institutes of Health. U.S. *Government Gain-of-Function Deliberative Process and Research Funding Pause on Selected Gain-of-Function Research Involving, MERS, and SARS Viruses: Frequently Asked Questions*.

<sup>529</sup> U.S. Department of Health and Human Services. National Institutes of Health. U.S. *Government Gain-of-Function Deliberative Process and Research Funding Pause on Selected Gain-of-Function Research Involving, MERS, and SARS Viruses*.

interrelationships between researchers, scientific publication entities, and federal agencies. Validation of the new UML artifacts for DURC would then analyze case studies of dual-use microbiological experiments to trace inconsistent entity interrelationships and executed processes to formulate policy recommendations since the USG DURC 2014 policy allows research institutions to create DURO and DURC implementation plans that reflect its organizational structure, resources, processes, and needs. A future study that considers a sample set of research institution implementation guides aligned with the USG DURC 2014 policy may invite development of custom DSR-IS artifacts compare the distinct organizational structures and processes from sample research institutions.

The emerging trend of DIYbio was started by hobbyists and professional researchers in the microbiological sciences seeking autonomy over regulation via makeshift home laboratories. Unlike, research facilities that possess, use, or transfer regulated BSAT materials with imposed security risk assessment (SRA) requirements, DIYbio facilities are unregulated and may appeal to persons working in regulated research institutions to pursue interests. If future requirements to regulate the DIYbio community laboratory spaces and persons are realized, the urgency to monitor private research institutions would closely overlap the need to implement biorisk oversight mechanisms of DIYbio community laboratories. A genuine effort to identify the modifications needed to implement additional biorisk oversight are implied to effectively observe facilities where biological agents are non-BSAT, persons may not hold an SRA, and the *BMBL* concepts of risk assessment and containment are likely ignored.

## APPENDICES

### Appendix A – BOBSL Registry Data Mining and Extraction Source Code

#### Source Code Listing - CbmDataMining.pl

```
#!/usr/bin/perl

#####
# Source file:      CbmDataMining.pl
#
#
# Author: Jonathan S. Gines, PhD Candidate
# George Mason University    -- Biodefense Program
# Dr. Gregory Koblenz          -- Chair
# Dr. Fran Harbour            -- Committee Member
# Dr. Nirup Menon              -- Committee Member
# Dr. Trevor Thrall           -- Committee Member
#
# Revision history:
#
#
# History:
# 1/2/2014 - Initial source code started
# 1/4/2014 - Implemented data extraction logic to filter BWC-CBM report files
# 1/5/2014 - Implemented logic to split CBM Form-A parts 1-2, and Form-G into raw string records
#
#####

use strict;
use warnings;
use DBI;
#use DateTime;
use File::Spec::Functions qw( catfile );
use Win32::OLE;
use Win32::OLE::Const 'Microsoft Word';

## Initialize data source file variables
my $datapath      = 'D:/home/GMU/BiOD_data';
my $word;
my @sourcefiles = glob("$datapath\BWC_CBM*.docx");
die "There are no CBM data source Microsoft Word files.\n" unless @sourcefiles;

## Confirm the ASCII text files were created
@sourcefiles = ();
@sourcefiles = glob($datapath."/tmp/*.txt");
die "There are no CBM data source ASCII files.\n" unless @sourcefiles;
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## Initialize general lookup hash variables

## Initialize of funding sources, and biological agents/toxins lookups tables
my @funding_sources          = ();
my @agtox_list                = ();
my %agtox_grps               = ();

while (<DATA>)
{
    chomp();
    if ( /^agtox/ )
    {
        push @agtox_list, $_;
    }
    else
    {
        push @funding_sources, $_;
    }
}

## U.S. state abbreviation lookup hash
my %states                      = ();
$states{'California'}           = 'CA';
$states{'Colorado'}              = 'CO';
$states{'Washington District of Columbia'} = 'Wash DC';
$states{'Georgia'}               = 'GA';
$states{'Florida'}               = 'FL';
$states{'Idaho'}                 = 'ID';
$states{'Iowa'}                  = 'IA';
$states{'Maryland'}              = 'MD';
$states{'Massachusetts'}         = 'MA';
$states{'Michigan'}              = 'MI';
$states{'Montana'}               = 'MT';
$states{'New Jersey'}            = 'NJ';
$states{'New Mexico'}             = 'NM';
$states{'New York'}               = 'NY';
$states{'North Carolina'}        = 'NC';
$states{'Ohio'}                  = 'OH';
$states{'Pennsylvania'}          = 'PA';
$states{'Texas'}                 = 'TX';
$states{'Utah'}                  = 'UT';
$states{'Virginia'}              = 'VA';
$states{'Washington'}             = 'WA';

## vars to store tuples or temporary lists
my @biod_records               = ();

## Extract relevant sections from U.S. BWC-CBM Reports to populate prototype BiOD:
## Confidence Building Measure Form-A, Part 1: Exchange of data on research centers and laboratories
## Confidence Building Measure Form-A, Part 2-i,ii: Exchange of data on national biological defense R&D programs (description)
## Confidence Building Measure Form-A, Part 2-iii: Exchange of data on national biological defense R&D programs (facilities)
## Confidence Building Measure Form-G: Declaration of vaccine production facilities

my $cbm_a_p1_start = 'Name(s) of facility';
my $cbm_a_p1_end   = 'Scope and general description of activities';
my $cbm_a_p2_start = 'What is the name of the facility?';
my $cbm_a_p2_end   = 'Outdoor Studies:';
my $cbm_g_start     = 'Name of facility';

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my $cbm_g_end = 'Appendix A';

## Extract Confidence Building Measure Form-E for dissertation analysis
my $cbm_e_start = "regulations and other measures";
my $cbm_e_end = "BWC - Confidence Building Measure";

## CBM Form-A, Part 1 data variables
my $ap1_facility_name;
my $ap1_responsible_org;
my $ap1_location;
my $ap1_funding_source;
my $ap1_lab_space;

## CBM Form-A, Part 2 data variables
my $ap2_facility_name;
my $ap2_location;
my $ap2_lab_space;
my $ap2_total_personnel;
my $ap2_mil_personnel;
my $ap2_civ_personnel;
my $ap2_total_scientist;
my $ap2_total_engineer;
my $ap2_total_technician;
my $ap2_totat_admin;
my $ap2_funding_src;
my $ap2_funding_level;
my $ap2_research_obj;
my $ap2_agent_toxin;

## CBM Form-G data variables
my $g_facility_name;
my $g_location;
my $g_research_focus;
my $g_vaccine_dev;

## CBM string variables capture raw data
my $cbm_a_p1rec;
my $cbm_a_p2rec;
my $cbm_g_rec;

## CBM string variables hold formatted data
my $cbm_a_entry;
my $counter = 0;

# Row metadata methods
#
sub convertWordToASCII($)
{
    ## Convert Microsoft Word BWC_CBM data files into ASCII text files
    foreach my $dfile (@sourcefiles)
    {
        $dfile =~ s/$datapath///;
        my $doc = $word->{Documents}->Open(catfile $datapath, $dfile);
        my $outfile = $dfile.".txt";

        $doc->SaveAs(
            catfile($datapath."/tmp", $outfile),
            wdFormatTextLineBreaks
        );

        $doc->Close(0);
    }
}

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        }
    }

sub formatSubmitDate($)
{
    my $raw_date = shift;
    $raw_date =~ s///;
    $raw_date =~ s/(^d{1,2})\s(\w+)\s(\d{4})/$2 $1 $3/;
    return $raw_date;
}

sub getDateStamp()
{
    my $dtstamp = localtime();
    $dtstamp =~ s/^w+\s+(\w+)\s+(\d{1,2})\s+(\.*)\s+(\d{4})/$1 $2\,$4 $3/;
    return $dtstamp;
}

# Data mining and extraction methods
#
sub getAgToxGroups($)
{
    my ($string)      =      @_;
    my @tuples       = ();
    #print "1 getAgentToxinGroups()\t RECVD: $string\n";

    ## scrub data
    #$string =~ s/^agents\_toxin)=(.*$)/$1/;
    $string =~ s/\n 2010.*$/;

    ## regex datamining
    $string =~ s/agents_toxin=//;
    $string =~ s/The facility maintains.*$/;
    $string =~ s/Agents_4/Agents /g;
    $string =~ s/Agents_and_/Agents and Toxins /g;
    $string =~ s/Agents_Including/Agents \Including/g;
    $string =~ s/Agents Including/Agents \Including/g;
    $string =~ s/Toxins_Including/Toxins \Including/g;
    $string =~ s/Toxins_Other/Toxins\|Other/g;
    $string =~ s/Pathogens_Overlap/Pathogens\|\Overlap/g;
    $string =~ s/Pathogens_Other/Pathogens\|\Other/g;
    $string =~ s/Pathogens_Some/Pathogens\|\Some/g;
    $string =~ s/Pathogens_The/Pathogens\|\The/g;
    $string =~ s/Pathogens_USDA/Pathogens\|\USDA/g;
    $string =~ s/Pathogens_All/Pathogens\|\All/g;
    $string =~ s/Including viruses and prions\.\_/_/g;
    $string =~ s/Including viruses and prions\.\//g;
    $string =~ s/Including viruses and prions//g;
    $string =~ s/USDAToxins/USDA/g;
    $string =~ s/agents_are/agents are/g;
    $string =~ s/toxins_Including/toxins \Including/g;
    $string =~ s/toxins_The/toxins\.\The/g;
    $string =~ s/toxins_Work/toxins\.\Work/g;
    $string =~ s/Priority Pathogens\s+/Priority Pathogens\)/g;
    $string =~ s/toxins_\$/toxins/g;
    $string =~ s/Toxins_\$/Toxins/g;
    $string =~ s/Toxins_The facility/Toxins\.\The facility/g;
    $string =~ s/The agents studied include viruses, bacteria, and fungi.//;
    $string =~ s/(The agents studied)(.*agricultural base.)/$1 \(\ie\., viruses\., bacteria\., and fungi\)$2/;
    $string =~ s/ our / US/g;
}

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@tuples = split(/\|/, $string);
push @agtox_list, @tuples;
#print "2 getAgentToxinGroups()\t RETURNS: $string\n\n";

return @tuples;
}

sub getFundingLevels($)
{
    my ($string) = @_;
    #print "1 getFundingLevels()\t RECV'D: $string\n";
    $string =~ s/\$/\$\\s+\\d+\\$/\\$1/g;
    $string =~ s/There was no.*funding.*carried over .*support of the work conducted at the facility//;
    $string =~ s/funding_level\\=Research/research_funding\\=/;
    $string =~ s/(research_funding.*\\)Development\\s+(\\$.*)\\/$1\\|dev_funding\\=$2\\/;
    $string =~ s/(dev_funding.*\\)Test and evaluation\\s+(\\$.*)\\/$1\\|testeval_funding\\=$2\\/;
    $string =~ s/(testeval_funding\\=.\\*)\\s+(\\$.*)\\(research_obj\\)\\/$1\\|total_funding\\=$2\\$3\\/;
    $string =~ s/Development\\s+\\$/\\|dev_funding\\=\\$/;
    $string =~ s/Test and evaluation\\s+\\$/\\|testeval_funding\\=\\$/;
    $string =~ s/(testeval_funding\\=)\\(\\$.*)\\s+(\\$.*)\\/$1\\$2\\|total_funding\\=$3\\/;

    ## General data scrubbing
    $string =~ s/\\$\\s+\\$/\\$/g;
    $string =~ s/\\s+\\|\\|\\$/\\$/g;
    $string =~ s/\\A=\\s+\\A=\\$/\\$/g;
    #print "2 getFundingLevels()\t RETURNS: $string\n";
    return $string;
}

sub getFundingSources($)
{
    my ($string)      = @_;
    my @tuples        = ();
    #print "getFundingSources() \\$string = $string\\n";
    $string =~ s/\\(CDC\\)//;

    foreach my $key (@funding_sources)
    {
        #chomp $key;
        if ($string =~ /$key\\b/)
        {
            #print "$key\\tfound in $string\\n";
            push @tuples, $key;
        }
    }

    return @tuples;
}

sub getLabSpaces($)
{
    my ($string) = @_;

    #print "1 getLabSpaces()\t RECV'D: $string\\n";

    ## Algorithm is to count the regex pattern of m2 to determine if multiple labs are reported
    my ($prefix, $suffix, $labspace);
}

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$string          =~ s/The organizational structure of each facility\//;
$prefix         = $string;
$suffix         = $string;
$labspace       = $string;

$prefix          =~ s/(.*)lab_space\=.*\$/1/;
$prefix          =~ s/(.*)_|\$/1;
$prefix          =~ s/.*(total_personnel\=.*\$)\$/1;

$labspace        =~ s/.*(lab_space\=.*\)| total_personnel.*\$/1/;
$labspace        =~ s/\_BL-2 laboratories.*BL3 plant pathogen containment.*personnel shower\out
procedures\//;
$labspace        =~ s/\_BSL-3Ag Large Animal Space \- enhancements include HEPA\filtered supply air\; .* epoxy-
coated floors\, epoxy-covered surfaces\//;
$labspace        =~ s/(sqM)\ Total//;
$labspace        =~ s/(sqM)//g;
$labspace        =~ s/BL1\|bsl1_m2\=/;
$labspace        =~ s/BL2\|bsl2_m2\=/;
$labspace        =~ s/BL3\|BSL-3_m2\=/;
$labspace        =~ s/BL4\|BSL-4_m2\=/;
$labspace        =~ s/(.*BSL-4_m2\=\$s+\d+_)\$s+(\.\d+\$)\$/1\|total_bsl_m2\=$2/;
$labspace        =~ s/(.*BSL-4_m2\=\d+)\_\(\d+\_\)\|total_personnel\$/1\|total_bsl_m2\=\$2/; #BSL-
4_m2=0_1055_|total_personnel
$labspace        =~ s/laboratory floor area\s+\|\total_bsl_m2\=/;

# laboratory floor area
$labspace        =~ s/\s//g;
$labspace        =~ s/lab_space\//;

my $new_string .= $prefix.$labspace.$suffix;
#print "2 getLabSpaces()\t RETURNS: $new_string\n";

return $new_string;
}


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sub getUniqLabs($)
{
    my ($string)      =      @_;
    my @tuples        =  ();
    #print "1 getUniqLabs() \$string = $string\n";
    $string =~ s/m2\_\_m2\//g;
    $string =~ s/Space\_\_Space\//g;
    $string =~ s/laboratory\_\_laboratory\//g;
    $string =~ s/\_|lab\_space\//;
    #print "2 getUniqLabs() \$string = $string\n";
    @tuples = split(/\./, $string);

    return @tuples;
}

sub getWord()
{
    my $word;
    eval {
        $word = Win32::OLE->GetActiveObject('Word.Application');
    };
    die "$@\n" if $@;
}


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unless(defined $word) {
    $word = Win32::OLE->new("Word.Application", sub { $_[0]->Quit })
        or die "Oops, cannot start Word: ",
            Win32::OLE->LastError, "\n";
}
return $word;
}

## makeBiodRecords() is the workhorse function that splits raw CBM data, then
## re-assembles into BIO record sets when multiple funding sources, laboratories,
## and biological agents or toxins are associated to an facility. This ensures
## each tuple is unique when executing proof-of-concept tests or "group by" SQL
## queries to carry out analysis of US CBM submitted reports.
##
sub makeBiodRecords( $$ )
{
    my ($rowmeta, $string) = @_;
    my @records                = ();
    my @agtox_groups           = ();
    my @funders                = ();
    my @labs                   = ();

    my $prefix                 = $string;
    my $suffix                 = $string;
    my $fundsrcs               = $string;
    my $agtoxstr               = $string;

    $agtoxstr =~ s/.*\|(agents_toxin.*$)/$/;

    #print "makeBiodRecords()\t RECVD: $string\n\n";

    $prefix      =~ s/(.)(\|funding_src.*$)/$/;
    #print "makeBiodRecords()\t \$prefix $prefix\n";
    if ($string =~ /research_funding/) {
        ## parse by funding sources only!
        $suffix      =~ s/.*(\|funding_src.*)((\|research_funding.*$))/$/;
        $fundsrcs   =~ s/.*(\|funding_src.*)((\|research_funding.*$))/$/;
        $fundsrcs   =~ s/_/_/g;
        #print "makeBiodRecords()\t \$suffix $suffix\n";
        #print "makeBiodRecords()\t \$fundsrcs $fundsrcs\n";
    }
    else
    {
        ## parse by funding sources and also multiple lab spaces reported
        $suffix      =~ s/.*(\|funding_src.*)((\|lab_space.*$))/$/;
        $fundsrcs   =~ s/.*(\|funding_src.*)((\|lab_space.*$))/$/;
        $fundsrcs   =~ s/_/_/g;
        #print "makeBiodRecords()\t \$suffix $suffix\n";
        #print "makeBiodRecords()\t \$fundsrcs $fundsrcs\n";
    }

    @funders      = getFundingSources($fundsrcs);
    @labs         = getUniqLabs($suffix);
    @agtox_groups = getAgToxGroups($agtoxstr) if ($agtoxstr =~ /agents_toxin/ );
    my $numlabs   = @labs;
    my $numagt    = @agtox_groups;

    my $cbm_form = "CBM-Form-A, Part 1\";
    $cbm_form = "CBM-Form-A, Part 2\" if ($string =~ /total_bsl_m2/ );
}

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foreach my $key (@funders)
{
    my $tmprec = $rowmeta.$cbm_form.$prefix;

    if ($suffix =~ /lab_space/)
    {
        if ($numlabs >1 )
        {
            foreach my $yy (@labs)
            {
                $tmprec .= "\|funding\_src\=". $key."|\lab\_space\=$yy";
                push @records, $tmprec;
            }
            $tmprec = $rowmeta.$cbm_form.$prefix;
        }
    }
    else
    {
        my $tmp_suffix      = $suffix;
        my $rsrchstr       = $suffix;

        $rsrchstr =~ s/.research_obj\=(.*)(agents_toxin.*$)/$1/;
        $rsrchstr = pruneResearchObj($rsrchstr);
        $tmp_suffix =~ s/(.*research_obj\=).*$/$1/;
        $tmp_suffix .= $rsrchstr."agents\_toxin\=";
        $suffix = $tmp_suffix;

        if ($numagts >0 )
        {
            #print "1 makeBiodRecords()\t OLD \$suffix --- $suffix\n";
            $suffix =~ s/(agents\_toxin\=).*$/$1/;

            foreach my $agtoxs (@agtox_groups)
            {
                my $tmprec1           = $tmprec;
                my $new_suffix         = $suffix;
                my $new_key            = $key;
                $new_suffix .= $agtoxs;
                #print "2 makeBiodRecords()\t NEW \$suffix --- $suffix\n";

                $new_key .= $new_suffix;
                $tmprec1 .= "\|funding\_src\=". $new_key;
                push @records, $tmprec1;
            }
        }
        else
        {
            $key .= $suffix;
            $tmprec .= "\|funding\_src\=". $key;
            push @records, $tmprec;
        }
    }
}

return @records;
}

sub parseCbmAPart1($)
{

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my $raw_string = shift;
#print "Form-A RECDV:\t$raw_string\n";
my @cbm_a1_records = ();
$raw_string =~ s/[^[:ascii:]]//g;
$raw_string =~ s/Form A\,\s+Part\s+\d+//g;
$raw_string =~ s/(N|n)ot (A|a)pplicable//g;
$raw_string =~ s/1\.s+Name\s+of facility2/facility\_name\=/;
$raw_string =~ s/2\.s+Responsible public or private organization or company\.\|\responsible_org\=/g;
$raw_string =~ s/3\.s+Location and postal address\.\|\location\=/;
$raw_string =~ s/4\.s+Source\s+of financing.*Ministry of Defence\.\|\funding_src\=/;
$raw_string =~ s/5\.s+Number of maximum containment units3.*size \(\m2\)\.\|\lab_space\=/;
$raw_string =~ s/6\.s+If no maximum containment unit.*$/;
#print "Form-A RETURN:\t$raw_string\n";
return $raw_string;
}

sub parseCbmAPart2($)
{
    my $raw_string = shift;
#print "Form-A2 RECDV:\t$raw_string\n";
#@cbm_a2_records = ();
$raw_string =~ s/[^[:ascii:]]//g;
$raw_string =~ s/1\.s+What is the name of the facility\?\|facility\_name\=/;
$raw_string =~ s/2\.s+Where is it located.*geographical location\|\?\\|\location\=/;
$raw_string =~ s/3\.s+Floor area of laboratory areas by containment level(.|\:)\|\lab_space\=/;
$raw_string =~ s/4\.s+The organizational structure of each facility\//;
$raw_string =~ s/1\s+Number of Personnel\|\total_personnel\=/;
$raw_string =~ s/number of personnel\|\total_personnel\=/;
$raw_string =~ s/(II)\|(ii)\|s+Division of (P|p)ersonnel\://;
$raw_string =~ s/(III)\|(iii)\|s+Division of (P|p)ersonnel by (C|c)ategory\://;
$raw_string =~ s/Briefly describe(.*\|research_obj\=/;
$raw_string =~ s/Agents Microorganisms and.*Toxins\|(.*)Outdoor Studies.*$\\|\agents_toxin\=$1/;
$raw_string =~ s/What.*are.*the source.*funding for the work.*financed by the Ministry of Defence\?\|\funding_src\=/;
$raw_string =~ s>List the scientific disciplines.*engineering.*\|\funding_src\=$1/;
#print "Form-A2 RETURN:\t$raw_string\n";
return $raw_string;
}

sub parseCbmG($)
{
    my $raw_string = shift;
#print "Form-G RECDV:\t$raw_string\n";
my @cbm_g_records = ();
$raw_string =~ s/[^[:ascii:]]//g;
$raw_string =~ s/1\.s+Name of facility/facility\_name\=/g;
$raw_string =~ s/2\.s+Location\s+\(Mailing Address\)\|\location\=/;
$raw_string =~ s/3\.s+General.*diseases covered\|\research_focus\=/;
$raw_string =~ s/Vaccines\|\vaccine_dev\=/;
$raw_string =~ s/Appendix A.*$/;
$raw_string =~ s/Form G.*$/;
#print "Form-G RETURN:\t$raw_string\n";
return $raw_string;
}

sub parseLocation($)
{
    my ($string)      = @_;
    my $prefix        = $string;
    my $suffix       = $string;
    my $location     = $string;
    my $street_city  = "";
    my $state         = "";
}

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my $zipcode = "";

#print "parseLocation()\t RECDV: $string\n";
$prefix =~ s/(.*)_location\=.*/$1/;
#print "$prefix = $prefix\n";
if ($string =~ /funding_src/) {
    if ($string =~ /total_bsl_m2/) {
        $suffix =~ s/.*(location\=.*)(bsl(1|2)\_\_.*$)/$2/;
        $location =~ s/.*(location\=.*)bsl(\d{1})\_\_.*$/$1/;
        $location =~ s/bsl\d{1}\_m2.*$/g;
        #print "1 \$suffix = $suffix\n";
        #print "1 \$location = $location\n";
    }
    else {
        $suffix =~ s/.*(location\=.*)(funding_src.*$)/$2/;
        $location =~ s/.*(location\=.*)funding_src.*$/$1/;
        #print "2 \$suffix = $suffix\n";
        #print "2 \$location = $location\n";
    }
}
else {
    $suffix =~ s/.*(location\=.*)(research_focus.*$)/$2/;
    $location =~ s/.*(location\=.*)research_focus.*$/$1/;
    #print "3 \$suffix = $suffix\n";
    #print "3 \$location = $location\n";
}

$location =~ s/\|\//;
$location =~ s/_United States.*$/;
$location =~ s/bsl\d{1}\_m2.*$/g;
$location =~ s/(.*\.)//;

$zipcode = $location;
$zipcode =~ s/^\d{5}$/$1/;
$zipcode =~ s/^\d{5}.*/$1/;
$zipcode =~ s/\_//;
$zipcode =~ s/_United States//;
$location =~ s/$zipcode//;

foreach my $st ( keys %states ) {
    if ( $location =~ /$st/ ) {
        $state = $states{$st};
        $location =~ s/$st//; # unless $st eq "Massachusetts";
    }
}

$location =~ s/\s+$/;
$location =~ s/_/ /g;
$location =~ s/_//g;
$location =~ s/location\=/_street\_city\=/;
#print " -- parseLocation()\t-- $location\|state\=$state\|zipcode\=$zipcode\n";

my $new_string = $prefix."$location\|state\=$state\|zipcode\=$zipcode\|$suffix";
#print "parseLocation()\t RETURNS: -- $new_string\n";

return $new_string;

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}

sub prepString($$)
{
    my ($cbm_form, $string) = @_;
    #print "OLD -- $cbm_form = $string\n";
    $string =~ s/\\=\\s+\\=/g;
    $string =~ s/\\=\\.\\=/g;
    $string =~ s/\\=\\_\\=/g;
    $string =~ s/\\=\\_(\\w+)\\=/g;
    $string =~ s/\\=\\s+\\_(\\w+)\\=/g;
    $string =~ s/\\=\\_\\//g;
    $string =~ s/\\s+\\_\\//g;
    $string =~ s/\\_\\_|\\_\\//g;
    $string =~ s/(^\\w+.*)\\_\\$/g;
    #print "\\nprepString()\\t-- $cbm_form = $string\\n";
    return $string;
}

sub pruneResearchObj($)
{
    my ($string) = @_;
    #print "pruneResearchObj()\\tOLD -- $string\\n";
    $string =~ s/\\_\\/_/g;
    $string =~ s/\\|//;
    $string =~ s/\\^\\^\\/_/g;
    $string =~ s/\\_.\\_Laboratory\\_. Laboratory/g;
    $string =~ s/\\_.\\_NBACC\\_. NBACC/g;
    $string =~ s/therapeutics\\s+\\|/therapeutics\\./;
    $string =~ s/Including viruses and prions\\./g;
    $string =~ s/Laboratory research began at NBACC in November 2010 at BSL-2 containment\\.//;
    $string =~ s/This generically includes both volatile.*organic components.*treatment processes\\ Investigation//;
    $string =~ s/This work involves.*innate or adaptive immunity.*prophylaxis and therapeutics\\./;
    $string =~ s/The team is using mass spectrometry methods.*pathogen secreted proteins\\./;
    $string =~ s/These platforms use PCR, immunoassay,. *biological species.*sampling environment\\ ./;
    $string =~ s/We are using mass spectrometry methods.*infectious bacteria.*pathogen secreted proteins\\./;
    $string =~ s/The select agents list is available at.*\\./;
    $string =~ s/(^.\\w+)\\s+\\$/g;
    $string =~ s/(^.*)\\|\\$/g;
    $string =~ s/\\s+(\\_|)/$1/g;
    #print "pruneResearchObj()\\tNEW -- $string\\t(NEW)\\n";
    return $string;
}

sub scrubString($$)
{
    my ($cbm_form, $string) = @_;
    $string =~ s/\\_\\_|\\_\\//g;
    $string =~ s/\\s+\\_\\_\\//g;
    $string =~ s/\\_\\_(ii)\\//g;
    $string =~ s/\\_\\_(iii)\\//g;
    $string =~ s/\\_\\_(iv)\\//g;
    $string =~ s/\\_\\_(vi)\\//g;
    $string =~ s/\\_\\_II\\//g;
    $string =~ s/\\_\\_III\\//g;
    $string =~ s/\\_\\_IV\\//g;
    $string =~ s/\\_\\_*\\//g;
    $string =~ s/\\=\\s+\\=/g;
    #print "\\n\\nscribString()\\t$cbm_form -- $string\\n";
    return $string;
}

```

```

# Main program execution
#
## Instantiate Microsoft Word DCOM object
$Win32::OLE::Warn = 3;
$word = getWord();
$word->{Visible} = 0;

## US-CBM metadata variables
my $submit_date;
my $upload_date = getDateStamp();

foreach my $fq_cbmfile ( @sourcefiles )
{
    #print
    "=====\\n";
    #print "[ $upload_date ]\\tExtracting CBM data from $fq_cbmfile\\n";
    #print
    "=====\\n";
    my $cbmfile = $fq_cbmfile;
    $cbmfile =~ s/^\\w+.*\\.(BWC_CBM.*).txt\\/$1/;

    my $load_entry = "$upload_date\\|$cbmfile\\|";

    open DATAFILE, $fq_cbmfile or die "Cannot open data source file:\\t$fq_cbmfile ".$!;
    while ( <DATAFILE> )
    {
        chomp;
        my $line = $_;
        $line =~ s/\\s+|\\s+$/g;
        next if length($line)<1;

        ## General data scrubbing and pre-parsing
        $line =~ s/\\//g;
        $line =~ s/\\]/\\//g;
        $line =~ s/\\s+-\\s+(partly|wholly)//g;
        $line =~ s/Total//;
        $line =~ s/Declared in accordance with Form A\\, (P|p)art 2\\s+\\(iii\\)//g;
        $line =~ s/(\\r|\\n)/\\g;
        next if (/^d{1,3}\\$|\\|^Page/);                                ## Ignore page numbers
        next if /WHO Laboratory Biosafety Manual/;
        next if /fixed patient treatment modules/;
        next if /facilities with maximum containment units/;

        ## Specialized extraction of US CBM file contents
        $line =~ s/\\(i\\)//g;
        $line =~ s/\\(HHS\\)//g;
        $line =~ s/U.S.\\s+Army Medical Research Institute of Infectious Diseases\\s+\\((USAMRIID\\))\\/$1/g;
        $line =~ s/National Institutes of Health\\s+\\((NIH\\))\\/$1/g;
        $line =~ s/National Institutes of Health/NIH/g;
        $line =~ s/National Biodefense Analysis and Countermeasures Center \\((NBACC\\))\\/$1/g;
        $line =~ s/Centers for Disease Control and Prevention/CDC/g;
        $line =~ s/U.S. Department of Health and Human Services/DHHS/g;
        $line =~ s/US Department of Health and Human Services/DHHS/g;
        $line =~ s/U.S. Agency For International Development \\((USAID\\))\\/$1/g;
        $line =~ s/U.S. Department of Agriculture \\((USDA\\))\\/$1/g;

```

```

$line =~ s/U.S. Department of Energy \((DOE)\)/$1/g;
$line =~ s/U.S. Department of Defense \((DOD)\)/$1 /g;
$line =~ s/U.S. Department of Justice \((DOJ)\)/$1 /g;
$line =~ s/U.S. Department of Homeland Security \((DHS)\)/$1 /g;
$line =~ s/U.S. Department of State \((DoS)\)/$1 /;
$line =~ s/U.S. Department of Defense \((DOD)\)/$1 /;
$line =~ s/U.S. Environmental Protection Agency \((EPA)\)/$1 /g;

if (/Submitted to the United Nations/ .. / 201[0-9]/)
{
    if (/.*\d{4}/)
    {
        $submit_date = formatSubmitDate($_);
        $load_entry .= $submit_date."| ";
    }
}

## CBM Form A, Part 1 - BiOD data population
if ( /$cbm_a_p1_start/ .. /$cbm_a_p1_end/ )
{
    if ( $line =~ /$cbm_a_p1_start/ )
    {
        if ( $cbm_a_p1rec && length($cbm_a_p1rec)>1 )
        {
            $cbm_a_entry = parseCbmAPart1($cbm_a_p1rec);
            $cbm_a_entry = prepString('CBM-Form-A-Part-1', $cbm_a_entry);

            $cbm_a_entry = parseLocation( $cbm_a_entry );
            $cbm_a_entry = scrubString('CBM-Form-A-Part-1', $cbm_a_entry);
            push @biod_records, makeBiodRecords( $load_entry, $cbm_a_entry );
            $cbm_a_p1rec = "";
        }
    }
    next if $line =~ /Scope and general description/;
    #print "CBM_A_Part_1 $. = $line\n";
    $cbm_a_p1rec .= "$line\_";
}
}

## CBM Form A, Part 2 - BiOD data population
if ( /$cbm_a_p2_start/ .. /$cbm_a_p2_end/ )
{
    ## Flush any CBM Form-A Part 1 entries -- ## maybe implement a flush() method?
    if ( $cbm_a_p1rec && length($cbm_a_p1rec)>1 )
    {
        $cbm_a_entry = parseCbmAPart1($cbm_a_p1rec);
        $cbm_a_entry = prepString('CBM-Form-A-Part-1', $cbm_a_entry);
        $cbm_a_entry = parseLocation( $cbm_a_entry );
        $cbm_a_entry = scrubString('CBM-Form-A-Part-1', $cbm_a_entry);
        push @biod_records, makeBiodRecords( $load_entry, $cbm_a_entry );

        undef $cbm_a_p1rec;
        $cbm_a_entry = "";
    }

    if ( $line =~ /$cbm_a_p2_start/ )
    {
        if ( $cbm_a_p2rec && length($cbm_a_p2rec)>1 )
        {
            #print "\n$cbm_a_p2rec = $cbm_a_p2rec\n";
            $cbm_a_p2rec =~ s/Briefly describe.*Objectives\:/\|research_obj\=/;
            $cbm_a_entry = parseCbmAPart2($cbm_a_p2rec);
        }
    }
}

```

```

$cbm_a_entry = prepString( 'CBM-Form-A-Part-2-i-ii-iii', $cbm_a_entry);

$cbm_a_entry = getFundingLevels($cbm_a_entry);
$cbm_a_entry = getLabSpaces($cbm_a_entry);
$cbm_a_entry = parseLocation( $cbm_a_entry );
$cbm_a_entry = scrubString('CBM-Form-A-Part-2-i-ii-iii', $cbm_a_entry);

push @biod_records, makeBiodRecords( $load_entry, $cbm_a_entry );

$cbm_a_p2rec = "";
}

}

$line =~ s/Military\s+(\d+)/\|mil_personnel\=$1/;
$line =~ s/Civilian\s+(\d+)/\|civ_personnel\=$1/;
$line =~ s/Engineers\s+(\d+)/\|total_engineer\=$1/;
$line =~ s/Scientists\s+(\d+)/\| total_scientist\=$1/;
$line =~ s/Technicians\s+(\d+)/\| total_technician\=$1/;
$line =~ s/Administrative\|Support\s+(\d+)/\| total_admin\=$1/;
$line =~ s/Administrative and support staff\s+/\| total_admin\=/;
$line =~ s/.*What are the funding levels.*$/\|funding_level\=/;
$line =~ s/.*(Briefly describe)/$1/;
#print "CBM_A_Part_2 $. = $line\n";
$cbm_a_p2rec .= "$line\_";
}

## CBM Form E - strictly for dissertation and Oversight Patchwork Map analysis
#if( /$cbm_e_start/ .. $cbm_e_end/ )
#{
#    print "CBM_E $. = $line\n";
#}

## CBM Form G - BiOD data population
if( /$cbm_g_start/ .. $cbm_g_end/ )
{
    ## Flush any CBM Form-A Part 2 entries
    if( $cbm_a_p2rec && length($cbm_a_p2rec)>1 )
    {
        $cbm_a_entry = parseCbmAPart2($cbm_a_p2rec);
        $cbm_a_entry = prepString( 'CBM-Form-A-Part-2-i-ii-iii', $cbm_a_entry);

        $cbm_a_entry = getFundingLevels($cbm_a_entry);
        $cbm_a_entry = getLabSpaces($cbm_a_entry);
        $cbm_a_entry = parseLocation( $cbm_a_entry );
        $cbm_a_entry = scrubString('CBM-Form-A-Part-2-i-ii-iii', $cbm_a_entry);
        push @biod_records, makeBiodRecords( $load_entry, $cbm_a_entry );
        undef $cbm_a_p2rec;
        $cbm_a_entry = "";
    }

    if( $line =~ /$cbm_g_start/ )
    {
        if( $cbm_g_rec && length( $cbm_g_rec )>1 )
        {
            #print "\n$cbm_g_rec = $cbm_g_rec\n";
            ## implement a CBM Form-G string parser before resetting $cbm_a_record
            $cbm_a_entry = parseCbmG( $cbm_g_rec );
            $cbm_a_entry = prepString( 'CBM-Form-G', $cbm_a_entry );

            $cbm_a_entry = parseLocation( $cbm_a_entry );

            $cbm_a_entry = scrubString( 'CBM-Form-G', $cbm_a_entry );
        }
    }
}

```

```

        push @biod_records, $load_entry."CBM-Form-G\".$cbm_a_entry;

        $cbm_g_rec = "";
    }
}
#print "CBM_G $. = $line\n";
$cbm_g_rec .= "$line\_";
}

if ( /$cbm_g_end/ )
{
    if ( $cbm_g_rec )
    {
        $cbm_a_entry = parseCbmG( $cbm_g_rec );
        $cbm_a_entry = prepString('CBM-Form-G', $cbm_a_entry);

        $cbm_a_entry = parseLocation( $cbm_a_entry );
        $cbm_a_entry = scrubString('CBM-Form-G', $cbm_a_entry);
        push @biod_records, $load_entry."CBM-Form-G\".$cbm_a_entry;

        undef $cbm_g_rec;
    }
}

}##end while ( <DATAFILE> )

close DATAFILE;
}

## Print out the records
print "\n\n\n";
print "--- BIOD Records ---\n";
my $count =0;
foreach my $row ( @biod_records )
{
    #print "[.$count++.]\t$row\n";
    print "$row\n";
}

## Print out metadata research objectives used for data mining
my %seen = {};
my @agdunes = {};
push @agdunes, @agtox_list;

@agtox_list = ();

foreach my $item (@agdunes) {
    push(@agtox_list, $item) unless $seen{$item}++;
}

foreach my $row ( @agtox_list )
{
    $row =~ s/(^\s+|\s+$)//;
    print "$row\n";
}

```

\_\_DATA\_\_

DOD  
 NIH  
 Georgia Research Alliance  
 DHS  
 Private Sector Companies  
 Private Donors  
 DOE  
 USDA  
 Universities  
 DHHS  
 EPA  
 Other Governmental Agencies  
 Internal (Laboratory Directed Research and Development LDRD)  
 U.S. Department of the Interior (DOI) - National Park Service  
 Non-profit Associations  
 Private Foundations  
 Pharmaceutical Industry  
 DOJ  
 CDC  
 Department of Defense  
 Department of Health and Human Services (DHHS)  
 USAID  
 DoS  
 Internal (Laboratory Directed Research and Development, LDRD)  
 U.S. Department of Agriculture  
 U.S. Department of State

## Source Code Listing - MySqlBiodDataLoader.pl

```

#
#
# Author: Jonathan S. Gines, PhD Candidate
# George Mason University -- Biodefense Program
# Dr. Gregory Koblentz           -- Chair
# Dr. Fran Harbour              -- Committee Member
# Dr. Nirup Menon               -- Committee Member
# Dr. Trevor Thrall             -- Committee Member
#
# MySqlBiodDataLoader.pl
# Revision history:
# -----
# 01/18/2014 - Initial script developed for executing streamed SQL statements
# 02/14/2014 - Support for columns as hash keys
# 03/31/2014 - Implementation of SQL parser to read from local _DATA_
# 06/26/2014 - Completed final source implementations
#
#
#
# -----
use strict;
use DBI;

## Stored data variables
my @data_entries          = ();
my @biores_labs_sql        = ();
my @biores_programs_sql   = ();
my @vaccine_labs_sql       = ();
my @all_uscbm_sql          = ();

```

```

## Initialize global variables
my $tbl
my $biores_labs_tbl = '';
my $biores_progs_tbl = '';
my $vaccine_labs_tbl = '';
my %uscbm_form_tbls = ();
$uscbm_form_tbls{'CBM-Form-A, Part 1'} = $biores_labs_tbl;
$uscbm_form_tbls{'CBM-Form-A, Part 2'} = $biores_progs_tbl;
$uscbm_form_tbls{'CBM-Form-G'} = $vaccine_labs_tbl;

my @biores_labs_tblflds = ();
my @biores_progs_tblflds = ();
my @vaccine_labs_tblflds = ();
my @lab_tbl_nulls = ();
my @biores_progs_nulls = ();

@biores_labs_tblflds = (
    'uscbm_form_ap1_id',
    'create_date',
    'uscbm_report',
    'uscbm_submit_date',
    'uscbm_form_section',
    'facility_name',
    'responsible_org',
    'street_city',
    'state',
    'zipcode',
    'funding_src',
    'lab_space',
    'FSAP_COR_REGISTRATION_NUMBER',
    'FSAP_COR_REGISTRATION_DATE',
    'FSAP_COR_RENEWAL_DATE',
    'FSAP_OVERALL_COMPLIANCE_GRADE',
    'FSAP_BMBL_COMPLIANCE_GRADE',
    'FSAP_NIHG_COMPLIANCE_GRADE',
    'BSL_INSPECTION_GRADE',
    'BSL_INSPECTION_AGENCY',
    'BSL_INIT_INSPECT_START_DATE',
    'BSL_INIT_INSPECT_END_DATE',
    'BSL_LAST_INSPECT_START_DATE',
    'BSL_LAST_INSPECT_END_DATE',
    'BSL_NEXT_INSPECT_START_DATE'
);

@biores_progs_tblflds = (
    'uscbm_form_ap2_id',
    'create_date',
    'uscbm_report',
    'uscbm_submit_date',
    'uscbm_form_section',
    'facility_name',
    'street_city',
    'state',
    'zipcode',
    'bsl2_m2',
    'BSL-3_m2',
    'BSL-4_m2',
    'total_bsl_m2',
    'total_personnel',
    'mil_personnel',
    'civ_personnel',
    'total_scientist',
);

```

```

        'total_engineer',
        'total_technician',
        'total_admin',
        'funding_src',
        'research_funding',
        'dev_funding',
        'testeval_funding',
        'total_funding',
        'research_obj',
        'agents_toxin',
        'TOTAL_SRA HOLDER',
        'BIORESEARCH_AUDIT_REQUESTING_AGENCY',
        'BIORESEARCH_AUDIT_REPORTING_AGENCY',
        'BIORESEARCH_INIT_AUDIT_START_DATE',
        'BIORESEARCH_INIT_AUDIT_END_DATE',
        'BIORESEARCH_LAST_AUDIT_START_DATE',
        'BIORESEARCH_LAST_AUDIT_END_DATE'
    );
}

@vaccine_labs_tblflds = (
    'uscbm_form_g_id',
    'create_date',
    'uscbm_report',
    'uscbm_submit_date',
    'uscbm_form_section',
    'facility_name',
    'street_city',
    'state',
    'zipcode',
    'research_focus',
    'vaccine_dev',
    'FSAP_COR_REGISTRATION_NUMBER',
    'FSAP_COR_REGISTRATION_DATE',
    'FSAP_COR_RENEWAL_DATE',
    'FSAP_OVERALL_COMPLIANCE_GRADE',
    'FSAP_BMBL_COMPLIANCE_GRADE',
    'FSAP_NIHG_COMPLIANCE_GRADE',
    'BSL_INSPECTION_GRADE',
    'BSL_INSPECTION_AGENCY',
    'BSL_INIT_INSPECT_START_DATE',
    'BSL_INIT_INSPECT_END_DATE',
    'BSL_LAST_INSPECT_START_DATE',
    'BSL_LAST_INSPECT_END_DATE',
    'BSL_NEXT_INSPECT_START_DATE'
);

## Set default values for null values
@lab_tbl_nulls = (
    'No COR registration number reported',
    'No COR registration date reported',
    'No COR renewal date reported',
    'No Federal Select Agent Grade reported',
    'No BMBL Compliance Grade reported',
    'No NIH Guidelines Compliance Grade reported',
    'No BSL Inspection Grade reported',
    'No BSL Inspection Agency reported',
    'No BSL initial inspection start date reported',
);

```

```

        'No BSL initial inspection end date reported',
        'No BSL last inspection start date reported',
        'No BSL last inspection end date reported',
        'No BSL scheduled inspection date reported'
    );
}

@bioresearch_program_audit_start_date = (
    0,
    'No audit requesting agency reported',
    'No audit reporting agency reported reported',
    'No initial bioresearch program audit start date
reported',
    'No initial bioresearch program audit end date
reported',
    'No last bioresearch program audit start date
reported',
    'No last bioresearch program audit end date
reported'
);

while (<DATA>)
{
    chomp;
    push @data_entries, $_;
}

#INSERT INTO table SET a=1, b=2, c=3

my $ii = 0;

foreach my $row (@data_entries)
{
    #print "row [\".$ii++.\"]\n$row\n";

    my @keyvals          = split /\|/, $row;
    my $cbm_form          = $keyvals[3];
    my $set_create_date   = "create_date=\"$keyvals[0].\" ";
    my $set_uscbm_rpt    = "uscbm_report=\"$keyvals[1].\" ";
    my $set_submit_date   = "uscbm_submit_date=\"$keyvals[2].\" ";
    my $set_cbm_form      = "uscbm_form_section=\"$keyvals[3].\" ";
    my $fixed_vals        = $set_create_date.$set_uscbm_rpt.$set_submit_date.$set_cbm_form;

    my $table             = $uscbm_form_tbls{$cbm_form};
    my $insert_sql         = "INSERT INTO $table SET \"$fixed_vals";

    my $kk = 0;
    foreach my $t_row (@keyvals)
    {
        my %tbl_row = ();
        if ($t_row =~ /=/)
        {
            my $int_row = $t_row;
            $t_row =~ s/(\w+\+=)(.*)/$1'$2\\'/;

            if ($t_row =~ /(^\total_|^bsl\d{1}_\personnel)/)
            {
                unless ($t_row =~ /^\total_funding/)
                {
                    $t_row = $int_row;
                }
            }
        }

        #print "2\t[$.kk++.]\\t$t_row\\n";
        $insert_sql .= "$t_row,";
    }
}

```

```

        }
    }
$insert_sql .= "\n";
$insert_sql =~ s/(.*)\n;/\n$1\n/;
#print "\tINSERT_SQL -- $insert_sql\n";
push @bioresearch_labs_sql, $insert_sql if ($table eq "cbm_bioresearch_labs");
push @bioresearch_programs_sql, $insert_sql if ($table eq "cbm_bioresearch_programs");
push @vaccine_labs_sql, $insert_sql if ($table eq "cbm_vaccine_prod_centers");
}

my @badsql = ();
my $dbh = DBI->connect('DBI:mysql:biod:host=localhost', 'root', 'biodefense',
                           { RaiseError => 1 });
my $i = 1;

push @all_uscbm_sql, @bioresearch_labs_sql;
push @all_uscbm_sql, @vaccine_labs_sql;
push @all_uscbm_sql, @bioresearch_programs_sql;

foreach my $inserts (@all_uscbm_sql)
{
    print $i++. " --- $inserts\n";
    my $j = $i;
    $j -= 1;
    eval
    {
        $dbh->do($inserts);
    };
    if (@_)
    {
        print "Failed on [ $j ]: $inserts\n";
        push (@badsql, "\n$DBI::errstr on [ $j ] $inserts\n");
    }
}

if ($dbh)
{
    $dbh->disconnect();
    print "\nMySQL database connection terminated..\n";
}

if ($#badsql > 0)
{
    foreach (@badsql) { print $_; }
}

```

## DATA

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=NBACC | street\_city=8300 Research Plaza Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=1032 | BSL-3\_m2=3160 | BSL-4\_m2=976 | total\_bsl\_m2=5168 | total\_personnel=167 | mil\_personnel=0 | civ\_personnel=167 | total\_scientist=34 | total\_engineer=16 | total\_technician=73 | total\_admin=44 | funding\_src=DHS | research\_funding=\$11,036,000 | dev\_funding=\$8,100,000 | testeval\_funding=\$0 | total\_funding=\$19,136,000 | research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Plum Island Animal Disease Center (PIADC) | street\_city=40550 Rte. 25 Orient Point | state=NY | zipcode=11957 | bsl2\_m2=234 | BSL-3\_m2=17643 | BSL-4\_m2=0 | total\_bsl\_m2=17877 | total\_personnel=357 | mil\_personnel=0 | civ\_personnel=357 | total\_scientist=92 | total\_engineer=2 | total\_technician=13 | total\_admin=250 | funding\_src=DHS | research\_funding=\$4,000,000 | dev\_funding=\$8,000,000 | testeval\_funding=\$4,000,000 | total\_funding=\$16,000,000 | research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock in the U.S. The focus of the research is on pathogens that infect animals, not those that infect humans. Technologies researched and developed are vaccines, antivirals and diagnostic methods. The facility also trains veterinarians to field diagnose high consequence foreign animal disease. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Plum Island Animal Disease Center (PIADC) | street\_city=40550 Rte. 25 Orient Point | state=NY | zipcode=11957 | bsl2\_m2=234 | BSL-3\_m2=17643 | BSL-4\_m2=0 | total\_bsl\_m2=17877 | total\_personnel=357 | mil\_personnel=0 | civ\_personnel=357 | total\_scientist=92 | total\_engineer=2 | total\_technician=13 | total\_admin=250 | funding\_src=USDA | research\_funding=\$4,000,000 | dev\_funding=\$8,000,000 | testeval\_funding=\$4,000,000 | total\_funding=\$16,000,000 | research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock in the U.S. The focus of the research is on pathogens that infect animals, not those that infect humans. Technologies researched and developed are vaccines, antivirals and diagnostic methods. The facility also trains veterinarians to field diagnose high consequence foreign animal disease. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DOD | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DOD | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DOD | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DHS | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DHS | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DHS | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DHHS | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DHHS | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=DHHS | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=EPA | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=EPA | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Battelle Biomedical Research Center | street\_city=1425 State Route 142 West Jefferson | state=OH | zipcode=43162 | bsl2\_m2=1483 | BSL-3\_m2=6549 | BSL-4\_m2=0 | total\_bsl\_m2=8032 | total\_personnel=185 | mil\_personnel=0 | civ\_personnel=185 | total\_scientist=49 | total\_engineer=1 | total\_technician=98 | total\_admin=37 | funding\_src=EPA | research\_funding=\$25,500,000 | dev\_funding=\$25,500,000 | testeval\_funding=\$1,300,000 | total\_funding=\$52,300,000 | research\_obj=Test and evaluation of medical countermeasures against biological threat/terrorism agents. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Rd Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=56 | mil\_personnel=0 | civ\_personnel=56 | total\_scientist=36 | total\_engineer=1 | total\_technician=7 | total\_admin=12 | funding\_src=DOD | research\_funding=\$0 | dev\_funding=\$0 | testeval\_funding=\$3,770,000 | total\_funding=\$3,770,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens) | Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Rd Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=56 | mil\_personnel=0 | civ\_personnel=56 | total\_scientist=36 | total\_engineer=1 | total\_technician=7 | total\_admin=12 | funding\_src=DOD | research\_funding=\$0 | dev\_funding=\$0 | testeval\_funding=\$3,770,000 | total\_funding=\$3,770,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Naval Medical Research Center (NMRC) | street\_city=503 Robert Grant Avenue Silver Spring | state=MD | zipcode=20910 | bsl2\_m2=100 | BSL-3\_m2=35 | BSL-4\_m2=0 | total\_bsl\_m2=135 | total\_personnel=83 | mil\_personnel=16 | civ\_personnel=67 | total\_scientist=23 | total\_engineer=0 | total\_technician=52 | total\_admin=8 | funding\_src=DOD | research\_funding=\$2,644,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$2,644,000 | research\_obj=The goal of the program is the development of rapid diagnostic assays which would increase the rapid detection and diagnosis of infectious diseases. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Naval Medical Research Center (NMRC) | street\_city=503 Robert Grant Avenue Silver Spring | state=MD | zipcode=20910 | bsl2\_m2=100 | BSL-3\_m2=35 | BSL-4\_m2=0 | total\_bsl\_m2=135 | total\_personnel=83 | mil\_personnel=16 | civ\_personnel=67 | total\_scientist=23 | total\_engineer=0 | total\_technician=52 | total\_admin=8 | funding\_src=DOD | research\_funding=\$2,644,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$2,644,000 | research\_obj=The goal of the program is the development of rapid diagnostic assays which would increase the rapid

detection and diagnosis of infectious diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Research Laboratory (NRL)|street\_city=4555 Overlook Ave. SW District of Columbia|state=WA|zipcode=20375|bsl2\_m2=1305|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1305|total\_personnel=61|mil\_personnel=2|civ\_personnel=59|total\_scientist=51|total\_engineer=6|total\_technician=4|total\_admin=0|funding\_src=DOD|research\_funding=\$5,938,000|dev\_funding=\$2,372,000|testeval\_funding=\$82,000|total\_funding=\$8,392,000|research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Research Laboratory (NRL)|street\_city=4555 Overlook Ave. SW District of Columbia|state=WA|zipcode=20375|bsl2\_m2=1305|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1305|total\_personnel=61|mil\_personnel=2|civ\_personnel=59|total\_scientist=51|total\_engineer=6|total\_technician=4|total\_admin=0|funding\_src=DOD|research\_funding=\$5,938,000|dev\_funding=\$2,372,000|testeval\_funding=\$82,000|total\_funding=\$8,392,000|research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-4\_m2=0|total\_bsl\_m2=216|total\_personnel=172|mil\_personnel=0|civ\_personnel=172|total\_scientist=66|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=DOD|research\_funding=\$4,719,000|dev\_funding=\$3,524,000|testeval\_funding=\$9,700,000|total\_funding=\$17,943,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-4\_m2=0|total\_bsl\_m2=216|total\_personnel=172|mil\_personnel=0|civ\_personnel=172|total\_scientist=66|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=DOD|research\_funding=\$4,719,000|dev\_funding=\$3,524,000|testeval\_funding=\$9,700,000|total\_funding=\$17,943,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-4\_m2=0|total\_bsl\_m2=216|total\_personnel=172|mil\_personnel=0|civ\_personnel=172|total\_scientist=66|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Private Sector  
Companies|research\_funding=\$4,719,000|dev\_funding=\$3,524,000|testeval\_funding=\$9,700,000|total\_funding=\$17,943,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-4\_m2=0|total\_bsl\_m2=216|total\_personnel=172|mil\_personnel=0|civ\_personnel=172|total\_scientist=66|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Private Sector  
Companies|research\_funding=\$4,719,000|dev\_funding=\$3,524,000|testeval\_funding=\$9,700,000|total\_funding=\$17,943,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-

3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=172|mil\_personnel=0|civ\_personnel=172|total\_scientist=66|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Private Sector  
Companies|research\_funding=\$4,719,000|dev\_funding=\$3,524,000|testeval\_funding=\$9,700,000|total\_funding=\$17,943,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=172|mil\_personnel=0|civ\_personnel=172|total\_scientist=66|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Other Governmental  
Agencies|research\_funding=\$4,719,000|dev\_funding=\$3,524,000|testeval\_funding=\$9,700,000|total\_funding=\$17,943,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=172|mil\_personnel=0|civ\_personnel=172|total\_scientist=66|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Other Governmental  
Agencies|research\_funding=\$4,719,000|dev\_funding=\$3,524,000|testeval\_funding=\$9,700,000|total\_funding=\$17,943,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=172|mil\_personnel=0|civ\_personnel=172|total\_scientist=66|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Other Governmental  
Agencies|research\_funding=\$4,719,000|dev\_funding=\$3,524,000|testeval\_funding=\$9,700,000|total\_funding=\$17,943,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Tyndall AFB -- 1|street\_city=3000 Research Road Tyndall AFB|state=FL|zipcode=32403|bsl2\_m2=55|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=55|total\_personnel=5|mil\_personnel=0|civ\_personnel=5|total\_scientist=3|total\_engineer=0|total\_technician=2|total\_admin=0|funding\_src=DOD|research\_funding=\$800,000|dev\_funding=\$0|testeval\_funding=\$150,000|total\_funding=\$950,000|research\_obj=The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used to classify the size distribution of bioaerosol challenges as needed.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Tyndall AFB -- 1|street\_city=3000 Research Road Tyndall AFB|state=FL|zipcode=32403|bsl2\_m2=55|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=55|total\_personnel=5|mil\_personnel=0|civ\_personnel=5|total\_scientist=3|total\_engineer=0|total\_technician=2|total\_admin=0|funding\_src=DHS|research\_funding=\$800,000|dev\_funding=\$0|testeval\_funding=\$150,000|total\_funding=\$950,000|research\_obj=The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used to classify the size distribution of bioaerosol challenges as needed.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Tyndall AFB -- 1|street\_city=3000 Research Road Tyndall AFB|state=FL|zipcode=32403|bsl2\_m2=55|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=55|total\_personnel=5|mil\_personnel=0|civ\_personnel=5|total\_scientist=3|total\_engineer=0|total\_technician=2|total\_admin=0|funding\_src=Other Governmental  
Agencies|research\_funding=\$800,000|dev\_funding=\$0|testeval\_funding=\$150,000|total\_funding=\$950,000|research\_obj=The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used to classify the size distribution of bioaerosol challenges as needed.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Tyndall AFB -- 2|street\_city=139 Barnes Drive Tyndall AFB|state=FL|zipcode=32403|bsl2\_m2=53|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=53|total\_personnel=7|mil\_personnel=0|civ\_personnel=7|total\_scientist=3|total\_engineer=1|total\_technician=1|total\_admin=2|funding\_src=DOD|research\_funding=\$1,000,000|dev\_funding=\$1,300,000|testeval\_funding=\$0|total\_funding=\$2,300,000|research\_obj=This facility supports the preparation and characterization of novel chemicals expected to exhibit

antimicrobial properties. It also supports research into degradation products formed by exposure of samples of reactive materials to surrogate threat agents. |agents\_toxin=None

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=U.S. Army Edgewood Chemical and Biological Center|street\_city=5183 Blackhawk Road Aberdeen Proving Ground|state=MD|zipcode=21010-5424|bsl2\_m2=532|BSL-3\_m2=177|BSL-4\_m2=0|total\_bsl\_m2=709|total\_personnel=263|mil\_personnel=0|civ\_personnel=263|total\_scientist=168|total\_engineer=39|total\_technician=27|total\_admin=29|funding\_src=DOD|research\_funding=\$1,204,000|dev\_funding=\$22,145,000|testeval\_funding=\$0|total\_funding=\$23,349,000|research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection of/from biological threat agents. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=U.S. Army Edgewood Chemical and Biological Center|street\_city=5183 Blackhawk Road Aberdeen Proving Ground|state=MD|zipcode=21010-5424|bsl2\_m2=532|BSL-3\_m2=177|BSL-4\_m2=0|total\_bsl\_m2=709|total\_personnel=263|mil\_personnel=0|civ\_personnel=263|total\_scientist=168|total\_engineer=39|total\_technician=27|total\_admin=29|funding\_src=DOD|research\_funding=\$1,204,000|dev\_funding=\$22,145,000|testeval\_funding=\$0|total\_funding=\$23,349,000|research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection of/from biological threat agents. |agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=U.S. Army Edgewood Chemical and Biological Center|street\_city=5183 Blackhawk Road Aberdeen Proving Ground|state=MD|zipcode=21010-5424|bsl2\_m2=532|BSL-3\_m2=177|BSL-4\_m2=0|total\_bsl\_m2=709|total\_personnel=263|mil\_personnel=0|civ\_personnel=263|total\_scientist=168|total\_engineer=39|total\_technician=27|total\_admin=29|funding\_src=DOD|research\_funding=\$1,204,000|dev\_funding=\$22,145,000|testeval\_funding=\$0|total\_funding=\$23,349,000|research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection of/from biological threat agents. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=U.S. Army Edgewood Chemical and Biological Center (ECBC)|street\_city=U.S. Army Edgewood Chemical and Biological Center 5183 Blackhawk Rd Aberdeen Proving Ground|state=MD|zipcode=21010-5424|bsl2\_m2=2000|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=2000|total\_personnel=6|mil\_personnel=0|civ\_personnel=6|total\_scientist=3|total\_engineer=3|total\_technician=0|total\_admin=0|funding\_src=DOD|research\_funding=\$0|dev\_funding=\$0|testeval\_funding=\$1,171,000|total\_funding=\$1,171,000|research\_obj=Conduct mixed reactor testing for the evaluation of the efficacy of the countermeasure solution against a biological warfare agent simulant to determine if agent neutralization can be achieved. |agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)|street\_city=3100 Ricketts Point Road Aberdeen Proving Ground|state=MD|zipcode=21010-5400|bsl2\_m2=300|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=300|total\_personnel=11|mil\_personnel=2|civ\_personnel=9|total\_scientist=5|total\_engineer=0|total\_technician=6|total\_admin=0|funding\_src=DOD|research\_funding=\$422,000|dev\_funding=\$630,000|testeval\_funding=\$0|total\_funding=\$1,052,000|research\_obj=The Institute's mission involves research on medical defenses against neurotoxins. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-4\_m2=0|total\_bsl\_m2=30258|total\_personnel=826|mil\_personnel=193|civ\_personnel=633|total\_scientist=256|total\_engineer=3|total\_technician=310|total\_admin=257|funding\_src=DOD|research\_funding=\$5,100,000|dev\_funding=\$58,324,000|testeval\_funding=\$0|total\_funding=\$63,424,000|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-4\_m2=0|total\_bsl\_m2=30258|total\_personnel=826|mil\_personnel=193|civ\_personnel=633|total\_scientist=256|total\_engineer=3|total\_technician=310|total\_admin=257|funding\_src=DOD|research\_funding=\$5,100,000|dev\_funding=\$58,324,000|testeval\_funding=\$0|total\_funding=\$63,424,000|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies. |agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-

5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-  
4\_m2=1093|total\_bsl\_m2=30258|total\_personnel=826|mil\_personnel=193|civ\_personnel=633|total\_scientist=256|total\_engineer=3|total\_technician=310|total\_admin=257|funding\_src=DOD|research\_funding=\$5,100,000|dev\_funding=\$58,324,000|testeval\_funding=\$0|total\_funding=\$63,424,000|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-  
4\_m2=1093|total\_bsl\_m2=30258|total\_personnel=826|mil\_personnel=193|civ\_personnel=633|total\_scientist=256|total\_engineer=3|total\_technician=310|total\_admin=257|funding\_src=DOD|research\_funding=\$5,100,000|dev\_funding=\$58,324,000|testeval\_funding=\$0|total\_funding=\$63,424,000|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Walter Reed Army Institute of Research (WRAIR)|street\_city=503 Robert Grant Avenue Silver Spring|state=MD|zipcode=20910|bsl2\_m2=294|BSL-3\_m2=165|BSL-  
4\_m2=0|total\_bsl\_m2=459|total\_personnel=25|mil\_personnel=3|civ\_personnel=22|total\_scientist=10|total\_engineer=0|total\_technician=15|total\_admin=0|funding\_src=DOD|research\_funding=\$4,540,550|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$4,540,550|research\_obj=The Walter Reed Army Institute of Research conducts research on bacterial threat agents, including the study of therapeutics against these agents.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Walter Reed Army Institute of Research (WRAIR)|street\_city=503 Robert Grant Avenue Silver Spring|state=MD|zipcode=20910|bsl2\_m2=294|BSL-3\_m2=165|BSL-  
4\_m2=0|total\_bsl\_m2=459|total\_personnel=25|mil\_personnel=3|civ\_personnel=22|total\_scientist=10|total\_engineer=0|total\_technician=15|total\_admin=0|funding\_src=DOD|research\_funding=\$4,540,550|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$4,540,550|research\_obj=The Walter Reed Army Institute of Research conducts research on bacterial threat agents, including the study of therapeutics against these agents.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Brookhaven National Laboratory|street\_city=Brookhaven National Laboratory Biology Department Upton|state=NY|zipcode=11973-5000|bsl2\_m2=165|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=268|total\_personnel=15|mil\_personnel=0|civ\_personnel=15|total\_scientist=10|total\_engineer=0|total\_technician=5|total\_admin=0|funding\_src=DOD|research\_funding=\$2,838,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$2,838,000|research\_obj=The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Brookhaven National Laboratory|street\_city=Brookhaven National Laboratory Biology Department Upton|state=NY|zipcode=11973-5000|bsl2\_m2=165|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=268|total\_personnel=15|mil\_personnel=0|civ\_personnel=15|total\_scientist=10|total\_engineer=0|total\_technician=5|total\_admin=0|funding\_src=DOD|research\_funding=\$2,838,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$2,838,000|research\_obj=The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.|agents\_toxin=Other pathogens or toxins. Work only involves one toxin (which is both a Select Agent Toxin and NIAID Category A Pathogen)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Brookhaven National Laboratory|street\_city=Brookhaven National Laboratory Biology Department Upton|state=NY|zipcode=11973-5000|bsl2\_m2=165|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=268|total\_personnel=15|mil\_personnel=0|civ\_personnel=15|total\_scientist=10|total\_engineer=0|total\_technician=5|total\_admin=0|funding\_src=DOE|research\_funding=\$2,838,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$2,838,000|research\_obj=The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=165 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=268 | total\_personnel=15 | mil\_personnel=0 | civ\_personnel=15 | total\_scientist=10 | total\_engineer=0 | total\_technician=5 | total\_admin=0 | funding\_src=DOE | research\_funding=\$2,838,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$2,838,000 | research\_obj=The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. | agents\_toxin=Other pathogens or toxins. Work only involves one toxin (which is both a Select Agent Toxin and NIAID Category A Pathogen)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=165 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=268 | total\_personnel=15 | mil\_personnel=0 | civ\_personnel=15 | total\_scientist=10 | total\_engineer=0 | total\_technician=5 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$2,838,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$2,838,000 | research\_obj=The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=165 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=268 | total\_personnel=15 | mil\_personnel=0 | civ\_personnel=15 | total\_scientist=10 | total\_engineer=0 | total\_technician=5 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$2,838,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$2,838,000 | research\_obj=The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. | agents\_toxin=Other pathogens or toxins. Work only involves one toxin (which is both a Select Agent Toxin and NIAID Category A Pathogen)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Lawrence Livermore National Laboratory | street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore | state=CA | zipcode=94550 | bsl2\_m2=1261 | BSL-3\_m2=60 | BSL-4\_m2=0 | total\_bsl\_m2=4599 | total\_personnel=115 | mil\_personnel=0 | civ\_personnel=115 | total\_scientist=93 | total\_engineer=8 | total\_technician=14 | total\_admin=0 | funding\_src=DOD | research\_funding=\$17,894,000 | dev\_funding=\$0 | testevel\_funding=\$553,000 | total\_funding=\$18,447,000 | research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Lawrence Livermore National Laboratory | street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore | state=CA | zipcode=94550 | bsl2\_m2=1261 | BSL-3\_m2=60 | BSL-4\_m2=0 | total\_bsl\_m2=4599 | total\_personnel=115 | mil\_personnel=0 | civ\_personnel=115 | total\_scientist=93 | total\_engineer=8 | total\_technician=14 | total\_admin=0 | funding\_src=DOD | research\_funding=\$17,894,000 | dev\_funding=\$0 | testevel\_funding=\$553,000 | total\_funding=\$18,447,000 | research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral

Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Lawrence Livermore National Laboratory |street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore |state=CA |zipcode=94550 |bsl2\_m2=1261 |BSL-3\_m2=60 |BSL-4\_m2=0 |total\_bsl\_m2=4599 |total\_personnel=115 |mil\_personnel=0 |civ\_personnel=115 |total\_scientist=93 |total\_engineer=8 |total\_technician=14 |total\_admin=0 |funding\_src=DOD |research\_funding=\$17,894,000 |dev\_funding=\$0 |testeval\_funding=\$553,000 |total\_funding=\$18,447,000 |research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

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Livermore | state=CA | zipcode=94550 | bsl2\_m2=1261 | BSL-3\_m2=60 | BSL-4\_m2=0 | total\_bsl\_m2=4599 | total\_personnel=115 | mil\_personnel=0 | civ\_personnel=115 | total\_scientist=93 | total\_engineer=8 | total\_technician=14 | total\_admin=0 | funding\_src=DHS | research\_funding=\$17,894,000 | dev\_funding=\$0 | testeval\_funding=\$553,000 | total\_l\_funding=\$18,447,000 | research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

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Livermore | state=CA | zipcode=94550 | bsl2\_m2=1261 | BSL-3\_m2=60 | BSL-4\_m2=0 | total\_bsl\_m2=4599 | total\_personnel=115 | mil\_personnel=0 | civ\_personnel=115 | total\_scientist=93 | total\_engineer=8 | total\_technician=14 | total\_admin=0 | funding\_src=DHS | research\_funding=\$17,894,000 | dev\_funding=\$0 | testeval\_funding=\$553,000 | total\_l\_funding=\$18,447,000 | research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

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Livermore | state=CA | zipcode=94550 | bsl2\_m2=1261 | BSL-3\_m2=60 | BSL-4\_m2=0 | total\_bsl\_m2=4599 | total\_personnel=115 | mil\_personnel=0 | civ\_personnel=115 | total\_scientist=93 | total\_engineer=8 | total\_technician=14 | total\_admin=0 | funding\_src=DHS | research\_funding=\$17,894,000 | dev\_funding=\$0 | testeval\_funding=\$553,000 | total\_l\_funding=\$18,447,000 | research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen

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Livermore |state=CA |zipcode=94550 |bsl2\_m2=1261 |BSL-3\_m2=60 |BSL-4\_m2=0 |total\_bsl\_m2=4599 |total\_personnel=115 |mil\_personnel=0 |civ\_personnel=115 |total\_scientist=93 |total\_engineer=8 |total\_technician=14 |total\_admin=0 |funding\_src=DHS |research\_funding=\$17,894,000 |dev\_funding=\$0 |testeval\_funding=\$553,000 |total\_funding=\$18,447,000 |research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin>All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.

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Livermore |state=CA |zipcode=94550 |bsl2\_m2=1261 |BSL-3\_m2=60 |BSL-4\_m2=0 |total\_bsl\_m2=4599 |total\_personnel=115 |mil\_personnel=0 |civ\_personnel=115 |total\_scientist=93 |total\_engineer=8 |total\_technician=14 |total\_admin=0 |funding\_src=Other Governmental Agencies |research\_funding=\$17,894,000 |dev\_funding=\$0 |testeval\_funding=\$553,000 |total\_funding=\$18,447,000 |research\_obj=L LNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

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Livermore |state=CA |zipcode=94550 |bsl2\_m2=1261 |BSL-3\_m2=60 |BSL-4\_m2=0 |total\_bsl\_m2=4599 |total\_personnel=115 |mil\_personnel=0 |civ\_personnel=115 |total\_scientist=93 |total\_engineer=8 |total\_technician=14 |total\_admin=0 |funding\_src=Other Governmental Agencies |research\_funding=\$17,894,000 |dev\_funding=\$0 |testeval\_funding=\$553,000 |total\_funding=\$18,447,000 |research\_obj=L LNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from

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Livermore|state=CA|zipcode=94550|bsl2\_m2=1261|BSL-3\_m2=60|BSL-  
4\_m2=0|total\_bsl\_m2=4599|total\_personnel=115|mil\_personnel=0|civ\_personnel=115|total\_scientist=93|total\_engineer=8|total\_technician=14|total\_admin=0|funding\_src=Other Governmental

Agencies|research\_funding=\$17,894,000|dev\_funding=\$0|testeval\_funding=\$553,000|total\_funding=\$18,447,000|research\_obj=L  
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Livermore|state=CA|zipcode=94550|bsl2\_m2=1261|BSL-3\_m2=60|BSL-  
4\_m2=0|total\_bsl\_m2=4599|total\_personnel=115|mil\_personnel=0|civ\_personnel=115|total\_scientist=93|total\_engineer=8|total\_technician=14|total\_admin=0|funding\_src=Other Governmental

Agencies|research\_funding=\$17,894,000|dev\_funding=\$0|testeval\_funding=\$553,000|total\_funding=\$18,447,000|research\_obj=L  
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4\_m2=0|total\_bsl\_m2=444|total\_personnel=84|mil\_personnel=0|civ\_personnel=84|total\_scientist=48|total\_engineer=4|total\_tec

hnician=32|total\_admin=0|funding\_src=DOD|research\_funding=\$12,382,000|dev\_funding=\$2,890,000|testeval\_funding=\$84,000|total\_funding=\$15,356,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory|street\_city=P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=444|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=444|total\_personnel=84|mil\_personnel=0|civ\_personnel=84|total\_scientist=48|total\_engineer=4|total\_technician=32|total\_admin=0|funding\_src=DOD|research\_funding=\$12,382,000|dev\_funding=\$2,890,000|testeval\_funding=\$84,000|total\_funding=\$15,356,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

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DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

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4\_m2=0|total\_bsl\_m2=444|total\_personnel=84|mil\_personnel=0|civ\_personnel=84|total\_scientist=48|total\_engineer=4|total\_technician=32|total\_admin=0|funding\_src=DHS|research\_funding=\$12,382,000|dev\_funding=\$2,890,000|testeval\_funding=\$84,000|total\_funding=\$15,356,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin=USDA PPQ Select Agents and Toxins

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sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

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O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=444|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=444|total\_personnel=84|mil\_personnel=0|civ\_personnel=84|total\_scientist=48|total\_engineer=4|total\_technician=32|total\_admin=0|funding\_src=Other Governmental Agencies|research\_funding=\$12,382,000|dev\_funding=\$2,890,000|testeval\_funding=\$84,000|total\_funding=\$15,356,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. 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O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=444|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=444|total\_personnel=84|mil\_personnel=0|civ\_personnel=84|total\_scientist=48|total\_engineer=4|total\_technician=32|total\_admin=0|funding\_src=Other Governmental Agencies|research\_funding=\$12,382,000|dev\_funding=\$2,890,000|testeval\_funding=\$84,000|total\_funding=\$15,356,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. 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Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=444|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=444|total\_personnel=84|mil\_personnel=0|civ\_personnel=84|total\_scientist=48|total\_engineer=4|total\_technician=32|total\_admin=0|funding\_src=Other Governmental Agencies|research\_funding=\$12,382,000|dev\_funding=\$2,890,000|testeval\_funding=\$84,000|total\_funding=\$15,356,000|research

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Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory|street\_city=P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=444|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=444|total\_personnel=84|mil\_personnel=0|civ\_personnel=84|total\_scientist=48|total\_engineer=4|total\_technician=32|total\_admin=0|funding\_src=Other Governmental Agencies|research\_funding=\$12,382,000|dev\_funding=\$2,890,000|testeval\_funding=\$84,000|total\_funding=\$15,356,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin>All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Pacific Northwest National Laboratory|street\_city=P. O. Box 999 Richland|state=WA|zipcode=99352|bsl2\_m2=633|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1438|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=37|total\_engineer=0|total\_technician=0|total\_admin=3|funding\_src=DOD|research\_funding=\$8,070,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$8,070,000|research\_obj=Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to neutralize evolving threats. For the Department of Homeland Security, the objectives of the research are to investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate from non-pathogenic near neighbors. DNAs and BSL-1/BSL-2 whole organisms are used in this research. For HHS and EPA projects, our research investigates methods for detection and determination of food and waterborne pathogens. For the Laboratory Directed Research and Development (LDRD) effort, the objective was to investigate stable platforms for novel molecular recognition elements for pathogen detection. Our role is to develop tools for organic signatures characterization in biological materials for forensic attribution. This generically includes both volatile and non-volatile organic components as either direct or indirect signatures of the culture media, preparation conditions, or treatment processes.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Pacific Northwest National Laboratory|street\_city=P. O. Box 999 Richland|state=WA|zipcode=99352|bsl2\_m2=633|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1438|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=37|total\_engineer=0|total\_technician=0|total\_admin=3|funding\_src=DOD|research\_funding=\$8,070,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$8,070,000|research\_obj=Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles

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Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory |street\_city=P. O. Box 999 Richland |state=WA |zipcode=99352 |bsl2\_m2=633 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=1438 |total\_personnel=40 |mil\_personnel=0 |civ\_personnel=40 |total\_scientist=37 |total\_engineer=0 |total\_technician=0 |total\_admin=3 |funding\_src=DOD |research\_funding=\$8,070,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$8,070,000 |research\_obj=Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to neutralize evolving threats. For the Department of Homeland Security, the objectives of the research are to investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate from non-pathogenic near neighbors. DNAs and BSL-1/BSL-2 whole organisms are used in this research. For HHS and EPA projects, our research investigates methods for detection and determination of food and waterborne pathogens. For the Laboratory Directed Research and Development (LDRD) effort, the objective was to investigate stable platforms for novel molecular recognition elements for pathogen detection. Our role is to develop tools for organic signatures characterization in biological materials for forensic attribution. This generically includes both volatile and non-volatile organic components as either direct or indirect signatures of the culture media, preparation conditions, or treatment processes. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory |street\_city=P. O. Box 999 Richland |state=WA |zipcode=99352 |bsl2\_m2=633 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=1438 |total\_personnel=40 |mil\_personnel=0 |civ\_personnel=40 |total\_scientist=37 |total\_engineer=0 |total\_technician=0 |total\_admin=3 |funding\_src=DOD |research\_funding=\$8,070,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$8,070,000 |research\_obj=Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to

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Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory|street\_city=P. O. Box 999 Richland|state=WA|zipcode=99352|bsl2\_m2=633|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1438|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=37|total\_engineer=0|total\_technician=0|total\_admin=3|funding\_src=DHS|research\_funding=\$8,070,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$8,070,000|research\_obj=Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to neutralize evolving threats. For the Department of Homeland Security, the objectives of the research are to investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate from non-pathogenic near neighbors. DNAs and BSL-1/BSL-2 whole organisms are used in this research. For HHS and EPA projects, our research investigates methods for detection and determination of food and waterborne pathogens. For the Laboratory Directed Research and Development (LDRD) effort, the objective was to investigate stable platforms for novel molecular recognition elements for pathogen detection. Our role is to develop tools for organic signatures characterization in biological materials for forensic attribution. This generically includes both volatile and non-volatile organic components as either direct or indirect signatures of the culture media, preparation conditions, or treatment processes. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory|street\_city=P. O. Box 999 Richland|state=WA|zipcode=99352|bsl2\_m2=633|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1438|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=37|total\_engineer=0|total\_technician=0|total\_admin=3|funding\_src=DHS|research\_funding=\$8,070,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$8,070,000|research\_obj=Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to neutralize evolving threats. For the Department of Homeland Security, the objectives of the research are to investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate from non-pathogenic near neighbors. DNAs and BSL-1/BSL-2 whole organisms are used in this research. For HHS and EPA projects, our research investigates methods for detection and determination of food and waterborne pathogens. For the Laboratory Directed Research and Development (LDRD) effort, the objective was to investigate stable platforms for novel molecular recognition elements for pathogen detection. Our role is to develop tools for organic signatures characterization in biological materials for forensic attribution. This generically includes both volatile and non-volatile organic components as either direct or indirect signatures of the culture media,

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Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory |street\_city=P. O. Box 999 Richland |state=WA |zipcode=99352 |bsl2\_m2=633 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=1438 |total\_personnel=40 |mil\_personnel=0 |civ\_personnel=40 |total\_scientist=37 |total\_engineer=0 |total\_technician=0 |total\_admin=3 |funding\_src=DHS |research\_funding=\$8,070,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$8,070,000 |research\_obj=Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to neutralize evolving threats. For the Department of Homeland Security, the objectives of the research are to investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate from non-pathogenic near neighbors. DNAs and BSL-1/BSL-2 whole organisms are used in this research. For HHS and EPA projects, our research investigates methods for detection and determination of food and waterborne pathogens. For the Laboratory Directed Research and Development (LDRD) effort, the objective was to investigate stable platforms for novel molecular recognition elements for pathogen detection. Our role is to develop tools for organic signatures characterization in biological materials for forensic attribution. This generically includes both volatile and non-volatile organic components as either direct or indirect signatures of the culture media, preparation conditions, or treatment processes. |agents\_toxin>All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.

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Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory |street\_city=P. O. Box 999 Richland |state=WA |zipcode=99352 |bsl2\_m2=633 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=1438 |total\_personnel=40 |mil\_personnel=0 |civ\_personnel=40 |total\_scientist=37 |total\_engineer=0 |total\_technician=0 |total\_admin=3 |funding\_src=EPA |research\_funding=\$8,070,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$8,070,000 |research\_obj=Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to neutralize evolving threats. For the Department of Homeland Security, the objectives of the research are to investigate nucleic acid

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Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Sandia National Laboratories | street\_city=P. O. Box 5800 Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=944 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=2217 | total\_personnel=78 | mil\_personnel=0 | civ\_personnel=78 | total\_scientist=40 | total\_engineer=7 | total\_technician=29 | total\_admin=2 | funding\_src=DOD | research\_funding=\$46,533,000 | dev\_funding=\$0 | testeval\_funding=\$324,000 | total\_funding=\$46,857,000 | research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Sandia National Laboratories | street\_city=P. O. Box 5800 Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=944 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=2217 | total\_personnel=78 | mil\_personnel=0 | civ\_personnel=78 | total\_scientist=40 | total\_engineer=7 | total\_technician=29 | total\_admin=2 | funding\_src=DOD | research\_funding=\$46,533,000 | dev\_funding=\$0 | testeval\_funding=\$324,000 | total\_funding=\$46,857,000 | research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Sandia National Laboratories | street\_city=P. O. Box 5800 Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=944 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=2217 | total\_personnel=78 | mil\_personnel=0 | civ\_personnel=78 | total\_scientist=40 | total\_engineer=7 | total\_technician=29 | total\_admin=2 | funding\_src=DOD | research\_funding=\$46,533,000 | dev\_funding=\$0 | testeval\_funding=\$324,000 | total\_funding=\$46,857,000 | research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Sandia National Laboratories | street\_city=P. O. Box 5800 Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=944 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=2217 | total\_personnel=78 | mil\_personnel=0 | civ\_personnel=78 | total\_scientist=40 | total\_engineer=7 | total\_technician=29 | total\_admin=2 | funding\_src=DOD | research\_funding=\$46,533,000 | dev\_funding=\$0 | testeval\_funding=\$324,000 | total\_funding=\$46,857,000 | research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin>All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Sandia National Laboratories | street\_city=P. O. Box 5800 Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=944 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=2217 | total\_personnel=78 | mil\_personnel=0 | civ\_personnel=78 | total\_scientist=40 | total\_engineer=7 | total\_technician=29 | total\_admin=2 | funding\_src=DHS | research\_funding=\$46,533,000 | dev\_funding=\$0 | testeval\_funding=\$324,000 | total\_funding=\$46,857,000 | research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles

using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=DHS |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=DHS |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=DHS |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin>All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=DOE |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=DOE |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=USDA Select Agents and Toxins

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unding=\$46,857,000|research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens) Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=944|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=2217|total\_personnel=78|mil\_personnel=0|civ\_personnel=78|total\_scientist=40|total\_engineer=7|total\_technician=29|total\_admin=2|funding\_src=DOE|research\_funding=\$46,533,000|dev\_funding=\$0|testeval\_funding=\$324,000|total\_funding=\$46,857,000|research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. 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Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=944|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=2217|total\_personnel=78|mil\_personnel=0|civ\_personnel=78|total\_scientist=40|total\_engineer=7|total\_technician=29|total\_admin=2|funding\_src=DHHS|research\_funding=\$46,533,000|dev\_funding=\$0|testeval\_funding=\$324,000|total\_funding=\$46,857,000|research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. 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biofuels. |agents\_toxin=All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=Other Governmental Agencies |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3.

Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=Other Governmental Agencies |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3.

Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=USDA Select Agents and Toxins Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=Other Governmental Agencies |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3.

Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=944 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2217 |total\_personnel=78 |mil\_personnel=0 |civ\_personnel=78 |total\_scientist=40 |total\_engineer=7 |total\_technician=29 |total\_admin=2 |funding\_src=Other Governmental Agencies |research\_funding=\$46,533,000 |dev\_funding=\$0 |testeval\_funding=\$324,000 |total\_funding=\$46,857,000 |research\_obj=The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3.

Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=CDC Mass Spectrometry Toxin Laboratory |street\_city=CDC DHHS 4770 Buford Highway Mail stop F-47 Atlanta |state=GA |zipcode=30341 |bsl2\_m2=114 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=114 |total\_personnel=30 |mil\_personnel=0 |civ\_personnel=30 |total\_scientist=27 |total\_engineer=0 |total\_technician=0 |total\_admin=3 |funding\_src=DHHS |research\_funding=\$1,900,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$1,900,000 |research\_obj=The CDC Mass Spectrometry Toxin Laboratory has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins. The laboratory uses advanced mass spectrometry techniques to measure peptides and proteins that are in the pathogenic pathway of the infectious agent or toxin and uses these measurements to identify and track infection or poisoning. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=CDC Mass Spectrometry Toxin Laboratory |street\_city=CDC DHHS 4770 Buford Highway Mail stop F-47 Atlanta |state=GA |zipcode=30341 |bsl2\_m2=114 |BSL-3\_m2=0 |BSL-

4\_m2=0|total\_bsl\_m2=114|total\_personnel=30|mil\_personnel=0|civ\_personnel=30|total\_scientist=27|total\_engineer=0|total\_technician=0|total\_admin=3|funding\_src=DHHS|research\_funding=\$1,900,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$1,900,000|research\_obj=The CDC Mass Spectrometry Toxin Laboratory has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins. The laboratory uses advanced mass spectrometry techniques to measure peptides and proteins that are in the pathogenic pathway of the infectious agent or toxin and uses these measurements to identify and track infection or poisoning.|agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC Mass Spectrometry Toxin Laboratory|street\_city=CDC DHHS 4770 Buford Highway Mail stop F-47  
Atlanta|state=GA|zipcode=30341|bsl2\_m2=114|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=114|total\_personnel=30|mil\_personnel=0|civ\_personnel=30|total\_scientist=27|total\_engineer=0|total\_technician=0|total\_admin=3|funding\_src=DHHS|research\_funding=\$1,900,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$1,900,000|research\_obj=The CDC Mass Spectrometry Toxin Laboratory has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins. The laboratory uses advanced mass spectrometry techniques to measure peptides and proteins that are in the pathogenic pathway of the infectious agent or toxin and uses these measurements to identify and track infection or poisoning.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC Mass Spectrometry Toxin Laboratory|street\_city=CDC DHHS 4770 Buford Highway Mail stop F-47  
Atlanta|state=GA|zipcode=30341|bsl2\_m2=114|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=114|total\_personnel=30|mil\_personnel=0|civ\_personnel=30|total\_scientist=27|total\_engineer=0|total\_technician=0|total\_admin=3|funding\_src=DHHS|research\_funding=\$1,900,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$1,900,000|research\_obj=The CDC Mass Spectrometry Toxin Laboratory has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins. The laboratory uses advanced mass spectrometry techniques to measure peptides and proteins that are in the pathogenic pathway of the infectious agent or toxin and uses these measurements to identify and track infection or poisoning.|agents\_toxin=Some Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, NCEZID, Division of Vector Borne Diseases (DVBD)|street\_city=CDC DHHS 3150 Rampart Road Fort  
Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-  
4\_m2=0|total\_bsl\_m2=1208|total\_personnel=160|mil\_personnel=0|civ\_personnel=160|total\_scientist=86|total\_engineer=6|total\_technician=0|total\_admin=68|funding\_src=DHHS|research\_funding=\$921,552|dev\_funding=\$460,756|testeval\_funding=\$460,756|total\_funding=\$1,843,064|research\_obj=The Division of Vector-Borne Diseases (DVBD) strives to protect the nation from bacterial and viral diseases transmitted by mosquitoes, ticks and fleas. DVBD's biodefense work focuses on development and implementation of epidemiology and surveillance; prevention, control and decontamination; vaccine development and improved diagnostics for diagnosis, detection and characterization of several vector-borne pathogens including various bacteria and alphaviruses. Additionally, DVBD serves as the national reference laboratory for these pathogens.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, NCEZID, Division of Vector Borne Diseases (DVBD)|street\_city=CDC DHHS 3150 Rampart Road Fort  
Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-  
4\_m2=0|total\_bsl\_m2=1208|total\_personnel=160|mil\_personnel=0|civ\_personnel=160|total\_scientist=86|total\_engineer=6|total\_technician=0|total\_admin=68|funding\_src=DHHS|research\_funding=\$921,552|dev\_funding=\$460,756|testeval\_funding=\$460,756|total\_funding=\$1,843,064|research\_obj=The Division of Vector-Borne Diseases (DVBD) strives to protect the nation from bacterial and viral diseases transmitted by mosquitoes, ticks and fleas. DVBD's biodefense work focuses on development and implementation of epidemiology and surveillance; prevention, control and decontamination; vaccine development and improved diagnostics for diagnosis, detection and characterization of several vector-borne pathogens including various bacteria and alphaviruses.

Additionally, DVBD serves as the national reference laboratory for these pathogens.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, NCEZID, Division of Vector Borne Diseases (DVBD)|street\_city=CDC DHHS 3150 Rampart Road Fort  
Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-  
4\_m2=0|total\_bsl\_m2=1208|total\_personnel=160|mil\_personnel=0|civ\_personnel=160|total\_scientist=86|total\_engineer=6|total\_technician=0|total\_admin=68|funding\_src=DHHS|research\_funding=\$921,552|dev\_funding=\$460,756|testeval\_funding=\$460,756|total\_funding=\$1,843,064|research\_obj=The Division of Vector-Borne Diseases (DVBD) strives to protect the nation from bacterial and viral diseases transmitted by mosquitoes, ticks and fleas. DVBD's biodefense work focuses on development and implementation of epidemiology and surveillance; prevention, control and decontamination; vaccine development and improved diagnostics for diagnosis, detection and characterization of several vector-borne pathogens including various bacteria and alphaviruses.

Additionally, DVBD serves as the national reference laboratory for these pathogens.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, NCEZID, Division of Vector Borne Diseases (DVBD)|street\_city=CDC DHHS 3150 Rampart Road Fort

Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-4\_m2=0|total\_bsl\_m2=1208|total\_personnel=160|mil\_personnel=0|civ\_personnel=160|total\_scientist=86|total\_engineer=6|total\_technician=0|total\_admin=68|funding\_src=DHHS|research\_funding=\$921,552|dev\_funding=\$460,756|testeval\_funding=\$460,756|total\_funding=\$1,843,064|research\_obj=The Division of Vector-Borne Diseases (DVBD) strives to protect the nation from bacterial and viral diseases transmitted by mosquitoes, ticks and fleas. DVBD's biodefense work focuses on development and implementation of epidemiology and surveillance; prevention, control and decontamination; vaccine development and improved diagnostics for diagnosis, detection and characterization of several vector-borne pathogens including various bacteria and alphaviruses. Additionally, DVBD serves as the national reference laboratory for these pathogens.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=DHS|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=DHS|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=DHS|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=DHS|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=DHHS|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-

4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=DHHS|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-  
4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=DHHS|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-  
4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=DHHS|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-  
4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=EPA|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-  
4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=EPA|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-  
4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=EPA|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-

g=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=Other Governmental Agencies|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=Other Governmental Agencies|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=Other Governmental Agencies|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=CDC DHHS 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=281|BSL-3\_m2=2215|BSL-4\_m2=962|total\_bsl\_m2=3458|total\_personnel=696|mil\_personnel=0|civ\_personnel=696|total\_scientist=232|total\_engineer=136|total\_technician=42|total\_admin=286|funding\_src=Other Governmental Agencies|research\_funding=\$81,672,476|dev\_funding=\$6,213,348|testeval\_funding=\$5,564,782|total\_funding=\$93,450,606|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=NIH, C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases|street\_city=NIH DHHS 9000 Rockville Pike Bethesda|state=MD|zipcode=20892|bsl2\_m2=2493|BSL-3\_m2=1091|BSL-4\_m2=0|total\_bsl\_m2=3584|total\_personnel=118|mil\_personnel=0|civ\_personnel=118|total\_scientist=95|total\_engineer=0|total\_technician=23|total\_admin=0|funding\_src=DHHS|research\_funding=\$38,735,010|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$38,735,010|research\_obj=At the C.W. Bill Young Center, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=NIH, C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases | street\_city=NIH DHHS 9000 Rockville Pike Bethesda | state=MD | zipcode=20892 | bsl2\_m2=2493 | BSL-3\_m2=1091 | BSL-4\_m2=0 | total\_bsl\_m2=3584 | total\_personnel=118 | mil\_personnel=0 | civ\_personnel=118 | total\_scientist=95 | total\_engineer=0 | total\_technician=23 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$38,735,010 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$38,735,010 | research\_obj=At the C.W. Bill Young Center, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=NIH, C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases | street\_city=NIH DHHS 9000 Rockville Pike Bethesda | state=MD | zipcode=20892 | bsl2\_m2=2493 | BSL-3\_m2=1091 | BSL-4\_m2=0 | total\_bsl\_m2=3584 | total\_personnel=118 | mil\_personnel=0 | civ\_personnel=118 | total\_scientist=95 | total\_engineer=0 | total\_technician=23 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$38,735,010 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$38,735,010 | research\_obj=At the C.W. Bill Young Center, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=NIH, C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases | street\_city=NIH DHHS 9000 Rockville Pike Bethesda | state=MD | zipcode=20892 | bsl2\_m2=2493 | BSL-3\_m2=1091 | BSL-4\_m2=0 | total\_bsl\_m2=3584 | total\_personnel=118 | mil\_personnel=0 | civ\_personnel=118 | total\_scientist=95 | total\_engineer=0 | total\_technician=23 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$38,735,010 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$38,735,010 | research\_obj=At the C.W. Bill Young Center, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. | agents\_toxin=Some Select Agent Toxin(s) below the de minimis level and thus exempt from registration with the Select Agent Program.

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=NIH, Dale and Betty Bumpers Vaccine Research Center | street\_city=NIH DHHS 9000 Rockville Pike Bethesda | state=MD | zipcode=20892 | bsl2\_m2=89 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=89 | total\_personnel=7 | mil\_personnel=0 | civ\_personnel=7 | total\_scientist=7 | total\_engineer=0 | total\_technician=0 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$782,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$782,000 | research\_obj=The research focus of the Biodefense Research Laboratory, Vaccine Research Center (VRC) comprises three areas: 1. Development of vaccines and antivirals 2. Studies of the mechanism of vaccine-induced immune protection 3. Basic research to understand the mechanism of virus replication (entry) and neutralization | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=NIH, Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML) | street\_city=903 South 4th St. Hamilton | state=MT | zipcode=59840 | bsl2\_m2=1361 | BSL-3\_m2=56 | BSL-4\_m2=631 | total\_bsl\_m2=2048 | total\_personnel=99 | mil\_personnel=0 | civ\_personnel=99 | total\_scientist=70 | total\_engineer=0 | total\_technician=29 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$25,980,983 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$25,980,983 | research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study

the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=NIH, Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML) |street\_city=903 South 4th St.  
Hamilton|state=MT |zipcode=59840 |bsl2\_m2=1361 |BSL-3\_m2=56 |BSL-  
4\_m2=631 |total\_bsl\_m2=2048 |total\_personnel=99 |mil\_personnel=0 |civ\_personnel=99 |total\_scientist=70 |total\_engineer=0 |total\_technician=29 |total\_admin=0 |funding\_src=DHHS |research\_funding=\$25,980,983 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$25,980,983 |research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program. |agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=NIH, Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML) |street\_city=903 South 4th St.  
Hamilton|state=MT |zipcode=59840 |bsl2\_m2=1361 |BSL-3\_m2=56 |BSL-  
4\_m2=631 |total\_bsl\_m2=2048 |total\_personnel=99 |mil\_personnel=0 |civ\_personnel=99 |total\_scientist=70 |total\_engineer=0 |total\_technician=29 |total\_admin=0 |funding\_src=DHHS |research\_funding=\$25,980,983 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$25,980,983 |research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=NIH, Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML) |street\_city=903 South 4th St.  
Hamilton|state=MT |zipcode=59840 |bsl2\_m2=1361 |BSL-3\_m2=56 |BSL-  
4\_m2=631 |total\_bsl\_m2=2048 |total\_personnel=99 |mil\_personnel=0 |civ\_personnel=99 |total\_scientist=70 |total\_engineer=0 |total\_technician=29 |total\_admin=0 |funding\_src=DHHS |research\_funding=\$25,980,983 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$25,980,983 |research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Foreign Disease-Weed Science Research Unit |street\_city=1301 Ditto Avenue Fort Detrick |state=MD |zipcode=21702 |bsl2\_m2=105 |BSL-3\_m2=950 |BSL-  
4\_m2=0 |total\_bsl\_m2=1055 |total\_personnel=43 |mil\_personnel=0 |civ\_personnel=43 |total\_scientist=12 |total\_engineer=0 |total\_technician=24 |total\_admin=7 |funding\_src=USDA |research\_funding=\$5,600,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,600,000 |research\_obj=The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides. |agents\_toxin=USDA PPQ Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Foreign Disease-Weed Science Research Unit | street\_city=1301 Ditto Avenue Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=105 | BSL-3\_m2=950 | BSL-4\_m2=0 | total\_bsl\_m2=1055 | total\_personnel=43 | mil\_personnel=0 | civ\_personnel=43 | total\_scientist=12 | total\_engineer=0 | total\_technician=24 | total\_admin=7 | funding\_src=USDA | research\_funding=\$5,600,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,600,000 | research\_obj=The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides. | agents\_toxin=Other pathogens or toxins. The agents studied (i.e., viruses, bacteria, and fungi) are foreign and/or emerging pathogens of plants that have an agricultural base. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that pose a threat to US plant production systems, US agricultural economy, and exports.

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=National Animal Disease Center (NADC) | street\_city=1920 Dayton Avenue Ames | state=IA | zipcode=50010 | bsl2\_m2=4410 | BSL-3\_m2=2489 | BSL-4\_m2=0 | total\_bsl\_m2=6899 | total\_personnel=292 | mil\_personnel=0 | civ\_personnel=292 | total\_scientist=44 | total\_engineer=0 | total\_technician=70 | total\_admin=178 | funding\_src=USDA | research\_funding=\$32,100,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$32,100,000 | research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. | agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=National Animal Disease Center (NADC) | street\_city=1920 Dayton Avenue Ames | state=IA | zipcode=50010 | bsl2\_m2=4410 | BSL-3\_m2=2489 | BSL-4\_m2=0 | total\_bsl\_m2=6899 | total\_personnel=292 | mil\_personnel=0 | civ\_personnel=292 | total\_scientist=44 | total\_engineer=0 | total\_technician=70 | total\_admin=178 | funding\_src=USDA | research\_funding=\$32,100,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$32,100,000 | research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=National Animal Disease Center (NADC) | street\_city=1920 Dayton Avenue Ames | state=IA | zipcode=50010 | bsl2\_m2=4410 | BSL-3\_m2=2489 | BSL-4\_m2=0 | total\_bsl\_m2=6899 | total\_personnel=292 | mil\_personnel=0 | civ\_personnel=292 | total\_scientist=44 | total\_engineer=0 | total\_technician=70 | total\_admin=178 | funding\_src=USDA | research\_funding=\$32,100,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$32,100,000 | research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Southeast Poultry Research Laboratory | street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens | state=GA | zipcode=30605 | bsl2\_m2=1138 | BSL-3\_m2=624 | BSL-4\_m2=0 | total\_bsl\_m2=1762 | total\_personnel=43 | mil\_personnel=0 | civ\_personnel=43 | total\_scientist=11 | total\_engineer=0 | total\_technician=19 | total\_admin=13 | funding\_src=DOD | research\_funding=\$5,800,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,800,000 | research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Southeast Poultry Research Laboratory | street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens | state=GA | zipcode=30605 | bsl2\_m2=1138 | BSL-3\_m2=624 | BSL-4\_m2=0 | total\_bsl\_m2=1762 | total\_personnel=43 | mil\_personnel=0 | civ\_personnel=43 | total\_scientist=11 | total\_engineer=0 | total\_technician=19 | total\_admin=13 | funding\_src=DOD | research\_funding=\$5,800,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,800,000 | research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Southeast Poultry Research Laboratory | street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens | state=GA | zipcode=30605 | bsl2\_m2=1138 | BSL-3\_m2=624 | BSL-4\_m2=0 | total\_bsl\_m2=1762 | total\_personnel=43 | mil\_personnel=0 | civ\_personnel=43 | total\_scientist=11 | total\_engineer=0 | total\_technician=19 | total\_admin=13 | funding\_src=NIH | research\_funding=\$5,800,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,800,000 | research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-A, Part 2 | facility\_name=Southeast Poultry Research Laboratory | street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens | state=GA | zipcode=30605 | bsl2\_m2=1138 | BSL-3\_m2=624 | BSL-4\_m2=0 | total\_bsl\_m2=1762 | total\_personnel=43 | mil\_personnel=0 | civ\_personnel=43 | total\_scientist=11 | total\_engineer=0 | total\_technician=19 | total\_admin=13 | funding\_src=NIH | research\_funding=\$5,800,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,800,000 | research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our

understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Southeast Poultry Research Laboratory |street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens |state=GA |zipcode=30605 |bsl2\_m2=1138 |BSL-3\_m2=624 |BSL-

4\_m2=0 |total\_bsl\_m2=1762 |total\_personnel=43 |mil\_personnel=0 |civ\_personnel=43 |total\_scientist=11 |total\_engineer=0 |total\_technician=19 |total\_admin=13 |funding\_src=Private Sector

Companies |research\_funding=\$5,800,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,800,000 |research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines

designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Southeast Poultry Research Laboratory |street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens |state=GA |zipcode=30605 |bsl2\_m2=1138 |BSL-3\_m2=624 |BSL-

4\_m2=0 |total\_bsl\_m2=1762 |total\_personnel=43 |mil\_personnel=0 |civ\_personnel=43 |total\_scientist=11 |total\_engineer=0 |total\_technician=19 |total\_admin=13 |funding\_src=Private Sector

Companies |research\_funding=\$5,800,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,800,000 |research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines

designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Southeast Poultry Research Laboratory |street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens |state=GA |zipcode=30605 |bsl2\_m2=1138 |BSL-3\_m2=624 |BSL-

4\_m2=0 |total\_bsl\_m2=1762 |total\_personnel=43 |mil\_personnel=0 |civ\_personnel=43 |total\_scientist=11 |total\_engineer=0 |total\_technician=19 |total\_admin=13 |funding\_src=USDA |research\_funding=\$5,800,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,800,000 |research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2011\_United\_States.docx |April 15 2011 |CBM-Form-A, Part 2 |facility\_name=Southeast Poultry Research Laboratory |street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road

Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=USDA|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-

4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Other Governmental Agencies|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines

designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-

4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Other Governmental Agencies|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines

designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-

4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Non-profit Associations|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to

produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Non-profit Associations|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=CDC|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39|BWC\_CBM\_2011\_United\_States.docx|April 15 2011|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=CDC|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-G | facility\_name=Emergent BioDefense Operations Lansing, Inc. | street\_city=3500 N. Martin Luther King Jr. Blvd. Lansing | state=MI | zipcode=48906 | research\_focus=Anthrax disease caused by Bacillus anthracis | vaccine\_dev=Anthrax Vaccine Adsorbed - BioThrax

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-G | facility\_name=MassBiologics | street\_city=University of Medical School Boston

Massachusetts | state=MA | zipcode=02130 | research\_focus=Diphtheria and tetanus caused by Corynebacterium diphtheriae and Clostridium tetani. | vaccine\_dev=Tetanus and Diphtheria Toxoids Adsorbed

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-G | facility\_name=MedImmune LLC | street\_city=One MedImmune Way Gaithersburg | state=MD | zipcode=20878 | research\_focus=Influenza disease caused by pandemic (H1N1) 2009 virus. Influenza disease caused by influenza virus subtypes A and type B contained in the vaccine. | vaccine\_dev=Influenza A (H1N1) 2009 Monovalent Vaccine\_ Influenza Vaccine Live, Intranasal - FluMist

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-G | facility\_name=Merck & Co, Inc (NJ) | street\_city=One Merck Drive P.O. Box 100 Whitehouse Station | state=NJ | zipcode=08889-0100 | research\_focus=Invasive disease caused by Haemophilus influenzae type b; infection caused by all known subtypes of hepatitis B virus; Hepatitis A disease; cervical, vulvar and vaginal cancer and certain other diseases caused by Human Papillomavirus (HPV) Types 6, 11, 16, and 18; Measles (rubeola); Mumps; diseases caused by Streptococcus pneumoniae; Rotavirus disease; Rubella (German measles) disease; Varicella disease caused by the varicella-zoster virus (VZV); Herpes zoster (shingles) disease. | vaccine\_dev=Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) - PedvaxHIB\_ Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) & Hepatitis B (Recombinant) Vaccine - COMVAX\_ Hepatitis A Vaccine, Inactivated - VAQTA\_ Hepatitis B Vaccine (Recombinant) - Recombivax HB\_ Human Papillomavirus Quadrivalent (Types 6, 11, 16, 18) Vaccine, Recombinant - Gardasil\_ Measles, Mumps, and Rubella Virus Vaccine, Live - M-M-R II\_ Measles, Mumps, Rubella and Varicella Virus Vaccine Live - ProQuad\_ Pneumococcal Vaccine, Polyvalent - Pneumovax 23\_ Rotavirus Vaccine, Live, Oral, Pentavalent - RotaTeq\_ Varicella Virus Vaccine Live - Varivax\_ Zoster Vaccine, Live, (Oka/Merck) - Zostavax

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-G | facility\_name=Organon Teknika Corporation LLC | street\_city=100 Rodolphe Street Building 1300 Durham | state=NC | zipcode=27712 | research\_focus=For the prevention of tuberculosis in persons not previously infected with M. tuberculosis who are at high risk for exposure; For the treatment and prophylaxis of carcinoma in situ (CIS) of the urinary bladder; For the prophylaxis of primary or recurrent state Ta and/or T1 papillary tumors following transurethral resection (TUR). | vaccine\_dev=BCG Live vaccine - BCG Vaccine; TICE BCG

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-G | facility\_name=Sanofi Pasteur Biologics Co. | street\_city=38 Sidney Street Cambridge | state=MA | zipcode=02139 | research\_focus=Smallpox disease | vaccine\_dev=Smallpox (Vaccinia) Vaccine, Live - ACAM2000

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-G | facility\_name=Sanofi Pasteur, Inc | street\_city=Discovery Drive Swiftwater | state=PA | zipcode=18370 | research\_focus=Diphtheria caused by Corynebacterium diphtheriae; tetanus caused by Clostridium tetani; pertussis diseases; influenza disease caused by pandemic (H1N1) 2009 virus; influenza disease caused by H5N1 subtype; influenza disease caused by influenza virus subtypes A and type B; invasive meningococcal disease caused by Neisseria meningitidis serogroups A, C, Y and W-135; meningitis and meningococcemia caused by N. meningitidis; and Yellow fever acute viral illness caused by a mosquito-borne flavivirus. | vaccine\_dev=Diphtheria & Tetanus Toxoids and Acellular Pertussis Vaccine Adsorbed - Tripedia; DTaP\_ Diphtheria and Tetanus Toxoids Adsorbed\_ Influenza A (H1N1) 2009 Monovalent Vaccine\_ Influenza Virus Vaccine, H5N1 (for National Stockpile)\_ Influenza Virus Vaccine, Trivalent, Types A and B33 - FluZone High- Dose\_ Meningococcal Polysaccharide (Serogroups A, C, Y and W-135) Diphtheria Toxoid\_Conjugate Vaccine - Menactra(r)\_ Meningococcal Polysaccharide Vaccine, Groups A, C, Y and W-135 Combined - Menomune(r)-A/C/Y/W-1351\_ Tetanus and Diphtheria Toxoids Adsorbed\_ Tetanus and Diphtheria Toxoids Adsorbed for Adult Use - DECAVAC\_ Tetanus Toxoid Adsorbed\_ Tetanus Toxoid for Booster Use Only\_ Yellow Fever Vaccine - YF-VAX(r)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2011\_United\_States.docx | April 15 2011 | CBM-Form-G | facility\_name=Wyeth Pharmaceuticals Inc | street\_city=Pfizer Inc. 235 East 42nd Street New York | state=NY | zipcode=10017 | research\_focus=Invasive disease caused by Streptococcus pneumoniae serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F and otitis media caused by Streptococcus pneumoniae serotypes\_4, 6B, 9V, 14, 18C, 19F and 23F. | vaccine\_dev=Pneumococcal 13-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar\_13(tm)\_ Pneumococcal 7-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar(r)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC | street\_city=1600 Clifton Road N.E.

Atlanta | state=GA | zipcode=30333 | funding\_src=DHS | lab\_space=BSL 4 Laboratory 136 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC | street\_city=1600 Clifton Road N.E.

Atlanta | state=GA | zipcode=30333 | funding\_src=DHS | lab\_space=BSL 4 Laboratory 271 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC | street\_city=1600 Clifton Road N.E.

Atlanta | state=GA | zipcode=30333 | funding\_src=DHS | lab\_space=BSL 4 Laboratory 136 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC | street\_city=1600 Clifton Road N.E.

Atlanta | state=GA | zipcode=30333 | funding\_src=DHHS | lab\_space=BSL 4 Laboratory 136 m2



Branch|street\_city=301 University Blvd. Galveston|state=TX|zipcode=77555|funding\_src=USDA|lab\_space=BSL 4 Laboratory  
1022 m2 GNL laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 1|facility\_name=Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical Branch|street\_city=301 University Blvd. Galveston|state=TX|zipcode=77555|funding\_src=Universities|lab\_space=BSL 4 Laboratory  
186 m2 Shope laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 1|facility\_name=Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical Branch|street\_city=301 University Blvd. Galveston|state=TX|zipcode=77555|funding\_src=Universities|lab\_space=BSL 4 Laboratory  
1022 m2 GNL laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 1|facility\_name=Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical Branch|street\_city=301 University Blvd. Galveston|state=TX|zipcode=77555|funding\_src=Private Foundations|lab\_space=BSL 4 Laboratory  
186 m2 Shope laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 1|facility\_name=Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical Branch|street\_city=301 University Blvd. Galveston|state=TX|zipcode=77555|funding\_src=Private Foundations|lab\_space=BSL 4 Laboratory  
1022 m2 GNL laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 1|facility\_name=Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical Branch|street\_city=301 University Blvd. Galveston|state=TX|zipcode=77555|funding\_src=Pharmaceutical Industry|lab\_space=BSL 4 Laboratory  
186 m2 Shope laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 1|facility\_name=Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical Branch|street\_city=301 University Blvd. Galveston|state=TX|zipcode=77555|funding\_src=Pharmaceutical Industry|lab\_space=BSL 4 Laboratory  
1022 m2 GNL laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1032|BSL-3\_m2=3160|BSL-4\_m2=976|total\_bsl\_m2=5168|total\_personnel=151|mil\_personnel=0|civ\_personnel=151|total\_scientist=26|total\_engineer=30|total\_technician=53|total\_admin=42|funding\_src=DHS|research\_funding=\$5,298,607|dev\_funding=\$8,339,428|testeval\_funding=\$0|total\_funding=\$13,638,035|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1032|BSL-3\_m2=3160|BSL-4\_m2=976|total\_bsl\_m2=5168|total\_personnel=151|mil\_personnel=0|civ\_personnel=151|total\_scientist=26|total\_engineer=30|total\_technician=53|total\_admin=42|funding\_src=DHS|research\_funding=\$5,298,607|dev\_funding=\$8,339,428|testeval\_funding=\$0|total\_funding=\$13,638,035|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1032|BSL-3\_m2=3160|BSL-4\_m2=976|total\_bsl\_m2=5168|total\_personnel=151|mil\_personnel=0|civ\_personnel=151|total\_scientist=26|total\_engineer=30|total\_technician=53|total\_admin=42|funding\_src=DHS|research\_funding=\$5,298,607|dev\_funding=\$8,339,428|testeval\_funding=\$0|total\_funding=\$13,638,035|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=NBACC | street\_city=8300 Research Plaza Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=1032 | BSL-3\_m2=3160 | BSL-4\_m2=976 | total\_bsl\_m2=5168 | total\_personnel=151 | mil\_personnel=0 | civ\_personnel=151 | total\_scientist=26 | total\_engineer=30 | total\_technician=53 | total\_admin=42 | funding\_src=DHS | research\_funding=\$5,298,607 | dev\_funding=\$8,339,428 | testevel\_funding=\$0 | total\_funding=\$13,638,035 | research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Plum Island Animal Disease Center (PIADC) | street\_city=40550 Rte. 25 Orient Point | state=NY | zipcode=11957 | bsl2\_m2=234 | BSL-3\_m2=17643 | BSL-4\_m2=0 | total\_bsl\_m2=17877 | total\_personnel=357 | mil\_personnel=0 | civ\_personnel=357 | total\_scientist=92 | total\_engineer=2 | total\_technician=13 | total\_admin=250 | funding\_src=DHS | research\_funding=\$3,800,000 | dev\_funding=\$8,000,000 | testevel\_funding=\$4,000,000 | total\_funding=\$16,000,000 | research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Plum Island Animal Disease Center (PIADC) | street\_city=40550 Rte. 25 Orient Point | state=NY | zipcode=11957 | bsl2\_m2=234 | BSL-3\_m2=17643 | BSL-4\_m2=0 | total\_bsl\_m2=17877 | total\_personnel=357 | mil\_personnel=0 | civ\_personnel=357 | total\_scientist=92 | total\_engineer=2 | total\_technician=13 | total\_admin=250 | funding\_src=DHS | research\_funding=\$3,800,000 | dev\_funding=\$8,000,000 | testevel\_funding=\$4,000,000 | total\_funding=\$16,000,000 | research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Plum Island Animal Disease Center (PIADC) | street\_city=40550 Rte. 25 Orient Point | state=NY | zipcode=11957 | bsl2\_m2=234 | BSL-3\_m2=17643 | BSL-4\_m2=0 | total\_bsl\_m2=17877 | total\_personnel=357 | mil\_personnel=0 | civ\_personnel=357 | total\_scientist=92 | total\_engineer=2 | total\_technician=13 | total\_admin=250 | funding\_src=USDA | research\_funding=\$3,800,000 | dev\_funding=\$8,000,000 | testevel\_funding=\$4,000,000 | total\_funding=\$16,000,000 | research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Plum Island Animal Disease Center (PIADC) | street\_city=40550 Rte. 25 Orient Point | state=NY | zipcode=11957 | bsl2\_m2=234 | BSL-3\_m2=17643 | BSL-4\_m2=0 | total\_bsl\_m2=17877 | total\_personnel=357 | mil\_personnel=0 | civ\_personnel=357 | total\_scientist=92 | total\_engineer=2 | total\_technician=13 | total\_admin=250 | funding\_src=USDA | research\_funding=\$3,800,000 | dev\_funding=\$8,000,000 | testevel\_funding=\$4,000,000 | total\_funding=\$16,000,000 | research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Rd Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=60 | mil\_personnel=0 | civ\_personnel=60 | total\_scientist=43 | total\_engineer=1 | total\_technician=6 | total\_admin=10 | funding\_src=DOD | research\_funding=\$231,000 | dev\_funding=\$0 | testevel\_funding=\$4,100,000 | total\_funding=\$4,331,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Rd Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=60 | mil\_personnel=0 | civ\_personnel=60 | total\_scientist=43 | total\_engineer=1 | total\_technician=6 | total\_admin=10 | funding\_src=DOD | research\_funding=\$231,000 | dev\_funding=\$0 | testevel\_funding=\$4,100,000 | total\_funding=\$4,331,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models. | agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Rd Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=60 | mil\_personnel=0 | civ\_personnel=60 | total\_scientist=43 | total\_engineer=1 | total\_technician=6 | total\_admin=10 | funding\_src=DOD | research\_funding=\$231,000 | dev\_funding=\$0 | testevel\_funding=\$4,100,000 | total\_funding=\$4,331,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models. | agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

nding=\$4,331,000|research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Lothar Salomon Test Facility (LSTF)|street\_city=2029 Burns Rd Dugway|state=UT|zipcode=84022-5006|bsl2\_m2=744|BSL-3\_m2=414|BSL-4\_m2=0|total\_bsl\_m2=1158|total\_personnel=60|mil\_personnel=0|civ\_personnel=60|total\_scientist=43|total\_engineer=1|total\_technician=6|total\_admin=10|funding\_src=DHS|research\_funding=\$231,000|dev\_funding=\$0|testeval\_funding=\$4,100,000|total\_funding=\$4,331,000|research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Lothar Salomon Test Facility (LSTF)|street\_city=2029 Burns Rd Dugway|state=UT|zipcode=84022-5006|bsl2\_m2=744|BSL-3\_m2=414|BSL-4\_m2=0|total\_bsl\_m2=1158|total\_personnel=60|mil\_personnel=0|civ\_personnel=60|total\_scientist=43|total\_engineer=1|total\_technician=6|total\_admin=10|funding\_src=DHS|research\_funding=\$231,000|dev\_funding=\$0|testeval\_funding=\$4,100,000|total\_funding=\$4,331,000|research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Lothar Salomon Test Facility (LSTF)|street\_city=2029 Burns Rd Dugway|state=UT|zipcode=84022-5006|bsl2\_m2=744|BSL-3\_m2=414|BSL-4\_m2=0|total\_bsl\_m2=1158|total\_personnel=60|mil\_personnel=0|civ\_personnel=60|total\_scientist=43|total\_engineer=1|total\_technician=6|total\_admin=10|funding\_src=DHS|research\_funding=\$231,000|dev\_funding=\$0|testeval\_funding=\$4,100,000|total\_funding=\$4,331,000|research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Lothar Salomon Test Facility (LSTF)|street\_city=2029 Burns Rd Dugway|state=UT|zipcode=84022-5006|bsl2\_m2=744|BSL-3\_m2=414|BSL-4\_m2=0|total\_bsl\_m2=1158|total\_personnel=60|mil\_personnel=0|civ\_personnel=60|total\_scientist=43|total\_engineer=1|total\_technician=6|total\_admin=10|funding\_src=DOJ|research\_funding=\$231,000|dev\_funding=\$0|testeval\_funding=\$4,100,000|total\_funding=\$4,331,000|research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Lothar Salomon Test Facility (LSTF)|street\_city=2029 Burns Rd Dugway|state=UT|zipcode=84022-5006|bsl2\_m2=744|BSL-3\_m2=414|BSL-4\_m2=0|total\_bsl\_m2=1158|total\_personnel=60|mil\_personnel=0|civ\_personnel=60|total\_scientist=43|total\_engineer=1|total\_technician=6|total\_admin=10|funding\_src=DOJ|research\_funding=\$231,000|dev\_funding=\$0|testeval\_funding=\$4,100,000|total\_funding=\$4,331,000|research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Lothar Salomon Test Facility (LSTF)|street\_city=2029 Burns Rd Dugway|state=UT|zipcode=84022-5006|bsl2\_m2=744|BSL-3\_m2=414|BSL-4\_m2=0|total\_bsl\_m2=1158|total\_personnel=60|mil\_personnel=0|civ\_personnel=60|total\_scientist=43|total\_engineer=1|total\_technician=6|total\_admin=10|funding\_src=DOJ|research\_funding=\$231,000|dev\_funding=\$0|testeval\_funding=\$4,100,000|total\_funding=\$4,331,000|research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Naval Medical Research Center (NMRC)|street\_city=503 Robert Grant Avenue Silver Spring|state=MD|zipcode=20910|bsl2\_m2=100|BSL-3\_m2=35|BSL-4\_m2=0|total\_bsl\_m2=135|total\_personnel=73|mil\_personnel=12|civ\_personnel=61|total\_scientist=16|total\_engineer=0|total\_technician=50|total\_admin=7|funding\_src=DOD|research\_funding=\$2,999,280|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$2,999,280|research\_obj=The goal of the program is the development of rapid and deployable detection assays to protect deployed troops. In a continued effort to have better prophylaxis measures, we are studying the potential use of multi-agent vaccines capable of conferring protection against multiple infectious diseases at once.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Naval Medical Research Center (NMRC)|street\_city=503 Robert Grant Avenue Silver Spring|state=MD|zipcode=20910|bsl2\_m2=100|BSL-3\_m2=35|BSL-4\_m2=0|total\_bsl\_m2=135|total\_personnel=73|mil\_personnel=12|civ\_personnel=61|total\_scientist=16|total\_engineer=0|total\_technician=50|total\_admin=7|funding\_src=DOD|research\_funding=\$2,999,280|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$2,999,280|research\_obj=The goal of the program is the development of rapid and deployable detection assays to protect deployed troops. In a continued effort to have better prophylaxis measures, we are studying the potential use of multi-agent vaccines capable of conferring protection against multiple infectious diseases at once.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Naval Research Laboratory (NRL) | street\_city=4555 Overlook Ave. SW District of Columbia | state=WA | zipcode=20375 | bsl2\_m2=1667 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=1667 | total\_personnel=48 | mil\_personnel=0 | civ\_personnel=48 | total\_scientist=38 | total\_engineer=5 | total\_technician=5 | total\_admin=0 | funding\_src=DOD | research\_funding=\$6,180,000 | dev\_funding=\$2,532,000 | testeval\_funding=\$0 | total\_funding=\$8,712,000 | research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Naval Research Laboratory (NRL) | street\_city=4555 Overlook Ave. SW District of Columbia | state=WA | zipcode=20375 | bsl2\_m2=1667 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=1667 | total\_personnel=48 | mil\_personnel=0 | civ\_personnel=48 | total\_scientist=38 | total\_engineer=5 | total\_technician=5 | total\_admin=0 | funding\_src=DOD | research\_funding=\$6,180,000 | dev\_funding=\$2,532,000 | testeval\_funding=\$0 | total\_funding=\$8,712,000 | research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Naval Research Laboratory (NRL) | street\_city=4555 Overlook Ave. SW District of Columbia | state=WA | zipcode=20375 | bsl2\_m2=1667 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=1667 | total\_personnel=48 | mil\_personnel=0 | civ\_personnel=48 | total\_scientist=38 | total\_engineer=5 | total\_technician=5 | total\_admin=0 | funding\_src=NIH | research\_funding=\$6,180,000 | dev\_funding=\$2,532,000 | testeval\_funding=\$0 | total\_funding=\$8,712,000 | research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Naval Research Laboratory (NRL) | street\_city=4555 Overlook Ave. SW District of Columbia | state=WA | zipcode=20375 | bsl2\_m2=1667 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=1667 | total\_personnel=48 | mil\_personnel=0 | civ\_personnel=48 | total\_scientist=38 | total\_engineer=5 | total\_technician=5 | total\_admin=0 | funding\_src=NIH | research\_funding=\$6,180,000 | dev\_funding=\$2,532,000 | testeval\_funding=\$0 | total\_funding=\$8,712,000 | research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory | street\_city=6149 Welsh Road Dahlgren | state=VA | zipcode=22448-5162 | bsl2\_m2=190 | BSL-3\_m2=26 | BSL-4\_m2=0 | total\_bsl\_m2=216 | total\_personnel=171 | mil\_personnel=0 | civ\_personnel=171 | total\_scientist=65 | total\_engineer=52 | total\_technician=13 | total\_admin=41 | funding\_src=DOD | research\_funding=\$3,222,000 | dev\_funding=\$6,210,000 | testeval\_funding=\$10,559,000 | total\_funding=\$19,991,000 | research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory | street\_city=6149 Welsh Road Dahlgren | state=VA | zipcode=22448-5162 | bsl2\_m2=190 | BSL-3\_m2=26 | BSL-4\_m2=0 | total\_bsl\_m2=216 | total\_personnel=171 | mil\_personnel=0 | civ\_personnel=171 | total\_scientist=65 | total\_engineer=52 | total\_technician=13 | total\_admin=41 | funding\_src=DOD | research\_funding=\$3,222,000 | dev\_funding=\$6,210,000 | testeval\_funding=\$10,559,000 | total\_funding=\$19,991,000 | research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning. | agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory | street\_city=6149 Welsh Road Dahlgren | state=VA | zipcode=22448-5162 | bsl2\_m2=190 | BSL-3\_m2=26 | BSL-4\_m2=0 | total\_bsl\_m2=216 | total\_personnel=171 | mil\_personnel=0 | civ\_personnel=171 | total\_scientist=65 | total\_engineer=52 | total\_technician=13 | total\_admin=41 | funding\_src=DOD | research\_funding=\$3,222,000 | dev\_funding=\$6,210,000 | testeval\_funding=\$10,559,000 | total\_funding=\$19,991,000 | research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory | street\_city=6149 Welsh Road Dahlgren | state=VA | zipcode=22448-5162 | bsl2\_m2=190 | BSL-3\_m2=26 | BSL-4\_m2=0 | total\_bsl\_m2=216 | total\_personnel=171 | mil\_personnel=0 | civ\_personnel=171 | total\_scientist=65 | total\_engineer=52 | total\_technician=13 | total\_admin=41 | funding\_src=Private Sector Companies | research\_funding=\$3,222,000 | dev\_funding=\$6,210,000 | testeval\_funding=\$10,559,000 | total\_funding=\$19,991,000 | res

earch\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road  
Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=171|mil\_personnel=0|civ\_personnel=171|total\_scientist=65|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Private Sector  
Companies|research\_funding=\$3,222,000|dev\_funding=\$6,210,000|testeval\_funding=\$10,559,000|total\_funding=\$19,991,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road  
Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=171|mil\_personnel=0|civ\_personnel=171|total\_scientist=65|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Private Sector  
Companies|research\_funding=\$3,222,000|dev\_funding=\$6,210,000|testeval\_funding=\$10,559,000|total\_funding=\$19,991,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road  
Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=171|mil\_personnel=0|civ\_personnel=171|total\_scientist=65|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Other Governmental  
Agencies|research\_funding=\$3,222,000|dev\_funding=\$6,210,000|testeval\_funding=\$10,559,000|total\_funding=\$19,991,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road  
Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=171|mil\_personnel=0|civ\_personnel=171|total\_scientist=65|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Other Governmental  
Agencies|research\_funding=\$3,222,000|dev\_funding=\$6,210,000|testeval\_funding=\$10,559,000|total\_funding=\$19,991,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road  
Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-  
4\_m2=0|total\_bsl\_m2=216|total\_personnel=171|mil\_personnel=0|civ\_personnel=171|total\_scientist=65|total\_engineer=52|total\_technician=13|total\_admin=41|funding\_src=Other Governmental  
Agencies|research\_funding=\$3,222,000|dev\_funding=\$6,210,000|testeval\_funding=\$10,559,000|total\_funding=\$19,991,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Tyndall Air Force Base -- 1|street\_city=3000 Research Road Tyndall AFB|state=FL|zipcode=32403|bsl2\_m2=55|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=55|total\_personnel=7|mil\_personnel=1|civ\_personnel=6|total\_scientist=5|total\_engineer=0|total\_technician=2|total\_admin=0|funding\_src=DOD|research\_funding=\$0|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$0|research\_obj=The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used for defensive purposes to classify the size distribution of bioaerosol challenges as needed.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Tyndall Air Force Base -- 1|street\_city=3000 Research Road Tyndall AFB|state=FL|zipcode=32403|bsl2\_m2=55|BSL-3\_m2=0|BSL-  
4\_m2=0|total\_bsl\_m2=55|total\_personnel=7|mil\_personnel=1|civ\_personnel=6|total\_scientist=5|total\_engineer=0|total\_technician=2|total\_admin=0|funding\_src=DHS|research\_funding=\$0|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$0|research\_obj=The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used for defensive purposes to classify the size distribution of bioaerosol challenges as needed.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Tyndall Air Force Base -- 1|street\_city=3000 Research Road Tyndall AFB|state=FL|zipcode=32403|bsl2\_m2=55|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=55|total\_personnel=7|mil\_personnel=1|civ\_personnel=6|total\_scientist=5|total\_engineer=0|total\_technician=2|total\_admin=0|funding\_src=Other Governmental Agencies|research\_funding=\$0|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$0|research\_obj=The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used for defensive purposes to classify the size distribution of bioaerosol challenges as needed.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Tyndall Air Force Base -- 2|street\_city=139 Barnes Drive Tyndall AFB|state=FL|zipcode=32403|bsl2\_m2=53|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=53|total\_personnel=21|mil\_personnel=2|civ\_personnel=19|total\_scientist=15|total\_engineer=1|total\_technician=2|total\_admin=3|funding\_src=DOD|research\_funding=\$395,000|dev\_funding=\$1,049,000|testeval\_funding=\$0|total\_funding=\$1,444,000|research\_obj=This facility supports the preparation and characterization of novel chemicals expected to exhibit antimicrobial properties. It also supports research into degradation products formed by exposure of samples of reactive materials to simulant threat agents.|agents\_toxin=None

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=U.S. Army Edgewood Chemical and Biological Center|street\_city=5183 Blackhawk Road Aberdeen Proving Ground|state=MD|zipcode=21010-5424|bsl2\_m2=532|BSL-3\_m2=177|BSL-4\_m2=0|total\_bsl\_m2=709|total\_personnel=291|mil\_personnel=0|civ\_personnel=291|total\_scientist=168|total\_engineer=39|total\_technician=28|total\_admin=56|funding\_src=DOD|research\_funding=\$1,270,000|dev\_funding=\$21,403,000|testeval\_funding=\$0|total\_funding=\$22,673,000|research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=U.S. Army Edgewood Chemical and Biological Center|street\_city=5183 Blackhawk Road Aberdeen Proving Ground|state=MD|zipcode=21010-5424|bsl2\_m2=532|BSL-3\_m2=177|BSL-4\_m2=0|total\_bsl\_m2=709|total\_personnel=291|mil\_personnel=0|civ\_personnel=291|total\_scientist=168|total\_engineer=39|total\_technician=28|total\_admin=56|funding\_src=DOD|research\_funding=\$1,270,000|dev\_funding=\$21,403,000|testeval\_funding=\$0|total\_funding=\$22,673,000|research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=U.S. Army Edgewood Chemical and Biological Center|street\_city=5183 Blackhawk Road Aberdeen Proving Ground|state=MD|zipcode=21010-5424|bsl2\_m2=532|BSL-3\_m2=177|BSL-4\_m2=0|total\_bsl\_m2=709|total\_personnel=291|mil\_personnel=0|civ\_personnel=291|total\_scientist=168|total\_engineer=39|total\_technician=28|total\_admin=56|funding\_src=DOD|research\_funding=\$1,270,000|dev\_funding=\$21,403,000|testeval\_funding=\$0|total\_funding=\$22,673,000|research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)|street\_city=3100 Ricketts Point Road Aberdeen Proving Ground|state=MD|zipcode=21010-5400|bsl2\_m2=300|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=300|total\_personnel=11|mil\_personnel=1|civ\_personnel=10|total\_scientist=5|total\_engineer=0|total\_technician=6|total\_admin=0|funding\_src=DOD|research\_funding=\$1,399,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$1,399,000|research\_obj=The Institute's mission involves research on medical defenses against neurotoxins.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-4\_m2=1186|total\_bsl\_m2=30351|total\_personnel=837|mil\_personnel=212|civ\_personnel=625|total\_scientist=282|total\_engineer=5|total\_technician=302|total\_admin=248|funding\_src=DOD|research\_funding=\$4,266,000|dev\_funding=\$47,533,000|testeval\_funding=\$7,785,000|total\_funding=\$59,584,000|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-4\_m2=1186|total\_bsl\_m2=30351|total\_personnel=837|mil\_personnel=212|civ\_personnel=625|total\_scientist=282|total\_engineer=5|total\_technician=302|total\_admin=248|funding\_src=DOD|research\_funding=\$4,266,000|dev\_funding=\$47,533,000|testeval\_funding=\$7,785,000|total\_funding=\$59,584,000|research\_obj=To develop medical countermeasures, to include candidate vaccines,

diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies. |agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-4\_m2=1186|total\_bsl\_m2=30351|total\_personnel=837|mil\_personnel=212|civ\_personnel=625|total\_scientist=282|total\_engineer=5|total\_technician=302|total\_admin=248|funding\_src=DOD|research\_funding=\$4,266,000|dev\_funding=\$47,533,000|testeval\_funding=\$7,785,000|total\_funding=\$59,584,000|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies. |agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-4\_m2=1186|total\_bsl\_m2=30351|total\_personnel=837|mil\_personnel=212|civ\_personnel=625|total\_scientist=282|total\_engineer=5|total\_technician=302|total\_admin=248|funding\_src=DOD|research\_funding=\$4,266,000|dev\_funding=\$47,533,000|testeval\_funding=\$7,785,000|total\_funding=\$59,584,000|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Walter Reed Army Institute of Research (WRAIR)|street\_city=503 Robert Grant Avenue Silver Spring|state=MD|zipcode=20910|bsl2\_m2=294|BSL-3\_m2=165|BSL-4\_m2=0|total\_bsl\_m2=459|total\_personnel=19|mil\_personnel=3|civ\_personnel=16|total\_scientist=7|total\_engineer=0|total\_technician=12|total\_admin=0|funding\_src=DOD|research\_funding=\$2,080,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$2,080,000|research\_obj=The Walter Reed Army Institute of Research conducts research on bacterial threat agents, including the study of therapeutics against these agents. Biological defense work at WRAIR was moved to Fort Detrick to comply with U.S. Base Realignment and Closure law. WRAIR had a biological defense program from January 2011 to August 2011.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Walter Reed Army Institute of Research (WRAIR)|street\_city=503 Robert Grant Avenue Silver Spring|state=MD|zipcode=20910|bsl2\_m2=294|BSL-3\_m2=165|BSL-4\_m2=0|total\_bsl\_m2=459|total\_personnel=19|mil\_personnel=3|civ\_personnel=16|total\_scientist=7|total\_engineer=0|total\_technician=12|total\_admin=0|funding\_src=DOD|research\_funding=\$2,080,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$2,080,000|research\_obj=The Walter Reed Army Institute of Research conducts research on bacterial threat agents, including the study of therapeutics against these agents. Biological defense work at WRAIR was moved to Fort Detrick to comply with U.S. Base Realignment and Closure law. WRAIR had a biological defense program from January 2011 to August 2011.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Brookhaven National Laboratory|street\_city=Brookhaven National Laboratory Biology Department Upton|state=NY|zipcode=11973-5000|bsl2\_m2=185|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=185|total\_personnel=18|mil\_personnel=0|civ\_personnel=18|total\_scientist=14|total\_engineer=0|total\_technician=4|total\_admin=0|funding\_src=DOD|research\_funding=\$6,343,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$6,343,000|research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Brookhaven National Laboratory|street\_city=Brookhaven National Laboratory Biology Department Upton|state=NY|zipcode=11973-5000|bsl2\_m2=185|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=185|total\_personnel=18|mil\_personnel=0|civ\_personnel=18|total\_scientist=14|total\_engineer=0|total\_technician=4|total\_admin=0|funding\_src=DOD|research\_funding=\$6,343,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$6,343,000|research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. |agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=185 | BSL-3\_m2=0 | BSL-  
4\_m2=0 | total\_bsl\_m2=185 | total\_personnel=18 | mil\_personnel=0 | civ\_personnel=18 | total\_scientist=14 | total\_engineer=0 | total\_technician=4 | total\_admin=0 | funding\_src=DOE | research\_funding=\$6,343,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$6,343,000 | research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=185 | BSL-3\_m2=0 | BSL-  
4\_m2=0 | total\_bsl\_m2=185 | total\_personnel=18 | mil\_personnel=0 | civ\_personnel=18 | total\_scientist=14 | total\_engineer=0 | total\_technician=4 | total\_admin=0 | funding\_src=DOE | research\_funding=\$6,343,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$6,343,000 | research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. | agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=185 | BSL-3\_m2=0 | BSL-  
4\_m2=0 | total\_bsl\_m2=185 | total\_personnel=18 | mil\_personnel=0 | civ\_personnel=18 | total\_scientist=14 | total\_engineer=0 | total\_technician=4 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$6,343,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$6,343,000 | research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=185 | BSL-3\_m2=0 | BSL-  
4\_m2=0 | total\_bsl\_m2=185 | total\_personnel=18 | mil\_personnel=0 | civ\_personnel=18 | total\_scientist=14 | total\_engineer=0 | total\_technician=4 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$6,343,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$6,343,000 | research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. | agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=185 | BSL-3\_m2=0 | BSL-  
4\_m2=0 | total\_bsl\_m2=185 | total\_personnel=18 | mil\_personnel=0 | civ\_personnel=18 | total\_scientist=14 | total\_engineer=0 | total\_technician=4 | total\_admin=0 | funding\_src=Other Governmental Agencies | research\_funding=\$6,343,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$6,343,000 | research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Brookhaven National Laboratory | street\_city=Brookhaven National Laboratory Biology Department Upton | state=NY | zipcode=11973-5000 | bsl2\_m2=185 | BSL-3\_m2=0 | BSL-  
4\_m2=0 | total\_bsl\_m2=185 | total\_personnel=18 | mil\_personnel=0 | civ\_personnel=18 | total\_scientist=14 | total\_engineer=0 | total\_technician=4 | total\_admin=0 | funding\_src=Other Governmental Agencies | research\_funding=\$6,343,000 | dev\_funding=\$0 | testevel\_funding=\$0 | total\_funding=\$6,343,000 | research\_obj=The

majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. |agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Idaho National Laboratory|street\_city=National Laboratory 2525 Fremont Ave. Idaho Falls Idaho|state=ID|zipcode=83415-2203|bsl2\_m2=90|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=90|total\_personnel=6|mil\_personnel=0|civ\_personnel=6|total\_scientist=6|total\_engineer=0|total\_technician=0|total\_admin=0|funding\_src=DHS|research\_funding=\$0|dev\_funding=\$0|testeval\_funding=\$280,000|total\_funding=\$280,000|research\_obj=Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2011, but viable culture collection is maintained.|agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Idaho National Laboratory|street\_city=National Laboratory 2525 Fremont Ave. Idaho Falls Idaho|state=ID|zipcode=83415-2203|bsl2\_m2=90|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=90|total\_personnel=6|mil\_personnel=0|civ\_personnel=6|total\_scientist=6|total\_engineer=0|total\_technician=0|total\_admin=0|funding\_src=DHS|research\_funding=\$0|dev\_funding=\$0|testeval\_funding=\$280,000|total\_funding=\$280,000|research\_obj=Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2011, but viable culture collection is maintained.|agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Idaho National Laboratory|street\_city=National Laboratory 2525 Fremont Ave. Idaho Falls Idaho|state=ID|zipcode=83415-2203|bsl2\_m2=90|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=90|total\_personnel=6|mil\_personnel=0|civ\_personnel=6|total\_scientist=6|total\_engineer=0|total\_technician=0|total\_admin=0|funding\_src=EPA|research\_funding=\$0|dev\_funding=\$0|testeval\_funding=\$280,000|total\_funding=\$280,000|research\_obj=Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2011, but viable culture collection is maintained.|agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Idaho National Laboratory|street\_city=National Laboratory 2525 Fremont Ave. Idaho Falls Idaho|state=ID|zipcode=83415-2203|bsl2\_m2=90|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=90|total\_personnel=6|mil\_personnel=0|civ\_personnel=6|total\_scientist=6|total\_engineer=0|total\_technician=0|total\_admin=0|funding\_src=EPA|research\_funding=\$0|dev\_funding=\$0|testeval\_funding=\$280,000|total\_funding=\$280,000|research\_obj=Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2011, but viable culture collection is maintained.|agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Lawrence Berkeley National Laboratory (LBNL)|street\_city=Lawrence Berkeley National Lab 1 Cyclotron Road Berkeley|state=CA|zipcode=94720|bsl2\_m2=130|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=130|total\_personnel=6|mil\_personnel=0|civ\_personnel=6|total\_scientist=3|total\_engineer=0|total\_technician=3|total\_admin=0|funding\_src=DHHS|research\_funding=\$200,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$200,000|research\_obj=No biological defense work currently. We are writing manuscripts from previous biological defense work on strain typing in Francisella. We currently have no live isolates or DNA from any Select Agent.|agents\_toxin=None

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Lawrence Livermore National Laboratory (LLNL)|street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore|state=CA|zipcode=94550|bsl2\_m2=1414|BSL-3\_m2=60|BSL-4\_m2=0|total\_bsl\_m2=1474|total\_personnel=124|mil\_personnel=0|civ\_personnel=124|total\_scientist=78|total\_engineer=3|total\_technician=17|total\_admin=26|funding\_src=DOD|research\_funding=\$23,514,000|dev\_funding=\$0|testeval\_funding=\$3,495,000|total\_funding=\$27,009,000|research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, post- decontamination agent viability testing, response planning, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological attack. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects whose goal is to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system.

This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-A, Part 2 |facility\_name=Lawrence Livermore National Laboratory (LLNL) |street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore |state=CA |zipcode=94550 |bsl2\_m2=1414 |BSL-3\_m2=60 |BSL-4\_m2=0 |total\_bsl\_m2=1474 |total\_personnel=124 |mil\_personnel=0 |civ\_personnel=124 |total\_scientist=78 |total\_engineer=3 |total\_technician=17 |total\_admin=26 |funding\_src=DOD |research\_funding=\$23,514,000 |dev\_funding=\$0 |testeval\_funding=\$3,495,000 |total\_funding=\$27,009,000 |research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, post- decontamination agent viability testing, response planning, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological attack. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects whose goal is to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-A, Part 2 |facility\_name=Lawrence Livermore National Laboratory (LLNL) |street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore |state=CA |zipcode=94550 |bsl2\_m2=1414 |BSL-3\_m2=60 |BSL-4\_m2=0 |total\_bsl\_m2=1474 |total\_personnel=124 |mil\_personnel=0 |civ\_personnel=124 |total\_scientist=78 |total\_engineer=3 |total\_technician=17 |total\_admin=26 |funding\_src=DOD |research\_funding=\$23,514,000 |dev\_funding=\$0 |testeval\_funding=\$3,495,000 |total\_funding=\$27,009,000 |research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, post- decontamination agent viability testing, response planning, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological attack. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects whose goal is to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

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protein interactions screening; and identify host molecular targets as potential therapeutic candidates. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory (LANL)|street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=346|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=346|total\_personnel=64|mil\_personnel=0|civ\_personnel=64|total\_scientist=27|total\_engineer=6|total\_technician=28|total\_admin=3|funding\_src=DOE|research\_funding=\$9,452,000|dev\_funding=\$5,393,000|testeval\_funding=\$8,840,000|total\_funding=\$23,685,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. |agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory (LANL)|street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=346|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=346|total\_personnel=64|mil\_personnel=0|civ\_personnel=64|total\_scientist=27|total\_engineer=6|total\_technician=28|total\_admin=3|funding\_src=DOE|research\_funding=\$9,452,000|dev\_funding=\$5,393,000|testeval\_funding=\$8,840,000|total\_funding=\$23,685,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. |agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory (LANL)|street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=346|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=346|total\_personnel=64|mil\_personnel=0|civ\_personnel=64|total\_scientist=27|total\_engineer=6|total\_technician=28|total\_admin=3|funding\_src=DOE|research\_funding=\$9,452,000|dev\_funding=\$5,393,000|testeval\_funding=\$8,840,000|total\_funding=\$23,685,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. |agents\_toxin=USDA Plant Protection and Quarantine (PPQ) Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory (LANL)|street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=346|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=346|total\_personnel=64|mil\_personnel=0|civ\_personnel=64|total\_scientist=27|total\_engineer=6|total\_technician=28|total\_admin=3|funding\_src=DOE|research\_funding=\$9,452,000|dev\_funding=\$5,393,000|testeval\_funding=\$8,840,000|total\_funding=\$23,685,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Los Alamos National Laboratory (LANL) | street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos | state=NM | zipcode=87545 | bsl2\_m2=346 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=346 | total\_personnel=64 | mil\_personnel=0 | civ\_personnel=64 | total\_scientist=27 | total\_engineer=6 | total\_technician=28 | total\_admin=3 | funding\_src=DHHS | research\_funding=\$9,452,000 | dev\_funding=\$5,393,000 | testeval\_funding=\$8,840,000 | total\_funding=\$23,685,000 | research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Los Alamos National Laboratory (LANL) | street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos | state=NM | zipcode=87545 | bsl2\_m2=346 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=346 | total\_personnel=64 | mil\_personnel=0 | civ\_personnel=64 | total\_scientist=27 | total\_engineer=6 | total\_technician=28 | total\_admin=3 | funding\_src=DHHS | research\_funding=\$9,452,000 | dev\_funding=\$5,393,000 | testeval\_funding=\$8,840,000 | total\_funding=\$23,685,000 | research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. | agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Los Alamos National Laboratory (LANL) | street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos | state=NM | zipcode=87545 | bsl2\_m2=346 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=346 | total\_personnel=64 | mil\_personnel=0 | civ\_personnel=64 | total\_scientist=27 | total\_engineer=6 | total\_technician=28 | total\_admin=3 | funding\_src=DHHS | research\_funding=\$9,452,000 | dev\_funding=\$5,393,000 | testeval\_funding=\$8,840,000 | total\_funding=\$23,685,000 | research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. | agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Los Alamos National Laboratory (LANL) | street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos | state=NM | zipcode=87545 | bsl2\_m2=346 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=346 | total\_personnel=64 | mil\_personnel=0 | civ\_personnel=64 | total\_scientist=27 | total\_engineer=6 | total\_technician=28 | total\_admin=3 | funding\_src=DHHS | research\_funding=\$9,452,000 | dev\_funding=\$5,393,000 | testeval\_funding=\$8,840,000 | total\_funding=\$23,685,000 | research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. | agents\_toxin=USDA Plant Protection and Quarantine (PPQ) Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Los Alamos National Laboratory (LANL) | street\_city=Los Alamos National Laboratory P. O. Box 1663 Los

Alamos|state=NM|zipcode=87545|bsl2\_m2=346|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=346|total\_personnel=64|mil\_personnel=0|civ\_personnel=64|total\_scientist=27|total\_engineer=6|total\_technician=28|total\_admin=3|funding\_src=DHHS|research\_funding=\$9,452,000|dev\_funding=\$5,393,000|testeval\_funding=\$8,840,000|total\_funding=\$23,685,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory (LANL)|street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=346|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=346|total\_personnel=64|mil\_personnel=0|civ\_personnel=64|total\_scientist=27|total\_engineer=6|total\_technician=28|total\_admin=3|funding\_src=Other Governmental Agencies|research\_funding=\$9,452,000|dev\_funding=\$5,393,000|testeval\_funding=\$8,840,000|total\_funding=\$23,685,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory (LANL)|street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=346|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=346|total\_personnel=64|mil\_personnel=0|civ\_personnel=64|total\_scientist=27|total\_engineer=6|total\_technician=28|total\_admin=3|funding\_src=Other Governmental Agencies|research\_funding=\$9,452,000|dev\_funding=\$5,393,000|testeval\_funding=\$8,840,000|total\_funding=\$23,685,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Los Alamos National Laboratory (LANL)|street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos|state=NM|zipcode=87545|bsl2\_m2=346|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=346|total\_personnel=64|mil\_personnel=0|civ\_personnel=64|total\_scientist=27|total\_engineer=6|total\_technician=28|total\_admin=3|funding\_src=Other Governmental Agencies|research\_funding=\$9,452,000|dev\_funding=\$5,393,000|testeval\_funding=\$8,840,000|total\_funding=\$23,685,000|research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Los Alamos National Laboratory (LANL) | street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos | state=NM | zipcode=87545 | bsl2\_m2=346 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=346 | total\_personnel=64 | mil\_personnel=0 | civ\_personnel=64 | total\_scientist=27 | total\_engineer=6 | total\_technician=28 | total\_admin=3 | funding\_src=Other Governmental Agencies | research\_funding=\$9,452,000 | dev\_funding=\$5,393,000 | testeval\_funding=\$8,840,000 | total\_funding=\$23,685,000 | research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. | agents\_toxin=USDA Plant Protection and Quarantine (PPQ) Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Los Alamos National Laboratory (LANL) | street\_city=Los Alamos National Laboratory P. O. Box 1663 Los Alamos | state=NM | zipcode=87545 | bsl2\_m2=346 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=346 | total\_personnel=64 | mil\_personnel=0 | civ\_personnel=64 | total\_scientist=27 | total\_engineer=6 | total\_technician=28 | total\_admin=3 | funding\_src=Other Governmental Agencies | research\_funding=\$9,452,000 | dev\_funding=\$5,393,000 | testeval\_funding=\$8,840,000 | total\_funding=\$23,685,000 | research\_obj=The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Pacific Northwest National Laboratory (PNNL) | street\_city=Pacific Northwest National Laboratory P. O. Box 999 Richland | state=WA | zipcode=99352 | bsl2\_m2=875 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=875 | total\_personnel=30 | mil\_personnel=0 | civ\_personnel=30 | total\_scientist=27 | total\_engineer=0 | total\_technician=0 | total\_admin=3 | funding\_src=DOD | research\_funding=\$15,368,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$15,368,000 | research\_obj=The primary objectives of the projects listed in this report include: Developing tools for organic signatures characterization in biological materials for forensic attribution. of nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate from non-pathogenic near neighbors. DNAs and BSL1/BSL2 whole organisms from Bacillus spp. Francisella sp. and Yersinia spp are used in this research. Investigating methods for detection and determination of food and waterborne pathogens. Microorganisms include murine norovirus, human norovirus, Listeria monocytogenes. We check for human papilloma virus because the HeLa cell line is used for cultivating human noroviruses. Understanding mechanisms in natural protein scaffolds underlying molecular recognition of diverse families of analytes to allow rapid molecular engineering of affinity reagents capable of threat detection. Developing diagnostic assays for toxin detection and activity, including a platform for toxin detection based upon a combination of 2 analytical approaches: 1) molecular recognition and 2) enzymatic activity assays. Using mass spectrometry methods to elucidate functional changes in the proteomes of infectious bacteria under relevant growth conditions, host-derived cell-lines during infection, or with over-expressed pathogen secreted proteins. Applying synthetic biology/genetic engineering tools to design and build a living cellular sensor that can be tuned to respond to selectable targets. Characterizing the ability of biofilms to capture, retain, or respond to a variety of contaminants. The objective of the LRD effort, is to investigate stable platforms for novel molecular recognition elements for pathogen detection. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories (SNL)|street\_city=Sandia National Laboratories P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1293|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1293|total\_personnel=85|mil\_personnel=0|civ\_personnel=85|total\_scientist=41|total\_engineer=10|total\_technician=33|total\_admin=1|funding\_src=DHS|research\_funding=\$48,311,000|dev\_funding=\$832,000|testeval\_funding=\$217,000|total\_funding=\$49,360,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; b. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro- separations technology; c. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

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Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=1293 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=1293 | total\_personnel=85 | mil\_personnel=0 | civ\_personnel=85 | total\_scientist=41 | total\_engineer=10 | total\_technician=33 | total\_admin=1 | funding\_src=DHS | research\_funding=\$48,311,000 | dev\_funding=\$832,000 | testeval\_funding=\$217,000 | total\_funding=\$49,360,000 | research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; b. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro- separations technology; c. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Sandia National Laboratories (SNL) | street\_city=Sandia National Laboratories P. O. Box 5800  
Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=1293 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=1293 | total\_personnel=85 | mil\_personnel=0 | civ\_personnel=85 | total\_scientist=41 | total\_engineer=10 | total\_technician=33 | total\_admin=1 | funding\_src=DOE | research\_funding=\$48,311,000 | dev\_funding=\$832,000 | testeval\_funding=\$217,000 | total\_funding=\$49,360,000 | research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; b. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro- separations technology; c. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Sandia National Laboratories (SNL) | street\_city=Sandia National Laboratories P. O. Box 5800  
Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=1293 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=1293 | total\_personnel=85 | mil\_personnel=0 | civ\_personnel=85 | total\_scientist=41 | total\_engineer=10 | total\_technician=33 | total\_admin=1 | funding\_src=DOE | research\_funding=\$48,311,000 | dev\_funding=\$832,000 | testeval\_funding=\$217,000 | total\_funding=\$49,360,000 | research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; b. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro- separations technology; c. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

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Albuquerque | state=NM | zipcode=87185 | bsl2\_m2=1293 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=1293 | total\_personnel=85 | mil\_personnel=0 | civ\_personnel=85 | total\_scientist=41 | total\_engineer=10 | total\_technician=33 | total\_admin=1 | funding\_src=DHHS | research\_funding=\$48,311,000 | dev\_funding=\$832,000 | testeval\_funding=\$217,000 | total\_funding=\$49,360,000 | research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; b. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro- separations technology; c. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-A, Part 2 | facility\_name=Sandia National Laboratories (SNL) | street\_city=Sandia National Laboratories P. O. Box 5800

Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1293|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1293|total\_personnel=85|mil\_personnel=0|civ\_personnel=85|total\_scientist=41|total\_engineer=10|total\_technician=33|total\_admin=1|funding\_src=Other Governmental Agencies|research\_funding=\$48,311,000|dev\_funding=\$832,000|testeval\_funding=\$217,000|total\_funding=\$49,360,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; b. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro- separations technology; c. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens) Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories (SNL)|street\_city=Sandia National Laboratories P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1293|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1293|total\_personnel=85|mil\_personnel=0|civ\_personnel=85|total\_scientist=41|total\_engineer=10|total\_technician=33|total\_admin=1|funding\_src=Other Governmental Agencies|research\_funding=\$48,311,000|dev\_funding=\$832,000|testeval\_funding=\$217,000|total\_funding=\$49,360,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; b. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro- separations technology; c. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens) Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, National Center for Environmental Health (NCEH), Division of Laboratory Sciences\_(DLS)|street\_city=CDC DHHS 4770 Buford Highway Mail stop F-47 Atlanta|state=GA|zipcode=30341|bsl2\_m2=0|BSL-3\_m2=114|BSL-4\_m2=0|total\_bsl\_m2=114|total\_personnel=10|mil\_personnel=0|civ\_personnel=10|total\_scientist=10|total\_engineer=0|total\_technician=0|total\_admin=0|funding\_src=CDC|research\_funding=\$1,136,260|dev\_funding=\$0|testeval\_funding=\$757,506|total\_funding=\$1,893,766|research\_obj=The CDC National Center for Environmental Health, Division of Laboratory Science has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens) Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DOD|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens) Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DOD|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens) Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DOD|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=USDA Select Agents and Toxins Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|

otal\_technician=30|total\_admin=2|funding\_src=DOD|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DHS|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DHS|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DHS|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=USDA Select Agents and Toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DHS|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DHHS|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-

4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DHHS|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=USDA  
Select Agents and Toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-  
4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=DHHS|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Other pathogens or toxins  
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4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=EPA|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Overlap  
Select Agents (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-  
4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=EPA|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=USDA  
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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2325|BSL-  
4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=EPA|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Other pathogens or toxins  
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4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=CDC|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS  
Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-

3\_m2=2325|BSL-  
4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=CDC|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-  
3\_m2=2325|BSL-  
4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=CDC|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=USDA Select Agents and Toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-  
3\_m2=2325|BSL-  
4\_m2=543|total\_bsl\_m2=3162|total\_personnel=238|mil\_personnel=0|civ\_personnel=238|total\_scientist=206|total\_engineer=0|total\_technician=30|total\_admin=2|funding\_src=CDC|research\_funding=\$12,814,857|dev\_funding=\$3,121,248|testeval\_funding=\$4,072,632|total\_funding=\$20,008,737|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-  
4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=DOD|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-  
4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=DOD|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.|agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-  
4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=DOD|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-  
4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=DHS|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research

on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=DHS|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. |agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=DHS|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=CDC|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=CDC|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. |agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins|street\_city=CDC DHHS 3150 Rampart Road Fort Collins|state=CO|zipcode=80521|bsl2\_m2=66|BSL-3\_m2=1142|BSL-4\_m2=0|total\_bsl\_m2=1208|total\_personnel=67|mil\_personnel=0|civ\_personnel=67|total\_scientist=54|total\_engineer=0|total\_technician=10|total\_admin=3|funding\_src=CDC|research\_funding=\$1,220,244|dev\_funding=\$610,121|testeval\_funding=\$610,121|total\_funding=\$2,440,486|research\_obj=DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)|street\_city=903 South 4th St. Hamilton|state=MT|zipcode=59840|bsl2\_m2=1361|BSL-3\_m2=56|BSL-4\_m2=631|total\_bsl\_m2=2048|total\_personnel=96|mil\_personnel=0|civ\_personnel=96|total\_scientist=70|total\_engineer=0|total\_technician=23|total\_admin=3|funding\_src=DHHS|research\_funding=\$24,946,139|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$24,946,139|research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-

containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)|street\_city=903 South 4th St.

Hamilton|state=MT|zipcode=59840|bsl2\_m2=1361|BSL-3\_m2=56|BSL-  
4\_m2=631|total\_bsl\_m2=2048|total\_personnel=96|mil\_personnel=0|civ\_personnel=96|total\_scientist=70|total\_engineer=0|total\_technician=23|total\_admin=3|funding\_src=DHHS|research\_funding=\$24,946,139|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$24,946,139|research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program. |agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)|street\_city=903 South 4th St.

Hamilton|state=MT|zipcode=59840|bsl2\_m2=1361|BSL-3\_m2=56|BSL-  
4\_m2=631|total\_bsl\_m2=2048|total\_personnel=96|mil\_personnel=0|civ\_personnel=96|total\_scientist=70|total\_engineer=0|total\_technician=23|total\_admin=3|funding\_src=DHHS|research\_funding=\$24,946,139|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$24,946,139|research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)|street\_city=903 South 4th St.

Hamilton|state=MT|zipcode=59840|bsl2\_m2=1361|BSL-3\_m2=56|BSL-  
4\_m2=631|total\_bsl\_m2=2048|total\_personnel=96|mil\_personnel=0|civ\_personnel=96|total\_scientist=70|total\_engineer=0|total\_technician=23|total\_admin=3|funding\_src=DHHS|research\_funding=\$24,946,139|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$24,946,139|research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=NIH , C.W. Bill Young Center for Biodefense and Emerging\_Infectious Diseases|street\_city=NIH DHHS 9000 Rockville Pike Bethesda|state=MD|zipcode=20892|bsl2\_m2=2493|BSL-3\_m2=1091|BSL-

4\_m2=0|total\_bsl\_m2=3584|total\_personnel=120|mil\_personnel=0|civ\_personnel=120|total\_scientist=91|total\_engineer=0|total\_technician=24|total\_admin=5|funding\_src=DHHS|research\_funding=\$36,223,033|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$36,223,033|research\_obj=At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and

humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012 |CBM-Form-A, Part 2 |facility\_name=NIH , C.W. Bill Young Center for Biodefense and Emerging\_Infectious Diseases|street\_city=NIH DHHS 9000 Rockville Pike

Bethesda|state=MD|zipcode=20892|bsl2\_m2=2493|BSL-3\_m2=1091|BSL-  
4\_m2=0|total\_bsl\_m2=3584|total\_personnel=120|mil\_personnel=0|civ\_personnel=120|total\_scientist=91|total\_engineer=0|total\_technician=24|total\_admin=5|funding\_src=DHHS|research\_funding=\$36,223,033|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$36,223,033|research\_obj=At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. |agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012 |CBM-Form-A, Part 2 |facility\_name=NIH , C.W. Bill Young Center for Biodefense and Emerging\_Infectious Diseases|street\_city=NIH DHHS 9000 Rockville Pike

Bethesda|state=MD|zipcode=20892|bsl2\_m2=2493|BSL-3\_m2=1091|BSL-  
4\_m2=0|total\_bsl\_m2=3584|total\_personnel=120|mil\_personnel=0|civ\_personnel=120|total\_scientist=91|total\_engineer=0|total\_technician=24|total\_admin=5|funding\_src=DHHS|research\_funding=\$36,223,033|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$36,223,033|research\_obj=At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012 |CBM-Form-A, Part 2 |facility\_name=NIH , C.W. Bill Young Center for Biodefense and Emerging\_Infectious Diseases|street\_city=NIH DHHS 9000 Rockville Pike

Bethesda|state=MD|zipcode=20892|bsl2\_m2=2493|BSL-3\_m2=1091|BSL-  
4\_m2=0|total\_bsl\_m2=3584|total\_personnel=120|mil\_personnel=0|civ\_personnel=120|total\_scientist=91|total\_engineer=0|total\_technician=24|total\_admin=5|funding\_src=DHHS|research\_funding=\$36,223,033|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$36,223,033|research\_obj=At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012 |CBM-Form-A, Part 2 |facility\_name=NIH , Dale and Betty Bumpers Vaccine Research Center|street\_city=NIH DHHS 9000 Rockville Pike Bethesda|state=MD|zipcode=20892|bsl2\_m2=89|BSL-3\_m2=0|BSL-

4\_m2=0|total\_bsl\_m2=89|total\_personnel=8|mil\_personnel=0|civ\_personnel=8|total\_scientist=8|total\_engineer=0|total\_technician=0|total\_admin=0|funding\_src=DHHS|research\_funding=\$774,548|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$774,548|research\_obj=The research focus of the Biodefense Research Laboratory, Vaccine Research Center (VRC) comprises three areas: 1. Development of vaccines and antivirals 2. Studies of the mechanism of vaccine-induced immune protection 3. Basic research to understand the mechanism of virus replication (entry) and neutralization|agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012 |CBM-Form-A, Part 2 |facility\_name=Foreign Disease-Weed Science Research Unit|street\_city=1301 Ditto Avenue Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=105|BSL-3\_m2=950|BSL-4\_m2=0|total\_bsl\_m2=1055|total\_personnel=36|mil\_personnel=0|civ\_personnel=36|total\_scientist=13|total\_engineer=0|total\_technician=16|total\_admin=7|funding\_src=USDA|research\_funding=\$5,600,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,600,000|research\_obj=The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification

of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides.|agents\_toxin=USDA Plant Protection and Quarantine (PPQ) Select Agents and Toxins

Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Foreign Disease-Weed Science Research Unit|street\_city=1301 Ditto Avenue Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=105|BSL-3\_m2=950|BSL-4\_m2=0|total\_bsl\_m2=1055|total\_personnel=36|mil\_personnel=0|civ\_personnel=36|total\_scientist=13|total\_engineer=0|total\_technician=16|total\_admin=7|funding\_src=USDA|research\_funding=\$5,600,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,600,000|research\_obj=The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides.|agents\_toxin=Other pathogens or toxins. The agents studied (i.e., viruses, bacteria, and fungi) are foreign and/or emerging pathogens of plants that have an agricultural base. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that pose a threat to US plant production systems, US agricultural economy, and exports.

Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Private Sector  
Companies|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and  
improve our understanding of the genetic and pathobiological basis of virulence. This research provides government

regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Private Sector  
Companies|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and  
improve our understanding of the genetic and pathobiological basis of virulence. This research provides government

regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Private Sector  
Companies|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=USDA|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=USDA|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=USDA|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Universities|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and

condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Universities|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Universities|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=DHHS|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=DHHS|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at

the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=DHHS|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Other Governmental Agencies|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Other Governmental Agencies|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Other Governmental Agencies|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Non-profit

Associations|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

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Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Non-profit

Associations|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

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Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Non-profit

Associations|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=National Animal Disease Center (NADC)|street\_city=1920 Dayton Avenue Ames|state=IA|zipcode=50010|bsl2\_m2=4410|BSL-3\_m2=2489|BSL-4\_m2=0|total\_bsl\_m2=6899|total\_personnel=282|mil\_personnel=0|civ\_personnel=282|total\_scientist=46|total\_engineer=0|total\_technician=80|total\_admin=156|funding\_src=Department of Defense|research\_funding=\$32,000,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$32,000,000|research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=DOD|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=DOD|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding

=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-

4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=NIH|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-

4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=NIH|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

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4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Private Sector  
Companies|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and

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Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-  
4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Private Sector  
Companies|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.  
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4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=USDA|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-  
4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=USDA|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.  
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4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=USDA|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

chnician=19|total\_admin=13|funding\_src=Other Governmental Agencies|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Other Governmental Agencies|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports. Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Non-profit Associations|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins Jan 20, 2014 01:19:39|BWC\_CBM\_2012\_USA-Public.docx|July 9 2012|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=11|total\_engineer=0|total\_technician=19|total\_admin=13|funding\_src=Non-profit Associations|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. 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Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-A, Part 2 |facility\_name=Southeast Poultry Research Laboratory |street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens |state=GA |zipcode=30605 |bsl2\_m2=1138 |BSL-3\_m2=624 |BSL-4\_m2=0 |total\_bsl\_m2=1762 |total\_personnel=43 |mil\_personnel=0 |civ\_personnel=43 |total\_scientist=11 |total\_engineer=0 |total\_technician=19 |total\_admin=13 |funding\_src=CDC |research\_funding=\$5,800,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,800,000 |research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-A, Part 2 |facility\_name=Southeast Poultry Research Laboratory |street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens |state=GA |zipcode=30605 |bsl2\_m2=1138 |BSL-3\_m2=624 |BSL-4\_m2=0 |total\_bsl\_m2=1762 |total\_personnel=43 |mil\_personnel=0 |civ\_personnel=43 |total\_scientist=11 |total\_engineer=0 |total\_technician=19 |total\_admin=13 |funding\_src=CDC |research\_funding=\$5,800,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,800,000 |research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-G |facility\_name=Barr Laboratories, Inc. |street\_city=2150 Perrowville Road Forest |state=VA |zipcode=24551 |research\_focus=Adenovirus Type 4 and Type 7 Vaccine, Live, Oral |vaccine\_dev=Adenovirus Type 4 and Type 7 Vaccine, Live, Oral

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-G |facility\_name=Emergent BioDefense Operations Lansing, Inc. |street\_city=3500 N. Martin Luther King Jr. Blvd. Lansing |state=MI |zipcode=48906 |research\_focus=Anthrax disease caused by Bacillus anthracis |vaccine\_dev=Anthrax Vaccine Adsorbed - BioThrax

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-G |facility\_name=MassBiologics |street\_city=University of Medical School Boston Massachusetts |state=MA |zipcode=02130 |research\_focus=Diphtheria and tetanus caused by Corynebacterium diphtheriae and Clostridium tetani. |vaccine\_dev=Tetanus and Diphtheria Toxoids Adsorbed

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-G |facility\_name=MedImmune LLC |street\_city=One MedImmune Way Gaithersburg |state=MD |zipcode=20878 |research\_focus=Influenza disease caused by pandemic (H1N1) 2009 virus. Influenza disease caused by influenza virus subtypes A and type B contained in the vaccine. |vaccine\_dev=Influenza A (H1N1) 2009 Monovalent Vaccine - Influenza Vaccine Live, Intranasal - FluMist

Jan 20, 2014 01:19:39 |BWC\_CBM\_2012\_USA-Public.docx |July 9 2012 |CBM-Form-G |facility\_name=Merck & Co, Inc (NJ) |street\_city=One Merck Drive P.O. Box 100 Whitehouse Station |state=NJ |zipcode=08889-0100 |research\_focus=Invasive disease caused by Haemophilus influenzae type b; infection caused by all known subtypes of hepatitis B virus; Hepatitis A disease; cervical, vulvar and vaginal cancer and certain other diseases caused by Human Papillomavirus (HPV) Types 6, 11, 16, and 18; Measles (rubeola); Mumps; diseases caused by Streptococcus pneumoniae; Rotavirus disease; Rubella (German measles) disease; Varicella disease caused by the varicella-zoster virus (VZV); Herpes zoster (shingles) disease. |vaccine\_dev=Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) - PedvaxHIB - Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) &

Hepatitis B (Recombinant) Vaccine - COMVAX\_ Hepatitis A Vaccine, Inactivated - VAQTA\_ Hepatitis B Vaccine (Recombinant) - Recombivax HB\_ Human Papillomavirus Quadrivalent (Types 6, 11, 16, 18) Vaccine, Recombinant - Gardasil\_ Measles, Mumps, and Rubella Virus Vaccine, Live - M-M-R II\_ Measles, Mumps, Rubella and Varicella Virus Vaccine Live - ProQuad\_ Pneumococcal Vaccine, Polysacient - Pneumovax 23\_ Rotavirus Vaccine, Live, Oral, Pentavalent - RotaTeq\_ Varicella Virus Vaccine Live - Varivax\_ Zoster Vaccine, Live, (Oka/Merck) - Zostavax

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-G | facility\_name=Organon Teknika Corporation LLC | street\_city=100 Rodolphe Street Building 1300 Durham | state=NC | zipcode=27712 | research\_focus=For the prevention of tuberculosis in persons not previously infected with M. tuberculosis who are at high risk for exposure; For the treatment and prophylaxis of carcinoma in situ (CIS) of the urinary bladder; For the prophylaxis of primary or recurrent stage Ta and/or T1 papillary tumors following transurethral resection (TUR). | vaccine\_dev=BCG Live vaccine - BCG Vaccine; TICE BCG

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-G | facility\_name=Sanofi Pasteur Biologics Co. | street\_city=38 Sidney Street Cambridge | state=MA | zipcode=02139 | research\_focus=Smallpox disease | vaccine\_dev=Smallpox (Vaccinia) Vaccine, Live - ACAM2000

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-G | facility\_name=Sanofi Pasteur, Inc | street\_city=Discovery Drive Swiftwater | state=PA | zipcode=18370 | research\_focus=Diphtheria caused by Corynebacterium diphtheriae; tetanus caused by Clostridium tetani; pertussis diseases; influenza disease caused by pandemic (H1N1) 2009 virus; influenza disease caused by H5N1 subtype; influenza disease caused by influenza virus subtypes A and type B; invasive meningococcal disease caused by Neisseria meningitidis serogroups A, C, Y and W-135; meningitis and meningococcemia caused by N. meningitidis; and Yellow fever acute viral illness caused by a mosquito-borne flavivirus. | vaccine\_dev=Diphtheria & Tetanus Toxoids and Acellular Pertussis Vaccine Adsorbed - Tripedia; DTaP\_ Diphtheria and Tetanus Toxoids Adsorbed\_ Influenza A (H1N1) 2009 Monovalent Vaccine\_ Influenza Virus Vaccine, H5N1 (for National Stockpile)\_ Influenza Virus Vaccine, Trivalent, Types A and B33 - FluZone(r) and FluZone High-Dose\_ Meningococcal Polysaccharide (Serogroups A, C, Y and W-135) Diphtheria Toxoid\_Conjugate Vaccine - Menactra(r)\_ Meningococcal Polysaccharide Vaccine, Groups A, C, Y and W-135 Combined - Menomune(r)-A/C/Y/W-1351\_ Tetanus and Diphtheria Toxoids Adsorbed\_ Tetanus and Diphtheria Toxoids Adsorbed for Adult Use - DECAVAC\_ Tetanus Toxoid Adsorbed\_ Tetanus Toxoid for Booster Use Only\_ Yellow Fever Vaccine - YF-VAX(r)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2012\_USA-Public.docx | July 9 2012 | CBM-Form-G | facility\_name=Wyeth Pharmaceuticals Inc | street\_city=Pfizer Inc. 235 East 42nd Street New York | state=NY | zipcode=10017 | research\_focus=Invasive disease caused by Streptococcus pneumoniae serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F and otitis media caused by Streptococcus pneumoniae serotypes 4, 6B, 9V, 14, 18C, 19F and 23F. | vaccine\_dev=Pneumococcal 13-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar 13\_ Pneumococcal 7-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DOD | lab\_space=BSL 4 Laboratory 136 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DOD | lab\_space=BSL 4 Laboratory 271 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DOD | lab\_space=BSL 4 Laboratory 136 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DOD | lab\_space=BSL 4 Laboratory 136 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DHS | lab\_space=BSL 4 Laboratory 136 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DHS | lab\_space=BSL 4 Laboratory 271 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DHHS | lab\_space=BSL 4 Laboratory 136 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DHHS | lab\_space=BSL 4 Laboratory 271 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=DHHS | lab\_space=BSL 4 Laboratory 136 m2

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 1 | facility\_name=CDC, Office of Infectious Diseases (OID) | responsible\_org=CDC, Department of Health and Human Services | street\_city=1600 Clifton Road N.E. Atlanta 30333 United States | state=GA | zipcode=30333 | funding\_src=CDC | lab\_space=BSL 4 Laboratory 136 m2



Branch|street\_city=301 University Blvd. Galveston United States|state=TX|zipcode=77555|funding\_src=USDA|lab\_space=BSL 4  
Laboratory 1022 m2 GNL Laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 1|facility\_name=Galveston National  
Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical  
Branch|street\_city=301 University Blvd. Galveston United States|state=TX|zipcode=77555|funding\_src=Universities|lab\_space=BSL  
4 Laboratory 186 m2 Shope Laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 1|facility\_name=Galveston National  
Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical  
Branch|street\_city=301 University Blvd. Galveston United States|state=TX|zipcode=77555|funding\_src=Universities|lab\_space=BSL  
4 Laboratory 1022 m2 GNL Laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 1|facility\_name=Galveston National  
Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical  
Branch|street\_city=301 University Blvd. Galveston United States|state=TX|zipcode=77555|funding\_src=Private  
Foundations|lab\_space=BSL 4 Laboratory 186 m2 Shope Laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 1|facility\_name=Galveston National  
Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical  
Branch|street\_city=301 University Blvd. Galveston United States|state=TX|zipcode=77555|funding\_src=Private  
Foundations|lab\_space=BSL 4 Laboratory 1022 m2 GNL Laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 1|facility\_name=Galveston National  
Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical  
Branch|street\_city=301 University Blvd. Galveston United States|state=TX|zipcode=77555|funding\_src=Pharmaceutical  
Industry|lab\_space=BSL 4 Laboratory 186 m2 Shope Laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 1|facility\_name=Galveston National  
Laboratory (GNL) Complex including Robert E. Shope Laboratory|responsible\_org=The University of Texas Medical  
Branch|street\_city=301 University Blvd. Galveston United States|state=TX|zipcode=77555|funding\_src=Pharmaceutical  
Industry|lab\_space=BSL 4 Laboratory 1022 m2 GNL Laboratory  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part  
2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1282|BSL-  
3\_m2=2564|BSL-  
4\_m2=980|total\_bsl\_m2=4826|total\_personnel=143|mil\_personnel=0|civ\_personnel=143|total\_scientist=23|total\_engineer=30|t  
otal\_technician=47|total\_admin=43|funding\_src=DOD|research\_funding=\$3,033,517|dev\_funding=\$6,579,127|testeval\_funding=\$  
0|total\_funding=\$9,612,644|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization  
of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps  
to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the  
development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed,  
NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations.  
NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and  
bioterrorism.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part  
2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1282|BSL-  
3\_m2=2564|BSL-  
4\_m2=980|total\_bsl\_m2=4826|total\_personnel=143|mil\_personnel=0|civ\_personnel=143|total\_scientist=23|total\_engineer=30|t  
otal\_technician=47|total\_admin=43|funding\_src=DOD|research\_funding=\$3,033,517|dev\_funding=\$6,579,127|testeval\_funding=\$  
0|total\_funding=\$9,612,644|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization  
of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps  
to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the  
development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed,  
NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations.  
NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and  
bioterrorism.|agents\_toxin=Overlap Select Agents ( Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part  
2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1282|BSL-  
3\_m2=2564|BSL-  
4\_m2=980|total\_bsl\_m2=4826|total\_personnel=143|mil\_personnel=0|civ\_personnel=143|total\_scientist=23|total\_engineer=30|t  
otal\_technician=47|total\_admin=43|funding\_src=DOD|research\_funding=\$3,033,517|dev\_funding=\$6,579,127|testeval\_funding=\$  
0|total\_funding=\$9,612,644|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization  
of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps  
to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the  
development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed,  
NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations.  
NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and  
bioterrorism.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part  
2 | facility\_name=NBACC | street\_city=8300 Research Plaza Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=1282 | BSL-  
3\_m2=2564 | BSL-  
4\_m2=980 | total\_bsl\_m2=4826 | total\_personnel=143 | mil\_personnel=0 | civ\_personnel=143 | total\_scientist=23 | total\_engineer=30 | total\_technician=47 | total\_admin=43 | funding\_src=DOD | research\_funding=\$3,033,517 | dev\_funding=\$6,579,127 | testevel\_funding=\$0 | total\_funding=\$9,612,644 | research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part  
2 | facility\_name=NBACC | street\_city=8300 Research Plaza Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=1282 | BSL-  
3\_m2=2564 | BSL-  
4\_m2=980 | total\_bsl\_m2=4826 | total\_personnel=143 | mil\_personnel=0 | civ\_personnel=143 | total\_scientist=23 | total\_engineer=30 | total\_technician=47 | total\_admin=43 | funding\_src=DHS | research\_funding=\$3,033,517 | dev\_funding=\$6,579,127 | testevel\_funding=\$0 | total\_funding=\$9,612,644 | research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part  
2 | facility\_name=NBACC | street\_city=8300 Research Plaza Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=1282 | BSL-  
3\_m2=2564 | BSL-  
4\_m2=980 | total\_bsl\_m2=4826 | total\_personnel=143 | mil\_personnel=0 | civ\_personnel=143 | total\_scientist=23 | total\_engineer=30 | total\_technician=47 | total\_admin=43 | funding\_src=DHS | research\_funding=\$3,033,517 | dev\_funding=\$6,579,127 | testevel\_funding=\$0 | total\_funding=\$9,612,644 | research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism. | agents\_toxin=Overlap Select Agents ( Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part  
2 | facility\_name=NBACC | street\_city=8300 Research Plaza Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=1282 | BSL-  
3\_m2=2564 | BSL-  
4\_m2=980 | total\_bsl\_m2=4826 | total\_personnel=143 | mil\_personnel=0 | civ\_personnel=143 | total\_scientist=23 | total\_engineer=30 | total\_technician=47 | total\_admin=43 | funding\_src=DHS | research\_funding=\$3,033,517 | dev\_funding=\$6,579,127 | testevel\_funding=\$0 | total\_funding=\$9,612,644 | research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism. | agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
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3\_m2=2564 | BSL-  
4\_m2=980 | total\_bsl\_m2=4826 | total\_personnel=143 | mil\_personnel=0 | civ\_personnel=143 | total\_scientist=23 | total\_engineer=30 | total\_technician=47 | total\_admin=43 | funding\_src=DHS | research\_funding=\$3,033,517 | dev\_funding=\$6,579,127 | testevel\_funding=\$0 | total\_funding=\$9,612,644 | research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part  
2 | facility\_name=NBACC | street\_city=8300 Research Plaza Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=1282 | BSL-

3\_m2=2564|BSL-  
4\_m2=980|total\_bsl\_m2=4826|total\_personnel=143|mil\_personnel=0|civ\_personnel=143|total\_scientist=23|total\_engineer=30|total\_technician=47|total\_admin=43|funding\_src=DOJ|research\_funding=\$3,033,517|dev\_funding=\$6,579,127|testeval\_funding=\$0|total\_funding=\$9,612,644|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part  
2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1282|BSL-3\_m2=2564|BSL-  
4\_m2=980|total\_bsl\_m2=4826|total\_personnel=143|mil\_personnel=0|civ\_personnel=143|total\_scientist=23|total\_engineer=30|total\_technician=47|total\_admin=43|funding\_src=DOJ|research\_funding=\$3,033,517|dev\_funding=\$6,579,127|testeval\_funding=\$0|total\_funding=\$9,612,644|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.|agents\_toxin=Overlap Select Agents ( Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part  
2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1282|BSL-3\_m2=2564|BSL-  
4\_m2=980|total\_bsl\_m2=4826|total\_personnel=143|mil\_personnel=0|civ\_personnel=143|total\_scientist=23|total\_engineer=30|total\_technician=47|total\_admin=43|funding\_src=DOJ|research\_funding=\$3,033,517|dev\_funding=\$6,579,127|testeval\_funding=\$0|total\_funding=\$9,612,644|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part  
2|facility\_name=NBACC|street\_city=8300 Research Plaza Fort Detrick|state=MD|zipcode=21702|bsl2\_m2=1282|BSL-3\_m2=2564|BSL-  
4\_m2=980|total\_bsl\_m2=4826|total\_personnel=143|mil\_personnel=0|civ\_personnel=143|total\_scientist=23|total\_engineer=30|total\_technician=47|total\_admin=43|funding\_src=DOJ|research\_funding=\$3,033,517|dev\_funding=\$6,579,127|testeval\_funding=\$0|total\_funding=\$9,612,644|research\_obj=The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Plum Island Animal Disease Center (PIADC)|street\_city=40550 Route 25 Orient Point|state=NY|zipcode=11957|bsl2\_m2=292|BSL-3\_m2=18046|BSL-4\_m2=0|total\_bsl\_m2=18338|total\_personnel=385|mil\_personnel=0|civ\_personnel=385|total\_scientist=97|total\_engineer=2|total\_technician=21|total\_admin=265|funding\_src=DHS|research\_funding=\$4,000,000|dev\_funding=\$11,000,000|testeval\_funding=\$5,000,000|total\_funding=\$20,000,000|research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.|agents\_toxin=USDA Select Agents and Toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Plum Island Animal Disease Center (PIADC)|street\_city=40550 Route 25 Orient Point|state=NY|zipcode=11957|bsl2\_m2=292|BSL-3\_m2=18046|BSL-4\_m2=0|total\_bsl\_m2=18338|total\_personnel=385|mil\_personnel=0|civ\_personnel=385|total\_scientist=97|total\_engineer=2|total\_technician=21|total\_admin=265|funding\_src=DHS|research\_funding=\$4,000,000|dev\_funding=\$11,000,000|testeval\_funding=\$5,000,000|total\_funding=\$20,000,000|research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.|agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Plum Island Animal Disease Center (PIADC) | street\_city=40550 Route 25 Orient Point | state=NY | zipcode=11957 | bsl2\_m2=292 | BSL-3\_m2=18046 | BSL-4\_m2=0 | total\_bsl\_m2=18338 | total\_personnel=385 | mil\_personnel=0 | civ\_personnel=385 | total\_scientist=97 | total\_engineer=2 | total\_technician=21 | total\_admin=265 | funding\_src=USDA | research\_funding=\$4,000,000 | dev\_funding=\$11,000,000 | testeval\_funding=\$5,000,000 | total\_funding=\$20,000,000 | research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Plum Island Animal Disease Center (PIADC) | street\_city=40550 Route 25 Orient Point | state=NY | zipcode=11957 | bsl2\_m2=292 | BSL-3\_m2=18046 | BSL-4\_m2=0 | total\_bsl\_m2=18338 | total\_personnel=385 | mil\_personnel=0 | civ\_personnel=385 | total\_scientist=97 | total\_engineer=2 | total\_technician=21 | total\_admin=265 | funding\_src=USDA | research\_funding=\$4,000,000 | dev\_funding=\$11,000,000 | testeval\_funding=\$5,000,000 | total\_funding=\$20,000,000 | research\_obj=PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Air Force Research Laboratory (AFRL), Materials and Manufacturing Directorate | street\_city=2914 Hobson Way Wright-Patterson Air Force Base | state=OH | zipcode=45433 | bsl2\_m2=60 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=60 | total\_personnel=9 | mil\_personnel=2 | civ\_personnel=7 | total\_scientist=9 | total\_engineer=0 | total\_technician=0 | total\_admin=0 | funding\_src=DOD | research\_funding=\$400,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$400,000 | research\_obj=To functionalize natural polymers like silk, cotton, and wool using simple halamine chemistry and to test their antimicrobial properties against non-pathogenic microbial simulants. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Road Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=57 | mil\_personnel=0 | civ\_personnel=57 | total\_scientist=39 | total\_engineer=1 | total\_technician=9 | total\_admin=8 | funding\_src=DOD | research\_funding=\$120,000 | dev\_funding=\$0 | testeval\_funding=\$4,100,000 | total\_funding=\$4,220,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Road Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=57 | mil\_personnel=0 | civ\_personnel=57 | total\_scientist=39 | total\_engineer=1 | total\_technician=9 | total\_admin=8 | funding\_src=DOD | research\_funding=\$120,000 | dev\_funding=\$0 | testeval\_funding=\$4,100,000 | total\_funding=\$4,220,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response. | agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Road Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=57 | mil\_personnel=0 | civ\_personnel=57 | total\_scientist=39 | total\_engineer=1 | total\_technician=9 | total\_admin=8 | funding\_src=DOD | research\_funding=\$120,000 | dev\_funding=\$0 | testeval\_funding=\$4,100,000 | total\_funding=\$4,220,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

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Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Lothar Salomon Test Facility (LSTF) | street\_city=2029 Burns Road Dugway | state=UT | zipcode=84022-5006 | bsl2\_m2=744 | BSL-3\_m2=414 | BSL-4\_m2=0 | total\_bsl\_m2=1158 | total\_personnel=57 | mil\_personnel=0 | civ\_personnel=57 | total\_scientist=39 | total\_engineer=1 | total\_technician=9 | total\_admin=8 | funding\_src=DHS | research\_funding=\$120,000 | dev\_funding=\$0 | testeval\_funding=\$4,100,000 | total\_funding=\$4,220,000 | research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response.

models to enhance countermeasure response. |agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Lothar Salomon Test Facility (LSTF) |street\_city=2029 Burns Road Dugway |state=UT |zipcode=84022-5006 |bsl2\_m2=744 |BSL-3\_m2=414 |BSL-4\_m2=0 |total\_bsl\_m2=1158 |total\_personnel=57 |mil\_personnel=0 |civ\_personnel=57 |total\_scientist=39 |total\_engineer=1 |total\_technician=9 |total\_admin=8 |funding\_src=DHS |research\_funding=\$120,000 |dev\_funding=\$0 |testeval\_funding=\$4,100,000 |total\_funding=\$4,220,000 |research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Lothar Salomon Test Facility (LSTF) |street\_city=2029 Burns Road Dugway |state=UT |zipcode=84022-5006 |bsl2\_m2=744 |BSL-3\_m2=414 |BSL-4\_m2=0 |total\_bsl\_m2=1158 |total\_personnel=57 |mil\_personnel=0 |civ\_personnel=57 |total\_scientist=39 |total\_engineer=1 |total\_technician=9 |total\_admin=8 |funding\_src=DOJ |research\_funding=\$120,000 |dev\_funding=\$0 |testeval\_funding=\$4,100,000 |total\_funding=\$4,220,000 |research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Lothar Salomon Test Facility (LSTF) |street\_city=2029 Burns Road Dugway |state=UT |zipcode=84022-5006 |bsl2\_m2=744 |BSL-3\_m2=414 |BSL-4\_m2=0 |total\_bsl\_m2=1158 |total\_personnel=57 |mil\_personnel=0 |civ\_personnel=57 |total\_scientist=39 |total\_engineer=1 |total\_technician=9 |total\_admin=8 |funding\_src=DOJ |research\_funding=\$120,000 |dev\_funding=\$0 |testeval\_funding=\$4,100,000 |total\_funding=\$4,220,000 |research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response. |agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Lothar Salomon Test Facility (LSTF) |street\_city=2029 Burns Road Dugway |state=UT |zipcode=84022-5006 |bsl2\_m2=744 |BSL-3\_m2=414 |BSL-4\_m2=0 |total\_bsl\_m2=1158 |total\_personnel=57 |mil\_personnel=0 |civ\_personnel=57 |total\_scientist=39 |total\_engineer=1 |total\_technician=9 |total\_admin=8 |funding\_src=DOJ |research\_funding=\$120,000 |dev\_funding=\$0 |testeval\_funding=\$4,100,000 |total\_funding=\$4,220,000 |research\_obj=Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Naval Medical Research Center (NMRC) |street\_city=8400 Research Plaza Fort Detrick |state=MD |zipcode=21702 |bsl2\_m2=2000 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2000 |total\_personnel=72 |mil\_personnel=13 |civ\_personnel=59 |total\_scientist=20 |total\_engineer=0 |total\_technician=44 |total\_admin=8 |funding\_src=DOD |research\_funding=\$4,100,100 |dev\_funding=\$0 |testeval\_funding=\$689,600 |total\_funding=\$4,789,700 |research\_obj=The goal of the program is the development of rapid and deployable detection assays to protect deployed troops. In a continued effort to have better prophylaxis measures, we are studying the potential use of multi-agent vaccines capable of conferring protection against multiple infectious diseases at once. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Naval Medical Research Center (NMRC) |street\_city=8400 Research Plaza Fort Detrick |state=MD |zipcode=21702 |bsl2\_m2=2000 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2000 |total\_personnel=72 |mil\_personnel=13 |civ\_personnel=59 |total\_scientist=20 |total\_engineer=0 |total\_technician=44 |total\_admin=8 |funding\_src=DOD |research\_funding=\$4,100,100 |dev\_funding=\$0 |testeval\_funding=\$689,600 |total\_funding=\$4,789,700 |research\_obj=The goal of the program is the development of rapid and deployable detection assays to protect deployed troops. In a continued effort to have better prophylaxis measures, we are studying the potential use of multi-agent vaccines capable of conferring protection against multiple infectious diseases at once. |agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Naval Research Laboratory (NRL) |street\_city=4555 Overlook Avenue SW District of Columbia |state=WA |zipcode=20375 |bsl2\_m2=2271 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2271 |total\_personnel=43 |mil\_personnel=0 |civ\_personnel=43 |total\_scientist=33 |total\_engineer=4 |total\_technician=6 |total\_admin=0 |funding\_src=DOD |research\_funding=\$7,205,000 |dev\_funding=\$3,379,000 |testeval\_funding=\$0 |total\_funding=\$10,584,000 |research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Naval Research Laboratory (NRL) |street\_city=4555 Overlook Avenue SW District of Columbia |state=WA |zipcode=20375 |bsl2\_m2=2271 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=2271 |total\_personnel=43 |mil\_personnel=0 |civ\_personnel=43 |total\_scientist=33 |total\_engineer=4 |total\_technician=6 |total\_admin=0 |funding\_src=DOD |research\_funding=\$7,205,000 |dev\_funding=\$3,379,000 |testeval\_funding=\$0 |total\_funding=\$10,584,000 |research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information. |agents\_toxin=HHS Select Agents and Toxins

chnician=6|total\_admin=0|funding\_src=DOD|research\_funding=\$7,205,000|dev\_funding=\$3,379,000|testeval\_funding=\$0|total\_funding=\$10,584,000|research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Naval Research Laboratory (NRL)|street\_city=4555 Overlook Avenue SW District of Columbia|state=WA|zipcode=20375|bsl2\_m2=2271|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=2271|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=33|total\_engineer=4|total\_technician=6|total\_admin=0|funding\_src=NIH|research\_funding=\$7,205,000|dev\_funding=\$3,379,000|testeval\_funding=\$0|total\_funding=\$10,584,000|research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Naval Research Laboratory (NRL)|street\_city=4555 Overlook Avenue SW District of Columbia|state=WA|zipcode=20375|bsl2\_m2=2271|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=2271|total\_personnel=43|mil\_personnel=0|civ\_personnel=43|total\_scientist=33|total\_engineer=4|total\_technician=6|total\_admin=0|funding\_src=NIH|research\_funding=\$7,205,000|dev\_funding=\$3,379,000|testeval\_funding=\$0|total\_funding=\$10,584,000|research\_obj=The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-4\_m2=0|total\_bsl\_m2=216|total\_personnel=173|mil\_personnel=0|civ\_personnel=173|total\_scientist=60|total\_engineer=50|total\_technician=16|total\_admin=47|funding\_src=DOD|research\_funding=\$2,187,000|dev\_funding=\$3,602,000|testeval\_funding=\$11,768,000|total\_funding=\$17,557,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-4\_m2=0|total\_bsl\_m2=216|total\_personnel=173|mil\_personnel=0|civ\_personnel=173|total\_scientist=60|total\_engineer=50|total\_technician=16|total\_admin=47|funding\_src=DOD|research\_funding=\$2,187,000|dev\_funding=\$3,602,000|testeval\_funding=\$11,768,000|total\_funding=\$17,557,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-4\_m2=0|total\_bsl\_m2=216|total\_personnel=173|mil\_personnel=0|civ\_personnel=173|total\_scientist=60|total\_engineer=50|total\_technician=16|total\_admin=47|funding\_src=Private Sector Companies|research\_funding=\$2,187,000|dev\_funding=\$3,602,000|testeval\_funding=\$11,768,000|total\_funding=\$17,557,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory|street\_city=6149 Welsh Road Dahlgren|state=VA|zipcode=22448-5162|bsl2\_m2=190|BSL-3\_m2=26|BSL-4\_m2=0|total\_bsl\_m2=216|total\_personnel=173|mil\_personnel=0|civ\_personnel=173|total\_scientist=60|total\_engineer=50|total\_technician=16|total\_admin=47|funding\_src=Private Sector Companies|research\_funding=\$2,187,000|dev\_funding=\$3,602,000|testeval\_funding=\$11,768,000|total\_funding=\$17,557,000|research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.|agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory | street\_city=6149 Welsh Road Dahlgren | state=VA | zipcode=22448-5162 | bsl2\_m2=190 | BSL-3\_m2=26 | BSL-4\_m2=0 | total\_bsl\_m2=216 | total\_personnel=173 | mil\_personnel=0 | civ\_personnel=173 | total\_scientist=60 | total\_engineer=50 | total\_technician=16 | total\_admin=47 | funding\_src=Private Sector  
Companies | research\_funding=\$2,187,000 | dev\_funding=\$3,602,000 | testevel\_funding=\$11,768,000 | total\_funding=\$17,557,000 | research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory | street\_city=6149 Welsh Road Dahlgren | state=VA | zipcode=22448-5162 | bsl2\_m2=190 | BSL-3\_m2=26 | BSL-4\_m2=0 | total\_bsl\_m2=216 | total\_personnel=173 | mil\_personnel=0 | civ\_personnel=173 | total\_scientist=60 | total\_engineer=50 | total\_technician=16 | total\_admin=47 | funding\_src=Other Governmental  
Agencies | research\_funding=\$2,187,000 | dev\_funding=\$3,602,000 | testevel\_funding=\$11,768,000 | total\_funding=\$17,557,000 | research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory | street\_city=6149 Welsh Road Dahlgren | state=VA | zipcode=22448-5162 | bsl2\_m2=190 | BSL-3\_m2=26 | BSL-4\_m2=0 | total\_bsl\_m2=216 | total\_personnel=173 | mil\_personnel=0 | civ\_personnel=173 | total\_scientist=60 | total\_engineer=50 | total\_technician=16 | total\_admin=47 | funding\_src=Other Governmental  
Agencies | research\_funding=\$2,187,000 | dev\_funding=\$3,602,000 | testevel\_funding=\$11,768,000 | total\_funding=\$17,557,000 | research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning. | agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory | street\_city=6149 Welsh Road Dahlgren | state=VA | zipcode=22448-5162 | bsl2\_m2=190 | BSL-3\_m2=26 | BSL-4\_m2=0 | total\_bsl\_m2=216 | total\_personnel=173 | mil\_personnel=0 | civ\_personnel=173 | total\_scientist=60 | total\_engineer=50 | total\_technician=16 | total\_admin=47 | funding\_src=Other Governmental  
Agencies | research\_funding=\$2,187,000 | dev\_funding=\$3,602,000 | testevel\_funding=\$11,768,000 | total\_funding=\$17,557,000 | research\_obj=Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Tyndall Air Force Base (AFB) -- 1 | street\_city=3000 Research Road Tyndall AFB | state=FL | zipcode=32403 | bsl2\_m2=55 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=55 | total\_personnel=6 | mil\_personnel=1 | civ\_personnel=5 | total\_scientist=4 | total\_engineer=0 | total\_technician=1 | total\_admin=1 | funding\_src=DHHS | research\_funding=\$800,000 | dev\_funding=\$0 | testevel\_funding=\$150,000 | total\_funding=\$950,000 | research\_obj=The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used for defensive purposes to characterize the size distribution of bioaerosol challenges as needed. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Tyndall Air Force Base (AFB) -- 2 | street\_city=139 Barnes Drive Tyndall AFB | state=FL | zipcode=32403 | bsl2\_m2=53 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=53 | total\_personnel=8 | mil\_personnel=1 | civ\_personnel=7 | total\_scientist=5 | total\_engineer=1 | total\_technician=1 | total\_admin=1 | funding\_src=DOD | research\_funding=\$150,000 | dev\_funding=\$280,000 | testevel\_funding=\$0 | total\_funding=\$430,000 | research\_obj=This facility supports the preparation and characterization of novel chemicals expected to exhibit antimicrobial properties. Materials are tested only against Biosafety Level 1 microorganisms at this facility. It also supports research into degradation products formed by exposure of samples of reactive materials to simulant chemical threat agents. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=U.S. Army Edgewood Chemical and Biological Center | street\_city=5183 Blackhawk Road Aberdeen Proving Ground | state=MD | zipcode=21010-5424 | bsl2\_m2=532 | BSL-3\_m2=177 | BSL-4\_m2=0 | total\_bsl\_m2=709 | total\_personnel=274 | mil\_personnel=0 | civ\_personnel=274 | total\_scientist=188 | total\_engineer=35 | total\_technician=21 | total\_admin=30 | funding\_src=DOD | research\_funding=\$1,427,000 | dev\_funding=\$19,871,000 | testevel\_funding=\$0 | total\_funding=\$21,298,000 | research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=U.S. Army Edgewood Chemical and Biological Center | street\_city=5183 Blackhawk Road Aberdeen Proving Ground | state=MD | zipcode=21010-5424 | bsl2\_m2=532 | BSL-3\_m2=177 | BSL-

4\_m2=0|total\_bsl\_m2=709|total\_personnel=274|mil\_personnel=0|civ\_personnel=274|total\_scientist=188|total\_engineer=35|total\_technician=21|total\_admin=30|funding\_src=DOD|research\_funding=\$1,427,000|dev\_funding=\$19,871,000|testeval\_funding=\$0|total\_funding=\$21,298,000|research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.|agents\_toxin=Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=U.S. Army Edgewood Chemical and Biological Center|street\_city=5183 Blackhawk Road Aberdeen Proving Ground|state=MD|zipcode=21010-5424|bsl2\_m2=532|BSL-3\_m2=177|BSL-

4\_m2=0|total\_bsl\_m2=709|total\_personnel=274|mil\_personnel=0|civ\_personnel=274|total\_scientist=188|total\_engineer=35|total\_technician=21|total\_admin=30|funding\_src=DOD|research\_funding=\$1,427,000|dev\_funding=\$19,871,000|testeval\_funding=\$0|total\_funding=\$21,298,000|research\_obj=Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)|street\_city=3100 Ricketts Point Road Aberdeen Proving Ground|state=MD|zipcode=21010-5400|bsl2\_m2=300|BSL-3\_m2=0|BSL-

4\_m2=0|total\_bsl\_m2=300|total\_personnel=9|mil\_personnel=0|civ\_personnel=9|total\_scientist=4|total\_engineer=0|total\_technician=5|total\_admin=0|funding\_src=DOD|research\_funding=\$940,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$940,00|research\_obj=The Institute's mission involves research on medical defenses against neurotoxins.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-

4\_m2=1186|total\_bsl\_m2=30351|total\_personnel=831|mil\_personnel=201|civ\_personnel=630|total\_scientist=263|total\_engineer=3|total\_technician=293|total\_admin=272|funding\_src=DOD|research\_funding=\$26,043,314|dev\_funding=\$39,342,622|testeval\_funding=\$854,892|total\_funding=\$66,240,828|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-

4\_m2=1186|total\_bsl\_m2=30351|total\_personnel=831|mil\_personnel=201|civ\_personnel=630|total\_scientist=263|total\_engineer=3|total\_technician=293|total\_admin=272|funding\_src=DOD|research\_funding=\$26,043,314|dev\_funding=\$39,342,622|testeval\_funding=\$854,892|total\_funding=\$66,240,828|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-

4\_m2=1186|total\_bsl\_m2=30351|total\_personnel=831|mil\_personnel=201|civ\_personnel=630|total\_scientist=263|total\_engineer=3|total\_technician=293|total\_admin=272|funding\_src=DOD|research\_funding=\$26,043,314|dev\_funding=\$39,342,622|testeval\_funding=\$854,892|total\_funding=\$66,240,828|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.|agents\_toxin=USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=USAMRIID|street\_city=1425 Porter Street Fort Detrick Frederick|state=MD|zipcode=21702-5011|bsl2\_m2=26026|BSL-3\_m2=3139|BSL-

4\_m2=1186|total\_bsl\_m2=30351|total\_personnel=831|mil\_personnel=201|civ\_personnel=630|total\_scientist=263|total\_engineer=3|total\_technician=293|total\_admin=272|funding\_src=DOD|research\_funding=\$26,043,314|dev\_funding=\$39,342,622|testeval\_funding=\$854,892|total\_funding=\$66,240,828|research\_obj=To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Brookhaven National Laboratory|street\_city=Biology Department Upton|state=NY|zipcode=11973-5000|bsl2\_m2=185|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=185|total\_personnel=13|mil\_personnel=0|civ\_personnel=13|total\_scientist=9|total\_engineer=0|total\_technician=4|total\_admin=0|funding\_src=DOD|research\_funding=\$4,130,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$4,130,000|research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that

is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Brookhaven National Laboratory |street\_city=Biology Department Upton |state=NY |zipcode=11973-5000 |bsl2\_m2=185 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=185 |total\_personnel=13 |mil\_personnel=0 |civ\_personnel=13 |total\_scientist=9 |total\_engineer=0 |total\_technician=4 |total\_admin=0 |funding\_src=DOD |research\_funding=\$4,130,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$4,130,000 |research\_obj=The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work. |agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Idaho National Laboratory |street\_city=2525 Fremont Ave. Falls Idaho |state=ID |zipcode=83415-2203 |bsl2\_m2=90 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=90 |total\_personnel=3 |mil\_personnel=0 |civ\_personnel=3 |total\_scientist=3 |total\_engineer=0 |total\_technician=0 |total\_admin=0 |funding\_src=EPA |research\_funding=\$0 |dev\_funding=\$0 |testeval\_funding=\$10,000 |total\_funding=\$10,000 |research\_obj=Viability testing subsequent to decontamination using *Bacillus atrophaeus* as a simulant for *B. anthracis*. No funded work with Brucella in 2012, but viable culture collection is maintained. |agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

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Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Lawrence Berkeley National Laboratory (LBNL) |street\_city=1 Cyclotron Road Berkeley |state=CA |zipcode=94720 |bsl2\_m2=130 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=130 |total\_personnel=6 |mil\_personnel=0 |civ\_personnel=6 |total\_scientist=3 |total\_engineer=0 |total\_technician=3 |total\_admin=0 |funding\_src=DHHS |research\_funding=\$200,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$200,000 |research\_obj=No biological defense work currently. We are writing manuscripts from previous biological defense work on strain typing in Francisella. We currently have no live isolates or DNA from any Select Agent. |agents\_toxin=None

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Lawrence Livermore National Laboratory (LLNL) |street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore |state=CA |zipcode=94550 |bsl2\_m2=1563 |BSL-3\_m2=60 |BSL-4\_m2=0 |total\_bsl\_m2=1623 |total\_personnel=106 |mil\_personnel=0 |civ\_personnel=106 |total\_scientist=56 |total\_engineer=8 |total\_technician=14 |total\_admin=28 |funding\_src=DOD |research\_funding=\$17,772,000 |dev\_funding=\$0 |testeval\_funding=\$3,054,000 |total\_funding=\$20,826,000 |research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch biological detection network put in place by the Department of Homeland Security (DHS). Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for various detection platforms. The development and screening of new nucleic acid-based assays are also core areas of expertise at LLNL. Testing and validation of new hardware components as well as training for the BioWatch network are other areas where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological incident. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine the geographic origin of an agent and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects to elucidate host-pathogen interactions. The goal of this research is to understand how microorganism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies specifically targeted to steps in the microorganism life cycle. LLNL is also involved in the search for new compounds as well as the development of novel vaccine strategies for disease prevention. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Lawrence Livermore National Laboratory (LLNL) |street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore |state=CA |zipcode=94550 |bsl2\_m2=1563 |BSL-3\_m2=60 |BSL-4\_m2=0 |total\_bsl\_m2=1623 |total\_personnel=106 |mil\_personnel=0 |civ\_personnel=106 |total\_scientist=56 |total\_engineer=8 |total\_technician=14 |total\_admin=28 |funding\_src=DOD |research\_funding=\$17,772,000 |dev\_funding=\$0 |testeval\_funding=\$3,054,000 |total\_funding=\$20,826,000 |research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch

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Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Lawrence Livermore National Laboratory (LLNL)|street\_city=Lawrence Livermore National Laboratory 7000 East Avenue  
Livermore|state=CA|zipcode=94550|bsl2\_m2=1563|BSL-3\_m2=60|BSL-

4\_m2=0|total\_bsl\_m2=1623|total\_personnel=106|mil\_personnel=0|civ\_personnel=106|total\_scientist=56|total\_engineer=8|total\_technician=14|total\_admin=28|funding\_src=DOD|research\_funding=\$17,772,000|dev\_funding=\$0|testeval\_funding=\$3,054,000|total\_funding=\$20,826,000|research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch biological detection network put in place by the Department of Homeland Security (DHS). Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for various detection platforms. The development and screening of new nucleic acid-based assays are also core areas of expertise at LLNL. Testing and validation of new hardware components as well as training for the BioWatch network are other areas where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological incident. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine the geographic origin of an agent and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects to elucidate host-pathogen interactions. The goal of this research is to understand how microorganism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies specifically targeted to steps in the microorganism life cycle. LLNL is also involved in the search for new compounds as well as the development of novel vaccine strategies for disease prevention.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Lawrence Livermore National Laboratory (LLNL)|street\_city=Lawrence Livermore National Laboratory 7000 East Avenue

Livermore|state=CA|zipcode=94550|bsl2\_m2=1563|BSL-3\_m2=60|BSL-  
4\_m2=0|total\_bsl\_m2=1623|total\_personnel=106|mil\_personnel=0|civ\_personnel=106|total\_scientist=56|total\_engineer=8|total\_technician=14|total\_admin=28|funding\_src=DHS|research\_funding=\$17,772,000|dev\_funding=\$0|testeval\_funding=\$3,054,000|total\_funding=\$20,826,000|research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch biological detection network put in place by the Department of Homeland Security (DHS). Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for various detection platforms. The development and screening of new nucleic acid-based assays are also core areas of expertise at LLNL. Testing and validation of new hardware components as well as training for the BioWatch network are other areas where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological incident. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine the geographic origin of an agent and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects to elucidate host-pathogen interactions. The goal of this research is to understand how microorganism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies specifically targeted to steps in the microorganism life cycle. LLNL is also involved in the search for new compounds as well as the development of novel vaccine strategies for disease prevention.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

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Livermore|state=CA|zipcode=94550|bsl2\_m2=1563|BSL-3\_m2=60|BSL-  
4\_m2=0|total\_bsl\_m2=1623|total\_personnel=106|mil\_personnel=0|civ\_personnel=106|total\_scientist=56|total\_engineer=8|total\_technician=14|total\_admin=28|funding\_src=DHS|research\_funding=\$17,772,000|dev\_funding=\$0|testeval\_funding=\$3,054,000|total\_funding=\$20,826,000|research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch biological detection network put in place by the Department of Homeland Security (DHS). Personnel from LLNL play an important

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4\_m2=0|total\_bsl\_m2=1623|total\_personnel=106|mil\_personnel=0|civ\_personnel=106|total\_scientist=56|total\_engineer=8|total\_technician=14|total\_admin=28|funding\_src=DHS|research\_funding=\$17,772,000|dev\_funding=\$0|testeval\_funding=\$3,054,000|total\_funding=\$20,826,000|research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch biological detection network put in place by the Department of Homeland Security (DHS). Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for various detection platforms. The development and screening of new nucleic acid-based assays are also core areas of expertise at LLNL. Testing and validation of new hardware components as well as training for the BioWatch network are other areas where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological incident. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine the geographic origin of an agent and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects to elucidate host-pathogen interactions. The goal of this research is to understand how microorganism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies specifically targeted to steps in the microorganism life cycle. LLNL is also involved in the search for new compounds as well as the development of novel vaccine strategies for disease prevention.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens) Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Lawrence Livermore National Laboratory (LLNL)|street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore|state=CA|zipcode=94550|bsl2\_m2=1563|BSL-3\_m2=60|BSL-  
4\_m2=0|total\_bsl\_m2=1623|total\_personnel=106|mil\_personnel=0|civ\_personnel=106|total\_scientist=56|total\_engineer=8|total\_technician=14|total\_admin=28|funding\_src=DOE|research\_funding=\$17,772,000|dev\_funding=\$0|testeval\_funding=\$3,054,000|total\_funding=\$20,826,000|research\_obj=LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch biological detection network put in place by the Department of Homeland Security (DHS). Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for various detection platforms. The development and screening of new nucleic acid-based assays are also core areas of expertise at LLNL. Testing and validation of new hardware components as well as training for the BioWatch network are other areas where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological incident. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine the geographic origin of an agent and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects to elucidate host-pathogen interactions. The goal of this research is to understand how microorganism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies specifically targeted to steps in the microorganism life cycle. LLNL is also involved in the search for new compounds as well as the development of novel vaccine strategies for disease prevention.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens) Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Lawrence Livermore National Laboratory (LLNL)|street\_city=Lawrence Livermore National Laboratory 7000 East Avenue Livermore|state=CA|zipcode=94550|bsl2\_m2=1563|BSL-3\_m2=60|BSL-  
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Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Los Alamos National Laboratory (LANL) |street\_city=Bikini Atoll Road SM-30 43-0001-01U Los Alamos |state=NM |zipcode=87545 |bsl2\_m2=498 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=498 |total\_personnel=34 |mil\_personnel=0 |civ\_personnel=34 |total\_scientist=20 |total\_engineer=1 |total\_technician=13 |total\_admin=0 |funding\_src=DOJ |research\_funding=\$12,633,000 |dev\_funding=\$1,600,000 |testeval\_funding=\$0 |total\_funding=\$14,233,000 |research\_obj=The biological defense research and development activities at the Los Alamos National Laboratory include pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection and analysis technologies. The main objectives for the studies are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; identify host molecular targets as potential therapeutic candidates; develop and validate assays to improve the ability to identify and characterize an incidence of bioterrorism against humans or agriculture; assess the feasibility of pathogen detection for environmental monitoring procedures with commercially available DNA extraction and purification techniques; and perform viral and bacterial pathogen sequencing for characterization, comparative genomic analysis, and metagenomic analysis. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

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4\_m2=0|total\_bsl\_m2=498|total\_personnel=34|mil\_personnel=0|civ\_personnel=34|total\_scientist=20|total\_engineer=1|total\_technician=13|total\_admin=0|funding\_src=DOJ|research\_funding=\$12,633,000|dev\_funding=\$1,600,000|testeval\_funding=\$0|total\_funding=\$14,233,000|research\_obj=The biological defense research and development activities at the Los Alamos National Laboratory include pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection and analysis technologies. The main objectives for the studies are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; identify host molecular targets as potential therapeutic candidates; develop and validate assays to improve the ability to identify and characterize an incidence of bioterrorism against humans or agriculture; assess the feasibility of pathogen detection for environmental monitoring procedures with commercially available DNA extraction and purification techniques; and perform viral and bacterial pathogen sequencing for characterization, comparative genomic analysis, and metagenomic analysis.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Pacific Northwest National Laboratory (PNNL)|street\_city=902 Battelle Boulevard Richland|state=WA|zipcode=99352|bsl2\_m2=679|BSL-3\_m2=0|BSL-

4\_m2=0|total\_bsl\_m2=679|total\_personnel=23|mil\_personnel=0|civ\_personnel=23|total\_scientist=21|total\_engineer=0|total\_technician=0|total\_admin=2|funding\_src=DOD|research\_funding=\$5,342,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,342,000|research\_obj=The primary objectives of the of the biodefense work being conducted at PNNL are: 1) develop analytical methods for identifying organic signatures of processing methods, procedures, and materials used in culturing and preparation of biological hazards, and to determine protein, carbohydrate and lipid changes in pathogens with variations in culture conditions and food source; 2) investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate those agents from non-pathogenic near neighbors; 3) investigate methods for detection and determination of food and waterborne pathogens and develop protocols to rapidly culture low yield organisms to enhance detection; 4) use mass spectrometric tools to elucidate functional changes in the proteomes of infectious bacteria under relevant growth conditions, host-derived cell-lines during infection, or with overexpressed pathogen secreted proteins; 5) evaluate next generation biodetection systems and approaches; and 6) study the basic infectious properties of Salmonella and Yersinia using a systems biology approach, then applying proteomics and metabolomics measurements to analyze those samples. In the case of Yersinia pestis, the bacteria are killed and prepared prior to being sent to PNNL for analysis.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Pacific Northwest National Laboratory (PNNL)|street\_city=902 Battelle Boulevard Richland|state=WA|zipcode=99352|bsl2\_m2=679|BSL-3\_m2=0|BSL-

4\_m2=0|total\_bsl\_m2=679|total\_personnel=23|mil\_personnel=0|civ\_personnel=23|total\_scientist=21|total\_engineer=0|total\_technician=0|total\_admin=2|funding\_src=DOD|research\_funding=\$5,342,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,342,000|research\_obj=The primary objectives of the of the biodefense work being conducted at PNNL are: 1) develop analytical methods for identifying organic signatures of processing methods, procedures, and materials used in culturing and preparation of biological hazards, and to determine protein, carbohydrate and lipid changes in pathogens with variations in culture conditions and food source; 2) investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate those agents from non-pathogenic near neighbors; 3) investigate methods for detection and determination of food and waterborne pathogens and develop protocols to rapidly culture low yield organisms to enhance detection; 4) use mass spectrometric tools to elucidate functional changes in the proteomes of infectious bacteria under relevant growth conditions, host-derived cell-lines during infection, or with overexpressed pathogen secreted proteins; 5) evaluate next generation biodetection systems and approaches; and 6) study the basic infectious properties of Salmonella and Yersinia using a systems biology approach, then applying proteomics and metabolomics measurements to analyze those samples. In the case of Yersinia pestis, the bacteria are killed and prepared prior to being sent to PNNL for analysis.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Pacific Northwest National Laboratory (PNNL)|street\_city=902 Battelle Boulevard Richland|state=WA|zipcode=99352|bsl2\_m2=679|BSL-3\_m2=0|BSL-

4\_m2=0|total\_bsl\_m2=679|total\_personnel=23|mil\_personnel=0|civ\_personnel=23|total\_scientist=21|total\_engineer=0|total\_technician=0|total\_admin=2|funding\_src=DHS|research\_funding=\$5,342,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,342,000|research\_obj=The primary objectives of the of the biodefense work being conducted at PNNL are: 1) develop analytical methods for identifying organic signatures of processing methods, procedures, and materials used in culturing and preparation of biological hazards, and to determine protein, carbohydrate and lipid changes in pathogens with variations in culture conditions and food source; 2) investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate those agents from non-pathogenic near neighbors; 3) investigate methods for detection and determination of food and waterborne pathogens and develop protocols to rapidly culture low yield organisms to enhance detection; 4) use mass spectrometric tools to elucidate functional changes in the proteomes of infectious bacteria under relevant growth conditions, host-derived cell-lines during infection, or with overexpressed pathogen secreted proteins; 5) evaluate next generation biodetection systems and approaches; and 6) study the basic infectious properties of Salmonella and Yersinia using a systems biology approach,

then applying proteomics and metabolomics measurements to analyze those samples. In the case of Yersinia pestis, the bacteria are killed and prepared prior to being sent to PNNL for analysis. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory (PNNL) |street\_city=902 Battelle Boulevard Richland |state=WA |zipcode=99352 |bsl2\_m2=679 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=679 |total\_personnel=23 |mil\_personnel=0 |civ\_personnel=23 |total\_scientist=21 |total\_engineer=0 |total\_technician=0 |total\_admin=2 |funding\_src=DHS |research\_funding=\$5,342,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,342,000 |research\_obj=The primary objectives of the of the biodefense work being conducted at PNNL are: 1) develop analytical methods for identifying organic signatures of processing methods, procedures, and materials used in culturing and preparation of biological hazards, and to determine protein, carbohydrate and lipid changes in pathogens with variations in culture conditions and food source; 2) investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate those agents from non-pathogenic near neighbors; 3) investigate methods for detection and determination of food and waterborne pathogens and develop protocols to rapidly culture low yield organisms to enhance detection; 4) use mass spectrometric tools to elucidate functional changes in the proteomes of infectious bacteria under relevant growth conditions, host-derived cell-lines during infection, or with overexpressed pathogen secreted proteins; 5) evaluate next generation biodetection systems and approaches; and 6) study the basic infectious properties of Salmonella and Yersinia using a systems biology approach, then applying proteomics and metabolomics measurements to analyze those samples. In the case of Yersinia pestis, the bacteria are killed and prepared prior to being sent to PNNL for analysis. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory (PNNL) |street\_city=902 Battelle Boulevard Richland |state=WA |zipcode=99352 |bsl2\_m2=679 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=679 |total\_personnel=23 |mil\_personnel=0 |civ\_personnel=23 |total\_scientist=21 |total\_engineer=0 |total\_technician=0 |total\_admin=2 |funding\_src=DHHS |research\_funding=\$5,342,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,342,000 |research\_obj=The primary objectives of the of the biodefense work being conducted at PNNL are: 1) develop analytical methods for identifying organic signatures of processing methods, procedures, and materials used in culturing and preparation of biological hazards, and to determine protein, carbohydrate and lipid changes in pathogens with variations in culture conditions and food source; 2) investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate those agents from non-pathogenic near neighbors; 3) investigate methods for detection and determination of food and waterborne pathogens and develop protocols to rapidly culture low yield organisms to enhance detection; 4) use mass spectrometric tools to elucidate functional changes in the proteomes of infectious bacteria under relevant growth conditions, host-derived cell-lines during infection, or with overexpressed pathogen secreted proteins; 5) evaluate next generation biodetection systems and approaches; and 6) study the basic infectious properties of Salmonella and Yersinia using a systems biology approach, then applying proteomics and metabolomics measurements to analyze those samples. In the case of Yersinia pestis, the bacteria are killed and prepared prior to being sent to PNNL for analysis. |agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Pacific Northwest National Laboratory (PNNL) |street\_city=902 Battelle Boulevard Richland |state=WA |zipcode=99352 |bsl2\_m2=679 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=679 |total\_personnel=23 |mil\_personnel=0 |civ\_personnel=23 |total\_scientist=21 |total\_engineer=0 |total\_technician=0 |total\_admin=2 |funding\_src=DHHS |research\_funding=\$5,342,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,342,000 |research\_obj=The primary objectives of the of the biodefense work being conducted at PNNL are: 1) develop analytical methods for identifying organic signatures of processing methods, procedures, and materials used in culturing and preparation of biological hazards, and to determine protein, carbohydrate and lipid changes in pathogens with variations in culture conditions and food source; 2) investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate those agents from non-pathogenic near neighbors; 3) investigate methods for detection and determination of food and waterborne pathogens and develop protocols to rapidly culture low yield organisms to enhance detection; 4) use mass spectrometric tools to elucidate functional changes in the proteomes of infectious bacteria under relevant growth conditions, host-derived cell-lines during infection, or with overexpressed pathogen secreted proteins; 5) evaluate next generation biodetection systems and approaches; and 6) study the basic infectious properties of Salmonella and Yersinia using a systems biology approach, then applying proteomics and metabolomics measurements to analyze those samples. In the case of Yersinia pestis, the bacteria are killed and prepared prior to being sent to PNNL for analysis. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories (SNL) |street\_city=P. O. Box 5800 Albuquerque |state=NM |zipcode=87185 |bsl2\_m2=1366 |BSL-3\_m2=0 |BSL-4\_m2=0 |total\_bsl\_m2=1366 |total\_personnel=109 |mil\_personnel=0 |civ\_personnel=109 |total\_scientist=77 |total\_engineer=3 |total\_technician=25 |total\_admin=4 |funding\_src=DOD |research\_funding=\$28,156,000 |dev\_funding=\$550,000 |testeval\_funding=\$751,000 |total\_funding=\$29,457,000 |research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology;

and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=DOD|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=DHS|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=DHS|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=DOE|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=DOE|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=DHHS|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,

000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=DHHS|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=Other Governmental Agencies|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Sandia National Laboratories (SNL)|street\_city=P. O. Box 5800 Albuquerque|state=NM|zipcode=87185|bsl2\_m2=1366|BSL-3\_m2=0|BSL-4\_m2=0|total\_bsl\_m2=1366|total\_personnel=109|mil\_personnel=0|civ\_personnel=109|total\_scientist=77|total\_engineer=3|total\_technician=25|total\_admin=4|funding\_src=Other Governmental

Agencies|research\_funding=\$28,156,000|dev\_funding=\$550,000|testeval\_funding=\$751,000|total\_funding=\$29,457,000|research\_obj=The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=CDC, National Center for Environmental Health (NCEH), Division of Laboratory Sciences (DLS)|street\_city=CDC DHHS 4770 Buford Highway Mail stop F-47 Atlanta|state=GA|zipcode=30341|bsl2\_m2=454|BSL-3\_m2=114|BSL-4\_m2=0|total\_bsl\_m2=568|total\_personnel=19|mil\_personnel=0|civ\_personnel=19|total\_scientist=19|total\_engineer=0|total\_technician=0|total\_admin=0|funding\_src=CDC|research\_funding=\$1,136,260|dev\_funding=\$450,000|testeval\_funding=\$911,284|total\_funding=\$2,497,544|research\_obj=The CDC National Center for Environmental Health, Division of Laboratory Science has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=DOD|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=DOD|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

otal\_technician=12|total\_admin=12|funding\_src=DOD|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

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Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=DHS|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

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Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-

4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=DHHS|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS  
Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-  
4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=DHHS|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Overlap  
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Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-  
4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=DHHS|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=USDA  
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Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-  
4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=DHHS|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Other pathogens or toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-  
4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=CDC|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS  
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Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=CDC, Office of Infectious Diseases (OID)|street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta|state=GA|zipcode=30333|bsl2\_m2=294|BSL-3\_m2=2331|BSL-  
4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=CDC|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Overlap  
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3\_m2=2331|BSL-  
4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=CDC|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Other pathogens or toxins  
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4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=USAID|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)  
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4\_m2=543|total\_bsl\_m2=3168|total\_personnel=184|mil\_personnel=4|civ\_personnel=180|total\_scientist=160|total\_engineer=0|total\_technician=12|total\_admin=12|funding\_src=USAID|research\_funding=\$12,780,426|dev\_funding=\$3,306,096|testeval\_funding=\$4,262,610|total\_funding=\$20,349,132|research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.|agents\_toxin=Other pathogens or toxins  
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Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=CDC, Office of Infectious Diseases (OID) | street\_city=Atlanta GA 1600 Clifton Road N.E. Atlanta | state=GA | zipcode=30333 | bsl2\_m2=294 | BSL-3\_m2=2331 | BSL-4\_m2=543 | total\_bsl\_m2=3168 | total\_personnel=184 | mil\_personnel=4 | civ\_personnel=180 | total\_scientist=160 | total\_engineer=0 | total\_technician=12 | total\_admin=12 | funding\_src=DoS | research\_funding=\$12,780,426 | dev\_funding=\$3,306,096 | testeval\_funding=\$4,262,610 | total\_funding=\$20,349,132 | research\_obj=Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins | street\_city=CDC DHHS 3150 Rampart Road Fort Collins | state=CO | zipcode=80521 | bsl2\_m2=66 | BSL-3\_m2=1142 | BSL-4\_m2=0 | total\_bsl\_m2=1208 | total\_personnel=53 | mil\_personnel=0 | civ\_personnel=53 | total\_scientist=44 | total\_engineer=0 | total\_technician=4 | total\_admin=5 | funding\_src=CDC | research\_funding=\$780,716 | dev\_funding=\$780,716 | testeval\_funding=\$745,580 | total\_funding=\$2,307,012 | research\_obj=CDC's Division of Vector Borne Diseases (DVBD) possesses many of the select agents that are on the Department of Health and Human Services and HHS/U.S. Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. | agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins | street\_city=CDC DHHS 3150 Rampart Road Fort Collins | state=CO | zipcode=80521 | bsl2\_m2=66 | BSL-3\_m2=1142 | BSL-4\_m2=0 | total\_bsl\_m2=1208 | total\_personnel=53 | mil\_personnel=0 | civ\_personnel=53 | total\_scientist=44 | total\_engineer=0 | total\_technician=4 | total\_admin=5 | funding\_src=CDC | research\_funding=\$780,716 | dev\_funding=\$780,716 | testeval\_funding=\$745,580 | total\_funding=\$2,307,012 | research\_obj=CDC's Division of Vector Borne Diseases (DVBD) possesses many of the select agents that are on the Department of Health and Human Services and HHS/U.S. Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. | agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins | street\_city=CDC DHHS 3150 Rampart Road Fort Collins | state=CO | zipcode=80521 | bsl2\_m2=66 | BSL-3\_m2=1142 | BSL-4\_m2=0 | total\_bsl\_m2=1208 | total\_personnel=53 | mil\_personnel=0 | civ\_personnel=53 | total\_scientist=44 | total\_engineer=0 | total\_technician=4 | total\_admin=5 | funding\_src=CDC | research\_funding=\$780,716 | dev\_funding=\$780,716 | testeval\_funding=\$745,580 | total\_funding=\$2,307,012 | research\_obj=CDC's Division of Vector Borne Diseases (DVBD) possesses many of the select agents that are on the Department of Health and Human Services and HHS/U.S. Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML) | street\_city=903 South 4th Street Hamilton | state=MT | zipcode=59840 | bsl2\_m2=1361 | BSL-3\_m2=407 | BSL-4\_m2=1145 | total\_bsl\_m2=2913 | total\_personnel=96 | mil\_personnel=0 | civ\_personnel=96 | total\_scientist=70 | total\_engineer=0 | total\_technician=23 | total\_admin=3 | funding\_src=DHHS | research\_funding=\$24,752,010 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$24,752,010 | research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination with viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and

rapid diagnostic assays in support of the civilian biodefense program.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)|street\_city=903 South 4th Street  
Hamilton|state=MT|zipcode=59840|bsl2\_m2=1361|BSL-3\_m2=407|BSL-  
4\_m2=1145|total\_bsl\_m2=2913|total\_personnel=96|mil\_personnel=0|civ\_personnel=96|total\_scientist=70|total\_engineer=0|total\_technician=23|total\_admin=3|funding\_src=DHHS|research\_funding=\$24,752,010|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$24,752,010|research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination with viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.|agents\_toxin=Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)|street\_city=903 South 4th Street  
Hamilton|state=MT|zipcode=59840|bsl2\_m2=1361|BSL-3\_m2=407|BSL-  
4\_m2=1145|total\_bsl\_m2=2913|total\_personnel=96|mil\_personnel=0|civ\_personnel=96|total\_scientist=70|total\_engineer=0|total\_technician=23|total\_admin=3|funding\_src=DHHS|research\_funding=\$24,752,010|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$24,752,010|research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination with viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.|agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)|street\_city=903 South 4th Street  
Hamilton|state=MT|zipcode=59840|bsl2\_m2=1361|BSL-3\_m2=407|BSL-  
4\_m2=1145|total\_bsl\_m2=2913|total\_personnel=96|mil\_personnel=0|civ\_personnel=96|total\_scientist=70|total\_engineer=0|total\_technician=23|total\_admin=3|funding\_src=DHHS|research\_funding=\$24,752,010|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$24,752,010|research\_obj=NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination with viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=NIH , C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases|street\_city=NIH DHHS 9000 Rockville Pike  
Bethesda|state=MD|zipcode=20892|bsl2\_m2=2493|BSL-3\_m2=1091|BSL-  
4\_m2=0|total\_bsl\_m2=3584|total\_personnel=120|mil\_personnel=0|civ\_personnel=120|total\_scientist=91|total\_engineer=0|total\_technician=24|total\_admin=5|funding\_src=DHHS|research\_funding=\$36,151,028|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$36,151,028|research\_obj=At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; and disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.|agents\_toxin=HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=NIH , C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases | street\_city=NIH DHHS 9000 Rockville Pike Bethesda | state=MD | zipcode=20892 | bsl2\_m2=2493 | BSL-3\_m2=1091 | BSL-4\_m2=0 | total\_bsl\_m2=3584 | total\_personnel=120 | mil\_personnel=0 | civ\_personnel=120 | total\_scientist=91 | total\_engineer=0 | total\_technician=24 | total\_admin=5 | funding\_src=DHHS | research\_funding=\$36,151,028 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$36,151,028 | research\_obj=At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; and disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. | agents\_toxin=Overlap Select Agents (Including NIAID Category A Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=NIH , C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases | street\_city=NIH DHHS 9000 Rockville Pike Bethesda | state=MD | zipcode=20892 | bsl2\_m2=2493 | BSL-3\_m2=1091 | BSL-4\_m2=0 | total\_bsl\_m2=3584 | total\_personnel=120 | mil\_personnel=0 | civ\_personnel=120 | total\_scientist=91 | total\_engineer=0 | total\_technician=24 | total\_admin=5 | funding\_src=DHHS | research\_funding=\$36,151,028 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$36,151,028 | research\_obj=At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; and disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. | agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=NIH , C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases | street\_city=NIH DHHS 9000 Rockville Pike Bethesda | state=MD | zipcode=20892 | bsl2\_m2=2493 | BSL-3\_m2=1091 | BSL-4\_m2=0 | total\_bsl\_m2=3584 | total\_personnel=120 | mil\_personnel=0 | civ\_personnel=120 | total\_scientist=91 | total\_engineer=0 | total\_technician=24 | total\_admin=5 | funding\_src=DHHS | research\_funding=\$36,151,028 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$36,151,028 | research\_obj=At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; and disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Dale and Betty Bumpers Vaccine Research Center | street\_city=NIH DHHS 9000 Rockville Pike Bethesda | state=MD | zipcode=20892 | bsl2\_m2=89 | BSL-3\_m2=0 | BSL-4\_m2=0 | total\_bsl\_m2=89 | total\_personnel=9 | mil\_personnel=0 | civ\_personnel=9 | total\_scientist=9 | total\_engineer=0 | total\_technician=0 | total\_admin=0 | funding\_src=DHHS | research\_funding=\$774,548 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$774,548 | research\_obj=The research focus of the Biodefense Research Laboratory, Vaccine Research Center (VRC) comprises three areas: 1. Development of vaccines and antivirals against hemorrhagic fever viruses such as Ebola, Marburg and Lassa 2. Studies of the mechanism of vaccine-induced immune protection 3. Basic research to understand the mechanism of virus replication (entry) and neutralization | agents\_toxin=Other pathogens or toxins

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Foreign Disease-Weed Science Research Unit | street\_city=1301 Ditto Avenue Fort Detrick | state=MD | zipcode=21702 | bsl2\_m2=105 | BSL-3\_m2=950 | BSL-4\_m2=0 | total\_bsl\_m2=1055 | total\_personnel=36 | mil\_personnel=0 | civ\_personnel=36 | total\_scientist=13 | total\_engineer=0 | total\_technician=16 | total\_admin=7 | funding\_src=U.S. Department of Agriculture | research\_funding=\$5,600,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,600,000 | research\_obj=The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical

phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides. |agents\_toxin=USDA PLANT PROTECTION AND QUARANTINE (PPQ) Select Agents and Toxins Other pathogens or toxins. The agents studied (ie., viruses, bacteria, and fungi) are foreign and/or emerging pathogens of plants that have an agricultural base. The majority of the agents\_studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that pose a threat to U.S. plant production systems, agricultural economy, and exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=National Animal Disease Center (NADC) |street\_city=1920 Dayton Avenue Ames |state=IA |zipcode=50010 |bsl2\_m2=4410 |BSL-3\_m2=2489 |BSL-4\_m2=0 |total\_bsl\_m2=6899 |total\_personnel=284 |mil\_personnel=0 |civ\_personnel=284 |total\_scientist=46 |total\_engineer=0 |total\_technician=84 |total\_admin=154 |funding\_src=U.S. Department of Agriculture |research\_funding=\$32,000,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$32,000,000 |research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=Overlap Select Agents (Including NIAID Category B Priority Pathogens)

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=National Animal Disease Center (NADC) |street\_city=1920 Dayton Avenue Ames |state=IA |zipcode=50010 |bsl2\_m2=4410 |BSL-3\_m2=2489 |BSL-4\_m2=0 |total\_bsl\_m2=6899 |total\_personnel=284 |mil\_personnel=0 |civ\_personnel=284 |total\_scientist=46 |total\_engineer=0 |total\_technician=84 |total\_admin=154 |funding\_src=U.S. Department of Agriculture |research\_funding=\$32,000,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$32,000,000 |research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=USDA Select Agents and Toxins

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=National Animal Disease Center (NADC) |street\_city=1920 Dayton Avenue Ames |state=IA |zipcode=50010 |bsl2\_m2=4410 |BSL-3\_m2=2489 |BSL-4\_m2=0 |total\_bsl\_m2=6899 |total\_personnel=284 |mil\_personnel=0 |civ\_personnel=284 |total\_scientist=46 |total\_engineer=0 |total\_technician=84 |total\_admin=154 |funding\_src=U.S. Department of Agriculture |research\_funding=\$32,000,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$32,000,000 |research\_obj=Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases. |agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to U.S. animal production systems, agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 |BWC\_CBM\_2013\_USA-Public.docx |April 15 2013 |CBM-Form-A, Part 2 |facility\_name=Southeast Poultry Research Laboratory |street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens |state=GA |zipcode=30605 |bsl2\_m2=1138 |BSL-3\_m2=624 |BSL-4\_m2=0 |total\_bsl\_m2=1762 |total\_personnel=40 |mil\_personnel=0 |civ\_personnel=40 |total\_scientist=11 |total\_engineer=0 |total\_technician=16 |total\_admin=13 |funding\_src=DOD |research\_funding=\$5,800,000 |dev\_funding=\$0 |testeval\_funding=\$0 |total\_funding=\$5,800,000 |research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control

strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=11|total\_engineer=0|total\_technician=16|total\_admin=13|funding\_src=DOD|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=11|total\_engineer=0|total\_technician=16|total\_admin=13|funding\_src=NIH|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=11|total\_engineer=0|total\_technician=16|total\_admin=13|funding\_src=NIH|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA\_Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Southeast Poultry Research Laboratory | street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens | state=GA | zipcode=30605 | bsl2\_m2=1138 | BSL-3\_m2=624 | BSL-4\_m2=0 | total\_bsl\_m2=1762 | total\_personnel=40 | mil\_personnel=0 | civ\_personnel=40 | total\_scientist=11 | total\_engineer=0 | total\_technician=16 | total\_admin=13 | funding\_src=Private Sector

Companies | research\_funding=\$5,800,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,800,000 | research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. | agents\_toxin=USDA Select Agents and Toxins

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Companies | research\_funding=\$5,800,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,800,000 | research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit. | agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

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Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA\_Public.docx | April 15 2013 | CBM-Form-A, Part 2 | facility\_name=Southeast Poultry Research Laboratory | street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens | state=GA | zipcode=30605 | bsl2\_m2=1138 | BSL-3\_m2=624 | BSL-4\_m2=0 | total\_bsl\_m2=1762 | total\_personnel=40 | mil\_personnel=0 | civ\_personnel=40 | total\_scientist=11 | total\_engineer=0 | total\_technician=16 | total\_admin=13 | funding\_src=USDA | research\_funding=\$5,800,000 | dev\_funding=\$0 | testeval\_funding=\$0 | total\_funding=\$5,800,000 | research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and

epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.

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Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road

Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=11|total\_engineer=0|total\_technician=16|total\_admin=13|funding\_src=Non-profit  
Associations|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=11|total\_engineer=0|total\_technician=16|total\_admin=13|funding\_src=CDC|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=USDA Select Agents and Toxins  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=11|total\_engineer=0|total\_technician=16|total\_admin=13|funding\_src=CDC|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=11|total\_engineer=0|total\_technician=16|total\_admin=13|funding\_src=U.S. Department of State|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and

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Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-A, Part 2|facility\_name=Southeast Poultry Research Laboratory|street\_city=Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens|state=GA|zipcode=30605|bsl2\_m2=1138|BSL-3\_m2=624|BSL-4\_m2=0|total\_bsl\_m2=1762|total\_personnel=40|mil\_personnel=0|civ\_personnel=40|total\_scientist=11|total\_engineer=0|total\_technician=16|total\_admin=13|funding\_src=U.S. Department of State|research\_funding=\$5,800,000|dev\_funding=\$0|testeval\_funding=\$0|total\_funding=\$5,800,000|research\_obj=Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.|agents\_toxin=Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-G|facility\_name=Barr Laboratories, Inc.|street\_city=2150 Perrowville Road Forest|state=VA|zipcode=24551|research\_focus=Adenovirus Type 4 and Type 7 Vaccine, Live, Oral|vaccine\_dev=Adenovirus Type 4 and Type 7 Vaccine, Live, Oral  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-G|facility\_name=Emergent BioDefense Operations Lansing, Inc.|street\_city=3500 N. Martin Luther King Jr. Blvd. Lansing|state=MI|zipcode=48906|research\_focus=Anthrax disease caused by Bacillus anthracis|vaccine\_dev=Anthrax Vaccine Adsorbed - BioThrax  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-G|facility\_name=MassBiologics|street\_city=University of Medical School Boston Massachusetts|state=MA|zipcode=02130|research\_focus=Diphtheria and tetanus caused by Corynebacterium diphtheriae and Clostridium tetani.|vaccine\_dev=Tetanus and Diphtheria Toxoids Adsorbed  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-G|facility\_name=MedImmune LLC|street\_city=One MedImmune Way Gaithersburg|state=MD|zipcode=20878|research\_focus=Influenza disease caused by influenza virus subtypes A and B.|vaccine\_dev=Influenza Vaccine Live, Intranasal - FluMist\_ Influenza Vaccine Live, Intranasal (FluMist(r) Quadrivalent)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-G|facility\_name=Merck Sharp & Dohme Corp.|street\_city=PO Box 1000 UG2D-68 West Point|state=PA|zipcode=19486-0004|research\_focus=Invasive disease caused by Haemophilus influenzae type b; infection caused by all known subtypes of hepatitis B virus; Hepatitis A disease; cervical, vulvar and vaginal cancer and certain other diseases caused by Human Papillomavirus (HPV) Types 6, 11, 16, and 18; Measles (rubeola); Mumps; diseases caused by Streptococcus pneumoniae; Rotavirus disease; Rubella (German measles) disease; Varicella disease caused by the varicella-zoster virus (VZV); Herpes zoster (shingles) disease.|vaccine\_dev=Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) - PedvaxHIB\_ Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) & Hepatitis B (Recombinant) Vaccine - COMVAX\_ Hepatitis A Vaccine, Inactivated - VAQTA\_ Hepatitis B Vaccine (Recombinant) - Recombivax HB\_ Human Papillomavirus Quadrivalent (Types 6, 11, 16, 18) Vaccine, Recombinant - Gardasil\_ Measles Virus Vaccine Live (ATTENUVAX(r))\_ Measles, Mumps, and Rubella Virus Vaccine, Live - M-M-R II\_ Measles, Mumps, Rubella and Varicella Virus Vaccine Live - ProQuad\_ Mumps Virus Vaccine Live, Jeryl Lynn Strain (Mumpsvax(r)) no longer being made \_ Pneumococcal Vaccine, Polyvalent - Pneumovax 23\_ Rotavirus Vaccine, Live, Oral, Pentavalent - RotaTeq\_ Rubella Virus Vaccine Live (MERUVAX(r) II)\_ Varicella Virus Vaccine Live - Varivax\_ Zoster Vaccine, Live, (Oka/Merck) - Zostavax  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-G|facility\_name=Organon Teknika Corporation LLC|street\_city=100 Rodolphe Street Building 1300 Durham|state=NC|zipcode=27712|research\_focus=For the prevention of tuberculosis|vaccine\_dev=BCG Live (BCG Vaccine)  
Jan 20, 2014 01:19:39|BWC\_CBM\_2013\_USA-Public.docx|April 15 2013|CBM-Form-G|facility\_name=Protein Sciences Corporation|street\_city=1000 Research Parkway Meriden Connecticut|state=|zipcode=06450-7159|research\_focus=For active immunization against disease caused by influenza virus subtypes A and B|vaccine\_dev=Influenza vaccine for subtypes A and B, (Flublock(r))

Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-G | facility\_name=Sanofi Pasteur Biologics Co.|street\_city=38 Sidney Street Cambridge|state=MA|zipcode=02139|research\_focus=Smallpox disease|vaccine\_dev=Smallpox (Vaccinia) Vaccine, Live - ACAM2000  
 Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-G | facility\_name=Sanofi Pasteur, Inc|street\_city=Discovery Drive Swiftwater|state=PA|zipcode=18370|research\_focus=Diphtheria caused by Corynebacterium diphtheriae; tetanus caused by Clostridium tetani; pertussis (whooping cough) caused by Bordetella pertussis; influenza disease caused by pandemic (H1N1) 2009 virus; influenza disease caused by H5N1 subtype; influenza disease caused by influenza virus subtypes A and B; invasive meningococcal disease caused by Neisseria meningitidis serogroups A, C, Y and W-135; meningitis and meningococcemia caused by N. meningitidis; and Yellow fever acute viral illness caused by a mosquito-borne flavivirus.|vaccine\_dev=Diphtheria & Tetanus Toxoids and Acellular Pertussis Vaccine Adsorbed - Tripedia; DTaP\_Diphtheria and Tetanus Toxoids Adsorbed USP (For Pediatric Use) (DT)\_Influenza Virus Vaccine (Fluzone(r), Fluzone High-Dose and Fluzone Intradermal)\_ Influenza Virus Vaccine, H5N1\_Meningococcal Polysaccharide (Serogroups A, C, Y and W-135) Diphtheria Toxoid Conjugate Vaccine - Menactra(r)\_ Meningococcal Polysaccharide Vaccine, Groups A, C, Y and W-135 Combined - Menomune(r)-A/C/Y/W-1351\_Tetanus and Diphtheria Toxoids Adsorbed for Adult Use - DECAVAC\_Tetanus Toxoid Adsorbed\_Tetanus Toxoid for Booster Use Only\_ Yellow Fever Vaccine - YF-VAX(r)  
 Jan 20, 2014 01:19:39 | BWC\_CBM\_2013\_USA-Public.docx | April 15 2013 | CBM-Form-G | facility\_name=Wyeth Pharmaceuticals Inc|street\_city=Pfizer Inc. 235 East 42nd Street New York|state=NY|zipcode=10017|research\_focus=Invasive disease caused by Streptococcus pneumoniae serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F and otitis media caused by Streptococcus pneumoniae serotypes 4, 6B, 9V, 14, 18C, 19F and 23F.|vaccine\_dev=Pneumococcal 13-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar 13

## Appendix B – Biorisk Oversight BSL Registry SQL Source Code

### BOBSL Registry DDL Source

```
/*
US CBM table capturing extracted data. The table fields that are in
CAPITAL letters indicate the derived, yet minimum columns (i.e., entity
attributes) that are relevant in developing a comprehensive Biorisk
oversight capability.
```

```
*/  
CREATE DATABASE `bioriskmgmt` /*!40100 DEFAULT CHARACTER SET utf8 */;
```

```
CREATE TABLE `biosafety_officer_directory` (
`BSO_ID` int(11) NOT NULL AUTO_INCREMENT,
`FNAME` varchar(60) DEFAULT 'No first name on record',
`LNAME` varchar(60) DEFAULT 'No last name on record',
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
PRIMARY KEY (`BSO_ID`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
```

```
CREATE TABLE `cbm_bioresearch_labs` (
`uscbm_form_ap1_id` int(11) NOT NULL AUTO_INCREMENT,
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`FSAP_COR_ID` varchar(100) DEFAULT 'No FSAP_COR_ID entry in FSAP_COR_REGISTRY',
`create_date` varchar(26) NOT NULL,
`uscbm_report` varchar(40) NOT NULL,
`uscbm_submit_date` varchar(26) NOT NULL,
`uscbm_form_section` varchar(26) NOT NULL,
`facility_name` varchar(180) NOT NULL,
`responsible_org` varchar(131) NOT NULL,
`street_city` varchar(180) NOT NULL,
`state` varchar(2) NOT NULL,
`zipcode` varchar(13) NOT NULL,
`funding_src` varchar(60) NOT NULL,
`lab_space` varchar(60) NOT NULL,
PRIMARY KEY (`uscbm_form_ap1_id`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
```

```
CREATE TABLE `cbm_bioresearch_programs` (
```

```

`uscbm_form_ap2_id` int(11) NOT NULL AUTO_INCREMENT,
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`FSAP_COR_ID` varchar(100) DEFAULT 'No FSAP_COR_ID entry in FSAP_COR_REGISTRY',
`create_date` varchar(26) NOT NULL,
`uscbm_report` varchar(40) NOT NULL,
`uscbm_submit_date` varchar(26) NOT NULL,
`uscbm_form_section` varchar(26) NOT NULL,
`facility_name` varchar(180) NOT NULL,
`street_city` varchar(180) NOT NULL,
`state` varchar(2) NOT NULL,
`zipcode` varchar(13) NOT NULL,
`bsl2_m2` int(11) DEFAULT NULL,
`bsl3_m2` int(11) DEFAULT NULL,
`BSL-4_m2` int(11) DEFAULT NULL,
`total_bsl_m2` int(11) DEFAULT NULL,
`total_personnel` int(11) DEFAULT NULL,
`mil_personnel` int(11) DEFAULT NULL,
`civ_personnel` int(11) DEFAULT NULL,
`total_scientist` int(11) DEFAULT NULL,
`total_engineer` int(11) DEFAULT NULL,
`total_technician` int(11) DEFAULT NULL,
`total_admin` int(11) DEFAULT NULL,
`funding_src` varchar(60) NOT NULL,
`research_funding` varchar(18) NOT NULL,
`dev_funding` varchar(18) NOT NULL,
`testeval_funding` varchar(18) NOT NULL,
`total_funding` varchar(18) NOT NULL,
`research_obj` text NOT NULL,
`agents_toxin` text NOT NULL,
`TOTAL_SRA HOLDER` int(11) DEFAULT NULL,
`BIORESEARCH_AUDIT_REQUESTING_AGENCY` varchar(60) DEFAULT 'No audit requesting agency reported',
`BIORESEARCH_AUDIT_REPORTING_AGENCY` varchar(60) DEFAULT 'No audit reporting agency reported reported',
`BIORESEARCH_INIT_AUDIT_START_DATE` varchar(60) DEFAULT 'No initial bioresearch program audit start date reported',
`BIORESEARCH_INIT_AUDIT_END_DATE` varchar(60) DEFAULT 'No initial bioresearch program audit end date reported',
`BIORESEARCH_LAST_AUDIT_START_DATE` varchar(60) DEFAULT 'No last bioresearch program audit start date reported',
`BIORESEARCH_LAST_AUDIT_END_DATE` varchar(60) DEFAULT 'No last bioresearch program audit end date reported',
`NUCLEIC_ACID_MOLECULE_EXPERIMENT` tinyint(1) DEFAULT NULL,
`HUMAN_GENE_TRANSER_EXPERIMENT` tinyint(1) DEFAULT NULL,
`COVERED_NON_EXEMPT_EXPERIMENT_CLASS_TYPE` varchar(60) DEFAULT 'Not reported',
`IBC_APPROVAL_REQUIRED` tinyint(1) DEFAULT NULL,
`IBC_APPROVAL_DATE` varchar(60) DEFAULT 'Not reported',
`IBC_NOTIFICATION_DATE` varchar(60) DEFAULT 'Not reported',
`IRB_APPROVAL_REQUIRED` tinyint(1) DEFAULT NULL,
`IRB_APPROVAL_DATE` varchar(60) DEFAULT 'Not reported',
`NIH_DIRECTOR_APPROVAL_REQUIRED` tinyint(1) DEFAULT NULL,
`NIH_DIRECTOR_APPROVAL_DATE` varchar(60) DEFAULT 'Not reported',
`NIH_OBA_APPROVAL_REQUIRED` tinyint(1) DEFAULT NULL,
`NIH_OBA_APPROVAL_DATE` varchar(60) DEFAULT 'Not reported',
`RAC REVIEW_COMPLETION_DATE` varchar(60) DEFAULT 'Not reported',
PRIMARY KEY (`uscbm_form_ap2_id`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

```

```

CREATE TABLE `cbm_vaccine_prod_centers` (
`uscbm_form_g_id` int(11) NOT NULL AUTO_INCREMENT,
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`FSAP_COR_ID` varchar(100) DEFAULT 'No FSAP_COR_ID entry in FSAP_COR_REGISTRY',
`create_date` varchar(26) NOT NULL,
`uscbm_report` varchar(40) NOT NULL,
`uscbm_submit_date` varchar(26) NOT NULL,
`uscbm_form_section` varchar(26) NOT NULL,
`facility_name` varchar(180) NOT NULL,
`street_city` varchar(180) NOT NULL,

```

```

`state` varchar(2) NOT NULL,
`zipcode` varchar(13) NOT NULL,
`research_focus` text NOT NULL,
`vaccine_dev` text NOT NULL,
PRIMARY KEY (`uscbm_form_g_id`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

CREATE TABLE `fed_agency_inspections_log` (
`FA_INSPECTION_LOG_ID` int(11) NOT NULL AUTO_INCREMENT,
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`SAR_INSPECTION_GRADE` varchar(60) DEFAULT 'No SAR inspection grade on record',
`SAR_INSPECTION_AGENCY` varchar(60) DEFAULT 'No SAR inspection agency on record',
`SAR_INSPECTION_REASON` varchar(60) DEFAULT 'No SAR inspection reason on record',
`SAR_INIT_INSPECTION_START_DATE` varchar(26) NOT NULL,
`SAR_INIT_INSPECTION_COMPLETION_DATE` varchar(26) NOT NULL,
`SAR_LAST_INSPECTION_COMPLETION_DATE` varchar(26) NOT NULL,
`FEDAGENCY_INSPECTOR_ID` varchar(60) DEFAULT 'No federal inspector ID on record',
`FED_INSPECTION_AGENCY` varchar(60) DEFAULT 'No federal inspection agency on record',
`FEDAGENCY_INSPECTION_GRADE` varchar(60) DEFAULT 'No federal inspection grade on record',
`FEDAGENCY_INSPECTION_REASON` varchar(60) DEFAULT 'No federal inspection reason on record',
`FEDAGENCY_INSPECTION_START_DATE` varchar(26) NOT NULL,
`FEDAGENCY_INSPECTION_COMPLETION_DATE` varchar(26) NOT NULL,
PRIMARY KEY (`FA_INSPECTION_LOG_ID`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

CREATE TABLE `fsap_cor_registry` (
`FSAP_COR_ID` int(11) NOT NULL AUTO_INCREMENT,
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`FSAP_COR_REGISTRATION_DATE` varchar(26) NOT NULL,
`FSAP_COR_GRANT_DATE` varchar(26) NOT NULL,
`FSAP_COR_RENEWAL_DATE` varchar(26) NOT NULL,
`FSAP_BMBL_COMPLIANCE_AUDIT_START_DATE` varchar(26) NOT NULL,
`FSAP_BMBL_COMPLIANCE_AUDIT_COMPLETION_DATE` varchar(26) NOT NULL,
`FSAP_BMBL_COMPLIANCE_AUDIT_GRADE` varchar(26) NOT NULL,
`FSAP_IMPORT_PERMIT_NUMBER` varchar(26) NOT NULL,
`FSAP_IMPORT_PERMIT_NUMBER_GRANT_DATE` varchar(26) NOT NULL,
`FSAP_IMPORT_PERMIT_NUMBER_EXPIRATION_DATE` varchar(26) NOT NULL,
`CORAPPFORM1_FILENAME` varchar(60) DEFAULT 'No CORAPPFORM1_FILENAME on record',
`SECINSPSECTRPT_FILENAME` varchar(60) DEFAULT 'No SECINSPSECTRPT_FILENAME on record',
`RISKMGTPLAN_FILENAME` varchar(60) DEFAULT 'No Risk Management filename on record',
`BIOSECPLAN_FILENAME` varchar(60) DEFAULT 'No Biosecurity filename on record',
`BIOSAFPLAN_FILENAME` varchar(60) DEFAULT 'No Biosafety Plan filename on record',
`INCIDRESPPLAN_FILENAME` varchar(60) DEFAULT 'No Incident Response Plan filename on record',
PRIMARY KEY (`FSAP_COR_ID`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

CREATE TABLE `institution_directory` (
`INST_ID` int(11) NOT NULL AUTO_INCREMENT,
`INST_NAME` varchar(60) DEFAULT 'No institution name on record',
`STREET_ADDRESS` varchar(60) DEFAULT 'No STREET ADDRESS provided',
`STATE` varchar(60) DEFAULT 'No STATE provided',
`ZIPCODE` varchar(60) DEFAULT 'No ZIPCODE provided',
`PI_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`IBC_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`RO_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
PRIMARY KEY (`INST_ID`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

CREATE TABLE `nihguidelines_compliance_registry` (
`NIHG_COMP_ID` int(11) NOT NULL AUTO_INCREMENT,
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`NIHG_COMPLIANCE_GRADE` varchar(26) NOT NULL,

```

```

`NIHG_COMPLIANCE_AUDIT_START_DATE` varchar(26) NOT NULL,
`NIHG_COMPLIANCE_AUDIT_COMPLETION_DATE` varchar(26) NOT NULL,
PRIMARY KEY ( `NIHG_COMP_ID` )
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

CREATE TABLE `principal_investigator_directory` (
`PI_ID` int(11) NOT NULL AUTO_INCREMENT,
`FNAME` varchar(60) DEFAULT 'No first name on record',
`LNAME` varchar(60) DEFAULT 'No last name on record',
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
PRIMARY KEY ( `PI_ID` )
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

CREATE TABLE `resp_official_directory` (
`RO_ID` int(11) NOT NULL AUTO_INCREMENT,
`FNAME` varchar(60) DEFAULT 'No first name on record',
`LNAME` varchar(60) DEFAULT 'No last name on record',
`ALTERNATE_RO` varchar(60) DEFAULT 'No federal inspection reason on record',
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
PRIMARY KEY ( `RO_ID` )
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

CREATE TABLE `usda_facility_directory` (
`USDA_FACILITY_ID` int(11) NOT NULL AUTO_INCREMENT,
`INST_ID` varchar(100) DEFAULT 'No INST_ID entry in INSTITUTION_DIRECTORY',
`LAST_AUDIT_DATE_ACCOUNTABILITY_RECORD` varchar(60) DEFAULT 'No federal inspection reason on record',
`LAST_AUDIT_DATE_NPI` varchar(26) NOT NULL,
PRIMARY KEY ( `USDA_FACILITY_ID` )
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
/*
***** Additional Biorisk oversight database tables are recommended to augment US CBM Report Submission
1) CREATE TABLE BIOAGENT_TRANSFER_REGISTRY – Augmentation of National Pathogen Inventory, but captures CDC/APHIS Form 2
2) CREATE TABLE FEDLAW_COMPLIANCE_REGISTRY
3) CREATE TABLE BIORESEARCH_FUNDING_SOURCES_REGISTRY -- to capture federal, public, AND private funding sources
4) CREATE TABLE EPA_LAB_CONSTRUCTION_BUILDING_PERMIT_REGISTRY
*****
*/

```

## CBM Bioresearch Lab Table – Data Extraction Entries

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory|Georgia State University|P. O. Box 4118 Atlanta|GA|30302-4118|U.S. Department of Defense (DOD)|BSL-4 60m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory|Georgia State University|P. O. Box 4118 Atlanta|GA|30302-4118|National Institutes of Health (NIH)|BSL-4 60m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory|Georgia State University|P. O. Box 4118 Atlanta|GA|30302-4118|Georgia Research Alliance|BSL-4 60m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology|Southwest Foundation for Biomedical Research|P.O. Box 760549 San Antonio|TX|78245-0549|National Institutes of Health (NIH)|BSL-4 114m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology|Southwest Foundation for Biomedical Research|P.O. Box 760549 San Antonio|TX|78245-0549|U.S. Department of Defense (DOD)|BSL-4 114m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology|Southwest Foundation for Biomedical Research|P.O. Box 760549 San Antonio|TX|78245-0549|U.S. Department of Homeland Security (DHS)|BSL-4 114m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology|Southwest Foundation for Biomedical Research|P.O. Box 760549 San Antonio|TX|78245-0549|Private Sector Companies|BSL-4 114m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology|Southwest Foundation for Biomedical Research|P.O. Box 760549 San Antonio|TX|78245-0549|Private Donors|BSL-4 114m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston |TX|77555|National Institutes of Health (NIH)|BSL-4 186m2 Shope lab BSL-4 1022m2 GNL lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston |TX|77555|U.S. Department of Homeland Security (DHS)|BSL-4 186m2 Shope lab BSL-4 1022m2 GNL lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston |TX|77555|U.S. Department of Defense (DOD)|BSL-4 186m2 Shope lab BSL-4 1022m2 GNL lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston |TX|77555|U.S. Department of Energy (DOE) Pharmaceutical Industry|BSL-4 186m2 Shope lab BSL-4 1022m2 GNL lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston |TX|77555|Private Foundations|BSL-4 186m2 Shope lab BSL-4 1022m2 GNL lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston |TX|77555|U.S. Department of Agriculture (USDA) Universities|BSL-4 186m2 Shope lab BSL-4 1022m2 GNL lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Plum Island Animal Disease Center (PIADC) Declared in accordance with Form A Part 2 (iii)|U.S. Department of Homeland Security Science and Technology Directorate Office of National Laboratories|DHS PIADC P.O. Box 848 Greenport|NY|11944-0848|U.S. Department of Homeland Security (DHS) Enhanced BSL3 2630m2 Enhanced BSL3 2961m2 Animal space Enhanced BSL3 12052m2 Support space

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Plum Island Animal Disease Center (PIADC) Declared in accordance with Form A Part 2 (iii)|U.S. Department of Homeland Security Science and Technology Directorate Office of National Laboratories|DHS PIADC P.O. Box 848 Greenport|NY|11944-0848|U.S. Department of Agriculture (USDA) Enhanced BSL3 2630m2 Enhanced BSL3 2961m2 Animal space Enhanced BSL3 12052m2 Support space

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Plum Island Animal Disease Center (PIADC) Declared in accordance with Form A Part 2 (iii)|U.S. Department of Homeland Security Science and Technology Directorate Office of National Laboratories|40550 Rte. 25 Orient Point|NY|11957|U.S. Department of Homeland Security (DHS) Enhanced BSL3 2630m2 Enhanced BSL3 2961m2 Animal space Enhanced BSL3 12052m2 Support space

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|Plum Island Animal Disease Center (PIADC) Declared in accordance with Form A Part 2 (iii)|U.S. Department of Homeland Security Science and Technology Directorate Office of National Laboratories|40550 Rte. 25 Orient Point|NY|11957|U.S. Department of Agriculture (USDA) Enhanced BSL3 2630m2 Enhanced BSL3 2961m2 Animal space Enhanced BSL3 12052m2 Support space

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) Declared in accordance with Form A Part 2 (iii)|U.S. Army Medical Research and Materiel Command|1425 Porter Street Fort Detrick Frederick|MD|21702-5011|U.S. Department of Defense (DOD)|BSL-4 1093m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) Declared in accordance with Form A Part 2 (iii)|Centers for Disease Control and Prevention U.S. Department of Health and Human Services|1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Department of Health and Human Services (HHS)|BSL-4 198m2 BSL-4 221m2 BSL-4 135m2 BSL-4 135m2 BSL-4 135m2 BSL-4 135m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) Declared in accordance with Form A Part 2 (iii)|Centers for Disease Control and Prevention U.S. Department of Health and Human Services|1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Department of Homeland Security (DHS)|BSL-4 198m2 BSL-4 221m2 BSL-4 135m2 BSL-4 135m2 BSL-4 135m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) Declared in accordance with Form A Part 2 (iii)|Centers for Disease Control and Prevention U.S. Department of Health and Human Services|1600 Clifton Road N.E. Atlanta|GA|30333|Other Governmental Agencies|BSL-4 198m2 BSL-4 221m2 BSL-4 135m2 BSL-4 135m2 BSL-4 135m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2011\_USA-Public.docx|April 15, 2011|CBM Form A Part 1 (i)|NIH Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML) Declared in accordance with Form A Part 2 (iii)|National Institutes of Health U.S.

Department of Health and Human Services|903 South 4th Street Hamilton|MT|59840|U.S. Department of Health and Human Services (HHS)|BSL-4 631m2 Total  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|National Biodefense Analysis and Countermeasures Center (NBACC) Declared in accordance with Form A Part 2 (iii)|U.S. Department of Homeland Security Science & Technology Directorate operated by Battelle National Biodefense Institute LLC|8300 Research Plaza Fort Detrick Frederick|MD|21702|U.S. Department of Homeland Security (DHS)|BSL-4 976m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) Declared in accordance with Form A Part 2 (iii)|U.S. Army Medical Research and Materiel Command|1425 Porter Street Fort Detrick Frederick|MD|21702-5011|U.S. Department of Defense (DOD) - wholly|BSL-4 1186m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) Declared in accordance with Form A Part 2 (iii)|Centers for Disease Control and Prevention|1600 Clifton Road N.E. Atlanta|GA|30333|Centers for Disease Control and Prevention (CDC)|BSL-4 136m2 BSL-4 271m2 BSL-4 136m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) Declared in accordance with Form A Part 2 (iii)|Centers for Disease Control and Prevention|1600 Clifton Road N.E. Atlanta|GA|30333|Internal (Laboratory Directed Research and Development LDRD)|BSL-4 136m2 BSL-4 271m2 BSL-4 136m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) Declared in accordance with Form A Part 2 (iii)|Centers for Disease Control and Prevention|1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Department of Health and Human Services (HHS)|BSL-4 136m2 BSL-4 271m2 BSL-4 136m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) Declared in accordance with Form A Part 2 (iii)|Centers for Disease Control and Prevention|1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Department of Homeland Security (DHS)|BSL-4 136m2 BSL-4 271m2 BSL-4 136m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) Declared in accordance with Form A Part 2 (iii)|Centers for Disease Control and Prevention|1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Environmental Protection Agency (EPA)|BSL-4 136m2 BSL-4 271m2 BSL-4 136m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|National Institutes of Health (NIH) NIAID-Rocky Mountain Laboratories Declared in accordance with Form A Part 2 (iii)|National Institutes of Health U.S. Department of Health and Human Services|903 South 4th Street Hamilton|MT|59840|U.S. Department of Health and Human Services (HHS)|BSL-4 631m2 Total  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston|TX|77555|Universities|BSL-4 186m2 Shope laboratory BSL-4 1022m2 GNL laboratory  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston|TX|77555|U.S. Department of Agriculture (USDA)|BSL-4 186m2 Shope laboratory BSL-4 1022m2 GNL laboratory  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston|TX|77555|Private Foundations|BSL-4 186m2 Shope laboratory BSL-4 1022m2 GNL laboratory  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston|TX|77555|Pharmaceutical Industry|BSL-4 186m2 Shope laboratory BSL-4 1022m2 GNL laboratory  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston|TX|77555|U.S. Department of Energy (DOE)|BSL-4 186m2 Shope laboratory BSL-4 1022m2 GNL laboratory  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston|TX|77555|U.S. Department of Defense (DOD) - partly U.S. Department of Homeland Security (DHS) |BSL-4 186m2 Shope laboratory BSL-4 1022m2 GNL laboratory  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch|301 University Blvd. Galveston|TX|77555|National Institutes of Health (NIH)|BSL-4 186m2 Shope laboratory BSL-4 1022m2 GNL laboratory  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology|Texas Biomedical Research Institute|P.O. Box 760549 San Antonio|TX|78245-0549|National Institutes of Health (NIH)|BSL-4 114m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology|Texas Biomedical Research Institute|P.O. Box 760549 San Antonio|TX|78245-0549|U.S. Department of Defense (DOD) - partly U.S. Department of Homeland Security (DHS) Private Sector Companies|BSL-4 114m2  
\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology|Texas Biomedical Research Institute|P.O. Box 760549 San Antonio|TX|78245-0549|Private Donors|BSL-4 114m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory|Georgia State University|P. O. Box 4118 Atlanta|GA|30302-4118|National Institutes of Health (NIH) |BSL-4 60m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory|Georgia State University|P. O. Box 4118 Atlanta|GA|30302-4118|Georgia Research Alliance |BSL-4 60m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory|Georgia State University|P. O. Box 4118 Atlanta|GA|30302-4118|Immunology Core Support |BSL-4 60m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2012\_USA-Public.docx|July 9, 2012|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory|Georgia State University|P. O. Box 4118 Atlanta|GA|30302-4118|Elizabeth R. Griffin Research Foundation |BSL-4 60m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|National Biodefense Analysis and Countermeasures Center (NBACC) [Declared in accordance with Form A Part 2 (iii)]|U.S. Department of Homeland Security Science & Technology Directorate (operated by Battelle National Biodefense Institute LLC)|8300 Research Plaza Fort Detrick |MD|21702|U.S. Department of Homeland Security (DHS) U.S. Department of Defense (DOD) - partly U.S. Department of Justice (DOJ) |BSL-4 980m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) [Declared in accordance with Form A Part 2 (iii)]|U.S. Army Medical Research and Materiel Command |1425 Porter Street Fort Detrick Frederick |MD|21702-5011|U.S. Department of Defense (DOD) |BSL-4 1186m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) [Declared in accordance with Form A Part 2 (iii)] |Centers for Disease Control and Prevention Department of Health and Human Services |1600 Clifton Road N.E. Atlanta|GA|30333|Centers for Disease Control and Prevention (CDC) |BSL-4 136m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) [Declared in accordance with Form A Part 2 (iii)] |Centers for Disease Control and Prevention Department of Health and Human Services |1600 Clifton Road N.E. Atlanta|GA|30333|Centers for Disease Control and Prevention (CDC) |BSL-4 271m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) [Declared in accordance with Form A Part 2 (iii)] |Centers for Disease Control and Prevention Department of Health and Human Services |1600 Clifton Road N.E. Atlanta|GA|30333|Centers for Disease Control and Prevention (CDC) |BSL-4 136m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) [Declared in accordance with Form A Part 2 (iii)] |Centers for Disease Control and Prevention Department of Health and Human Services |1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Department of Health and Human Services (HHS) |BSL-4 Lab 136m2 BSL-4 Lab 271m2 BSL-4 Lab 136m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) [Declared in accordance with Form A Part 2 (iii)] |Centers for Disease Control and Prevention Department of Health and Human Services |1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Department of Homeland Security (DHS) |BSL-4 Lab 136m2 BSL-4 Lab 271m2 BSL-4 Lab 136m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) [Declared in accordance with Form A Part 2 (iii)] |Centers for Disease Control and Prevention Department of Health and Human Services |1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Agency For International Development (USAID) U.S. Department of State (DoS) |BSL-4 Lab 136m2 BSL-4 Lab 271m2 BSL-4 Lab 136m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|CDC Office of Infectious Diseases (OID) [Declared in accordance with Form A Part 2 (iii)] |Centers for Disease Control and Prevention Department of Health and Human Services |1600 Clifton Road N.E. Atlanta|GA|30333|U.S. Department of Defense (DOD) - partly |BSL-4 Lab 136m2 BSL-4 Lab 271m2 BSL-4 Lab 136m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|National Institutes of Health (NIH) NIAID-Rocky Mountain Laboratories [Declared in accordance with Form A Part 2 (iii)] |National Institutes of Health U.S. Department of Health and Human Services |903 South 4th Street Hamilton|MT|59840|U.S. Department of Health and Human Services (HHS) |BSL-4 1145m2

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch |301 University Blvd. Galveston|TX|77555|Universities |BSL-4 Lab 186m2 Shope Lab BSL-4 Lab 1022m2 GNL Lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch |301 University Blvd. Galveston|TX|77555|U.S. Department of Agriculture (USDA) |BSL-4 Lab 186m2 Shope Lab BSL-4 Lab 1022m2 GNL Lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch |301 University Blvd. Galveston|TX|77555|Private Foundations |BSL-4 Lab 186m2 Shope Lab BSL-4 Lab 1022m2 GNL Lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch |301 University Blvd. Galveston|TX|77555|Pharmaceutical Industry |BSL-4 Lab 186m2 Shope Lab BSL-4 Lab 1022m2 GNL Lab

\N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch |301 University Blvd.  
 Galveston|TX|77555|U.S. Department of Energy (DOE)|BSL-4 Lab 186m2 Shope Lab BSL-4 Lab 1022m2 GNL Lab  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch |301 University Blvd.  
 Galveston|TX|77555|U.S. Department of Defense (DOD) - partly|BSL-4 Lab 186m2 Shope Lab BSL-4 Lab 1022m2 GNL Lab  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch |301 University Blvd.  
 Galveston|TX|77555|U.S. Department of Homeland Security (DHS)|BSL-4 Lab 186m2 Shope Lab BSL-4 Lab 1022m2 GNL Lab  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Galveston National Laboratory (GNL) Complex including Robert E. Shope Laboratory|The University of Texas Medical Branch |301 University Blvd.  
 Galveston|TX|77555|National Institutes of Health (NIH)|BSL-4 Lab 186m2 Shope Lab BSL-4 Lab 1022m2 GNL Lab  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology |Texas Biomedical Research Institute |P.O. Box 760549 San Antonio|TX|78245-0549|National Institutes of Health (NIH) |BSL-4 114m2  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology |Texas Biomedical Research Institute |P.O. Box 760549 San Antonio|TX|78245-0549|U.S. Department of Defense (DOD) - partly|BSL-4 114m2  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology |Texas Biomedical Research Institute |P.O. Box 760549 San Antonio|TX|78245-0549|U.S. Department of Homeland Security (DHS)|BSL-4 114m2  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology |Texas Biomedical Research Institute |P.O. Box 760549 San Antonio|TX|78245-0549|Private Sector Companies|BSL-4 114m2  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|The Betty Slick and Lewis J. Moorman Jr. Laboratory Complex Department of Virology and Immunology |Texas Biomedical Research Institute |P.O. Box 760549 San Antonio|TX|78245-0549|Private Donors|BSL-4 114m2  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory |Georgia State University |P. O. Box 4118 Atlanta|GA|30302-4118|National Institutes of Health (NIH) |BSL-4 60m2  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory |Georgia State University |P. O. Box 4118 Atlanta|GA|30302-4118|Georgia Research Alliance|BSL-4 60m2  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory |Georgia State University |P. O. Box 4118 Atlanta|GA|30302-4118|Immunology Core Support|BSL-4 60m2  
 \N|\N|\N|August 29, 2015|BWC\_CBM\_2013\_USA-Public.docx|April 15, 2013|CBM Form A Part 1 (i)|Viral Immunology Center - National B Virus Resource Laboratory |Georgia State University |P. O. Box 4118 Atlanta|GA|30302-4118|Elizabeth R. Griffin Research Foundation|BSL-4 60m2

## CBM Bioresearch Programs and Vaccine Prod Centers - SQL Source

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109 --- INSERT INTO cbm_vaccine_prod_centers SET create_date='Jan 20, 2014 01:19:39',
uscbm_report='BWC_CBM_2011_United_States.docx', uscbm_submit_date='April 15 2011', uscbm_form_section='CBM-Form-G',
facility_name='Emergent BioDefense Operations Lansing, Inc.',street_city='3500 N. Martin Luther King Jr. Blvd.
Lansing',state='MI',zipcode='48906',research_focus='Anthrax disease caused by Bacillus anthracis',vaccine_dev='Anthrax Vaccine Adsorbed - BioThrax';
110 --- INSERT INTO cbm_vaccine_prod_centers SET create_date='Jan 20, 2014 01:19:39',
uscbm_report='BWC_CBM_2011_United_States.docx', uscbm_submit_date='April 15 2011', uscbm_form_section='CBM-Form-G',
facility_name='MassBiologics',street_city='University of Medical School Boston
Massachusetts',state='MA',zipcode='02130',research_focus='Diphtheria and tetanus caused by Corynebacterium diphtheriae and Clostridium tetani.',vaccine_dev='Tetanus and Diphtheria Toxoids Adsorbed';
111 --- INSERT INTO cbm_vaccine_prod_centers SET create_date='Jan 20, 2014 01:19:39',
uscbm_report='BWC_CBM_2011_United_States.docx', uscbm_submit_date='April 15 2011', uscbm_form_section='CBM-Form-G',
facility_name='MedImmune LLC',street_city='One MedImmune Way
Gaithersburg',state='MD',zipcode='20878',research_focus='Influenza disease caused by pandemic (H1N1) 2009 virus. Influenza disease caused by influenza virus subtypes A and type B contained in the vaccine.',vaccine_dev='Influenza A (H1N1) 2009 Monovalent Vaccine_ Influenza Vaccine Live, Intranasal - FluMist';
112 --- INSERT INTO cbm_vaccine_prod_centers SET create_date='Jan 20, 2014 01:19:39',
uscbm_report='BWC_CBM_2011_United_States.docx', uscbm_submit_date='April 15 2011', uscbm_form_section='CBM-Form-G',
facility_name='Merck & Co, Inc (NJ)',street_city='One Merck Drive P.O. Box 100 Whitehouse Station',state='NJ',zipcode='08889-
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0100',research\_focus='Invasive disease caused by Haemophilus influenzae type b; infection caused by all known subtypes of hepatitis B virus; Hepatitis A disease; cervical, vulvar and vaginal cancer and certain other diseases caused by Human Papillomavirus (HPV) Types 6, 11, 16, and 18; Measles (rubeola); Mumps; diseases caused by Streptococcus pneumoniae; Rotavirus disease; Rubella (German measles) disease; Varicella disease caused by the varicella-zoster virus (VZV); Herpes zoster (shingles) disease.',vaccine\_dev='Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) - PedvaxHIB\_ Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) & Hepatitis B (Recombinant) Vaccine - COMVAX\_ Hepatitis A Vaccine, Inactivated - VAQTA\_ Hepatitis B Vaccine (Recombinant) - Recombivax HB\_ Human Papillomavirus Quadrivalent (Types 6, 11, 16, 18) Vaccine, Recombinant - Gardasil\_ Measles, Mumps, and Rubella Virus Vaccine, Live - M-M-R II\_ Measles, Mumps, Rubella and Varicella Virus Vaccine Live - ProQuad\_ Pneumococcal Vaccine, Polyvalent - Pneumovax 23\_ Rotavirus Vaccine, Live, Oral, Pentavalent - RotaTeq\_ Varicella Virus Vaccine Live - Varivax\_ Zoster Vaccine, Live, (Oka/Merck) - Zostavax';  
 113 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-G', facility\_name='Organon Teknika Corporation LLC',street\_city='100 Rodolphe Street Building 1300 Durham',state='NC',zipcode='27712',research\_focus='For the prevention of tuberculosis in persons not previously infected with M. tuberculosis who are at high risk for exposure; For the treatment and prophylaxis of carcinoma in situ (CIS) of the urinary bladder; For the prophylaxis of primary or recurrent state Ta and/or T1 papillary tumors following transurethral resection (TUR)',vaccine\_dev='BCG Live vaccine - BCG Vaccine; TICE BCG';  
 114 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-G', facility\_name='Sanofi Pasteur Biologics Co.',street\_city='38 Sidney Street Cambridge',state='MA',zipcode='02139',research\_focus='Smallpox disease',vaccine\_dev='Smallpox (Vaccinia) Vaccine, Live - ACAM2000';  
 115 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-G', facility\_name='Sanofi Pasteur, Inc',street\_city='Discovery Drive Swiftwater',state='PA',zipcode='18370',research\_focus='Diphtheria caused by Corynebacterium diphtheriae; tetanus caused by Clostridium tetani; pertussis diseases; influenza disease caused by pandemic (H1N1) 2009 virus; influenza disease caused by H5N1 subtype; influenza disease caused by influenza virus subtypes A and type B; invasive meningococcal disease caused by Neisseria meningitidis serogroups A, C, Y and W-135; meningitis and meningococcemia caused by N. meningitidis; and Yellow fever acute viral illness caused by a mosquito-borne flavivirus.',vaccine\_dev='Diphtheria & Tetanus Toxoids and Acellular Pertussis Vaccine Adsorbed - Tripedia; DTaP\_ Diphtheria and Tetanus Toxoids Adsorbed\_ Influenza A (H1N1) 2009 Monovalent Vaccine\_ Influenza Virus Vaccine, H5N1 (for National Stockpile)\_ Influenza Virus Vaccine, Trivalent, Types A and B33 - Fluzone(r) and Fluzone High- Dose\_ Meningococcal Polysaccharide (Serogroups A, C, Y and W-135) Diphtheria Toxoid\_Conjugate Vaccine - Menactra(r)\_ Meningococcal Polysaccharide Vaccine, Groups A, C, Y and W-135 Combined - Menomune(r)-A/C/Y/W-1351\_ Tetanus and Diphtheria Toxoids Adsorbed\_ Tetanus and Diphtheria Toxoids Adsorbed for Adult Use - DECAVAC\_ Tetanus Toxoid Adsorbed\_ Tetanus Toxoid for Booster Use Only\_ Yellow Fever Vaccine - YF-VAX(r)';  
 116 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-G', facility\_name='Wyeth Pharmaceuticals Inc',street\_city='Pfizer Inc. 235 East 42nd Street New York',state='NY',zipcode='10017',research\_focus='Invasive disease caused by Streptococcus pneumoniae serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F and otitis media caused by Streptococcus pneumoniae serotypes 4, 6B, 9V, 14, 18C, 19F and 23F.',vaccine\_dev='Pneumococcal 13-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar\_13(tm)\_ Pneumococcal 7-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar(r)';  
 117 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='Barr Laboratories, Inc.',street\_city='2150 Perrowville Road Forest',state='VA',zipcode='24551',research\_focus='Adenovirus Type 4 and Type 7 Vaccine, Live, Oral',vaccine\_dev='Adenovirus Type 4 and Type 7 Vaccine, Live, Oral';  
 118 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='Emergent BioDefense Operations Lansing, Inc.',street\_city='3500 N. Martin Luther King Jr. Blvd. Lansing',state='MI',zipcode='48906',research\_focus='Anthrax disease caused by Bacillus anthracis',vaccine\_dev='Anthrax Vaccine Adsorbed - BioThrax';  
 119 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='MassBiologics',street\_city='University of Medical School Boston Massachusetts',state='MA',zipcode='02130',research\_focus='Diphtheria and tetanus caused by Corynebacterium diphtheriae and Clostridium tetani.',vaccine\_dev='Tetanus and Diphtheria Toxoids Adsorbed';  
 120 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='MedImmune LLC',street\_city='One MedImmune Way Gaithersburg',state='MD',zipcode='20878',research\_focus='Influenza disease caused by pandemic (H1N1) 2009 virus. Influenza disease caused by influenza virus subtypes A and type B contained in the vaccine.',vaccine\_dev='Influenza A (H1N1) 2009 Monovalent Vaccine\_ Influenza Vaccine Live, Intranasal - FluMist'.

121 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='Merck & Co, Inc (NJ)', street\_city='One Merck Drive P.O. Box 100 Whitehouse Station', state='NJ', zipcode='08889-0100', research\_focus='Invasive disease caused by Haemophilus influenzae type b; infection caused by all known subtypes of hepatitis B virus; Hepatitis A disease; cervical, vulvar and vaginal cancer and certain other diseases caused by Human Papillomavirus (HPV) Types 6, 11, 16, and 18; Measles (rubeola); Mumps; diseases caused by Streptococcus pneumoniae; Rotavirus disease; Rubella (German measles) disease; Varicella disease caused by the varicella-zoster virus (VZV); Herpes zoster (shingles) disease.', vaccine\_dev='Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) - PedvaxHIB\_ Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) & Hepatitis B (Recombinant) Vaccine - COMVAX\_ Hepatitis A Vaccine, Inactivated - VAQTA\_ Hepatitis B Vaccine (Recombinant) - Recombivax HB\_ Human Papillomavirus Quadrivalent (Types 6, 11, 16, 18) Vaccine, Recombinant - Gardasil\_ Measles, Mumps, and Rubella Virus Vaccine, Live - M-M-R II\_ Measles, Mumps, Rubella and Varicella Virus Vaccine Live - ProQuad\_ Pneumococcal Vaccine, Polysaccharide - Pneumovax 23\_ Rotavirus Vaccine, Live, Oral, Pentavalent - RotaTeq\_ Varicella Virus Vaccine Live - Varivax\_ Zoster Vaccine, Live, (Oka/Merck) - Zostavax';

122 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='Organon Teknika Corporation LLC', street\_city='100 Rodolphe Street Building 1300 Durham', state='NC', zipcode='27712', research\_focus='For the prevention of tuberculosis in persons not previously infected with M. tuberculosis who are at high risk for exposure; For the treatment and prophylaxis of carcinoma in situ (CIS) of the urinary bladder; For the prophylaxis of primary or recurrent state Ta and/or T1 papillary tumors following transurethral resection (TUR).', vaccine\_dev='BCG Live vaccine - BCG Vaccine; TICE BCG';

123 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='Sanofi Pasteur Biologics Co.', street\_city='38 Sidney Street Cambridge', state='MA', zipcode='02139', research\_focus='Smallpox disease', vaccine\_dev='Smallpox (Vaccinia) Vaccine, Live - ACAM2000';

124 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='Sanofi Pasteur, Inc', street\_city='Discovery Drive Swiftwater', state='PA', zipcode='18370', research\_focus='Diphtheria caused by Corynebacterium diphtheriae; tetanus caused by Clostridium tetani; pertussis diseases; influenza disease caused by pandemic (H1N1) 2009 virus; influenza disease caused by H5N1 subtype; influenza disease caused by influenza virus subtypes A and type B; invasive meningococcal disease caused by Neisseria meningitidis serogroups A, C, Y and W-135; meningitis and meningococcemia caused by N. meningitidis; and Yellow fever acute viral illness caused by a mosquito-borne flavivirus.', vaccine\_dev='Diphtheria & Tetanus Toxoids and Acellular Pertussis Vaccine Adsorbed - Tripedia; DTaP\_ Diphtheria and Tetanus Toxoids Adsorbed\_ Influenza A (H1N1) 2009 Monovalent Vaccine\_ Influenza Virus Vaccine, H5N1 (for National Stockpile)\_ Influenza Virus Vaccine, Trivalent, Types A and B33 - Fluzone(r) and Fluzone High-Dose\_ Meningococcal Polysaccharide (Serogroups A, C, Y and W-135) Diphtheria Toxoid-Conjugate Vaccine - Menactra(r)\_ Meningococcal Polysaccharide Vaccine, Groups A, C, Y and W-135 Combined - Menomune(r)-A/C/Y/W-1351\_ Tetanus and Diphtheria Toxoids Adsorbed\_ Tetanus and Diphtheria Toxoids Adsorbed for Adult Use - DECAVAC\_ Tetanus Toxoid Adsorbed\_ Tetanus Toxoid for Booster Use Only\_ Yellow Fever Vaccine - YF-VAX(r);

125 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-G', facility\_name='Wyeth Pharmaceuticals Inc', street\_city='Pfizer Inc. 235 East 42nd Street New York', state='NY', zipcode='10017', research\_focus='Invasive disease caused by Streptococcus pneumoniae serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F.', vaccine\_dev='Pneumococcal 13-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar 13\_ Pneumococcal 7-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar';

126 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='Barr Laboratories, Inc.', street\_city='2150 Perrowville Road Forest', state='VA', zipcode='24551', research\_focus='Adenovirus Type 4 and Type 7 Vaccine, Live, Oral', vaccine\_dev='Adenovirus Type 4 and Type 7 Vaccine, Live, Oral';

127 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='Emergent BioDefense Operations Lansing, Inc.', street\_city='3500 N. Martin Luther King Jr. Blvd. Lansing', state='MI', zipcode='48906', research\_focus='Anthrax disease caused by Bacillus anthracis', vaccine\_dev='Anthrax Vaccine Adsorbed - BioThrax';

128 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='MassBiologics', street\_city='University of Medical School Boston Massachusetts', state='MA', zipcode='02130', research\_focus='Diphtheria and tetanus caused by Corynebacterium diphtheriae and Clostridium tetani.', vaccine\_dev='Tetanus and Diphtheria Toxoids Adsorbed';

129 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='MedImmune LLC', street\_city='One MedImmune Way Gaithersburg', state='MD', zipcode='20878', research\_focus='Influenza disease caused by influenza virus subtypes A and B.', vaccine\_dev='Influenza Vaccine Live, Intranasal - FluMist\_ Influenza Vaccine Live, Intranasal (FluMist(r) Quadrivalent)';

130 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='Merck Sharp & Dohme Corp.', street\_city='PO Box 1000 UG2D-68 West Point', state='PA', zipcode='19486-0004', research\_focus='Invasive disease caused by Haemophilus influenzae type b; infection caused by all known subtypes of hepatitis B virus; Hepatitis A disease; cervical, vulvar and vaginal cancer and certain other diseases caused by Human Papillomavirus (HPV) Types 6, 11, 16, and 18; Measles (rubeola); Mumps; diseases caused by Streptococcus pneumoniae; Rotavirus disease; Rubella (German measles) disease; Varicella disease caused by the varicella-zoster virus (VZV); Herpes zoster (shingles) disease.', vaccine\_dev='Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) - PedvaxHIB\_Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) & Hepatitis B (Recombinant) Vaccine - COMVAX\_Hepatitis A Vaccine, Inactivated - VAQTA\_Hepatitis B Vaccine (Recombinant) - Recombivax HB\_Human Papillomavirus Quadrivalent (Types 6, 11, 16, 18) Vaccine, Recombinant - Gardasil\_Measles Virus Vaccine Live (ATTENUVAX(r))\_Measles, Mumps, and Rubella Virus Vaccine, Live - M-M-R II\_Measles, Mumps, Rubella and Varicella Virus Vaccine Live - ProQuad\_Mumps Virus Vaccine Live, Jeryl Lynn Strain (Mumpsvax(r)) no longer being made\_Pneumococcal Vaccine, Polysaccharide - Pneumovax 23\_Rotavirus Vaccine, Live, Oral, Pentavalent - RotaTeq\_Rubella Virus Vaccine Live (MERUVAX(r) II)\_Varicella Virus Vaccine Live - Varivax\_Zoster Vaccine, Live, (Oka/Merck) - Zostavax';

131 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='Organon Teknika Corporation LLC', street\_city='100 Rodolphe Street Building 1300 Durham', state='NC', zipcode='27712', research\_focus='For the prevention of tuberculosis', vaccine\_dev='BCG Live (BCG Vaccine)';

132 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='Protein Sciences Corporation', street\_city='1000 Research Parkway Meriden Connecticut', state='', zipcode='06450-7159', research\_focus='For active immunization against disease caused by influenza virus subtypes A and B', vaccine\_dev='Influenza vaccine for subtypes A and B, (Flublock(r))';

133 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='Sanofi Pasteur Biologics Co.', street\_city='38 Sidney Street Cambridge', state='MA', zipcode='02139', research\_focus='Smallpox disease', vaccine\_dev='Smallpox (Vaccinia) Vaccine, Live - ACAM2000';

134 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='Sanofi Pasteur, Inc.', street\_city='Discovery Drive Swiftwater', state='PA', zipcode='18370', research\_focus='Diphtheria caused by Corynebacterium diphtheriae; tetanus caused by Clostridium tetani; pertussis (whooping cough) caused by Bordetella pertussis; influenza disease caused by pandemic (H1N1) 2009 virus; influenza disease caused by H5N1 subtype; influenza disease caused by influenza virus subtypes A and B; invasive meningococcal disease caused by Neisseria meningitidis serogroups A, C, Y and W-135; meningitis and meningococcemia caused by N. meningitidis; and Yellow fever acute viral illness caused by a mosquito-borne flavivirus.', vaccine\_dev='Diphtheria & Tetanus Toxoids and Acellular Pertussis Vaccine Adsorbed - Tripedia; DTaP\_Diphtheria and Tetanus Toxoids Adsorbed USP (For Pediatric Use) (DT)\_Influenza Virus Vaccine (Fluzone(r)), Fluzone High-Dose and Fluzone Intradermal\_Influenza Virus Vaccine, H5N1\_Meningococcal Polysaccharide (Serogroups A, C, Y and W-135) Diphtheria Toxoid Conjugate Vaccine - Menactra(r)\_Meningococcal Polysaccharide Vaccine, Groups A, C, Y and W-135 Combined - Menomune(r)-A/C/Y/W-135\_Tetanus and Diphtheria Toxoids Adsorbed for Adult Use - DECAVAC\_Tetanus Toxoid Adsorbed\_Tetanus Toxoid for Booster Use Only\_Yellow Fever Vaccine - YF-VAX(r)';

135 --- INSERT INTO cbm\_vaccine\_prod\_centers SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-G', facility\_name='Wyeth Pharmaceuticals Inc', street\_city='Pfizer Inc. 235 East 42nd Street New York', state='NY', zipcode='10017', research\_focus='Invasive disease caused by Streptococcus pneumoniae serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F and otitis media caused by Streptococcus pneumoniae serotypes 4, 6B, 9V, 14, 18C, 19F and 23F.', vaccine\_dev='Pneumococcal 13-valent Conjugate Vaccine (Diphtheria CRM197 Protein) - Prevnar 13';

136 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1032, BSL-3\_m2=3160, BSL-4\_m2=976, total\_bsl\_m2=5168, total\_personnel=167, mil\_personnel=0, civ\_personnel=167, total\_scientist=34, total\_engineer=16, total\_technician=73, total\_admin=44, funding\_src='DHS', research\_funding='\$11,036,000', dev\_funding='\$8,100,000', testevel\_funding='\$0', total\_funding='\$19,136,000', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism.', agents\_toxin='Other pathogens or toxins';

137 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Plum Island Animal Disease Center (PIADC)', street\_city='40550 Rte. 25 Orient  
 Point', state='NY', zipcode='11957', bsl2\_m2=234, BSL-3\_m2=17643, BSL-  
 4\_m2=0, total\_bsl\_m2=17877, total\_personnel=357, mil\_personnel=0, civ\_personnel=357, total\_scientist=92, total\_engineer=2, total\_te  
 chnician=13, total\_admin=250, funding\_src='DHS', research\_funding='\$4,000,000', dev\_funding='\$8,000,000', testeval\_funding='\$4,0  
 0,000', total\_funding='\$16,000,000', research\_obj='PIADC provides the only research and development and confirmatory diagnostic  
 capability for specific high-consequence, contagious, foreign animal diseases of livestock in the U.S. The focus of the research is on  
 pathogens that infect animals, not those that infect humans. Technologies researched and developed are vaccines, antivirals and  
 diagnostic methods. The facility also trains veterinarians to field diagnose high consequence foreign animal  
 disease.', agents\_toxin='USDA Select Agents and Toxins';  
 138 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Plum Island Animal Disease Center (PIADC)', street\_city='40550 Rte. 25 Orient  
 Point', state='NY', zipcode='11957', bsl2\_m2=234, BSL-3\_m2=17643, BSL-  
 4\_m2=0, total\_bsl\_m2=17877, total\_personnel=357, mil\_personnel=0, civ\_personnel=357, total\_scientist=92, total\_engineer=2, total\_te  
 chnician=13, total\_admin=250, funding\_src='USDA', research\_funding='\$4,000,000', dev\_funding='\$8,000,000', testeval\_funding='\$4,0  
 0,000', total\_funding='\$16,000,000', research\_obj='PIADC provides the only research and development and confirmatory diagnostic  
 capability for specific high-consequence, contagious, foreign animal diseases of livestock in the U.S. The focus of the research is on  
 pathogens that infect animals, not those that infect humans. Technologies researched and developed are vaccines, antivirals and  
 diagnostic methods. The facility also trains veterinarians to field diagnose high consequence foreign animal  
 disease.', agents\_toxin='USDA Select Agents and Toxins';  
 139 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Battelle Biomedical Research Center', street\_city='1425 State Route 142 West  
 Jefferson', state='OH', zipcode='43162', bsl2\_m2=1483, BSL-3\_m2=6549, BSL-  
 4\_m2=0, total\_bsl\_m2=8032, total\_personnel=185, mil\_personnel=0, civ\_personnel=185, total\_scientist=49, total\_engineer=1, total\_te  
 hnician=98, total\_admin=37, funding\_src='DOD', research\_funding='\$25,500,000', dev\_funding='\$25,500,000', testeval\_funding='\$1,30  
 0,000', total\_funding='\$52,300,000', research\_obj='Test and evaluation of medical countermeasures against biological  
 threat/terrorism agents.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
 140 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Battelle Biomedical Research Center', street\_city='1425 State Route 142 West  
 Jefferson', state='OH', zipcode='43162', bsl2\_m2=1483, BSL-3\_m2=6549, BSL-  
 4\_m2=0, total\_bsl\_m2=8032, total\_personnel=185, mil\_personnel=0, civ\_personnel=185, total\_scientist=49, total\_engineer=1, total\_te  
 hnician=98, total\_admin=37, funding\_src='DOD', research\_funding='\$25,500,000', dev\_funding='\$25,500,000', testeval\_funding='\$1,30  
 0,000', total\_funding='\$52,300,000', research\_obj='Test and evaluation of medical countermeasures against biological  
 threat/terrorism agents.', agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';  
 141 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Battelle Biomedical Research Center', street\_city='1425 State Route 142 West  
 Jefferson', state='OH', zipcode='43162', bsl2\_m2=1483, BSL-3\_m2=6549, BSL-  
 4\_m2=0, total\_bsl\_m2=8032, total\_personnel=185, mil\_personnel=0, civ\_personnel=185, total\_scientist=49, total\_engineer=1, total\_te  
 hnician=98, total\_admin=37, funding\_src='DOD', research\_funding='\$25,500,000', dev\_funding='\$25,500,000', testeval\_funding='\$1,30  
 0,000', total\_funding='\$52,300,000', research\_obj='Test and evaluation of medical countermeasures against biological  
 threat/terrorism agents.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority  
 Pathogens)';  
 142 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Battelle Biomedical Research Center', street\_city='1425 State Route 142 West  
 Jefferson', state='OH', zipcode='43162', bsl2\_m2=1483, BSL-3\_m2=6549, BSL-  
 4\_m2=0, total\_bsl\_m2=8032, total\_personnel=185, mil\_personnel=0, civ\_personnel=185, total\_scientist=49, total\_engineer=1, total\_te  
 hnician=98, total\_admin=37, funding\_src='DHS', research\_funding='\$25,500,000', dev\_funding='\$25,500,000', testeval\_funding='\$1,30  
 0,000', total\_funding='\$52,300,000', research\_obj='Test and evaluation of medical countermeasures against biological  
 threat/terrorism agents.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
 143 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Battelle Biomedical Research Center', street\_city='1425 State Route 142 West  
 Jefferson', state='OH', zipcode='43162', bsl2\_m2=1483, BSL-3\_m2=6549, BSL-  
 4\_m2=0, total\_bsl\_m2=8032, total\_personnel=185, mil\_personnel=0, civ\_personnel=185, total\_scientist=49, total\_engineer=1, total\_te  
 hnician=98, total\_admin=37, funding\_src='DHS', research\_funding='\$25,500,000', dev\_funding='\$25,500,000', testeval\_funding='\$1,30

0,000',total\_funding='\$52,300,000',research\_obj='Test and evaluation of medical countermeasures against biological threat/terrorism agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';  
144 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
Part 2', facility\_name='Battelle Biomedical Research Center',street\_city='1425 State Route 142 West  
Jefferson',state='OH',zipcode='43162',bsl2\_m2=1483,BSL-3\_m2=6549,BSL-  
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hnician=98,total\_admin=37,funding\_src='DHS',research\_funding='\$25,500,000',dev\_funding='\$25,500,000',testeval\_funding='\$1,30  
0,000',total\_funding='\$52,300,000',research\_obj='Test and evaluation of medical countermeasures against biological  
threat/terrorism agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority  
Pathogens)';  
145 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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4\_m2=0,total\_bsl\_m2=8032,total\_personnel=185,mil\_personnel=0,civ\_personnel=185,total\_scientist=49,total\_engineer=1,total\_tec  
hnician=98,total\_admin=37,funding\_src='DHHS',research\_funding='\$25,500,000',dev\_funding='\$25,500,000',testeval\_funding='\$1,3  
0,000',total\_funding='\$52,300,000',research\_obj='Test and evaluation of medical countermeasures against biological  
threat/terrorism agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
146 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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Jefferson',state='OH',zipcode='43162',bsl2\_m2=1483,BSL-3\_m2=6549,BSL-  
4\_m2=0,total\_bsl\_m2=8032,total\_personnel=185,mil\_personnel=0,civ\_personnel=185,total\_scientist=49,total\_engineer=1,total\_tec  
hnician=98,total\_admin=37,funding\_src='DHHS',research\_funding='\$25,500,000',dev\_funding='\$25,500,000',testeval\_funding='\$1,3  
0,000',total\_funding='\$52,300,000',research\_obj='Test and evaluation of medical countermeasures against biological  
threat/terrorism agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';  
147 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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Part 2', facility\_name='Battelle Biomedical Research Center',street\_city='1425 State Route 142 West  
Jefferson',state='OH',zipcode='43162',bsl2\_m2=1483,BSL-3\_m2=6549,BSL-  
4\_m2=0,total\_bsl\_m2=8032,total\_personnel=185,mil\_personnel=0,civ\_personnel=185,total\_scientist=49,total\_engineer=1,total\_tec  
hnician=98,total\_admin=37,funding\_src='DHHS',research\_funding='\$25,500,000',dev\_funding='\$25,500,000',testeval\_funding='\$1,3  
0,000',total\_funding='\$52,300,000',research\_obj='Test and evaluation of medical countermeasures against biological  
threat/terrorism agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority  
Pathogens)';  
148 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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Part 2', facility\_name='Battelle Biomedical Research Center',street\_city='1425 State Route 142 West  
Jefferson',state='OH',zipcode='43162',bsl2\_m2=1483,BSL-3\_m2=6549,BSL-  
4\_m2=0,total\_bsl\_m2=8032,total\_personnel=185,mil\_personnel=0,civ\_personnel=185,total\_scientist=49,total\_engineer=1,total\_tec  
hnician=98,total\_admin=37,funding\_src='EPA',research\_funding='\$25,500,000',dev\_funding='\$25,500,000',testeval\_funding='\$1,300  
,000',total\_funding='\$52,300,000',research\_obj='Test and evaluation of medical countermeasures against biological threat/terrorism  
agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
149 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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Jefferson',state='OH',zipcode='43162',bsl2\_m2=1483,BSL-3\_m2=6549,BSL-  
4\_m2=0,total\_bsl\_m2=8032,total\_personnel=185,mil\_personnel=0,civ\_personnel=185,total\_scientist=49,total\_engineer=1,total\_tec  
hnician=98,total\_admin=37,funding\_src='EPA',research\_funding='\$25,500,000',dev\_funding='\$25,500,000',testeval\_funding='\$1,300  
,000',total\_funding='\$52,300,000',research\_obj='Test and evaluation of medical countermeasures against biological threat/terrorism  
agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';  
150 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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Jefferson',state='OH',zipcode='43162',bsl2\_m2=1483,BSL-3\_m2=6549,BSL-  
4\_m2=0,total\_bsl\_m2=8032,total\_personnel=185,mil\_personnel=0,civ\_personnel=185,total\_scientist=49,total\_engineer=1,total\_tec  
hnician=98,total\_admin=37,funding\_src='EPA',research\_funding='\$25,500,000',dev\_funding='\$25,500,000',testeval\_funding='\$1,300  
,000',total\_funding='\$52,300,000',research\_obj='Test and evaluation of medical countermeasures against biological threat/terrorism  
agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)';  
151 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,

Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)',street\_city='2029 Burns Rd Dugway',state='UT',zipcode='84022-5006',bsl2\_m2=744,BSL-3\_m2=414,BSL-  
 4\_m2=0,total\_bsl\_m2=1158,total\_personnel=56,mil\_personnel=0,civ\_personnel=56,total\_scientist=36,total\_engineer=1,total\_technician=7,total\_admin=12,funding\_src='DOD',research\_funding='\$0',dev\_funding='\$0',testeval\_funding='\$3,770,000',total\_funding='\$3,770,000',research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';  
 152 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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 Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)',street\_city='2029 Burns Rd Dugway',state='UT',zipcode='84022-5006',bsl2\_m2=744,BSL-3\_m2=414,BSL-  
 4\_m2=0,total\_bsl\_m2=1158,total\_personnel=56,mil\_personnel=0,civ\_personnel=56,total\_scientist=36,total\_engineer=1,total\_technician=7,total\_admin=12,funding\_src='DOD',research\_funding='\$0',dev\_funding='\$0',testeval\_funding='\$3,770,000',total\_funding='\$3,770,000',research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';  
 153 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Naval Medical Research Center (NMRC)',street\_city='503 Robert Grant Avenue Silver Spring',state='MD',zipcode='20910',bsl2\_m2=100,BSL-3\_m2=35,BSL-  
 4\_m2=0,total\_bsl\_m2=135,total\_personnel=83,mil\_personnel=16,civ\_personnel=67,total\_scientist=23,total\_engineer=0,total\_technician=52,total\_admin=8,funding\_src='DOD',research\_funding='\$2,644,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,644,000',research\_obj='The goal of the program is the development of rapid diagnostic assays which would increase the rapid detection and diagnosis of infectious diseases.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
 154 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Naval Medical Research Center (NMRC)',street\_city='503 Robert Grant Avenue Silver Spring',state='MD',zipcode='20910',bsl2\_m2=100,BSL-3\_m2=35,BSL-  
 4\_m2=0,total\_bsl\_m2=135,total\_personnel=83,mil\_personnel=16,civ\_personnel=67,total\_scientist=23,total\_engineer=0,total\_technician=52,total\_admin=8,funding\_src='DOD',research\_funding='\$2,644,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,644,000',research\_obj='The goal of the program is the development of rapid diagnostic assays which would increase the rapid detection and diagnosis of infectious diseases.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';  
 155 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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 Part 2', facility\_name='Naval Research Laboratory (NRL)',street\_city='4555 Overlook Ave. SW District of Columbia',state='WA',zipcode='20375',bsl2\_m2=1305,BSL-3\_m2=0,BSL-  
 4\_m2=0,total\_bsl\_m2=1305,total\_personnel=61,mil\_personnel=2,civ\_personnel=59,total\_scientist=51,total\_engineer=6,total\_technician=4,total\_admin=0,funding\_src='DOD',research\_funding='\$5,938,000',dev\_funding='\$2,372,000',testeval\_funding='\$82,000',total\_funding='\$8,392,000',research\_obj='The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';  
 156 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Naval Research Laboratory (NRL)',street\_city='4555 Overlook Ave. SW District of Columbia',state='WA',zipcode='20375',bsl2\_m2=1305,BSL-3\_m2=0,BSL-  
 4\_m2=0,total\_bsl\_m2=1305,total\_personnel=61,mil\_personnel=2,civ\_personnel=59,total\_scientist=51,total\_engineer=6,total\_technician=4,total\_admin=0,funding\_src='DOD',research\_funding='\$5,938,000',dev\_funding='\$2,372,000',testeval\_funding='\$82,000',total\_funding='\$8,392,000',research\_obj='The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';  
 157 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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 Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
 4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_technician=13,total\_admin=41,funding\_src='DOD',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,000',total\_funding='\$17,943,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

158 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road  
 Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
 4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_tec  
 hnician=13,total\_admin=41,funding\_src='DOD',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,  
 000',total\_funding='\$17,943,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems,  
 collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management  
 planning.',agents\_toxin='Overlap Select Agents (Including NIAID Category A Priority Pathogens)';  
 159 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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 Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road  
 Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
 4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_tec  
 hnician=13,total\_admin=41,funding\_src='DOD',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,  
 000',total\_funding='\$17,943,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems,  
 collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management  
 planning.',agents\_toxin='Other pathogens or toxins ';  
 160 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road  
 Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
 4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_tec  
 hnician=13,total\_admin=41,funding\_src='Private Sector  
 Companies',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,000',total\_funding='\$17,943,000',re  
 search\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection  
 systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='HHS Select  
 Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
 161 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road  
 Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
 4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_tec  
 hnician=13,total\_admin=41,funding\_src='Private Sector  
 Companies',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,000',total\_funding='\$17,943,000',re  
 search\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection  
 systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='Overlap  
 Select Agents (Including NIAID Category A Priority Pathogens)';  
 162 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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 Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road  
 Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
 4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_tec  
 hnician=13,total\_admin=41,funding\_src='Private Sector  
 Companies',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,000',total\_funding='\$17,943,000',re  
 search\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection  
 systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='Other  
 pathogens or toxins ';  
 163 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road  
 Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
 4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_tec  
 hnician=13,total\_admin=41,funding\_src='Other Governmental  
 Agencies',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,000',total\_funding='\$17,943,000',re  
 search\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection  
 systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='HHS Select  
 Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
 164 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
 Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road  
 Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-

4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_technician=13,total\_admin=41,funding\_src='Other Governmental Agencies',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,000',total\_funding='\$17,943,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='Overlap Select Agents (Including NIAID Category A Priority Pathogens)';

165 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Naval Surface Warfare Center-Dahlgren Division',street\_city='6149 Welsh Road Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-4\_m2=0,total\_bsl\_m2=216,total\_personnel=172,mil\_personnel=0,civ\_personnel=172,total\_scientist=66,total\_engineer=52,total\_technician=13,total\_admin=41,funding\_src='Other Governmental Agencies',research\_funding='\$4,719,000',dev\_funding='\$3,524,000',testeval\_funding='\$9,700,000',total\_funding='\$17,943,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='Other pathogens or toxins';

166 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Tyndall AFB -- 1',street\_city='3000 Research Road Tyndall AFB',state='FL',zipcode='32403',bsl2\_m2=55,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=55,total\_personnel=5,mil\_personnel=0,civ\_personnel=5,total\_scientist=3,total\_engineer=0,total\_technician=2,total\_admin=0,funding\_src='DOD',research\_funding='\$800,000',dev\_funding='\$0',testeval\_funding='\$150,000',total\_funding='\$950,000',research\_obj='The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used to classify the size distribution of bioaerosol challenges as needed.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

167 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Tyndall AFB -- 1',street\_city='3000 Research Road Tyndall AFB',state='FL',zipcode='32403',bsl2\_m2=55,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=55,total\_personnel=5,mil\_personnel=0,civ\_personnel=5,total\_scientist=3,total\_engineer=0,total\_technician=2,total\_admin=0,funding\_src='DHS',research\_funding='\$800,000',dev\_funding='\$0',testeval\_funding='\$150,000',total\_funding='\$950,000',research\_obj='The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used to classify the size distribution of bioaerosol challenges as needed.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

168 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Tyndall AFB -- 1',street\_city='3000 Research Road Tyndall AFB',state='FL',zipcode='32403',bsl2\_m2=55,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=55,total\_personnel=5,mil\_personnel=0,civ\_personnel=5,total\_scientist=3,total\_engineer=0,total\_technician=2,total\_admin=0,funding\_src='Other Governmental Agencies',research\_funding='\$800,000',dev\_funding='\$0',testeval\_funding='\$150,000',total\_funding='\$950,000',research\_obj='The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used to classify the size distribution of bioaerosol challenges as needed.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

169 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Tyndall AFB -- 2',street\_city='139 Barnes Drive Tyndall AFB',state='FL',zipcode='32403',bsl2\_m2=53,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=53,total\_personnel=7,mil\_personnel=0,civ\_personnel=7,total\_scientist=3,total\_engineer=1,total\_technician=1,total\_admin=2,funding\_src='DOD',research\_funding='\$1,000,000',dev\_funding='\$1,300,000',testeval\_funding='\$0',total\_funding='\$2,300,000',research\_obj='This facility supports the preparation and characterization of novel chemicals expected to exhibit antimicrobial properties. It also supports research into degradation products formed by exposure of samples of reactive materials to surrogate threat agents.',agents\_toxin='None';

170 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='U.S. Army Edgewood Chemical and Biological Center',street\_city='5183 Blackhawk Road Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=532,BSL-3\_m2=177,BSL-4\_m2=0,total\_bsl\_m2=709,total\_personnel=263,mil\_personnel=0,civ\_personnel=263,total\_scientist=168,total\_engineer=39,total\_technician=27,total\_admin=29,funding\_src='DOD',research\_funding='\$1,204,000',dev\_funding='\$22,145,000',testeval\_funding='\$0',total\_funding='\$23,349,000',research\_obj='Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection';

of/from biological threat agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

171 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center',street\_city='5183 Blackhawk Road Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=532,BSL-3\_m2=177,BSL-4\_m2=0,total\_bsl\_m2=709,total\_personnel=263,mil\_personnel=0,civ\_personnel=263,total\_scientist=168,total\_engineer=39,total\_technician=27,total\_admin=29,funding\_src='DOD',research\_funding='\$1,204,000',dev\_funding='\$22,145,000',testeval\_funding='\$0',total\_funding='\$23,349,000',research\_obj='Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection of/from biological threat agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

172 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center',street\_city='5183 Blackhawk Road Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=532,BSL-3\_m2=177,BSL-4\_m2=0,total\_bsl\_m2=709,total\_personnel=263,mil\_personnel=0,civ\_personnel=263,total\_scientist=168,total\_engineer=39,total\_technician=27,total\_admin=29,funding\_src='DOD',research\_funding='\$1,204,000',dev\_funding='\$22,145,000',testeval\_funding='\$0',total\_funding='\$23,349,000',research\_obj='Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection of/from biological threat agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

173 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center (ECBC)',street\_city='U.S. Army Edgewood Chemical and Biological Center 5183 Blackhawk Rd Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=2000,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=2000,total\_personnel=6,mil\_personnel=0,civ\_personnel=6,total\_scientist=3,total\_engineer=3,total\_technician=0,total\_admin=0,funding\_src='DOD',research\_funding='\$0',dev\_funding='\$0',testeval\_funding='\$1,171,000',total\_funding='\$1,171,000',research\_obj='Conduct mixed reactor testing for the evaluation of the efficacy of the countermeasure solution against a biological warfare agent simulant to determine if agent neutralization can be achieved.',agents\_toxin='Other pathogens or toxins';

174 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)',street\_city='3100 Ricketts Point Road Aberdeen Proving Ground',state='MD',zipcode='21010-5400',bsl2\_m2=300,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=300,total\_personnel=11,mil\_personnel=2,civ\_personnel=9,total\_scientist=5,total\_engineer=0,total\_technician=6,total\_admin=0,funding\_src='DOD',research\_funding='\$422,000',dev\_funding='\$630,000',testeval\_funding='\$0',total\_funding='\$1,052,000',research\_obj='The Institute's mission involves research on medical defenses against neurotoxins.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

175 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-4\_m2=1093,total\_bsl\_m2=30258,total\_personnel=826,mil\_personnel=193,civ\_personnel=633,total\_scientist=256,total\_engineer=3,total\_technician=310,total\_admin=257,funding\_src='DOD',research\_funding='\$5,100,000',dev\_funding='\$58,324,000',testeval\_funding='\$0',total\_funding='\$63,424,000',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

176 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-4\_m2=1093,total\_bsl\_m2=30258,total\_personnel=826,mil\_personnel=193,civ\_personnel=633,total\_scientist=256,total\_engineer=3,total\_technician=310,total\_admin=257,funding\_src='DOD',research\_funding='\$5,100,000',dev\_funding='\$58,324,000',testeval\_funding='\$0',total\_funding='\$63,424,000',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

177 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-4\_m2=1093,total\_bsl\_m2=30258,total\_personnel=826,mil\_personnel=193,civ\_personnel=633,total\_scientist=256,total\_engineer=3,

total\_technician=310,total\_admin=257,funding\_src='DOD',research\_funding='\$5,100,000',dev\_funding='\$58,324,000',testeval\_funding='\$0',total\_funding='\$63,424,000',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

178 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-4\_m2=1093,total\_bsl\_m2=30258,total\_personnel=826,mil\_personnel=193,civ\_personnel=633,total\_scientist=256,total\_engineer=3, total\_technician=310,total\_admin=257,funding\_src='DOD',research\_funding='\$5,100,000',dev\_funding='\$58,324,000',testeval\_funding='\$0',total\_funding='\$63,424,000',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

179 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Walter Reed Army Institute of Research (WRAIR)',street\_city='503 Robert Grant Avenue Silver Spring',state='MD',zipcode='20910',bsl2\_m2=294,BSL-3\_m2=165,BSL-4\_m2=0,total\_bsl\_m2=459,total\_personnel=25,mil\_personnel=3,civ\_personnel=22,total\_scientist=10,total\_engineer=0,total\_technician=15,total\_admin=0,funding\_src='DOD',research\_funding='\$4,540,550',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$4,540,550',research\_obj='The Walter Reed Army Institute of Research conducts research on bacterial threat agents, including the study of therapeutics against these agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

180 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Walter Reed Army Institute of Research (WRAIR)',street\_city='503 Robert Grant Avenue Silver Spring',state='MD',zipcode='20910',bsl2\_m2=294,BSL-3\_m2=165,BSL-4\_m2=0,total\_bsl\_m2=459,total\_personnel=25,mil\_personnel=3,civ\_personnel=22,total\_scientist=10,total\_engineer=0,total\_technician=15,total\_admin=0,funding\_src='DOD',research\_funding='\$4,540,550',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$4,540,550',research\_obj='The Walter Reed Army Institute of Research conducts research on bacterial threat agents, including the study of therapeutics against these agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

181 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=165,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=268,total\_personnel=15,mil\_personnel=0,civ\_personnel=15,total\_scientist=10,total\_engineer=0,total\_technician=5,total\_admin=0,funding\_src='DOD',research\_funding='\$2,838,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,838,000',research\_obj='The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

182 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=165,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=268,total\_personnel=15,mil\_personnel=0,civ\_personnel=15,total\_scientist=10,total\_engineer=0,total\_technician=5,total\_admin=0,funding\_src='DOD',research\_funding='\$2,838,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,838,000',research\_obj='The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.',agents\_toxin='Other pathogens or toxins. Work only involves one toxin (which is both a Select Agent Toxin and NIAID Category A Pathogen)';

183 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
 uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=165,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=268,total\_personnel=15,mil\_personnel=0,civ\_personnel=15,total\_scientist=10,total\_engineer=0,total\_technician=5,total\_admin=0,funding\_src='DOE',research\_funding='\$2,838,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,838,000',research\_obj='The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of

the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.'agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens);

184 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=165,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=268,total\_personnel=15,mil\_personnel=0,civ\_personnel=15,total\_scientist=10,total\_engineer=0,total\_technician=5,total\_admin=0,funding\_src='DOE',research\_funding='\$2,838,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,838,000',research\_obj='The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.'agents\_toxin='Other pathogens or toxins. Work only involves one toxin (which is both a Select Agent Toxin and NIAID Category A Pathogen)';

185 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=165,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=268,total\_personnel=15,mil\_personnel=0,civ\_personnel=15,total\_scientist=10,total\_engineer=0,total\_technician=5,total\_admin=0,funding\_src='DHHS',research\_funding='\$2,838,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,838,000',research\_obj='The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.'agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

186 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=165,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=268,total\_personnel=15,mil\_personnel=0,civ\_personnel=15,total\_scientist=10,total\_engineer=0,total\_technician=5,total\_admin=0,funding\_src='DHHS',research\_funding='\$2,838,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,838,000',research\_obj='The overall objective of the work is to develop countermeasures for biowarfare agents. The specific aim of the projects are to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis.'agents\_toxin='Other pathogens or toxins. Work only involves one toxin (which is both a Select Agent Toxin and NIAID Category A Pathogen)';

187 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lawrence Livermore National Laboratory',street\_city='Lawrence Livermore National Laboratory 7000 East Avenue Livermore',state='CA',zipcode='94550',bsl2\_m2=1261,BSL-3\_m2=60,BSL-4\_m2=0,total\_bsl\_m2=4599,total\_personnel=115,mil\_personnel=0,civ\_personnel=115,total\_scientist=93,total\_engineer=8,total\_technician=14,total\_admin=0,funding\_src='DOD',research\_funding='\$17,894,000',dev\_funding='\$0',testeval\_funding='\$553,000',total\_funding='\$18,447,000',research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention.'agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

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4\_m2=0,total\_bsl\_m2=4599,total\_personnel=115,mil\_personnel=0,civ\_personnel=115,total\_scientist=93,total\_engineer=8,total\_technician=14,total\_admin=0,funding\_src='DHS',research\_funding='\$17,894,000',dev\_funding='\$0',testeval\_funding='\$553,000',total\_funding='\$18,447,000',research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

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LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention.' ,agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)'; 198 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lawrence Livermore National Laboratory', street\_city='Lawrence Livermore National Laboratory 7000 East Avenue Livermore', state='CA', zipcode='94550', bsl2\_m2=1261, BSL-3\_m2=60, BSL-4\_m2=0, total\_bsl\_m2=4599, total\_personnel=115, mil\_personnel=0, civ\_personnel=115, total\_scientist=93, total\_engineer=8, total\_technician=14, total\_admin=0, funding\_src='Other Governmental Agencies', research\_funding='\$17,894,000', dev\_funding='\$0', testeval\_funding='\$553,000', total\_funding='\$18,447,000', research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation,

structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS which is known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help to restore normal activities in the event that a biological agent is used. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution, LLNL also has ongoing research projects to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention.',agents\_toxin='All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';

199 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DOD',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

200 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DOD',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

201 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DOD',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing

and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

202 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los  
Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-  
4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_techni-  
cian=32,total\_admin=0,funding\_src='DOD',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',to-  
tal\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the  
following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen  
detection technology development. The main objectives for these research and development activities are to: study molecular,  
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sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop  
DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing  
and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify  
host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA PPQ Select Agents and Toxins';

203 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los  
Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-  
4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_techni-  
cian=32,total\_admin=0,funding\_src='DOD',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',to-  
tal\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the  
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sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop  
DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing  
and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify  
host molecular targets as potential therapeutic candidates.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent,  
NIAID Category A, B and C Priority Pathogens)';

204 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los  
Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-  
4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_techni-  
cian=32,total\_admin=0,funding\_src='DOD',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',to-  
tal\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the  
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DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing  
and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify  
host molecular targets as potential therapeutic candidates.',agents\_toxin='All Select Agent Toxin(s) below the de minimus level and  
thus exempt from registration with the Select Agent Program.';

205 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los  
Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-  
4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_techni-  
cian=32,total\_admin=0,funding\_src='DHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',tot-  
al\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the  
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DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens');

206 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens');

207 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens');

208 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA PPQ Select Agents and Toxins';

209 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve

sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

210 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';

211 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

212 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

213 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular,

chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

214 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA PPO Select Agents and Toxins';

215 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

216 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='DHHS',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';

217 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='Other Governmental Agencies',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature

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218 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='Other Governmental Agencies',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens');

219 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='Other Governmental Agencies',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens');

220 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='Other Governmental Agencies',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA PPQ Select Agents and Toxins';

221 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los

Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='Other Governmental Agencies',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

222 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Los Alamos National Laboratory',street\_city='P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=444,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=444,total\_personnel=84,mil\_personnel=0,civ\_personnel=84,total\_scientist=48,total\_engineer=4,total\_technician=32,total\_admin=0,funding\_src='Other Governmental Agencies',research\_funding='\$12,382,000',dev\_funding='\$2,890,000',testeval\_funding='\$84,000',total\_funding='\$15,356,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interactions, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';

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224 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A,

Part 2', facility\_name='Pacific Northwest National Laboratory',street\_city='P. O. Box 999 Richland',state='WA',zipcode='99352',bsl2\_m2=633,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=1438,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=37,total\_engineer=0,total\_technician=0,total\_admin=3,funding\_src='DOD',research\_funding='\$8,070,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$8,070,000',research\_obj='Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to neutralize evolving threats. For the Department of Homeland Security, the objectives of the research are to investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate from non-pathogenic near neighbors. DNAs and BSL-1/BSL-2 whole organisms are used in this research. For HHS and EPA projects, our research investigates methods for detection and determination of food and waterborne pathogens. For the Laboratory Directed Research and Development (LDRD) effort, the objective was to investigate stable platforms for novel molecular recognition elements for pathogen detection. Our role is to develop tools for organic signatures characterization in biological materials for forensic attribution. This generically includes both volatile and non-volatile organic components as either direct or indirect signatures of the culture media, preparation conditions, or treatment processes.',agents\_toxin='Overlap Select Agents (Including NIAID Category A Priority Pathogens)';

225 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Pacific Northwest National Laboratory',street\_city='P. O. Box 999 Richland',state='WA',zipcode='99352',bsl2\_m2=633,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=1438,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=37,total\_engineer=0,total\_technician=0,total\_admin=3,funding\_src='DOD',research\_funding='\$8,070,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$8,070,000',research\_obj='Our goal is to develop the means to rapidly create new affinity reagents that recognize entire families of threat agents, focusing on the development of reagents to detect certain isotoxins. Affinity reagents that recognize a toxin family will provide an ability to monitor the presence of unexpected and evolved agents. Our approach will build on a naturally occurring protein scaffold (i.e., calmodulin) whose molecular plasticity permits binding to more than 300 different binding sequences with little sequence similarity. As current computational algorithms do not rationalize binding to these different structural motifs in a manner that effectively predicts additional binding partners present in cells, we propose to first identify the fundamental principles that permit rapid and high-affinity binding to target proteins. Using these insights, we will design and express high-affinity scaffolds that bind isotoxins. This molecular understanding will permit an ability to design binding clefts to recognize new peptide motifs present in threat agents. Critical to these efforts are: 1) high-throughput measurements of the affinities and kinetics of binding between the protein scaffold and known binding sequences, 2) the development and testing of computational models that predict naturally occurring binding sequences, and 3) an ability to deploy computational models to engineer new binding clefts to create bifunctional affinity reagents against families of threat agents. It is expected that the development of a means to rapidly identify high efficacy mechanisms of bio-molecular interactions between protein scaffolds with both natural and modified targets will provide the needed ability to rapidly create new affinity reagents that can be deployed with existing detection strategies to neutralize evolving threats. For the Department of Homeland Security, the objectives of the research are to investigate nucleic acid and immunoassay detection methods for biological threat agents and to be able to discriminate from non-pathogenic near neighbors. DNAs and BSL-1/BSL-2 whole organisms are used in this research. For HHS and EPA projects, our research investigates methods for detection and determination of food and waterborne pathogens. For the Laboratory Directed Research and Development (LDRD) effort, the objective was to investigate stable platforms for novel molecular recognition elements for pathogen detection. Our role is to develop tools for organic signatures characterization in biological materials for forensic attribution. This generically includes both volatile and non-volatile organic components as either direct or indirect signatures of the culture media, preparation conditions, or treatment processes.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

226 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Pacific Northwest National Laboratory',street\_city='P. O. Box 999 Richland',state='WA',zipcode='99352',bsl2\_m2=633,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=1438,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=37,total\_engineer=0,total\_technician=0,total\_admin=3,funding\_src='DOD',research\_funding='\$8,070,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$8,

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4\_m2=0,total\_bsl\_m2=2217,total\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='DHS',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding=\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

250 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
Part 2', facility\_name='Sandia National Laboratories',street\_city='P. O. Box 5800  
Albuquerque',state='NM',zipcode='87185',bsl2\_m2=944,BSL-3\_m2=0,BSL-

4\_m2=0,total\_bsl\_m2=2217,total\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='DHS',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding=\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';

251 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
Part 2', facility\_name='Sandia National Laboratories',street\_city='P. O. Box 5800  
Albuquerque',state='NM',zipcode='87185',bsl2\_m2=944,BSL-3\_m2=0,BSL-

4\_m2=0,total\_bsl\_m2=2217,total\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='DOE',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding=\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

252 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A,  
Part 2', facility\_name='Sandia National Laboratories',street\_city='P. O. Box 5800  
Albuquerque',state='NM',zipcode='87185',bsl2\_m2=944,BSL-3\_m2=0,BSL-

4\_m2=0,total\_bsl\_m2=2217,total\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='DOE',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding=\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='USDA Select Agents and Toxins';

253 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories', street\_city='P. O. Box 5800 Albuquerque', state='NM', zipcode='87185', bsl2\_m2=944, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=2217, total\_personnel=78, mil\_personnel=0, civ\_personnel=78, total\_scientist=40, total\_engineer=7, total\_technician=29, total\_admin=2, funding\_src='DOE', research\_funding='\$46,533,000', dev\_funding='\$0', testeval\_funding='\$324,000', total\_funding='\$46,857,000', research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

254 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories', street\_city='P. O. Box 5800 Albuquerque', state='NM', zipcode='87185', bsl2\_m2=944, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=2217, total\_personnel=78, mil\_personnel=0, civ\_personnel=78, total\_scientist=40, total\_engineer=7, total\_technician=29, total\_admin=2, funding\_src='DOE', research\_funding='\$46,533,000', dev\_funding='\$0', testeval\_funding='\$324,000', total\_funding='\$46,857,000', research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.', agents\_toxin='All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';

255 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories', street\_city='P. O. Box 5800 Albuquerque', state='NM', zipcode='87185', bsl2\_m2=944, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=2217, total\_personnel=78, mil\_personnel=0, civ\_personnel=78, total\_scientist=40, total\_engineer=7, total\_technician=29, total\_admin=2, funding\_src='DHHS', research\_funding='\$46,533,000', dev\_funding='\$0', testeval\_funding='\$324,000', total\_funding='\$46,857,000', research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

256 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories', street\_city='P. O. Box 5800 Albuquerque', state='NM', zipcode='87185', bsl2\_m2=944, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=2217, total\_personnel=78, mil\_personnel=0, civ\_personnel=78, total\_scientist=40, total\_engineer=7, total\_technician=29, total\_admin=2, funding\_src='DHHS', research\_funding='\$46,533,000', dev\_funding='\$0', testeval\_funding='\$324,000', total\_funding='\$46,857,000', research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.', agents\_toxin='USDA Select Agents and Toxins';

257 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories', street\_city='P. O. Box 5800 Albuquerque', state='NM', zipcode='87185', bsl2\_m2=944, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=2217, total\_personnel=78, mil\_personnel=0, civ\_personnel=78, total\_scientist=40, total\_engineer=7, total\_technician=29, total\_admin=2, funding\_src='DHHS', research\_funding='\$46,533,000', dev\_funding='\$0', testeval\_funding='\$324,000', total\_funding='\$46,857,000', research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins

interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)'; 258 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories',street\_city='P. O. Box 5800 Albuquerque',state='NM',zipcode='87185',bsl2\_m2=944,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=2217,total\_personnel=78,mil\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='DHHS',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding='\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.'; 259 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories',street\_city='P. O. Box 5800 Albuquerque',state='NM',zipcode='87185',bsl2\_m2=944,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=2217,total\_personnel=78,mil\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='Other Governmental Agencies',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding='\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)'; 260 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories',street\_city='P. O. Box 5800 Albuquerque',state='NM',zipcode='87185',bsl2\_m2=944,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=2217,total\_personnel=78,mil\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='Other Governmental Agencies',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding='\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='USDA Select Agents and Toxins'; 261 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories',street\_city='P. O. Box 5800 Albuquerque',state='NM',zipcode='87185',bsl2\_m2=944,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=2217,total\_personnel=78,mil\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='Other Governmental Agencies',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding='\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)'; 262 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Sandia National Laboratories',street\_city='P. O. Box 5800

Albuquerque',state='NM',zipcode='87185',bsl2\_m2=944,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=2217,total\_personnel=78,mil\_personnel=0,civ\_personnel=78,total\_scientist=40,total\_engineer=7,total\_technician=29,total\_admin=2,funding\_src='Other Governmental Agencies',research\_funding='\$46,533,000',dev\_funding='\$0',testeval\_funding='\$324,000',total\_funding='\$46,857,000',research\_obj='The Sandia National Laboratory (SNL) Chem/Bio Defense Program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: 1. Analyze pathogenic mechanisms caused by toxins interacting with cell membranes; 2. Development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; 3. Development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='All Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';

263 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='CDC Mass Spectrometry Toxin Laboratory',street\_city='CDC DHHS 4770 Buford Highway Mail stop F-47 Atlanta',state='GA',zipcode='30341',bsl2\_m2=114,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=114,total\_personnel=30,mil\_personnel=0,civ\_personnel=30,total\_scientist=27,total\_engineer=0,total\_technician=0,total\_admin=3,funding\_src='DHHS',research\_funding='\$1,900,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$1,900,000',research\_obj='The CDC Mass Spectrometry Toxin Laboratory has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins. The laboratory uses advanced mass spectrometry techniques to measure peptides and proteins that are in the pathogenic pathway of the infectious agent or toxin and uses these measurements to identify and track infection or poisoning.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

264 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='CDC Mass Spectrometry Toxin Laboratory',street\_city='CDC DHHS 4770 Buford Highway Mail stop F-47 Atlanta',state='GA',zipcode='30341',bsl2\_m2=114,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=114,total\_personnel=30,mil\_personnel=0,civ\_personnel=30,total\_scientist=27,total\_engineer=0,total\_technician=0,total\_admin=3,funding\_src='DHHS',research\_funding='\$1,900,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$1,900,000',research\_obj='The CDC Mass Spectrometry Toxin Laboratory has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins. The laboratory uses advanced mass spectrometry techniques to measure peptides and proteins that are in the pathogenic pathway of the infectious agent or toxin and uses these measurements to identify and track infection or poisoning.',agents\_toxin='Overlap Select Agents (Including NIAID Category A Priority Pathogens)';

265 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='CDC Mass Spectrometry Toxin Laboratory',street\_city='CDC DHHS 4770 Buford Highway Mail stop F-47 Atlanta',state='GA',zipcode='30341',bsl2\_m2=114,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=114,total\_personnel=30,mil\_personnel=0,civ\_personnel=30,total\_scientist=27,total\_engineer=0,total\_technician=0,total\_admin=3,funding\_src='DHHS',research\_funding='\$1,900,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$1,900,000',research\_obj='The CDC Mass Spectrometry Toxin Laboratory has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins. The laboratory uses advanced mass spectrometry techniques to measure peptides and proteins that are in the pathogenic pathway of the infectious agent or toxin and uses these measurements to identify and track infection or poisoning.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A and B Priority Pathogens)';

266 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='CDC Mass Spectrometry Toxin Laboratory',street\_city='CDC DHHS 4770 Buford Highway Mail stop F-47 Atlanta',state='GA',zipcode='30341',bsl2\_m2=114,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=114,total\_personnel=30,mil\_personnel=0,civ\_personnel=30,total\_scientist=27,total\_engineer=0,total\_technician=0,total\_admin=3,funding\_src='DHHS',research\_funding='\$1,900,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$1,900,000',research\_obj='The CDC Mass Spectrometry Toxin Laboratory has successfully developed toxin assays that are critical for better detection and diagnosis during a public health response to biological toxins. The laboratory uses advanced mass spectrometry techniques to measure peptides and proteins that are in the pathogenic pathway of the infectious agent or toxin and uses these measurements to identify and track infection or poisoning.',agents\_toxin='Some Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';

267 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2011\_United\_States.docx',uscbm\_submit\_date='April 15 2011',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='CDC, NCEZID, Division of Vector Borne Diseases (DVBD)',street\_city='CDC DHHS 3150 Rampart Road Fort Collins',state='CO',zipcode='80521',bsl2\_m2=66,BSL-3\_m2=1142,BSL-4\_m2=0,total\_bsl\_m2=1208,total\_personnel=160,mil\_personnel=0,civ\_personnel=160,total\_scientist=86,total\_engineer=6,total\_technician=0,total\_admin=68,funding\_src='DHHS',research\_funding='\$921,552',dev\_funding='\$460,756',testeval\_funding='\$460,756',total\_funding='\$1,843,064',research\_obj='The Division of Vector-Borne Diseases (DVBD) strives to protect the nation from bacterial

and viral diseases transmitted by mosquitoes, ticks and fleas. DVBD's biodefense work focuses on development and implementation of epidemiology and surveillance; prevention, control and decontamination; vaccine development and improved diagnostics for diagnosis, detection and characterization of several vector-borne pathogens including various bacteria and alphaviruses.

Additionally, DVBD serves as the national reference laboratory for these pathogens.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens');

268 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, NCEZID, Division of Vector Borne Diseases (DVBD)', street\_city='CDC DHHS 3150 Rampart Road Fort Collins', state='CO', zipcode='80521', bsl2\_m2=66, BSL-3\_m2=1142, BSL-4\_m2=0, total\_bsl\_m2=1208, total\_personnel=160, mil\_personnel=0, civ\_personnel=160, total\_scientist=86, total\_engineer=6, total\_technician=0, total\_admin=68, funding\_src='DHS', research\_funding='\$921,552', dev\_funding='\$460,756', testeval\_funding='\$460,756', total\_funding='\$1,843,064', research\_obj='The Division of Vector-Borne Diseases (DVBD) strives to protect the nation from bacterial and viral diseases transmitted by mosquitoes, ticks and fleas. DVBD's biodefense work focuses on development and implementation of epidemiology and surveillance; prevention, control and decontamination; vaccine development and improved diagnostics for diagnosis, detection and characterization of several vector-borne pathogens including various bacteria and alphaviruses.

Additionally, DVBD serves as the national reference laboratory for these pathogens.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

269 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, NCEZID, Division of Vector Borne Diseases (DVBD)', street\_city='CDC DHHS 3150 Rampart Road Fort Collins', state='CO', zipcode='80521', bsl2\_m2=66, BSL-3\_m2=1142, BSL-4\_m2=0, total\_bsl\_m2=1208, total\_personnel=160, mil\_personnel=0, civ\_personnel=160, total\_scientist=86, total\_engineer=6, total\_technician=0, total\_admin=68, funding\_src='DHS', research\_funding='\$921,552', dev\_funding='\$460,756', testeval\_funding='\$460,756', total\_funding='\$1,843,064', research\_obj='The Division of Vector-Borne Diseases (DVBD) strives to protect the nation from bacterial and viral diseases transmitted by mosquitoes, ticks and fleas. DVBD's biodefense work focuses on development and implementation of epidemiology and surveillance; prevention, control and decontamination; vaccine development and improved diagnostics for diagnosis, detection and characterization of several vector-borne pathogens including various bacteria and alphaviruses.

Additionally, DVBD serves as the national reference laboratory for these pathogens.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

270 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, NCEZID, Division of Vector Borne Diseases (DVBD)', street\_city='CDC DHHS 3150 Rampart Road Fort Collins', state='CO', zipcode='80521', bsl2\_m2=66, BSL-3\_m2=1142, BSL-4\_m2=0, total\_bsl\_m2=1208, total\_personnel=160, mil\_personnel=0, civ\_personnel=160, total\_scientist=86, total\_engineer=6, total\_technician=0, total\_admin=68, funding\_src='DHS', research\_funding='\$921,552', dev\_funding='\$460,756', testeval\_funding='\$460,756', total\_funding='\$1,843,064', research\_obj='The Division of Vector-Borne Diseases (DVBD) strives to protect the nation from bacterial and viral diseases transmitted by mosquitoes, ticks and fleas. DVBD's biodefense work focuses on development and implementation of epidemiology and surveillance; prevention, control and decontamination; vaccine development and improved diagnostics for diagnosis, detection and characterization of several vector-borne pathogens including various bacteria and alphaviruses.

Additionally, DVBD serves as the national reference laboratory for these pathogens.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)';

271 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='CDC DHHS 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=281, BSL-3\_m2=2215, BSL-4\_m2=962, total\_bsl\_m2=3458, total\_personnel=696, mil\_personnel=0, civ\_personnel=696, total\_scientist=232, total\_engineer=136, total\_technician=42, total\_admin=286, funding\_src='DHS', research\_funding='\$81,672,476', dev\_funding='\$6,213,348', testeval\_funding='\$5,564,782', total\_funding='\$93,450,606', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

272 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='CDC DHHS 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=281, BSL-3\_m2=2215, BSL-4\_m2=962, total\_bsl\_m2=3458, total\_personnel=696, mil\_personnel=0, civ\_personnel=696, total\_scientist=232, total\_engineer=136, total\_technician=42, total\_admin=286, funding\_src='DHS', research\_funding='\$81,672,476', dev\_funding='\$6,213,348', testeval\_funding='\$5,564,782', total\_funding='\$93,450,606', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and

surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

273 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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al\_technician=42,total\_admin=286,funding\_src='DHS',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding='  
\$5,564,782',total\_funding='\$93,450,606',research\_obj='Activities include developing diagnostic assayss for public health, conducting  
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virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and  
surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='USDA Select Agents and Toxins  
(Including NIAID Category A Priority Pathogens)';

274 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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4\_m2=962,total\_bsl\_m2=3458,total\_personnel=696,mil\_personnel=0,civ\_personnel=696,total\_scientist=232,total\_engineer=136,tot  
al\_technician=42,total\_admin=286,funding\_src='DHS',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding='  
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surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='Other pathogens or toxins (Including  
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275 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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4\_m2=962,total\_bsl\_m2=3458,total\_personnel=696,mil\_personnel=0,civ\_personnel=696,total\_scientist=232,total\_engineer=136,tot  
al\_technician=42,total\_admin=286,funding\_src='DHHS',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding='  
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276 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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277 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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4\_m2=962,total\_bsl\_m2=3458,total\_personnel=696,mil\_personnel=0,civ\_personnel=696,total\_scientist=232,total\_engineer=136,tot  
al\_technician=42,total\_admin=286,funding\_src='DHHS',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding='  
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pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting  
epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='USDA  
Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

278 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
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al\_technician=42,total\_admin=286,funding\_src='DHHS',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding ='\$5,564,782',total\_funding='\$93,450,606',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)';  
279 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)',street\_city='CDC DHHS 1600 Clifton Road N.E. Atlanta',state='GA',zipcode='30333',bsl2\_m2=281,BSL-3\_m2=2215,BSL-  
4\_m2=962,total\_bsl\_m2=3458,total\_personnel=696,mil\_personnel=0,civ\_personnel=696,total\_scientist=232,total\_engineer=136,tot al\_technician=42,total\_admin=286,funding\_src='EPA',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding=' \$5,564,782',total\_funding='\$93,450,606',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';  
280 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)',street\_city='CDC DHHS 1600 Clifton Road N.E. Atlanta',state='GA',zipcode='30333',bsl2\_m2=281,BSL-3\_m2=2215,BSL-  
4\_m2=962,total\_bsl\_m2=3458,total\_personnel=696,mil\_personnel=0,civ\_personnel=696,total\_scientist=232,total\_engineer=136,tot al\_technician=42,total\_admin=286,funding\_src='EPA',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding=' \$5,564,782',total\_funding='\$93,450,606',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';  
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4\_m2=962,total\_bsl\_m2=3458,total\_personnel=696,mil\_personnel=0,civ\_personnel=696,total\_scientist=232,total\_engineer=136,tot al\_technician=42,total\_admin=286,funding\_src='EPA',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding=' \$5,564,782',total\_funding='\$93,450,606',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';  
282 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)',street\_city='CDC DHHS 1600 Clifton Road N.E. Atlanta',state='GA',zipcode='30333',bsl2\_m2=281,BSL-3\_m2=2215,BSL-  
4\_m2=962,total\_bsl\_m2=3458,total\_personnel=696,mil\_personnel=0,civ\_personnel=696,total\_scientist=232,total\_engineer=136,tot al\_technician=42,total\_admin=286,funding\_src='EPA',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding=' \$5,564,782',total\_funding='\$93,450,606',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)';  
283 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)',street\_city='CDC DHHS 1600 Clifton Road N.E. Atlanta',state='GA',zipcode='30333',bsl2\_m2=281,BSL-3\_m2=2215,BSL-  
4\_m2=962,total\_bsl\_m2=3458,total\_personnel=696,mil\_personnel=0,civ\_personnel=696,total\_scientist=232,total\_engineer=136,tot al\_technician=42,total\_admin=286,funding\_src='Other Governmental Agencies',research\_funding='\$81,672,476',dev\_funding='\$6,213,348',testeval\_funding=' \$5,564,782',total\_funding='\$93,450,606',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

284 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='CDC DHHS 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=281, BSL-3\_m2=2215, BSL-4\_m2=962, total\_bsl\_m2=3458, total\_personnel=696, mil\_personnel=0, civ\_personnel=696, total\_scientist=232, total\_engineer=136, total\_technician=42, total\_admin=286, funding\_src='Other Governmental Agencies', research\_funding='\$81,672,476', dev\_funding='\$6,213,348', testeval\_funding='\$5,564,782', total\_funding='\$93,450,606', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.', agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

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286 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='CDC DHHS 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=281, BSL-3\_m2=2215, BSL-4\_m2=962, total\_bsl\_m2=3458, total\_personnel=696, mil\_personnel=0, civ\_personnel=696, total\_scientist=232, total\_engineer=136, total\_technician=42, total\_admin=286, funding\_src='Other Governmental Agencies', research\_funding='\$81,672,476', dev\_funding='\$6,213,348', testeval\_funding='\$5,564,782', total\_funding='\$93,450,606', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of microorganisms, evaluating decontamination methods, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases. Biodefense activities include those with select agents.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A and C Priority Pathogens)';

287 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=2493, BSL-3\_m2=1091, BSL-4\_m2=0, total\_bsl\_m2=3584, total\_personnel=118, mil\_personnel=0, civ\_personnel=118, total\_scientist=95, total\_engineer=0, total\_technician=23, total\_admin=0, funding\_src='DHHS', research\_funding='\$38,735,010', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$38,735,010', research\_obj='At the C.W. Bill Young Center, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

288 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=2493, BSL-3\_m2=1091, BSL-4\_m2=0, total\_bsl\_m2=3584, total\_personnel=118, mil\_personnel=0, civ\_personnel=118, total\_scientist=95, total\_engineer=0, total\_technician=23, total\_admin=0, funding\_src='DHHS', research\_funding='\$38,735,010', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$38,735,010', research\_obj='At the C.W. Bill Young Center, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses.

Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.',agents\_toxin='USDA Select Agents and Toxins';  
289 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=2493, BSL-3\_m2=1091, BSL-4\_m2=0, total\_bsl\_m2=3584, total\_personnel=118, mil\_personnel=0, civ\_personnel=118, total\_scientist=95, total\_engineer=0, total\_technician=23, total\_admin=0, funding\_src='DHHS', research\_funding='\$38,735,010', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$38,735,010', research\_obj='At the C.W. Bill Young Center, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';  
290 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=2493, BSL-3\_m2=1091, BSL-4\_m2=0, total\_bsl\_m2=3584, total\_personnel=118, mil\_personnel=0, civ\_personnel=118, total\_scientist=95, total\_engineer=0, total\_technician=23, total\_admin=0, funding\_src='DHHS', research\_funding='\$38,735,010', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$38,735,010', research\_obj='At the C.W. Bill Young Center, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.',agents\_toxin='Some Select Agent Toxin(s) below the de minimus level and thus exempt from registration with the Select Agent Program.';  
291 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, Dale and Betty Bumpers Vaccine Research Center', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=89, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=89, total\_personnel=7, mil\_personnel=0, civ\_personnel=7, total\_scientist=7, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='DHHS', research\_funding='\$782,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$782,000', research\_obj='The research focus of the Biodefense Research Laboratory, Vaccine Research Center (VRC) comprises three areas: 1. Development of vaccines and antivirals 2. Studies of the mechanism of vaccine-induced immune protection 3. Basic research to understand the mechanism of virus replication (entry) and neutralization',agents\_toxin='Other pathogens or toxins';  
292 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)', street\_city='903 South 4th St. Hamilton', state='MT', zipcode='59840', bsl2\_m2=1361, BSL-3\_m2=56, BSL-4\_m2=631, total\_bsl\_m2=2048, total\_personnel=99, mil\_personnel=0, civ\_personnel=99, total\_scientist=70, total\_engineer=0, total\_technician=29, total\_admin=0, funding\_src='DHHS', research\_funding='\$25,980,983', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$25,980,983', research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';  
293 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)', street\_city='903 South 4th St. Hamilton', state='MT', zipcode='59840', bsl2\_m2=1361, BSL-3\_m2=56, BSL-4\_m2=0,

4\_m2=631,total\_bsl\_m2=2048,total\_personnel=99,mil\_personnel=0,civ\_personnel=99,total\_scientist=70,total\_engineer=0,total\_technician=29,total\_admin=0,funding\_src='DHHS',research\_funding='\$25,980,983',dev\_funding='\$0',testeval\_funding='\$0',total\_funding=\$25,980,983',research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens');

294 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)', street\_city='903 South 4th St. Hamilton', state='MT', zipcode='59840', bsl2\_m2=1361,BSL-3\_m2=56,BSL-

4\_m2=631,total\_bsl\_m2=2048,total\_personnel=99,mil\_personnel=0,civ\_personnel=99,total\_scientist=70,total\_engineer=0,total\_technician=29,total\_admin=0,funding\_src='DHHS',research\_funding='\$25,980,983',dev\_funding='\$0',testeval\_funding='\$0',total\_funding=\$25,980,983',research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.',agents\_toxin='USDA Select Agents and Toxins';

295 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH, Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)', street\_city='903 South 4th St. Hamilton', state='MT', zipcode='59840', bsl2\_m2=1361,BSL-3\_m2=56,BSL-

4\_m2=631,total\_bsl\_m2=2048,total\_personnel=99,mil\_personnel=0,civ\_personnel=99,total\_scientist=70,total\_engineer=0,total\_technician=29,total\_admin=0,funding\_src='DHHS',research\_funding='\$25,980,983',dev\_funding='\$0',testeval\_funding='\$0',total\_funding=\$25,980,983',research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens);

296 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Foreign Disease-Weed Science Research Unit', street\_city='1301 Ditto Avenue Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=105,BSL-3\_m2=950,BSL-

4\_m2=0,total\_bsl\_m2=1055,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=12,total\_engineer=0,total\_technician=24,total\_admin=7,funding\_src='USDA',research\_funding='\$5,600,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding=\$5,600,000',research\_obj='The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides.',agents\_toxin='USDA PPQ Select Agents and Toxins';

297 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Foreign Disease-Weed Science Research Unit', street\_city='1301 Ditto Avenue Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=105,BSL-3\_m2=950,BSL-

4\_m2=0,total\_bsl\_m2=1055,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=12,total\_engineer=0,total\_technician=24,total\_admin=7,funding\_src='USDA',research\_funding='\$5,600,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,600,000',research\_obj='The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides.',agents\_toxin='Other pathogens or toxins. The agents studied (ie., viruses, bacteria, and fungi) are foreign and/or emerging pathogens of plants that have an agricultural base. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that pose a threat to US plant production systems, US agricultural economy, and exports.';

298 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410,BSL-3\_m2=2489,BSL-

4\_m2=0,total\_bsl\_m2=6899,total\_personnel=292,mil\_personnel=0,civ\_personnel=292,total\_scientist=44,total\_engineer=0,total\_technician=70,total\_admin=178,funding\_src='USDA',research\_funding='\$32,100,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$32,100,000',research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens');

299 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410,BSL-3\_m2=2489,BSL-

4\_m2=0,total\_bsl\_m2=6899,total\_personnel=292,mil\_personnel=0,civ\_personnel=292,total\_scientist=44,total\_engineer=0,total\_technician=70,total\_admin=178,funding\_src='USDA',research\_funding='\$32,100,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$32,100,000',research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='USDA Select Agents and Toxins';

300 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',  
uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410,BSL-3\_m2=2489,BSL-

4\_m2=0,total\_bsl\_m2=6899,total\_personnel=292,mil\_personnel=0,civ\_personnel=292,total\_scientist=44,total\_engineer=0,total\_technician=70,total\_admin=178,funding\_src='USDA',research\_funding='\$32,100,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$32,100,000',research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the

agents studied are not classified by USDA as select agents. The agents classified as select agents are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports. ';

301 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='DOD',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding=' \$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins'.

302 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='DOD',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding=' \$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports. ';

303 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='NIH',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding=' \$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

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304 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='NIH',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding=' \$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

ician=19,total\_admin=13,funding\_src='NIH',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

305 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='Private Sector Companies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins';

306 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='Private Sector Companies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

307 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='USDA',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the

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308 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='USDA',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

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310 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='Other Governmental Agencies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including

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Associations', research\_funding='\$5,800,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding='\$5,800,000', research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.', agents\_toxin='USDA Select Agents and Toxins';

312 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory', street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens', state='GA', zipcode='30605', bsl2\_m2=1138, BSL-3\_m2=624, BSL-4\_m2=0, total\_bsl\_m2=1762, total\_personnel=43, mil\_personnel=0, civ\_personnel=43, total\_scientist=11, total\_engineer=0, total\_technician=19, total\_admin=13, funding\_src='Non-profit'

Associations', research\_funding='\$5,800,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding='\$5,800,000', research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports. :'

313 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2011\_United\_States.docx', uscbm\_submit\_date='April 15 2011', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory', street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens', state='GA', zipcode='30605', bsl2\_m2=1138, BSL-3\_m2=624, BSL-4\_m2=0, total\_bsl\_m2=1762, total\_personnel=43, mil\_personnel=0, civ\_personnel=43, total\_scientist=11, total\_engineer=0, total\_technician=19, total\_admin=13, funding\_src='CDC', research\_funding='\$5,800,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding='\$5,800,000', research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

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of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='CDC',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

315 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC',street\_city='8300 Research Plaza Fort Detrick',state='MD',zipcode='21702',bsl2\_m2=1032,BSL-3\_m2=3160,BSL-

4\_m2=976,total\_bsl\_m2=5168,total\_personnel=151,mil\_personnel=0,civ\_personnel=151,total\_scientist=26,total\_engineer=30,total\_technician=53,total\_admin=42,funding\_src='DHS',research\_funding='\$5,298,607',dev\_funding='\$8,339,428',testeval\_funding='\$0',total\_funding='\$13,638,035',research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

316 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC',street\_city='8300 Research Plaza Fort Detrick',state='MD',zipcode='21702',bsl2\_m2=1032,BSL-3\_m2=3160,BSL-

4\_m2=976,total\_bsl\_m2=5168,total\_personnel=151,mil\_personnel=0,civ\_personnel=151,total\_scientist=26,total\_engineer=30,total\_technician=53,total\_admin=42,funding\_src='DHS',research\_funding='\$5,298,607',dev\_funding='\$8,339,428',testeval\_funding='\$0',total\_funding='\$13,638,035',research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

317 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC',street\_city='8300 Research Plaza Fort Detrick',state='MD',zipcode='21702',bsl2\_m2=1032,BSL-3\_m2=3160,BSL-

4\_m2=976,total\_bsl\_m2=5168,total\_personnel=151,mil\_personnel=0,civ\_personnel=151,total\_scientist=26,total\_engineer=30,total\_technician=53,total\_admin=42,funding\_src='DHS',research\_funding='\$5,298,607',dev\_funding='\$8,339,428',testeval\_funding='\$0',total\_funding='\$13,638,035',research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

318 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC',street\_city='8300 Research Plaza Fort Detrick',state='MD',zipcode='21702',bsl2\_m2=1032,BSL-

3\_m2=3160,BSL-  
4\_m2=976,total\_bsl\_m2=5168,total\_personnel=151,mil\_personnel=0,civ\_personnel=151,total\_scientist=26,total\_engineer=30,total\_technician=53,total\_admin=42,funding\_src='DHS',research\_funding='\$5,298,607',dev\_funding='\$8,339,428',testeval\_funding='\$0',total\_funding='\$13,638,035',research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational forensic analysis to support the attribution of planned and actual events of biocrime and bioterrorism.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';  
319 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx',uscbm\_submit\_date='July 9 2012',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Plum Island Animal Disease Center (PIADC)',street\_city='40550 Rte. 25 Orient Point',state='NY',zipcode='11957',bsl2\_m2=234,BSL-3\_m2=17643,BSL-4\_m2=0,total\_bsl\_m2=17877,total\_personnel=357,mil\_personnel=0,civ\_personnel=357,total\_scientist=92,total\_engineer=2,total\_technician=13,total\_admin=250,funding\_src='DHS',research\_funding='\$3,800,000',dev\_funding='\$8,000,000',testeval\_funding='\$4,000,000',total\_funding='\$16,000,000',research\_obj='PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.',agents\_toxin='USDA Select Agents and Toxins';  
320 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx',uscbm\_submit\_date='July 9 2012',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Plum Island Animal Disease Center (PIADC)',street\_city='40550 Rte. 25 Orient Point',state='NY',zipcode='11957',bsl2\_m2=234,BSL-3\_m2=17643,BSL-4\_m2=0,total\_bsl\_m2=17877,total\_personnel=357,mil\_personnel=0,civ\_personnel=357,total\_scientist=92,total\_engineer=2,total\_technician=13,total\_admin=250,funding\_src='DHS',research\_funding='\$3,800,000',dev\_funding='\$8,000,000',testeval\_funding='\$4,000,000',total\_funding='\$16,000,000',research\_obj='PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.',agents\_toxin='USDA Select Agents and Toxins';  
321 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx',uscbm\_submit\_date='July 9 2012',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Plum Island Animal Disease Center (PIADC)',street\_city='40550 Rte. 25 Orient Point',state='NY',zipcode='11957',bsl2\_m2=234,BSL-3\_m2=17643,BSL-4\_m2=0,total\_bsl\_m2=17877,total\_personnel=357,mil\_personnel=0,civ\_personnel=357,total\_scientist=92,total\_engineer=2,total\_technician=13,total\_admin=250,funding\_src='USDA',research\_funding='\$3,800,000',dev\_funding='\$8,000,000',testeval\_funding='\$4,000,000',total\_funding='\$16,000,000',research\_obj='PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.',agents\_toxin='USDA Select Agents and Toxins';  
322 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx',uscbm\_submit\_date='July 9 2012',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Plum Island Animal Disease Center (PIADC)',street\_city='40550 Rte. 25 Orient Point',state='NY',zipcode='11957',bsl2\_m2=234,BSL-3\_m2=17643,BSL-4\_m2=0,total\_bsl\_m2=17877,total\_personnel=357,mil\_personnel=0,civ\_personnel=357,total\_scientist=92,total\_engineer=2,total\_technician=13,total\_admin=250,funding\_src='USDA',research\_funding='\$3,800,000',dev\_funding='\$8,000,000',testeval\_funding='\$4,000,000',total\_funding='\$16,000,000',research\_obj='PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.',agents\_toxin='USDA Select Agents and Toxins';  
323 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx',uscbm\_submit\_date='July 9 2012',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Lothar Salomon Test Facility (LSTF)',street\_city='2029 Burns Rd Dugway',state='UT',zipcode='84022-5006',bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0,total\_bsl\_m2=1158,total\_personnel=60,mil\_personnel=0,civ\_personnel=60,total\_scientist=43,total\_engineer=1,total\_technician=6,total\_admin=10,funding\_src='DOD',research\_funding='\$231,000',dev\_funding='\$0',testeval\_funding='\$4,100,000',total\_funding='\$4,331,000',research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
324 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx',uscbm\_submit\_date='July 9 2012',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Lothar Salomon Test Facility (LSTF)',street\_city='2029 Burns Rd Dugway',state='UT',zipcode='84022-5006',bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0,total\_bsl\_m2=1158,total\_personnel=60,mil\_personnel=0,civ\_personnel=60,total\_scientist=43,total\_engineer=1,total\_technician=6,total\_admin=10,funding\_src='DOD',research\_funding='\$231,000',dev\_funding='\$0',testeval\_funding='\$4,100,000',total\_funding='\$4,331,000',research\_obj='Testing of battlefield detection and identification methods, protective equipment, and

decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.'agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens');

325 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)', street\_city='2029 Burns Rd Dugway', state='UT', zipcode='84022-5006', bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0, total\_bsl\_m2=1158, total\_personnel=60, mil\_personnel=0, civ\_personnel=60, total\_scientist=43, total\_engineer=1, total\_technician=6, total\_admin=10, funding\_src='DOD', research\_funding='\$231,000', dev\_funding='\$0', testeval\_funding='\$4,100,000', total\_funding='\$4,331,000', research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.'agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

326 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)', street\_city='2029 Burns Rd Dugway', state='UT', zipcode='84022-5006', bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0, total\_bsl\_m2=1158, total\_personnel=60, mil\_personnel=0, civ\_personnel=60, total\_scientist=43, total\_engineer=1, total\_technician=6, total\_admin=10, funding\_src='DHS', research\_funding='\$231,000', dev\_funding='\$0', testeval\_funding='\$4,100,000', total\_funding='\$4,331,000', research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.'agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

327 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)', street\_city='2029 Burns Rd Dugway', state='UT', zipcode='84022-5006', bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0, total\_bsl\_m2=1158, total\_personnel=60, mil\_personnel=0, civ\_personnel=60, total\_scientist=43, total\_engineer=1, total\_technician=6, total\_admin=10, funding\_src='DHS', research\_funding='\$231,000', dev\_funding='\$0', testeval\_funding='\$4,100,000', total\_funding='\$4,331,000', research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.'agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

328 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)', street\_city='2029 Burns Rd Dugway', state='UT', zipcode='84022-5006', bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0, total\_bsl\_m2=1158, total\_personnel=60, mil\_personnel=0, civ\_personnel=60, total\_scientist=43, total\_engineer=1, total\_technician=6, total\_admin=10, funding\_src='DHS', research\_funding='\$231,000', dev\_funding='\$0', testeval\_funding='\$4,100,000', total\_funding='\$4,331,000', research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.'agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

329 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)', street\_city='2029 Burns Rd Dugway', state='UT', zipcode='84022-5006', bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0, total\_bsl\_m2=1158, total\_personnel=60, mil\_personnel=0, civ\_personnel=60, total\_scientist=43, total\_engineer=1, total\_technician=6, total\_admin=10, funding\_src='DOJ', research\_funding='\$231,000', dev\_funding='\$0', testeval\_funding='\$4,100,000', total\_funding='\$4,331,000', research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.'agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

330 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)', street\_city='2029 Burns Rd Dugway', state='UT', zipcode='84022-5006', bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0, total\_bsl\_m2=1158, total\_personnel=60, mil\_personnel=0, civ\_personnel=60, total\_scientist=43, total\_engineer=1, total\_technician=6, total\_admin=10, funding\_src='DOJ', research\_funding='\$231,000', dev\_funding='\$0', testeval\_funding='\$4,100,000', total\_funding='\$4,331,000', research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.'agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

331 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)', street\_city='2029 Burns Rd Dugway', state='UT', zipcode='84022-5006', bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0, total\_bsl\_m2=1158, total\_personnel=60, mil\_personnel=0, civ\_personnel=60, total\_scientist=43, total\_engineer=1, total\_technician=6, total\_admin=10, funding\_src='DOJ', research\_funding='\$231,000', dev\_funding='\$0', testeval\_funding='\$4,100,000', total\_funding='\$4,331,000', research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models.'agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

332 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Medical Research Center (NMRC)', street\_city='503 Robert Grant Avenue Silver Spring', state='MD', zipcode='20910', bsl2\_m2=100,BSL-3\_m2=35,BSL-4\_m2=0, total\_bsl\_m2=135, total\_personnel=73, mil\_personnel=12, civ\_personnel=61, total\_scientist=16, total\_engineer=0, total\_techn

ician=50,total\_admin=7,funding\_src='DOD',research\_funding='\$2,999,280',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,999,280',research\_obj='The goal of the program is the development of rapid and deployable detection assays to protect deployed troops. In a continued effort to have better prophylaxis measures, we are studying the potential use of multi-agent vaccines capable of conferring protection against multiple infectious diseases at once.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

333 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Medical Research Center (NMRC)', street\_city='503 Robert Grant Avenue Silver Spring', state='MD', zipcode='20910', bsl2\_m2=100, BSL-3\_m2=35, BSL-4\_m2=0, total\_bsl\_m2=135, total\_personnel=73, mil\_personnel=12, civ\_personnel=61, total\_scientist=16, total\_engineer=0, total\_technician=50, total\_admin=7, funding\_src='DOD', research\_funding='\$2,999,280', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$2,999,280', research\_obj='The goal of the program is the development of rapid and deployable detection assays to protect deployed troops. In a continued effort to have better prophylaxis measures, we are studying the potential use of multi-agent vaccines capable of conferring protection against multiple infectious diseases at once.', agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

334 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Research Laboratory (NRL)', street\_city='4555 Overlook Ave. SW District of Columbia', state='WA', zipcode='20375', bsl2\_m2=1667, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=1667, total\_personnel=48, mil\_personnel=0, civ\_personnel=48, total\_scientist=38, total\_engineer=5, total\_technician=5, total\_admin=0, funding\_src='DOD', research\_funding='\$6,180,000', dev\_funding='\$2,532,000', testeval\_funding='\$0', total\_funding='\$8,712,000', research\_obj='The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

335 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Research Laboratory (NRL)', street\_city='4555 Overlook Ave. SW District of Columbia', state='WA', zipcode='20375', bsl2\_m2=1667, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=1667, total\_personnel=48, mil\_personnel=0, civ\_personnel=48, total\_scientist=38, total\_engineer=5, total\_technician=5, total\_admin=0, funding\_src='DOD', research\_funding='\$6,180,000', dev\_funding='\$2,532,000', testeval\_funding='\$0', total\_funding='\$8,712,000', research\_obj='The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

336 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Research Laboratory (NRL)', street\_city='4555 Overlook Ave. SW District of Columbia', state='WA', zipcode='20375', bsl2\_m2=1667, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=1667, total\_personnel=48, mil\_personnel=0, civ\_personnel=48, total\_scientist=38, total\_engineer=5, total\_technician=5, total\_admin=0, funding\_src='NIH', research\_funding='\$6,180,000', dev\_funding='\$2,532,000', testeval\_funding='\$0', total\_funding='\$8,712,000', research\_obj='The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

337 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Research Laboratory (NRL)', street\_city='4555 Overlook Ave. SW District of Columbia', state='WA', zipcode='20375', bsl2\_m2=1667, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=1667, total\_personnel=48, mil\_personnel=0, civ\_personnel=48, total\_scientist=38, total\_engineer=5, total\_technician=5, total\_admin=0, funding\_src='NIH', research\_funding='\$6,180,000', dev\_funding='\$2,532,000', testeval\_funding='\$0', total\_funding='\$8,712,000', research\_obj='The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

338 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory', street\_city='6149 Welsh Road Dahlgren', state='VA', zipcode='22448-5162', bsl2\_m2=190, BSL-3\_m2=26, BSL-4\_m2=0, total\_bsl\_m2=216, total\_personnel=171, mil\_personnel=0, civ\_personnel=171, total\_scientist=65, total\_engineer=52, total\_technician=13, total\_admin=41, funding\_src='DOD', research\_funding='\$3,222,000', dev\_funding='\$6,210,000', testeval\_funding='\$10,559,000', total\_funding='\$19,991,000', research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

339 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory', street\_city='6149 Welsh Road

Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
4\_m2=0,total\_bsl\_m2=216,total\_personnel=171,mil\_personnel=0,civ\_personnel=171,total\_scientist=65,total\_engineer=52,total\_tec  
hnician=13,total\_admin=41,funding\_src='DOD',research\_funding='\$3,222,000',dev\_funding='\$6,210,000',testeval\_funding='\$10,559  
,000',total\_funding='\$19,991,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems,  
collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management  
planning.',agents\_toxin='Overlap Select Agents (Including NIAID Category A Priority Pathogens)';  
340 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-  
Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare  
Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory',street\_city='6149 Welsh Road  
Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
4\_m2=0,total\_bsl\_m2=216,total\_personnel=171,mil\_personnel=0,civ\_personnel=171,total\_scientist=65,total\_engineer=52,total\_tec  
hnician=13,total\_admin=41,funding\_src='DOD',research\_funding='\$3,222,000',dev\_funding='\$6,210,000',testeval\_funding='\$10,559  
,000',total\_funding='\$19,991,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems,  
collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management  
planning.',agents\_toxin='Other pathogens or toxins';  
341 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-  
Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare  
Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory',street\_city='6149 Welsh Road  
Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
4\_m2=0,total\_bsl\_m2=216,total\_personnel=171,mil\_personnel=0,civ\_personnel=171,total\_scientist=65,total\_engineer=52,total\_tec  
hnician=13,total\_admin=41,funding\_src='Private Sector  
Companies',research\_funding='\$3,222,000',dev\_funding='\$6,210,000',testeval\_funding='\$10,559,000',total\_funding='\$19,991,000',r  
esearch\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection  
systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='HHS Select  
Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
342 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-  
Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare  
Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory',street\_city='6149 Welsh Road  
Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
4\_m2=0,total\_bsl\_m2=216,total\_personnel=171,mil\_personnel=0,civ\_personnel=171,total\_scientist=65,total\_engineer=52,total\_tec  
hnician=13,total\_admin=41,funding\_src='Private Sector  
Companies',research\_funding='\$3,222,000',dev\_funding='\$6,210,000',testeval\_funding='\$10,559,000',total\_funding='\$19,991,000',r  
esearch\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection  
systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='Overlap  
Select Agents (Including NIAID Category A Priority Pathogens)';  
343 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-  
Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare  
Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory',street\_city='6149 Welsh Road  
Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
4\_m2=0,total\_bsl\_m2=216,total\_personnel=171,mil\_personnel=0,civ\_personnel=171,total\_scientist=65,total\_engineer=52,total\_tec  
hnician=13,total\_admin=41,funding\_src='Private Sector  
Companies',research\_funding='\$3,222,000',dev\_funding='\$6,210,000',testeval\_funding='\$10,559,000',total\_funding='\$19,991,000',r  
esearch\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection  
systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='Other  
pathogens or toxins';  
344 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-  
Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare  
Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory',street\_city='6149 Welsh Road  
Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
4\_m2=0,total\_bsl\_m2=216,total\_personnel=171,mil\_personnel=0,civ\_personnel=171,total\_scientist=65,total\_engineer=52,total\_tec  
hnician=13,total\_admin=41,funding\_src='Other Governmental  
Agencies',research\_funding='\$3,222,000',dev\_funding='\$6,210,000',testeval\_funding='\$10,559,000',total\_funding='\$19,991,000',res  
earch\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection  
systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='HHS Select  
Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
345 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-  
Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare  
Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory',street\_city='6149 Welsh Road  
Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
4\_m2=0,total\_bsl\_m2=216,total\_personnel=171,mil\_personnel=0,civ\_personnel=171,total\_scientist=65,total\_engineer=52,total\_tec  
hnician=13,total\_admin=41,funding\_src='Other Governmental  
Agencies',research\_funding='\$3,222,000',dev\_funding='\$6,210,000',testeval\_funding='\$10,559,000',total\_funding='\$19,991,000',res

search\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='Overlap Select Agents (Including NIAID Category A Priority Pathogens)';  
 346 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory',street\_city='6149 Welsh Road Dahlgren',state='VA',zipcode='22448-5162',bsl2\_m2=190,BSL-3\_m2=26,BSL-  
 4\_m2=0,total\_bsl\_m2=216,total\_personnel=171,mil\_personnel=0,civ\_personnel=171,total\_scientist=65,total\_engineer=52,total\_technician=13,total\_admin=41,funding\_src='Other Governmental Agencies',research\_funding='\$3,222,000',dev\_funding='\$6,210,000',testeval\_funding='\$10,559,000',total\_funding='\$19,991,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='Other pathogens or toxins';  
 347 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Tyndall Air Force Base --1',street\_city='3000 Research Road Tyndall AFB',state='FL',zipcode='32403',bsl2\_m2=55,BSL-3\_m2=0,BSL-  
 4\_m2=0,total\_bsl\_m2=55,total\_personnel=7,mil\_personnel=1,civ\_personnel=6,total\_scientist=5,total\_engineer=0,total\_technician=2,total\_admin=0,funding\_src='DOD',research\_funding='\$0',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$0',research\_obj='The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used for defensive purposes to classify the size distribution of bioaerosol challenges as needed.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)';  
 348 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Tyndall Air Force Base --1',street\_city='3000 Research Road Tyndall AFB',state='FL',zipcode='32403',bsl2\_m2=55,BSL-3\_m2=0,BSL-  
 4\_m2=0,total\_bsl\_m2=55,total\_personnel=7,mil\_personnel=1,civ\_personnel=6,total\_scientist=5,total\_engineer=0,total\_technician=2,total\_admin=0,funding\_src='DHS',research\_funding='\$0',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$0',research\_obj='The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used for defensive purposes to classify the size distribution of bioaerosol challenges as needed.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)';  
 349 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Tyndall Air Force Base --1',street\_city='3000 Research Road Tyndall AFB',state='FL',zipcode='32403',bsl2\_m2=55,BSL-3\_m2=0,BSL-  
 4\_m2=0,total\_bsl\_m2=55,total\_personnel=7,mil\_personnel=1,civ\_personnel=6,total\_scientist=5,total\_engineer=0,total\_technician=2,total\_admin=0,funding\_src='Other Governmental Agencies',research\_funding='\$0',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$0',research\_obj='The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used for defensive purposes to classify the size distribution of bioaerosol challenges as needed.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)';  
 350 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Tyndall Air Force Base --2',street\_city='139 Barnes Drive Tyndall AFB',state='FL',zipcode='32403',bsl2\_m2=53,BSL-3\_m2=0,BSL-  
 4\_m2=0,total\_bsl\_m2=53,total\_personnel=21,mil\_personnel=2,civ\_personnel=19,total\_scientist=15,total\_engineer=1,total\_technician=2,total\_admin=3,funding\_src='DOD',research\_funding='\$395,000',dev\_funding='\$1,049,000',testeval\_funding='\$0',total\_funding='\$1,444,000',research\_obj='This facility supports the preparation and characterization of novel chemicals expected to exhibit antimicrobial properties. It also supports research into degradation products formed by exposure of samples of reactive materials to simulant threat agents.',agents\_toxin='None';  
 351 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center',street\_city='5183 Blackhawk Road Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=532,BSL-3\_m2=177,BSL-  
 4\_m2=0,total\_bsl\_m2=709,total\_personnel=0,civ\_personnel=291,total\_scientist=168,total\_engineer=39,total\_technician=28,total\_admin=56,funding\_src='DOD',research\_funding='\$1,270,000',dev\_funding='\$21,403,000',testeval\_funding='\$0',total\_funding='\$22,673,000',research\_obj='Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';  
 352 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center',street\_city='5183 Blackhawk Road Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=532,BSL-3\_m2=177,BSL-  
 4\_m2=0,total\_bsl\_m2=709,total\_personnel=291,mil\_personnel=0,civ\_personnel=291,total\_scientist=168,total\_engineer=39,total\_technician=28,total\_admin=56,funding\_src='DOD',research\_funding='\$1,270,000',dev\_funding='\$21,403,000',testeval\_funding='\$0',total\_funding='\$22,673,000',research\_obj='Development of non-medical defensive material against biological agents to include:

research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';  
353 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center',street\_city='5183 Blackhawk Road Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=532,BSL-3\_m2=177,BSL-4\_m2=0,total\_bsl\_m2=709,total\_personnel=291,mil\_personnel=0,civ\_personnel=291,total\_scientist=168,total\_engineer=39,total\_technician=28,total\_admin=56,funding\_src='DOD',research\_funding='\$1,270,000',dev\_funding='\$21,403,000',testeval\_funding='\$0',total\_funding='\$22,673,000',research\_obj='Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';  
354 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)',street\_city='3100 Ricketts Point Road Aberdeen Proving Ground',state='MD',zipcode='21010-5400',bsl2\_m2=300,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=300,total\_personnel=11,mil\_personnel=1,civ\_personnel=10,total\_scientist=5,total\_engineer=0,total\_technician=6,total\_admin=0,funding\_src='DOD',research\_funding='\$1,399,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$1,399,000',research\_obj='The Institute's mission involves research on medical defenses against neurotoxins.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';  
355 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-4\_m2=1186,total\_bsl\_m2=30351,total\_personnel=837,mil\_personnel=212,civ\_personnel=625,total\_scientist=282,total\_engineer=5,total\_technician=302,total\_admin=248,funding\_src='DOD',research\_funding='\$4,266,000',dev\_funding='\$47,533,000',testeval\_funding='\$7,785,000',total\_funding='\$59,584,000',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';  
356 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-4\_m2=1186,total\_bsl\_m2=30351,total\_personnel=837,mil\_personnel=212,civ\_personnel=625,total\_scientist=282,total\_engineer=5,total\_technician=302,total\_admin=248,funding\_src='DOD',research\_funding='\$4,266,000',dev\_funding='\$47,533,000',testeval\_funding='\$7,785,000',total\_funding='\$59,584,000',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';  
357 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-4\_m2=1186,total\_bsl\_m2=30351,total\_personnel=837,mil\_personnel=212,civ\_personnel=625,total\_scientist=282,total\_engineer=5,total\_technician=302,total\_admin=248,funding\_src='DOD',research\_funding='\$4,266,000',dev\_funding='\$47,533,000',testeval\_funding='\$7,785,000',total\_funding='\$59,584,000',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
358 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-4\_m2=1186,total\_bsl\_m2=30351,total\_personnel=837,mil\_personnel=212,civ\_personnel=625,total\_scientist=282,total\_engineer=5,total\_technician=302,total\_admin=248,funding\_src='DOD',research\_funding='\$4,266,000',dev\_funding='\$47,533,000',testeval\_funding='\$7,785,000',total\_funding='\$59,584,000',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';  
359 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Walter Reed Army

Institute of Research (WRAIR)',street\_city='503 Robert Grant Avenue Silver Spring',state='MD',zipcode='20910',bsl2\_m2=294,BSL-3\_m2=165,BSL-4\_m2=0,total\_bsl\_m2=459,total\_personnel=19,mil\_personnel=3,civ\_personnel=16,total\_scientist=7,total\_engineer=0,total\_technician=12,total\_admin=0,funding\_src='DOD',research\_funding='\$2,080,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,080,000',research\_obj='The Walter Reed Army Institute of Research conducts research on bacterial threat agents, including the study of therapeutics against these agents. Biological defense work at WRAIR was moved to Fort Detrick to comply with U.S. Base Realignment and Closure law. WRAIR had a biological defense program from January 2011 to August 2011.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

360 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Walter Reed Army Institute of Research (WRAIR)',street\_city='503 Robert Grant Avenue Silver Spring',state='MD',zipcode='20910',bsl2\_m2=294,BSL-3\_m2=165,BSL-4\_m2=0,total\_bsl\_m2=459,total\_personnel=19,mil\_personnel=3,civ\_personnel=16,total\_scientist=7,total\_engineer=0,total\_technician=12,total\_admin=0,funding\_src='DOD',research\_funding='\$2,080,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$2,080,000',research\_obj='The Walter Reed Army Institute of Research conducts research on bacterial threat agents, including the study of therapeutics against these agents. Biological defense work at WRAIR was moved to Fort Detrick to comply with U.S. Base Realignment and Closure law. WRAIR had a biological defense program from January 2011 to August 2011.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

361 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=185,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=185,total\_personnel=18,mil\_personnel=0,civ\_personnel=18,total\_scientist=14,total\_engineer=0,total\_technician=4,total\_admin=0,funding\_src='DOD',research\_funding='\$6,343,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$6,343,000',research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

362 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=185,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=185,total\_personnel=18,mil\_personnel=0,civ\_personnel=18,total\_scientist=14,total\_engineer=0,total\_technician=4,total\_admin=0,funding\_src='DOD',research\_funding='\$6,343,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$6,343,000',research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.',agents\_toxin='Other pathogens or toxins';

363 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=185,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=185,total\_personnel=18,mil\_personnel=0,civ\_personnel=18,total\_scientist=14,total\_engineer=0,total\_technician=4,total\_admin=0,funding\_src='DOE',research\_funding='\$6,343,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$6,343,000',research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

364 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory',street\_city='Brookhaven National Laboratory Biology Department Upton',state='NY',zipcode='11973-5000',bsl2\_m2=185,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=185,total\_personnel=18,mil\_personnel=0,civ\_personnel=18,total\_scientist=14,total\_engineer=0,total\_technician=4,total\_admin=0,funding\_src='DOE',research\_funding='\$6,343,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$6,343,000',research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to

determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.',agents\_toxin='Other pathogens or toxins';

365 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory', street\_city='Brookhaven National Laboratory Biology Department Upton', state='NY', zipcode='11973-5000', bsl2\_m2=185, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=185, total\_personnel=18, mil\_personnel=0, civ\_personnel=18, total\_scientist=14, total\_engineer=0, total\_technician=4, total\_admin=0, funding\_src='DHHS', research\_funding='\$6,343,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$6,343,000', research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

366 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory', street\_city='Brookhaven National Laboratory Biology Department Upton', state='NY', zipcode='11973-5000', bsl2\_m2=185, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=185, total\_personnel=18, mil\_personnel=0, civ\_personnel=18, total\_scientist=14, total\_engineer=0, total\_technician=4, total\_admin=0, funding\_src='DHHS', research\_funding='\$6,343,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$6,343,000', research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

367 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory', street\_city='Brookhaven National Laboratory Biology Department Upton', state='NY', zipcode='11973-5000', bsl2\_m2=185, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=185, total\_personnel=18, mil\_personnel=0, civ\_personnel=18, total\_scientist=14, total\_engineer=0, total\_technician=4, total\_admin=0, funding\_src='Other Governmental Agencies', research\_funding='\$6,343,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$6,343,000', research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

368 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory', street\_city='Brookhaven National Laboratory Biology Department Upton', state='NY', zipcode='11973-5000', bsl2\_m2=185, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=185, total\_personnel=18, mil\_personnel=0, civ\_personnel=18, total\_scientist=14, total\_engineer=0, total\_technician=4, total\_admin=0, funding\_src='Other Governmental Agencies', research\_funding='\$6,343,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$6,343,000', research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

369 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Idaho National Laboratory', street\_city='National Laboratory 2525 Fremont Ave. Idaho Falls Idaho', state='ID', zipcode='83415-2203', bsl2\_m2=90, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=90, total\_personnel=6, mil\_personnel=0, civ\_personnel=6, total\_scientist=6, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='DHS', research\_funding='\$0', dev\_funding='\$0', testeval\_funding='\$280,000', total\_funding='\$280,000', research\_obj='Viability testing subsequent to decontamination using Bacillus atropphaeus as a simulant for B. anthracis. No funded

work with Brucella in 2011, but viable culture collection is maintained.',agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens)';  
370 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Idaho National Laboratory', street\_city='National Laboratory 2525 Fremont Ave. Idaho Falls Idaho', state='ID', zipcode='83415-2203', bsl2\_m2=90, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=90, total\_personnel=6, mil\_personnel=0, civ\_personnel=6, total\_scientist=6, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='DHS', research\_funding='\$0', dev\_funding='\$0', testeval\_funding='\$280,000', total\_funding='\$280,000', research\_obj='Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2011, but viable culture collection is maintained.', agents\_toxin='Other pathogens or toxins';  
371 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Idaho National Laboratory', street\_city='National Laboratory 2525 Fremont Ave. Idaho Falls Idaho', state='ID', zipcode='83415-2203', bsl2\_m2=90, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=90, total\_personnel=6, mil\_personnel=0, civ\_personnel=6, total\_scientist=6, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='EPA', research\_funding='\$0', dev\_funding='\$0', testeval\_funding='\$280,000', total\_funding='\$280,000', research\_obj='Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2011, but viable culture collection is maintained.', agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens)';  
372 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Idaho National Laboratory', street\_city='National Laboratory 2525 Fremont Ave. Idaho Falls Idaho', state='ID', zipcode='83415-2203', bsl2\_m2=90, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=90, total\_personnel=6, mil\_personnel=0, civ\_personnel=6, total\_scientist=6, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='EPA', research\_funding='\$0', dev\_funding='\$0', testeval\_funding='\$280,000', total\_funding='\$280,000', research\_obj='Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2011, but viable culture collection is maintained.', agents\_toxin='Other pathogens or toxins';  
373 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lawrence Berkeley National Laboratory (LBNL)', street\_city='Lawrence Berkeley National Lab 1 Cyclotron Road Berkeley', state='CA', zipcode='94720', bsl2\_m2=130, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=130, total\_personnel=6, mil\_personnel=0, civ\_personnel=6, total\_scientist=3, total\_engineer=0, total\_technician=3, total\_admin=0, funding\_src='DHHS', research\_funding='\$200,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$200,000', research\_obj='No biological defense work currently. We are writing manuscripts from previous biological defense work on strain typing in Francisella. We currently have no live isolates or DNA from any Select Agent.', agents\_toxin='None';  
374 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lawrence Livermore National Laboratory (LLNL)', street\_city='Lawrence Livermore National Laboratory 7000 East Avenue Livermore', state='CA', zipcode='94550', bsl2\_m2=1414, BSL-3\_m2=60, BSL-4\_m2=0, total\_bsl\_m2=1474, total\_personnel=124, mil\_personnel=0, civ\_personnel=124, total\_scientist=78, total\_engineer=3, total\_technician=17, total\_admin=26, funding\_src='DOD', research\_funding='\$23,514,000', dev\_funding='\$0', testeval\_funding='\$3,495,000', total\_funding='\$27,009,000', research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, post- decontamination agent viability testing, response planning, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological attack. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects whose goal is to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
375 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lawrence Livermore National Laboratory (LLNL)', street\_city='Lawrence Livermore National Laboratory 7000 East Avenue

Livermore',state='CA',zipcode='94550',bsl2\_m2=1414,BSL-3\_m2=60,BSL-4\_m2=0,total\_bsl\_m2=1474,total\_personnel=124,mil\_personnel=0,civ\_personnel=124,total\_scientist=78,total\_engineer=3,total\_technician=17,total\_admin=26,funding\_src='DOD',research\_funding='\$23,514,000',dev\_funding='\$0',testeval\_funding='\$3,495,000',total\_funding='\$27,009,000',research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, post- decontamination agent viability testing, response planning, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological attack. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects whose goal is to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens');

376 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx',uscbm\_submit\_date='July 9 2012',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Lawrence Livermore National Laboratory (LLNL)',street\_city='Lawrence Livermore National Laboratory 7000 East Avenue Livermore',state='CA',zipcode='94550',bsl2\_m2=1414,BSL-3\_m2=60,BSL-4\_m2=0,total\_bsl\_m2=1474,total\_personnel=124,mil\_personnel=0,civ\_personnel=124,total\_scientist=78,total\_engineer=3,total\_technician=17,total\_admin=26,funding\_src='DOD',research\_funding='\$23,514,000',dev\_funding='\$0',testeval\_funding='\$3,495,000',total\_funding='\$27,009,000',research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, post- decontamination agent viability testing, response planning, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological attack. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects whose goal is to help elucidate the mechanism of host-pathogen interactions. The goal of this research is to understand how an organism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies that are specifically targeted to steps in the organism life cycle. LLNL is also involved in the search for new compounds that can be used as effective intervention strategies as well as the development of novel vaccine strategies for disease prevention.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens');

377 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx',uscbm\_submit\_date='July 9 2012',uscbm\_form\_section='CBM-Form-A, Part 2',facility\_name='Lawrence Livermore National Laboratory (LLNL)',street\_city='Lawrence Livermore National Laboratory 7000 East Avenue Livermore',state='CA',zipcode='94550',bsl2\_m2=1414,BSL-3\_m2=60,BSL-4\_m2=0,total\_bsl\_m2=1474,total\_personnel=124,mil\_personnel=0,civ\_personnel=124,total\_scientist=78,total\_engineer=3,total\_technician=17,total\_admin=26,funding\_src='DHS',research\_funding='\$23,514,000',dev\_funding='\$0',testeval\_funding='\$3,495,000',total\_funding='\$27,009,000',research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, post- decontamination agent viability testing, response planning, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological attack. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an

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4\_m2=0, total\_bsl\_m2=1474, total\_personnel=124, mil\_personnel=0, civ\_personnel=124, total\_scientist=78, total\_engineer=3, total\_technician=17, total\_admin=26, funding\_src='DHS', research\_funding='\$23,514,000', dev\_funding='\$0', testeval\_funding='\$3,495,000', total\_funding='\$27,009,000', research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, post- decontamination agent viability testing, response planning, and forensics. The biological detection platforms being developed at LLNL include multiplex assays, the Autonomous Pathogen Detection System (APDS), Biological Aerosol Mass Spectrometry (BAMS), Enhanced Biological Aerosol Detection System (EDBADS), and the Viral Discovery Platform (VDP). LLNL is also working to support and upgrade the biological detection network put in place by DHS known as BioWatch. Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for the various detection platforms. The development and screening of new DNA/RNA based assays is also a core area of expertise at LLNL. Testing and validation of new hardware components, and training for the BioWatch network is another area where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological attack. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine where an agent may have come from and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects whose goal is to help elucidate the mechanism of host-pathogen interactions.

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395 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory (LANL)', street\_city='Los Alamos National Laboratory P. O. Box 1663 Los Alamos', state='NM', zipcode='87545', bsl2\_m2=346, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=346, total\_personnel=64, mil\_personnel=0, civ\_personnel=64, total\_scientist=27, total\_engineer=6, total\_technician=28, total\_admin=3, funding\_src='DOD', research\_funding='\$9,452,000', dev\_funding='\$5,393,000', testevel\_funding='\$8,840,000', total\_funding='\$23,685,000', research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA Plant Protection and Quarantine (PPQ) Select Agents and Toxins';  
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402 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory (LANL)', street\_city='Los Alamos National Laboratory P. O. Box 1663 Los Alamos', state='NM', zipcode='87545', bsl2\_m2=346, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=346, total\_personnel=64, mil\_personnel=0, civ\_personnel=64, total\_scientist=27, total\_engineer=6, total\_technician=28, total\_admin=3, funding\_src='DOE', research\_funding='\$9,452,000', dev\_funding='\$5,393,000', testeval\_funding='\$8,840,000', total\_funding='\$23,685,000', research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.' ,agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

403 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory (LANL)', street\_city='Los Alamos National Laboratory P. O. Box 1663 Los Alamos', state='NM', zipcode='87545', bsl2\_m2=346, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=346, total\_personnel=64, mil\_personnel=0, civ\_personnel=64, total\_scientist=27, total\_engineer=6, total\_technician=28, total\_admin=3, funding\_src='DOE', research\_funding='\$9,452,000', dev\_funding='\$5,393,000', testeval\_funding='\$8,840,000', total\_funding='\$23,685,000', research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.' ,agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

404 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory (LANL)', street\_city='Los Alamos National Laboratory P. O. Box 1663 Los Alamos', state='NM', zipcode='87545', bsl2\_m2=346, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=346, total\_personnel=64, mil\_personnel=0, civ\_personnel=64, total\_scientist=27, total\_engineer=6, total\_technician=28, total\_admin=3, funding\_src='DOE', research\_funding='\$9,452,000', dev\_funding='\$5,393,000', testeval\_funding='\$8,840,000', total\_funding='\$23,685,000', research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.' ,agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

405 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory (LANL)', street\_city='Los Alamos National Laboratory P. O. Box 1663 Los Alamos', state='NM', zipcode='87545', bsl2\_m2=346, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=346, total\_personnel=64, mil\_personnel=0, civ\_personnel=64, total\_scientist=27, total\_engineer=6, total\_technician=28, total\_admin=3, funding\_src='DOE', research\_funding='\$9,452,000', dev\_funding='\$5,393,000', testeval\_funding='\$8,840,000', total\_funding='\$23,685,000', research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and

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406 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory (LANL)', street\_city='Los Alamos National Laboratory P. O. Box 1663 Los Alamos', state='NM', zipcode='87545', bsl2\_m2=346, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=346, total\_personnel=64, mil\_personnel=0, civ\_personnel=64, total\_scientist=27, total\_engineer=6, total\_technician=28, total\_admin=3, funding\_src='DOE', research\_funding='\$9,452,000', dev\_funding='\$5,393,000', testeval\_funding='\$8,840,000', total\_funding='\$23,685,000', research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

407 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory (LANL)', street\_city='Los Alamos National Laboratory P. O. Box 1663 Los Alamos', state='NM', zipcode='87545', bsl2\_m2=346, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=346, total\_personnel=64, mil\_personnel=0, civ\_personnel=64, total\_scientist=27, total\_engineer=6, total\_technician=28, total\_admin=3, funding\_src='DHHS', research\_funding='\$9,452,000', dev\_funding='\$5,393,000', testeval\_funding='\$8,840,000', total\_funding='\$23,685,000', research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

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,total\_funding='\$23,685,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category B Priority Pathogens)';

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Alamos',state='NM',zipcode='87545',bsl2\_m2=346,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=346,total\_personnel=64,mil\_personnel=0,civ\_personnel=64,total\_scientist=27,total\_engineer=6,total\_technician=28,total\_admin=3,funding\_src='Other Governmental Agencies',research\_funding='\$9,452,000',dev\_funding='\$5,393,000',testeval\_funding='\$8,840,000',total\_funding='\$23,685,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

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415 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Los Alamos National Laboratory (LANL)',street\_city='Los Alamos National Laboratory P. O. Box 1663 Los Alamos',state='NM',zipcode='87545',bsl2\_m2=346,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=346,total\_personnel=64,mil\_personnel=0,civ\_personnel=64,total\_scientist=27,total\_engineer=6,total\_technician=28,total\_admin=3,funding\_src='Other Governmental Agencies',research\_funding='\$9,452,000',dev\_funding='\$5,393,000',testeval\_funding='\$8,840,000',total\_funding='\$23,685,000',research\_obj='The biological defense research at the Los Alamos National Laboratory includes the following areas: pathogen signature identification, host-pathogen interaction characterization, biothreat agent virulence study, and pathogen detection technology development. The main objectives for these research and development activities are to: understand molecular mechanisms of host-pathogen interaction, study molecular, chemical, and physical signatures of biothreat agents for pathogen detection and characterization; study microbial organism genetic variations for detection assay design and improvement; evaluate detection assay and platform performance; improve sample collection techniques; develop environmental sample analysis and pathogen fate analysis techniques; develop DNA, RNA and protein based detection and bioforensics assays; develop next generation high throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='USDA Plant Protection and Quarantine (PPQ) Select Agents and Toxins';

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throughput microbial sequencing and finishing capabilities; develop high throughput assays for host-pathogen protein interactions screening; and identify host molecular targets as potential therapeutic candidates.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens');

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450 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2325, BSL-

4\_m2=543, total\_bsl\_m2=3162, total\_personnel=238, mil\_personnel=0, civ\_personnel=238, total\_scientist=206, total\_engineer=0, total\_technician=30, total\_admin=2, funding\_src='DHHS', research\_funding='\$12,814,857', dev\_funding='\$3,121,248', testevel\_funding='\$4,072,632', total\_funding='\$20,008,737', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='USDA Select Agents and Toxins' ;

451 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2325, BSL-

4\_m2=543, total\_bsl\_m2=3162, total\_personnel=238, mil\_personnel=0, civ\_personnel=238, total\_scientist=206, total\_engineer=0, total\_technician=30, total\_admin=2, funding\_src='DHHS', research\_funding='\$12,814,857', dev\_funding='\$3,121,248', testevel\_funding='\$4,072,632', total\_funding='\$20,008,737', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='Other pathogens or toxins' ;

452 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2325, BSL-

4\_m2=543, total\_bsl\_m2=3162, total\_personnel=238, mil\_personnel=0, civ\_personnel=238, total\_scientist=206, total\_engineer=0, total\_technician=30, total\_admin=2, funding\_src='EPA', research\_funding='\$12,814,857', dev\_funding='\$3,121,248', testevel\_funding='\$4,072,632', total\_funding='\$20,008,737', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)' ;

453 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2325, BSL-

4\_m2=543, total\_bsl\_m2=3162, total\_personnel=238, mil\_personnel=0, civ\_personnel=238, total\_scientist=206, total\_engineer=0, total\_technician=30, total\_admin=2, funding\_src='EPA', research\_funding='\$12,814,857', dev\_funding='\$3,121,248', testevel\_funding='\$4,072,632', total\_funding='\$20,008,737', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)' ;

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455 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2325, BSL-

4\_m2=543, total\_bsl\_m2=3162, total\_personnel=238, mil\_personnel=0, civ\_personnel=238, total\_scientist=206, total\_engineer=0, total\_technician=30, total\_admin=2, funding\_src='EPA', research\_funding='\$12,814,857', dev\_funding='\$3,121,248', testevel\_funding='\$4,072,632', total\_funding='\$20,008,737', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='Other pathogens or toxins' ;

456 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2325, BSL-4\_m2=543, total\_bsl\_m2=3162, total\_personnel=238, mil\_personnel=0, civ\_personnel=238, total\_scientist=206, total\_engineer=0, total\_technician=30, total\_admin=2, funding\_src='CDC', research\_funding='\$12,814,857', dev\_funding='\$3,121,248', testeval\_funding='\$4,072,632', total\_funding='\$20,008,737', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

457 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2325, BSL-4\_m2=543, total\_bsl\_m2=3162, total\_personnel=238, mil\_personnel=0, civ\_personnel=238, total\_scientist=206, total\_engineer=0, total\_technician=30, total\_admin=2, funding\_src='CDC', research\_funding='\$12,814,857', dev\_funding='\$3,121,248', testeval\_funding='\$4,072,632', total\_funding='\$20,008,737', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

458 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2325, BSL-4\_m2=543, total\_bsl\_m2=3162, total\_personnel=238, mil\_personnel=0, civ\_personnel=238, total\_scientist=206, total\_engineer=0, total\_technician=30, total\_admin=2, funding\_src='CDC', research\_funding='\$12,814,857', dev\_funding='\$3,121,248', testeval\_funding='\$4,072,632', total\_funding='\$20,008,737', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='USDA Select Agents and Toxins';

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461 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins', street\_city='CDC DHHS 3150 Rampart Road Fort Collins', state='CO', zipcode='80521', bsl2\_m2=66, BSL-3\_m2=1142, BSL-4\_m2=0, total\_bsl\_m2=1208, total\_personnel=67, mil\_personnel=0, civ\_personnel=67, total\_scientist=54, total\_engineer=0, total\_technician=10, total\_admin=3, funding\_src='DOD', research\_funding='\$1,220,244', dev\_funding='\$610,121', testeval\_funding='\$610,121', total\_funding='\$2,440,486', research\_obj='DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.', agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens)';

462 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins', street\_city='CDC DHHS 3150 Rampart Road Fort Collins', state='CO', zipcode='80521', bsl2\_m2=66, BSL-3\_m2=1142, BSL-4\_m2=0, total\_bsl\_m2=1208, total\_personnel=67, mil\_personnel=0, civ\_personnel=67, total\_scientist=54, total\_engineer=0, total\_technician=10, total\_admin=3, funding\_src='DOD', research\_funding='\$1,220,244', dev\_funding='\$610,121', testeval\_funding='\$610,121', total\_funding='\$2,440,486', research\_obj='DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)';

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468 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins', street\_city='CDC DHHS 3150 Rampart Road Fort Collins', state='CO', zipcode='80521', bsl2\_m2=66, BSL-3\_m2=1142, BSL-4\_m2=0, total\_bsl\_m2=1208, total\_personnel=67, mil\_personnel=0, civ\_personnel=67, total\_scientist=54, total\_engineer=0, total\_technician=10, total\_admin=3, funding\_src='CDC', research\_funding='\$1,220,244', dev\_funding='\$610,121', testeval\_funding='\$610,121', total\_funding='\$2,440,486', research\_obj='DVBD possesses many of the select agents that are on the Department of Health and Human Services and HHS/US Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)';  
469 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)', street\_city='903 South 4th St. Hamilton', state='MT', zipcode='59840', bsl2\_m2=1361, BSL-3\_m2=56, BSL-4\_m2=631, total\_bsl\_m2=2048, total\_personnel=96, mil\_personnel=0, civ\_personnel=96, total\_scientist=70, total\_engineer=0, total\_technician=23, total\_admin=3, funding\_src='DHHS', research\_funding='\$24,946,139', dev\_funding='\$0', testeval\_funding='\$0', total\_funding=\$24,946,139', research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';  
470 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)', street\_city='903 South 4th St. Hamilton', state='MT', zipcode='59840', bsl2\_m2=1361, BSL-3\_m2=56, BSL-4\_m2=631, total\_bsl\_m2=2048, total\_personnel=96, mil\_personnel=0, civ\_personnel=96, total\_scientist=70, total\_engineer=0, total\_technician=23, total\_admin=3, funding\_src='DHHS', research\_funding='\$24,946,139', dev\_funding='\$0', testeval\_funding='\$0', total\_funding=\$24,946,139', research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.', agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';  
471 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)', street\_city='903 South 4th St. Hamilton', state='MT', zipcode='59840', bsl2\_m2=1361, BSL-3\_m2=56, BSL-4\_m2=631, total\_bsl\_m2=2048, total\_personnel=96, mil\_personnel=0, civ\_personnel=96, total\_scientist=70, total\_engineer=0, total\_technician=23, total\_admin=3, funding\_src='DHHS', research\_funding='\$24,946,139', dev\_funding='\$0', testeval\_funding='\$0', total\_funding=\$24,946,139', research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.', agents\_toxin='USDA Select Agents and Toxins';  
472 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Integrated Research

Facility (IRF) - Rocky Mountain Laboratories (RML)',street\_city='903 South 4th St. Hamilton',state='MT',zipcode='59840',bsl2\_m2=1361,BSL-3\_m2=56,BSL-4\_m2=631,total\_bsl\_m2=2048,total\_personnel=96,mil\_personnel=0,civ\_personnel=96,total\_scientist=70,total\_engineer=0,total\_technician=23,total\_admin=3,funding\_src='DHHS',research\_funding='\$24,946,139',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$24,946,139',research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination of viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)'.

473 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH , C.W. Bill Young Center for Biodefense and Emerging\_Infectious Diseases',street\_city='NIH DHHS 9000 Rockville Pike Bethesda',state='MD',zipcode='20892',bsl2\_m2=2493,BSL-3\_m2=1091,BSL-4\_m2=0,total\_bsl\_m2=3584,total\_personnel=120,mil\_personnel=0,civ\_personnel=120,total\_scientist=91,total\_engineer=0,total\_technician=24,total\_admin=5,funding\_src='DHHS',research\_funding='\$36,223,033',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$36,223,033',research\_obj='At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)'.

474 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH , C.W. Bill Young Center for Biodefense and Emerging\_Infectious Diseases',street\_city='NIH DHHS 9000 Rockville Pike Bethesda',state='MD',zipcode='20892',bsl2\_m2=2493,BSL-3\_m2=1091,BSL-4\_m2=0,total\_bsl\_m2=3584,total\_personnel=120,mil\_personnel=0,civ\_personnel=120,total\_scientist=91,total\_engineer=0,total\_technician=24,total\_admin=5,funding\_src='DHHS',research\_funding='\$36,223,033',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$36,223,033',research\_obj='At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A Priority Pathogens)'.

475 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH , C.W. Bill Young Center for Biodefense and Emerging\_Infectious Diseases',street\_city='NIH DHHS 9000 Rockville Pike Bethesda',state='MD',zipcode='20892',bsl2\_m2=2493,BSL-3\_m2=1091,BSL-4\_m2=0,total\_bsl\_m2=3584,total\_personnel=120,mil\_personnel=0,civ\_personnel=120,total\_scientist=91,total\_engineer=0,total\_technician=24,total\_admin=5,funding\_src='DHHS',research\_funding='\$36,223,033',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$36,223,033',research\_obj='At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.',agents\_toxin='USDA Select Agents and Toxins'.

476 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH , C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=2493, BSL-3\_m2=1091, BSL-4\_m2=0, total\_bsl\_m2=3584, total\_personnel=120, mil\_personnel=0, civ\_personnel=120, total\_scientist=91, total\_engineer=0, total\_technician=24, total\_admin=5, funding\_src='DHHS', research\_funding='\$36,223,033', dev\_funding='\$0', testeval\_funding='\$0', total\_funding=\$'36,223,033', research\_obj='At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

477 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH , Dale and Betty Bumpers Vaccine Research Center', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=89, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=89, total\_personnel=8, mil\_personnel=0, civ\_personnel=8, total\_scientist=8, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='DHHS', research\_funding='\$774,548', dev\_funding='\$0', testeval\_funding='\$0', total\_funding=\$'774,548', research\_obj='The research focus of the Biodefense Research Laboratory, Vaccine Research Center (VRC) comprises three areas: 1. Development of vaccines and antivirals 2. Studies of the mechanism of vaccine-induced immune protection 3. Basic research to understand the mechanism of virus replication (entry) and neutralization', agents\_toxin='Other pathogens or toxins';

478 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Foreign Disease-Weed Science Research Unit', street\_city='1301 Ditto Avenue Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=105, BSL-3\_m2=950, BSL-4\_m2=0, total\_bsl\_m2=1055, total\_personnel=36, mil\_personnel=0, civ\_personnel=36, total\_scientist=13, total\_engineer=0, total\_technician=16, total\_admin=7, funding\_src='USDA', research\_funding='\$5,600,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding=\$'5,600,000', research\_obj='The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides.', agents\_toxin='USDA Plant Protection and Quarantine (PPQ) Select Agents and Toxins';

479 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Foreign Disease-Weed Science Research Unit', street\_city='1301 Ditto Avenue Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=105, BSL-3\_m2=950, BSL-4\_m2=0, total\_bsl\_m2=1055, total\_personnel=36, mil\_personnel=0, civ\_personnel=36, total\_scientist=13, total\_engineer=0, total\_technician=16, total\_admin=7, funding\_src='USDA', research\_funding='\$5,600,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding=\$'5,600,000', research\_obj='The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides.', agents\_toxin='Other pathogens or toxins. The agents studied (ie., viruses, bacteria, and fungi) are foreign and/or emerging pathogens of plants that have an agricultural base. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that pose a threat to US plant production systems, US agricultural economy, and exports.';

480 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410, BSL-3\_m2=2489, BSL-4\_m2=0, total\_bsl\_m2=6899, total\_personnel=282, mil\_personnel=0, civ\_personnel=282, total\_scientist=46, total\_engineer=0, total\_technician=80, total\_admin=156, funding\_src='Private Sector Companies', research\_funding='\$32,000,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding=\$'32,000,000', research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and

endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and

improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens)';

481 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410,BSL-3\_m2=2489,BSL-4\_m2=0, total\_bsl\_m2=6899, total\_personnel=282, mil\_personnel=0, civ\_personnel=282, total\_scientist=46, total\_engineer=0, total\_technician=80, total\_admin=156, funding\_src='Private Sector'

Companies', research\_funding='\$32,000,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$32,000,000', research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and

improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='USDA Select Agents and Toxins' ;

482 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410,BSL-3\_m2=2489,BSL-4\_m2=0, total\_bsl\_m2=6899, total\_personnel=282, mil\_personnel=0, civ\_personnel=282, total\_scientist=46, total\_engineer=0, total\_technician=80, total\_admin=156, funding\_src='Private Sector'

Companies', research\_funding='\$32,000,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$32,000,000', research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and

improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports.';

483 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410,BSL-3\_m2=2489,BSL-4\_m2=0, total\_bsl\_m2=6899, total\_personnel=282, mil\_personnel=0, civ\_personnel=282, total\_scientist=46, total\_engineer=0, total\_technician=80, total\_admin=156, funding\_src='USDA', research\_funding='\$32,000,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$32,000,000', research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and

improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens)' ;

484 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410,BSL-3\_m2=2489,BSL-

4\_m2=0,total\_bsl\_m2=6899,total\_personnel=282,mil\_personnel=0,civ\_personnel=282,total\_scientist=46,total\_engineer=0,total\_technician=80,total\_admin=156,funding\_src='USDA',research\_funding='\$32,000,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$32,000,000',research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='USDA Select Agents and Toxins'':

485 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410, bsl3\_m2=2489, bsl4\_m2=0, total\_bsl\_m2=6899, total\_personnel=282, mil\_personnel=0, civ\_personnel=282, total\_scientist=46, total\_engineer=0, total\_technician=80, total\_admin=156, funding\_src='USDA', research\_funding='\$32,000,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$32,000,000', research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)'. The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US animal production systems, US agricultural economy, and agricultural exports. ':

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Agencies', research\_funding='\$32,000,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding='\$32,000,000', research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease;

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Associations',research\_funding='\$32,000,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$32,000,000',research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens)':

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499 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410, BSL-3\_m2=2489, BSL-4\_m2=0, total\_bsl\_m2=6899, total\_personnel=282, mil\_personnel=0, civ\_personnel=282, total\_scientist=46, total\_engineer=0, total\_technician=80, total\_admin=156, funding\_src='Department of Defense', research\_funding='\$32,000,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$32,000,000', research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.', agents\_toxin='USDA Select Agents and Toxins';

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501 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory', street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens', state='GA', zipcode='30605', bsl2\_m2=1138, BSL-3\_m2=624, BSL-4\_m2=0, total\_bsl\_m2=1762, total\_personnel=43, mil\_personnel=0, civ\_personnel=43, total\_scientist=11, total\_engineer=0, total\_technician=19, total\_admin=13, funding\_src='DOD', research\_funding='\$5,800,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$5,800,000', research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.', agents\_toxin='USDA Select Agents and Toxins';

502 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory', street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens', state='GA', zipcode='30605', bsl2\_m2=1138, BSL-3\_m2=624, BSL-4\_m2=0, total\_bsl\_m2=1762, total\_personnel=43, mil\_personnel=0, civ\_personnel=43, total\_scientist=11, total\_engineer=0, total\_technician=19, total\_admin=13, funding\_src='DOD', research\_funding='\$5,800,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$5,800,000', research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from

impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.' ,agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports. ';

503 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='NIH',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.' ,agents\_toxin='USDA Select Agents and Toxins' ;

504 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='NIH',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.' ,agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports. ';

505 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='Private Sector Companies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved

intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins'; 506 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='Private Sector Companies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

507 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='USDA',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins'; 508 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='USDA',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

509 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry

Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='Other Governmental Agencies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. 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The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.'; 511 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='Non-profit Associations',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. 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The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins'; 512 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='Non-profit Associations',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease

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513 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='CDC',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests; develop vaccines designed for the control and, when feasible, the eradication of disease; improve our

understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins';

514 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2012\_USA-Public.docx', uscbm\_submit\_date='July 9 2012', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=11,total\_engineer=0,total\_technician=19,total\_admin=13,funding\_src='CDC',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; develop more sensitive, specific and faster diagnostic tests;

develop vaccines designed for the control and, when feasible, the eradication of disease; improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

515 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC',street\_city='8300 Research Plaza Fort Detrick',state='MD',zipcode='21702',bsl2\_m2=1282,BSL-3\_m2=2564,BSL-

4\_m2=980,total\_bsl\_m2=4826,total\_personnel=143,mil\_personnel=0,civ\_personnel=143,total\_scientist=23,total\_engineer=30,total\_technician=47,total\_admin=43,funding\_src='DOD',research\_funding='\$3,033,517',dev\_funding='\$6,579,127',testeval\_funding='\$0',total\_funding='\$9,612,644',research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

516 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DOD', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testevel\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

517 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DOD', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testevel\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

518 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DOD', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testevel\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

519 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DHS', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testevel\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

520 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DHS', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testevel\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed,

NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.'agents\_toxin='Overlap Select Agents ( Including NIAID Category A, B and C Priority Pathogens)';

521 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-

4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DHS', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testeval\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

522 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-

4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DHS', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testeval\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

523 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-

4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DOJ', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testeval\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

524 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-

4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DOJ', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testeval\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='Overlap Select Agents ( Including NIAID Category A, B and C Priority Pathogens)';

525 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-

4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DOJ', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testeval\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of

biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)':  
526 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NBACC', street\_city='8300 Research Plaza Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=1282, BSL-3\_m2=2564, BSL-4\_m2=980, total\_bsl\_m2=4826, total\_personnel=143, mil\_personnel=0, civ\_personnel=143, total\_scientist=23, total\_engineer=30, total\_technician=47, total\_admin=43, funding\_src='DOJ', research\_funding='\$3,033,517', dev\_funding='\$6,579,127', testeval\_funding='\$0', total\_funding='\$9,612,644', research\_obj='The NBACC mission is to provide the nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution investigations. NBACC conducts studies to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities; and to determine potential impacts to guide the development of biological countermeasures such as detectors, drugs, vaccines, and decontamination technologies. When needed, NBACC conducts experimental programs to better characterize the benefits and risks of changes in U.S. biodefense preparations. NBACC also develops bioforensic assays and provides operational bioforensic analysis to support the attribution of biocrime and bioterrorism.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)':  
527 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Plum Island Animal Disease Center (PIADC)', street\_city='40550 Route 25 Orient Point', state='NY', zipcode='11957', bsl2\_m2=292, BSL-3\_m2=18046, BSL-4\_m2=0, total\_bsl\_m2=18338, total\_personnel=385, mil\_personnel=0, civ\_personnel=385, total\_scientist=97, total\_engineer=2, total\_technician=21, total\_admin=265, funding\_src='DHS', research\_funding='\$4,000,000', dev\_funding='\$11,000,000', testeval\_funding='\$5,000,000', total\_funding='\$20,000,000', research\_obj='PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.', agents\_toxin='USDA Select Agents and Toxins':  
528 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Plum Island Animal Disease Center (PIADC)', street\_city='40550 Route 25 Orient Point', state='NY', zipcode='11957', bsl2\_m2=292, BSL-3\_m2=18046, BSL-4\_m2=0, total\_bsl\_m2=18338, total\_personnel=385, mil\_personnel=0, civ\_personnel=385, total\_scientist=97, total\_engineer=2, total\_technician=21, total\_admin=265, funding\_src='DHS', research\_funding='\$4,000,000', dev\_funding='\$11,000,000', testeval\_funding='\$5,000,000', total\_funding='\$20,000,000', research\_obj='PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.', agents\_toxin='Other pathogens or toxins':  
529 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Plum Island Animal Disease Center (PIADC)', street\_city='40550 Route 25 Orient Point', state='NY', zipcode='11957', bsl2\_m2=292, BSL-3\_m2=18046, BSL-4\_m2=0, total\_bsl\_m2=18338, total\_personnel=385, mil\_personnel=0, civ\_personnel=385, total\_scientist=97, total\_engineer=2, total\_technician=21, total\_admin=265, funding\_src='USDA', research\_funding='\$4,000,000', dev\_funding='\$11,000,000', testeval\_funding='\$5,000,000', total\_funding='\$20,000,000', research\_obj='PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.', agents\_toxin='USDA Select Agents and Toxins':  
530 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Plum Island Animal Disease Center (PIADC)', street\_city='40550 Route 25 Orient Point', state='NY', zipcode='11957', bsl2\_m2=292, BSL-3\_m2=18046, BSL-4\_m2=0, total\_bsl\_m2=18338, total\_personnel=385, mil\_personnel=0, civ\_personnel=385, total\_scientist=97, total\_engineer=2, total\_technician=21, total\_admin=265, funding\_src='USDA', research\_funding='\$4,000,000', dev\_funding='\$11,000,000', testeval\_funding='\$5,000,000', total\_funding='\$20,000,000', research\_obj='PIADC provides the only research and development and confirmatory diagnostic capability for specific high-consequence, contagious, foreign animal diseases of livestock, including foot-and-mouth disease, in the U.S. Technologies researched and developed are vaccines, antivirals and diagnostic methods.', agents\_toxin='Other pathogens or toxins':  
531 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Air Force Research Laboratory (AFRL), Materials and Manufacturing Directorate', street\_city='2914 Hobson Way Wright-Patterson Air Force Base', state='OH', zipcode='45433', bsl2\_m2=60, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=60, total\_personnel=9, mil\_personnel=2, civ\_personnel=7, total\_scientist=9, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='DOD', research\_funding='\$400,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$400,000',

research\_obj='To functionalize natural polymers like silk, cotton, and wool using simple halamine chemistry and to test their antimicrobial properties against non-pathogenic microbial simulants.',agents\_toxin='Other pathogens or toxins';  
532 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)',street\_city='2029 Burns Road Dugway',state='UT',zipcode='84022-5006',bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0,total\_bsl\_m2=1158,total\_personnel=57,mil\_personnel=0,civ\_personnel=57,total\_scientist=39,total\_engineer=1,total\_technician=9,total\_admin=8,funding\_src='DOD',research\_funding='\$120,000',dev\_funding='\$0',testeval\_funding='\$4,100,000',total\_funding='\$4,220,000',research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
533 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lothar Salomon Test Facility (LSTF)',street\_city='2029 Burns Road Dugway',state='UT',zipcode='84022-5006',bsl2\_m2=744,BSL-3\_m2=414,BSL-4\_m2=0,total\_bsl\_m2=1158,total\_personnel=57,mil\_personnel=0,civ\_personnel=57,total\_scientist=39,total\_engineer=1,total\_technician=9,total\_admin=8,funding\_src='DOD',research\_funding='\$120,000',dev\_funding='\$0',testeval\_funding='\$4,100,000',total\_funding='\$4,220,000',research\_obj='Testing of battlefield detection and identification methods, protective equipment, and decontamination systems, to include interferent testing of biological detectors and to develop/validate aerosol particle dispersion models to enhance countermeasure response.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';  
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541 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Medical Research Center (NMRC)',street\_city='8400 Research Plaza Fort Detrick',state='MD',zipcode='21702',bsl2\_m2=2000,BSL-3\_m2=0,BSL-4\_m2=0,total\_bsl\_m2=2000,total\_personnel=72,mil\_personnel=13,civ\_personnel=59,total\_scientist=20,total\_engineer=0,total\_technician=44,total\_admin=8,funding\_src='DOD',research\_funding='\$4,100,100',dev\_funding='\$0',testeval\_funding='\$689,600',total\_funding='\$4,789,700',research\_obj='The goal of the program is the development of rapid and deployable detection assays to protect deployed troops. In a continued effort to have better prophylaxis measures, we are studying the potential use of multi-agent vaccines capable of conferring protection against multiple infectious diseases at once.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

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4\_m2=0,total\_bsl\_m2=2271,total\_personnel=43,mil\_personnel=0,civ\_personnel=43,total\_scientist=33,total\_engineer=4,total\_technician=6,total\_admin=0,funding\_src='NIH',research\_funding='\$7,205,000',dev\_funding='\$3,379,000',testeval\_funding='\$0',total\_funding='\$10,584,000',research\_obj='The objectives are to develop and test reliable systems for the detection of biological warfare agents in order to provide early warning and contamination avoidance information.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';  
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4\_m2=0,total\_bsl\_m2=216,total\_personnel=173,mil\_personnel=0,civ\_personnel=173,total\_scientist=60,total\_engineer=50,total\_technician=16,total\_admin=47,funding\_src='DOD',research\_funding='\$2,187,000',dev\_funding='\$3,602,000',testeval\_funding='\$11,768,000',total\_funding='\$17,557,000',research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
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553 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory', street\_city='6149 Welsh Road Dahlgren', state='VA', zipcode='22448-5162', bsl2\_m2=190, BSL-3\_m2=26, BSL-4\_m2=0, total\_bsl\_m2=216, total\_personnel=173, mil\_personnel=0, civ\_personnel=173, total\_scientist=60, total\_engineer=50, total\_technician=16, total\_admin=47, funding\_src='Other Governmental Agencies', research\_funding='\$2,187,000', dev\_funding='\$3,602,000', testeval\_funding='\$11,768,000', total\_funding='\$17,557,000', research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

554 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory', street\_city='6149 Welsh Road Dahlgren', state='VA', zipcode='22448-5162', bsl2\_m2=190, BSL-3\_m2=26, BSL-4\_m2=0, total\_bsl\_m2=216, total\_personnel=173, mil\_personnel=0, civ\_personnel=173, total\_scientist=60, total\_engineer=50, total\_technician=16, total\_admin=47, funding\_src='Other Governmental Agencies', research\_funding='\$2,187,000', dev\_funding='\$3,602,000', testeval\_funding='\$11,768,000', total\_funding='\$17,557,000', research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.', agents\_toxin='Overlap Select Agents (Including NIAID Category A Priority Pathogens)';

555 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Naval Surface Warfare Center-Dahlgren Division\_Chemical, Biological, Radiological (CBR) Defense Laboratory', street\_city='6149 Welsh Road Dahlgren', state='VA', zipcode='22448-5162', bsl2\_m2=190, BSL-3\_m2=26, BSL-4\_m2=0, total\_bsl\_m2=216, total\_personnel=173, mil\_personnel=0, civ\_personnel=173, total\_scientist=60, total\_engineer=50, total\_technician=16, total\_admin=47, funding\_src='Other Governmental Agencies', research\_funding='\$2,187,000', dev\_funding='\$3,602,000', testeval\_funding='\$11,768,000', total\_funding='\$17,557,000', research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.', agents\_toxin='Other pathogens or toxins';

556 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Tyndall Air Force Base (AFB) -- 1', street\_city='3000 Research Road Tyndall AFB', state='FL', zipcode='32403', bsl2\_m2=55, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=55, total\_personnel=6, mil\_personnel=1, civ\_personnel=5, total\_scientist=4, total\_engineer=0, total\_technician=1, total\_admin=1, funding\_src='DHHS', research\_funding='\$800,000', dev\_funding='\$0', testeval\_funding='\$150,000', total\_funding='\$950,000', research\_obj='The facility houses and supports a bioaerosol test chamber in which aerosols containing biological simulants are used for defensive purposes to characterize the size distribution of bioaerosol challenges as needed.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)';

557 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Tyndall Air Force Base (AFB) -- 2', street\_city='139 Barnes Drive Tyndall AFB', state='FL', zipcode='32403', bsl2\_m2=53, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=53, total\_personnel=8, mil\_personnel=1, civ\_personnel=7, total\_scientist=5, total\_engineer=1, total\_technician=1, total\_admin=1, funding\_src='DOD', research\_funding='\$150,000', dev\_funding='\$280,000', testeval\_funding='\$0', total\_funding='\$43,000', research\_obj='This facility supports the preparation and characterization of novel chemicals expected to exhibit antimicrobial properties. Materials are tested only against Biosafety Level 1 microorganisms at this facility. It also supports research into degradation products formed by exposure of samples of reactive materials to simulant chemical threat agents.', agents\_toxin='Other pathogens or toxins';

558 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center', street\_city='5183 Blackhawk Road Aberdeen Proving Ground', state='MD', zipcode='21010-5424', bsl2\_m2=532, BSL-3\_m2=177, BSL-4\_m2=0, total\_bsl\_m2=709, total\_personnel=274, mil\_personnel=0, civ\_personnel=274, total\_scientist=188, total\_engineer=35, total\_technician=16, total\_admin=47, funding\_src='Other Governmental Agencies', research\_funding='\$2,187,000', dev\_funding='\$3,602,000', testeval\_funding='\$11,768,000', total\_funding='\$17,557,000', research\_obj='Efforts at this defense laboratory are focused on biological detection systems, collective and individual protection systems, hazard mitigation technologies, risk assessment tools and consequence management planning.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

chnician=21,total\_admin=30,funding\_src='DOD',research\_funding='\$1,427,000',dev\_funding='\$19,871,000',testeval\_funding='\$0',total\_funding='\$21,298,000',research\_obj='Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

559 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center',street\_city='5183 Blackhawk Road Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=532,BSL-3\_m2=177,BSL-

4\_m2=0,total\_bsl\_m2=709,total\_personnel=274,mil\_personnel=0,civ\_personnel=274,total\_scientist=188,total\_engineer=35,total\_technician=21,total\_admin=30,funding\_src='DOD',research\_funding='\$1,427,000',dev\_funding='\$19,871,000',testeval\_funding='\$0',total\_funding='\$21,298,000',research\_obj='Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.',agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

560 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Edgewood Chemical and Biological Center',street\_city='5183 Blackhawk Road Aberdeen Proving Ground',state='MD',zipcode='21010-5424',bsl2\_m2=532,BSL-3\_m2=177,BSL-

4\_m2=0,total\_bsl\_m2=709,total\_personnel=274,mil\_personnel=0,civ\_personnel=274,total\_scientist=188,total\_engineer=35,total\_technician=21,total\_admin=30,funding\_src='DOD',research\_funding='\$1,427,000',dev\_funding='\$19,871,000',testeval\_funding='\$0',total\_funding='\$21,298,000',research\_obj='Development of non-medical defensive material against biological agents to include: research, development, and engineering for methods of rapid detection, identification, decontamination, and physical protection from biological threat agents.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B Priority Pathogens)';

561 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)',street\_city='3100 Ricketts Point Road Aberdeen Proving Ground',state='MD',zipcode='21010-5400',bsl2\_m2=300,BSL-3\_m2=0,BSL-

4\_m2=0,total\_bsl\_m2=300,total\_personnel=9,mil\_personnel=0,civ\_personnel=9,total\_scientist=4,total\_engineer=0,total\_technician=5,total\_admin=0,funding\_src='DOD',research\_funding='\$940,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$940,000',research\_obj='The Institute's mission involves research on medical defenses against neurotoxins.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

562 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-

4\_m2=1186,total\_bsl\_m2=30351,total\_personnel=831,mil\_personnel=201,civ\_personnel=630,total\_scientist=263,total\_engineer=3,total\_technician=293,total\_admin=272,funding\_src='DOD',research\_funding='\$26,043,314',dev\_funding='\$39,342,622',testeval\_funding='\$854,892',total\_funding='\$66,240,828',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

563 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-

4\_m2=1186,total\_bsl\_m2=30351,total\_personnel=831,mil\_personnel=201,civ\_personnel=630,total\_scientist=263,total\_engineer=3,total\_technician=293,total\_admin=272,funding\_src='DOD',research\_funding='\$26,043,314',dev\_funding='\$39,342,622',testeval\_funding='\$854,892',total\_funding='\$66,240,828',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';

564 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID',street\_city='1425 Porter Street Fort Detrick Frederick',state='MD',zipcode='21702-5011',bsl2\_m2=26026,BSL-3\_m2=3139,BSL-

4\_m2=1186,total\_bsl\_m2=30351,total\_personnel=831,mil\_personnel=201,civ\_personnel=630,total\_scientist=263,total\_engineer=3,total\_technician=293,total\_admin=272,funding\_src='DOD',research\_funding='\$26,043,314',dev\_funding='\$39,342,622',testeval\_funding='\$854,892',total\_funding='\$66,240,828',research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.',agents\_toxin='USDA Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

565 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='USAMRIID', street\_city='1425 Porter Street Fort Detrick Frederick', state='MD', zipcode='21702-5011', bsl2\_m2=26026, BSL-3\_m2=3139, BSL-4\_m2=1186, total\_bsl\_m2=30351, total\_personnel=831, mil\_personnel=201, civ\_personnel=630, total\_scientist=263, total\_engineer=3, total\_technician=293, total\_admin=272, funding\_src='DOD', research\_funding='\$26,043,314', dev\_funding='\$39,342,622', testeval\_funding='\$854,892', total\_funding='\$66,240,828', research\_obj='To develop medical countermeasures, to include candidate vaccines, diagnostic tests and drug or immunological therapies for biological agents. Perform exploratory studies and advanced development of protective and therapeutic countermeasures and agent identification technologies.', agents\_toxin='Other pathogens or toxins (including non-Select Agent, NIAID Category A, B and C Priority Pathogens)';

566 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory', street\_city='Biology Department Upton', state='NY', zipcode='11973-5000', bsl2\_m2=185, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=185, total\_personnel=13, mil\_personnel=0, civ\_personnel=13, total\_scientist=9, total\_engineer=0, total\_technician=4, total\_admin=0, funding\_src='DOD', research\_funding='\$4,130,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$4,130,000', research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A Priority Pathogens)';

567 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Brookhaven National Laboratory', street\_city='Biology Department Upton', state='NY', zipcode='11973-5000', bsl2\_m2=185, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=185, total\_personnel=13, mil\_personnel=0, civ\_personnel=13, total\_scientist=9, total\_engineer=0, total\_technician=4, total\_admin=0, funding\_src='DOD', research\_funding='\$4,130,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$4,130,000', research\_obj='The majority of the agents are not used for biodefense related work. The overall objective of the project that is biodefense related (DOD supported) is to develop countermeasures for biowarfare agents. The specific aim of the project is to determine the three-dimensional structures of the agents. The purified agents are crystallized using standard crystallization techniques and brought to the National Synchrotron Light Sources (also at Brookhaven National Laboratory) for x-ray diffraction studies. These results can lead to vaccine development, treatment, and/or diagnosis. BNL is registered with the CDC Select Agent Program for this work.', agents\_toxin='Other pathogens or toxins';

568 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Idaho National Laboratory', street\_city='2525 Fremont Ave. Falls Idaho', state='ID', zipcode='83415-2203', bsl2\_m2=90, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=90, total\_personnel=3, mil\_personnel=0, civ\_personnel=3, total\_scientist=3, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='EPA', research\_funding='\$0', dev\_funding='\$0', testeval\_funding='\$10,000', total\_funding='\$10,000', research\_obj='Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2012, but viable culture collection is maintained.', agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens)';

569 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Idaho National Laboratory', street\_city='2525 Fremont Ave. Falls Idaho', state='ID', zipcode='83415-2203', bsl2\_m2=90, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=90, total\_personnel=3, mil\_personnel=0, civ\_personnel=3, total\_scientist=3, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='EPA', research\_funding='\$0', dev\_funding='\$0', testeval\_funding='\$10,000', total\_funding='\$10,000', research\_obj='Viability testing subsequent to decontamination using Bacillus atrophaeus as a simulant for B. anthracis. No funded work with Brucella in 2012, but viable culture collection is maintained.', agents\_toxin='Other pathogens or toxins';

570 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lawrence Berkeley National Laboratory (LBNL)', street\_city='1 Cyclotron Road Berkeley', state='CA', zipcode='94720', bsl2\_m2=130, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=130, total\_personnel=6, mil\_personnel=0, civ\_personnel=6, total\_scientist=3, total\_engineer=0, total\_technician=3, total\_admin=0, funding\_src='DHHS', research\_funding='\$200,000', dev\_funding='\$0', testeval\_funding='\$0', total\_funding='\$200,000', research\_obj='No biological defense work currently. We are writing manuscripts from previous biological defense work on strain typing in Francisella. We currently have no live isolates or DNA from any Select Agent.', agents\_toxin='None';

571 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lawrence Livermore National Laboratory (LLNL)', street\_city='Lawrence Livermore National Laboratory 7000 East Avenue Livermore', state='CA', zipcode='94550', bsl2\_m2=1563, BSL-3\_m2=60, BSL-4\_m2=0, total\_bsl\_m2=1623, total\_personnel=106, mil\_personnel=0, civ\_personnel=106, total\_scientist=56, total\_engineer=8, total\_technician=14, total\_admin=28, funding\_src='DOD', research\_funding='\$17,772,000', dev\_funding='\$0', testeval\_funding='\$3,054,000', total\_funding='\$20,826,000', research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration,

and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch biological detection network put in place by the Department of Homeland Security (DHS). Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for various detection platforms. The development and screening of new nucleic acid-based assays are also core areas of expertise at LLNL. Testing and validation of new hardware components as well as training for the BioWatch network are other areas where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological incident. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine the geographic origin of an agent and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects to elucidate host-pathogen interactions. The goal of this research is to understand how microorganism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies specifically targeted to steps in the microorganism life cycle. LLNL is also involved in the search for new compounds as well as the development of novel vaccine strategies for disease prevention.'agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';

572 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Lawrence Livermore National Laboratory (LLNL)', street\_city='Lawrence Livermore National Laboratory 7000 East Avenue Livermore', state='CA', zipcode='94550', bsl2\_m2=1563, BSL-3\_m2=60, BSL-4\_m2=0, total\_bsl\_m2=1623, total\_personnel=106, mil\_personnel=0, civ\_personnel=106, total\_scientist=56, total\_engineer=8, total\_technician=14, total\_admin=28, funding\_src='DOD', research\_funding='\$17,772,000', dev\_funding='\$0', testeval\_funding='\$3,054,000', total\_funding='\$20,826,000', research\_obj='LLNL is performing work in the area of biological agent detection, therapeutics development, virulence mechanism elucidation, structural characterization, agent viability testing, response planning, restoration, and forensics. The biological detection platforms are being developed. LLNL is also working to support and upgrade the BioWatch biological detection network put in place by the Department of Homeland Security (DHS). Personnel from LLNL play an important role in the bioinformatics required to develop new detection assays for various detection platforms. The development and screening of new nucleic acid-based assays are also core areas of expertise at LLNL. Testing and validation of new hardware components as well as training for the BioWatch network are other areas where LLNL supports the DHS mission. In addition to the detection platforms LLNL is also working on tools that will help restore normal activities in the event of a biological incident. These include developing rapid viability testing, decontamination strategies, and biological response plans for DHS, DOD, and EPA. We also have substantial activities in developing forensic assays to help determine the geographic origin of an agent and who might be responsible for the use of that agent. Beyond detection, response, recovery, and attribution LLNL also has ongoing research projects to elucidate host-pathogen interactions. The goal of this research is to understand how microorganism is able to defeat or circumvent the host immune system. This will enable the development of new intervention strategies specifically targeted to steps in the microorganism life cycle. LLNL is also involved in the search for new compounds as well as the development of novel vaccine strategies for disease prevention.', agents\_toxin='Overlap Select Agents (Including NIAID Category A and B Priority Pathogens)';

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hnician=25,total\_admin=4,funding\_src='DHHS',research\_funding='\$28,156,000',dev\_funding='\$550,000',testeval\_funding='\$751,000',total\_funding='\$29,457,000',research\_obj='The Sandia Chem/Bio program is an applied research program designed to develop and demonstrate technologies and systems that can be used to mitigate the impact of attacks on civilian populations with chemical or biological agents. Specific aims include: a) analysis of pathogenic mechanisms caused by toxins interacting with cell membranes; b) development of diagnostic and detection technologies for toxins, bacteria, and viruses by applying micro-separations technology; and c) development of technologies for the characterization of aerosolized particles using optics, among many others. Work with biological agents at Sandia also includes work in nanotechnology and biofuels.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)'";  
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616 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294,BSL-3\_m2=2331,BSL-4\_m2=543, total\_bsl\_m2=3168, total\_personnel=184, mil\_personnel=4, civ\_personnel=180, total\_scientist=160, total\_engineer=0, total\_technician=12, total\_admin=12, funding\_src='DOD', research\_funding='\$12,780,426', dev\_funding='\$3,306,096', testeval\_funding='\$4,262,610', total\_funding='\$20,349,132', research\_obj='Activities include developing diagnostic assays for public health, conducting

molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)':  
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619 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2331, BSL-4\_m2=543, total\_bsl\_m2=3168, total\_personnel=184, mil\_personnel=4, civ\_personnel=180, total\_scientist=160, total\_engineer=0, total\_technician=12, total\_admin=12, funding\_src='DOD', research\_funding='\$12,780,426', dev\_funding='\$3,306,096', testevel\_funding='\$4,262,610', total\_funding='\$20,349,132', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='Other pathogens or toxins':  
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621 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2331, BSL-4\_m2=543, total\_bsl\_m2=3168, total\_personnel=184, mil\_personnel=4, civ\_personnel=180, total\_scientist=160, total\_engineer=0, total\_technician=12, total\_admin=12, funding\_src='DHS', research\_funding='\$12,780,426', dev\_funding='\$3,306,096', testevel\_funding='\$4,262,610', total\_funding='\$20,349,132', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenictiy and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)':  
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4\_m2=543, total\_bsl\_m2=3168, total\_personnel=184, mil\_personnel=4, civ\_personnel=180, total\_scientist=160, total\_engineer=0, total\_technician=12, total\_admin=12, funding\_src='DHS', research\_funding='\$12,780,426', dev\_funding='\$3,306,096', testeval\_funding='\$4,262,610', total\_funding='\$20,349,132', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='Other pathogens or toxins ';

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632 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2331, BSL-4\_m2=543, total\_bsl\_m2=3168, total\_personnel=184, mil\_personnel=4, civ\_personnel=180, total\_scientist=160, total\_engineer=0, total\_technician=12, total\_admin=12, funding\_src='USAID', research\_funding='\$12,780,426', dev\_funding='\$3,306,096', testeval\_funding='\$4,262,610', total\_funding='\$20,349,132', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

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634 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)', street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta', state='GA', zipcode='30333', bsl2\_m2=294, BSL-3\_m2=2331, BSL-4\_m2=543, total\_bsl\_m2=3168, total\_personnel=184, mil\_personnel=4, civ\_personnel=180, total\_scientist=160, total\_engineer=0, total\_technician=12, total\_admin=12, funding\_src='USAID', research\_funding='\$12,780,426', dev\_funding='\$3,306,096', testeval\_funding='\$4,262,610', total\_funding='\$20,349,132', research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.', agents\_toxin='USDA Select Agents and Toxins';

635 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of

Infectious Diseases (OID)',street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta',state='GA',zipcode='30333',bsl2\_m2=294,BSL-3\_m2=2331,BSL-4\_m2=543,total\_bsl\_m2=3168,total\_personnel=184,mil\_personnel=4,civ\_personnel=180,total\_scientist=160,total\_engineer=0,total\_technician=12,total\_admin=12,funding\_src='USAID',research\_funding='\$12,780,426',dev\_funding='\$3,306,096',testeval\_funding='\$4,262,610',total\_funding='\$20,349,132',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.',agents\_toxin='Other pathogens or toxins';  
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637 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)',street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta',state='GA',zipcode='30333',bsl2\_m2=294,BSL-3\_m2=2331,BSL-4\_m2=543,total\_bsl\_m2=3168,total\_personnel=184,mil\_personnel=4,civ\_personnel=180,total\_scientist=160,total\_engineer=0,total\_technician=12,total\_admin=12,funding\_src='DoS',research\_funding='\$12,780,426',dev\_funding='\$3,306,096',testeval\_funding='\$4,262,610',total\_funding='\$20,349,132',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.',agents\_toxin='Overlap Select Agents (Including NIAID Category A, B and C Priority Pathogens)';  
638 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, Office of Infectious Diseases (OID)',street\_city='Atlanta GA 1600 Clifton Road N.E. Atlanta',state='GA',zipcode='30333',bsl2\_m2=294,BSL-3\_m2=2331,BSL-4\_m2=543,total\_bsl\_m2=3168,total\_personnel=184,mil\_personnel=4,civ\_personnel=180,total\_scientist=160,total\_engineer=0,total\_technician=12,total\_admin=12,funding\_src='DoS',research\_funding='\$12,780,426',dev\_funding='\$3,306,096',testeval\_funding='\$4,262,610',total\_funding='\$20,349,132',research\_obj='Activities include developing diagnostic assays for public health, conducting molecular and antigenic characterization of organisms, determining pathogenicity and virulence of infectious agents, determining the natural history of infectious organisms, and conducting epidemiologic studies and surveillance for diseases.',agents\_toxin='USDA Select Agents and Toxins';  
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640 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft. Collins',street\_city='CDC DHHS 3150 Rampart Road Fort Collins',state='CO',zipcode='80521',bsl2\_m2=66,BSL-3\_m2=1142,BSL-4\_m2=0,total\_bsl\_m2=1208,total\_personnel=53,mil\_personnel=0,civ\_personnel=53,total\_scientist=44,total\_engineer=0,total\_technician=4,total\_admin=5,funding\_src='CDC',research\_funding='\$780,716',dev\_funding='\$780,716',testeval\_funding='\$745,580',total\_funding='\$2,307,012',research\_obj='CDC s Division of Vector Borne Diseases (DVBD) possesses many of the select agents that are on the Department of Health and Human Services and HHS/U.S. Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A and B Priority Pathogens)';  
641 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft.

Collins',street\_city='CDC DHHS 3150 Rampart Road Fort Collins',state='CO',zipcode='80521',bsl2\_m2=66,BSL-3\_m2=1142,BSL-4\_m2=0,total\_bsl\_m2=1208,total\_personnel=53,mil\_personnel=0,civ\_personnel=53,total\_scientist=44,total\_engineer=0,total\_technician=4,total\_admin=5,funding\_src='CDC',research\_funding='\$780,716',dev\_funding='\$780,716',testeval\_funding='\$745,580',total\_funding='\$2,307,012',research\_obj='CDC's Division of Vector Borne Diseases (DVBD) possesses many of the select agents that are on the Department of Health and Human Services and HHS/U.S. Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.',agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens)';

642 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='CDC, OID, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector Borne Diseases (DVBD) - Ft.

Collins',street\_city='CDC DHHS 3150 Rampart Road Fort Collins',state='CO',zipcode='80521',bsl2\_m2=66,BSL-3\_m2=1142,BSL-4\_m2=0,total\_bsl\_m2=1208,total\_personnel=53,mil\_personnel=0,civ\_personnel=53,total\_scientist=44,total\_engineer=0,total\_technician=4,total\_admin=5,funding\_src='CDC',research\_funding='\$780,716',dev\_funding='\$780,716',testeval\_funding='\$745,580',total\_funding='\$2,307,012',research\_obj='CDC's Division of Vector Borne Diseases (DVBD) possesses many of the select agents that are on the Department of Health and Human Services and HHS/U.S. Department of Agriculture overlap lists. Within CDC, DVBD has the primary responsibility for research on tularemia, plague and the alphaviruses. This research involves development of assays for surveillance and detection of each agent and molecular and antigenic characterization.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens)';

643 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)',street\_city='903 South 4th Street

Hamilton',state='MT',zipcode='59840',bsl2\_m2=1361,BSL-3\_m2=407,BSL-4\_m2=1145,total\_bsl\_m2=2913,total\_personnel=96,mil\_personnel=0,civ\_personnel=96,total\_scientist=70,total\_engineer=0,total\_technician=23,total\_admin=3,funding\_src='DHHS',research\_funding='\$24,752,010',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$24,752,010',research\_obj='NIH RML scientists broadly study pathogens that cause viral hemorrhagic fevers, viral encephalitis, and certain respiratory diseases. This work employs investigations in cell culture; animal models, including nonhuman primates; reservoir species; and arthropod hosts in order to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. Specifically, studies include pathogenesis and pathophysiology of high-containment pathogens using molecular technologies; immune responses to infection and vaccination with viral pathogens; vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.',agents\_toxin='HHS Select Agents and Toxins (Including NIAID Category A, B and C Priority Pathogens)';

644 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Integrated Research Facility (IRF) - Rocky Mountain Laboratories (RML)',street\_city='903 South 4th Street

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vector/reservoir transmission of viral pathogens and development of new vaccine candidates; in vitro and in vivo systems to study the interactions between viral pathogens or viral components and host cells; and epidemiology and ecology of pathogens. Research activities address pathogenesis studies, vaccinology, and development of therapeutic countermeasures and rapid diagnostic assays in support of the civilian biodefense program.',agents\_toxin='USDA Select Agents and Toxins';  
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650 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH , C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=2493, BSL-3\_m2=1091, BSL-4\_m2=0, total\_bsl\_m2=3584, total\_personnel=120, mil\_personnel=0, civ\_personnel=120, total\_scientist=91, total\_engineer=0, total\_technician=24, total\_admin=5, funding\_src='DHHS', research\_funding='\$36,151,028', dev\_funding='\$0', testevel\_funding='\$0', total\_funding\_g='\$36,151,028', research\_obj='At the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases, the Laboratory of Infectious Diseases (LID) focuses on viral vaccine development, host immune response to viruses, and viral molecular biology and genetics. Newer programs focus on developing vaccines, from basic research to clinical trials. The Laboratory of Bacterial Diseases (LBD) focuses on the development of diagnostics, vaccines, and therapeutics for biodefense. Specific research concerns the identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; and disease pathogenesis. The Laboratory of Viral Diseases (LVD) studies the basic mechanisms of viral entry into cells, regulation of viral gene expression, viral DNA replication, assembly and transport of viral proteins and particles, viral virulence, and humoral and cellular immunity, for DNA and RNA viruses. Applied research includes development of recombinant expression vectors, candidate vaccines, and antiviral agents.', agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category A, B and C Priority Pathogens)':

651 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='NIH , Dale and Betty Bumpers Vaccine Research Center', street\_city='NIH DHHS 9000 Rockville Pike Bethesda', state='MD', zipcode='20892', bsl2\_m2=89, BSL-3\_m2=0, BSL-4\_m2=0, total\_bsl\_m2=89, total\_personnel=9, mil\_personnel=0, civ\_personnel=9, total\_scientist=9, total\_engineer=0, total\_technician=0, total\_admin=0, funding\_src='DHHS', research\_funding='\$774,548', dev\_funding='\$0', testevel\_funding='\$0', total\_funding\_g='\$774,548', research\_obj='The research focus of the Biodefense Research Laboratory, Vaccine Research Center (VRC) comprises three areas: 1. Development of vaccines and antivirals against hemorrhagic fever viruses such as Ebola, Marburg and Lassa 2. Studies of the mechanism of vaccine-induced immune protection 3. Basic research to understand the mechanism of virus replication (entry) and neutralization', agents\_toxin='Other pathogens or toxins':

652 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Foreign Disease-Weed Science Research Unit', street\_city='1301 Ditto Avenue Fort Detrick', state='MD', zipcode='21702', bsl2\_m2=105, BSL-3\_m2=950, BSL-4\_m2=0, total\_bsl\_m2=1055, total\_personnel=36, mil\_personnel=0, civ\_personnel=36, total\_scientist=13, total\_engineer=0, total\_technician=16, total\_admin=7, funding\_src='U.S. Department of Agriculture', research\_funding='\$5,600,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding\_g='\$5,600,000', research\_obj='The USDA, Agricultural Research Service, Foreign Disease-Weed Science Research Unit has two distinct missions united by a common relationship to plant pathology and the unit's unique BL-3 plant pathogen laboratory and greenhouse containment facilities. The mission of the foreign disease program is to develop techniques for the rapid detection and identification of new and emerging crop pathogens, and to provide fundamental information on emerging pathogens for risk assessment and the development of practical phytosanitary regulations for the import and export of agricultural commodities and germplasm. The mission of the weed biological control program is to collect foreign pathogens overseas from weeds in their native habitat, and to evaluate, characterize and release the pathogens in the U.S. for biological control of introduced weeds, leading to improved, sustainable weed control practices in agricultural systems with reduced dependence on chemical herbicides.', agents\_toxin='USDA PLANT PROTECTION AND QUARANTINE (PPQ) Select Agents and Toxins Other pathogens or toxins. The agents studied (ie., viruses, bacteria, and fungi) are foreign and/or emerging pathogens of plants that have an agricultural base. The majority of the agents\_studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that pose a threat to U.S. plant production systems, agricultural economy, and exports. ':

653 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)', street\_city='1920 Dayton Avenue Ames', state='IA', zipcode='50010', bsl2\_m2=4410, BSL-3\_m2=2489, BSL-4\_m2=0, total\_bsl\_m2=6899, total\_personnel=284, mil\_personnel=0, civ\_personnel=284, total\_scientist=46, total\_engineer=0, total\_technician=84, total\_admin=154, funding\_src='U.S. Department of Agriculture', research\_funding='\$32,000,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding\_g='\$32,000,000', research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and ? improve our understanding

of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Overlap Select Agents (Including NIAID Category B Priority Pathogens');

654 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)',street\_city='1920 Dayton Avenue Ames',state='IA',zipcode='50010',bsl2\_m2=4410,BSL-3\_m2=2489,BSL-4\_m2=0,total\_bsl\_m2=6899,total\_personnel=284,mil\_personnel=0,civ\_personnel=284,total\_scientist=46,total\_engineer=0,total\_technician=84,total\_admin=154,funding\_src='U.S. Department of

Agriculture',research\_funding='\$32,000,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$32,000,000',research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='USDA Select Agents and Toxins'.

655 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='National Animal Disease Center (NADC)',street\_city='1920 Dayton Avenue Ames',state='IA',zipcode='50010',bsl2\_m2=4410,BSL-3\_m2=2489,BSL-4\_m2=0,total\_bsl\_m2=6899,total\_personnel=284,mil\_personnel=0,civ\_personnel=284,total\_scientist=46,total\_engineer=0,total\_technician=84,total\_admin=154,funding\_src='U.S. Department of

Agriculture',research\_funding='\$32,000,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$32,000,000',research\_obj='Provide scientific information to solutions in the control and eradication of national and international exotic, emerging, zoonotic, and endemic infectious diseases of animals through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research programs are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance, and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of pathogens at the domestic-wild life interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the livestock industries with improved intervention strategies against priority diseases.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are endemic and emerging viruses and bacteria that cause diseases in livestock and poultry. The majority of the agents studied are not classified by USDA as select agents. The agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to U.S. animal production systems, agricultural economy, and agricultural exports.';

656 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=11,total\_engineer=0,total\_technician=16,total\_admin=13,funding\_src='DOD',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins'.

657 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=11,total\_engineer=0,total\_technician=16,total\_admin=13,funding\_src='DOD',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the

research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

658 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-

4\_m2=0,total\_bsl\_m2=1762,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=11,total\_engineer=0,total\_technician=16,total\_admin=13,funding\_src='NIH',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins'.

659 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-

4\_m2=0,total\_bsl\_m2=1762,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=11,total\_engineer=0,total\_technician=16,total\_admin=13,funding\_src='NIH',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';

660 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-

4\_m2=0,total\_bsl\_m2=1762,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=11,total\_engineer=0,total\_technician=16,total\_admin=13,funding\_src='Private Sector Companies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against

poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.';agents\_toxin='USDA Select Agents and Toxins';  
661 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory', street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens', state='GA', zipcode='30605', bsl2\_m2=1138, BSL-3\_m2=624, BSL-4\_m2=0, total\_bsl\_m2=1762, total\_personnel=40, mil\_personnel=0, civ\_personnel=40, total\_scientist=11, total\_engineer=0, total\_technician=16, total\_admin=13, funding\_src='Private Sector  
Companies', research\_funding='\$5,800,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding='\$5,800,000', research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.';agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';  
662 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory', street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens', state='GA', zipcode='30605', bsl2\_m2=1138, BSL-3\_m2=624, BSL-4\_m2=0, total\_bsl\_m2=1762, total\_personnel=40, mil\_personnel=0, civ\_personnel=40, total\_scientist=11, total\_engineer=0, total\_technician=16, total\_admin=13, funding\_src='USDA', research\_funding='\$5,800,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding='\$5,800,000', research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.';agents\_toxin='USDA Select Agents and Toxins';  
663 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory', street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens', state='GA', zipcode='30605', bsl2\_m2=1138, BSL-3\_m2=624, BSL-4\_m2=0, total\_bsl\_m2=1762, total\_personnel=40, mil\_personnel=0, civ\_personnel=40, total\_scientist=11, total\_engineer=0, total\_technician=16, total\_admin=13, funding\_src='USDA', research\_funding='\$5,800,000', dev\_funding='\$0', testevel\_funding='\$0', total\_funding='\$5,800,000', research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.';agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports.';  
664 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39', uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory', street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road

Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=11,total\_engineer=0,total\_technician=16,total\_admin=13,funding\_src='Other Governmental Agencies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='USDA Select Agents and Toxins';

665 --- INSERT INTO cbm\_bioresearch\_programs SET create\_date='Jan 20, 2014 01:19:39',uscbm\_report='BWC\_CBM\_2013\_USA-Public.docx', uscbm\_submit\_date='April 15 2013', uscbm\_form\_section='CBM-Form-A, Part 2', facility\_name='Southeast Poultry Research Laboratory',street\_city='Agricultural Research Service United States Department of Agriculture 934 College Station Road Athens',state='GA',zipcode='30605',bsl2\_m2=1138,BSL-3\_m2=624,BSL-4\_m2=0,total\_bsl\_m2=1762,total\_personnel=40,mil\_personnel=0,civ\_personnel=40,total\_scientist=11,total\_engineer=0,total\_technician=16,total\_admin=13,funding\_src='Other Governmental Agencies',research\_funding='\$5,800,000',dev\_funding='\$0',testeval\_funding='\$0',total\_funding='\$5,800,000',research\_obj='Provide scientific solutions to national and international exotic, emerging and endemic poultry viral diseases through a comprehensive research program emphasizing basic and applied research in diagnostics, prevention, and control strategies, prediction of disease outbreaks, molecular epidemiology, and understanding disease pathogenesis. The objectives of the research program are to produce new research knowledge and technology to: ? prevent, reduce or eliminate losses from impaired performance and increased deaths and condemnations; ? develop more sensitive, specific and faster diagnostic tests; ? develop vaccines designed for the control and, when feasible, the eradication of disease; ? improve our understanding of the ecology and epidemiology of viruses at the wild bird-domestic poultry interface; and ? improve our understanding of the genetic and pathobiological basis of virulence. This research provides government regulatory agencies and the poultry industries with improved intervention strategies against poultry viral diseases. The Laboratory has two research units: 1) Exotic and Emerging Avian Viral Diseases Research Unit, and 2) Endemic Poultry Viral Diseases Research Unit.',agents\_toxin='Other pathogens or toxins (Including non-Select Agent, NIAID Category B and C Priority Pathogens). The agents studied are foreign and emerging viruses that cause diseases in poultry. The majority of the agents studied are classified by USDA as select agents. Some of the agents classified as select agents are pathogens that are zoonotic agents (diseases transmitted from animals to people) that pose a threat to US poultry production systems, US agricultural economy, and agricultural exports. ';

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## Appendix C – Sunshine Project List of BSL-3 and BSL-4 Labs within U.S.

### the sunshine project

#### Key: High Containment Labs and Other Facilities of the US Biodefense Program

This map shows existing biosafety level three and four facilities used in US biodefense research, as well as planned biodefense labs. It also shows important aerosol facilities and open air testing locations used in biodefense. BSL-3/4 facilities not known to be heavily dedicated to biodefense are not indicated here.

#### Operational BSL-4 Facilities

USAMRIID Fort Detrick, Frederick, Maryland  
DCLS "Biotech Six", Richmond, Virginia  
Centers for Disease Control, Atlanta, Georgia (x2)  
Univ. of Texas Medical Branch, Galveston  
Southwest Fdn for Biomed. Res., San Antonio, TX  
  
Planned / Under Construction BSL-4 Facilities  
Boston University, Boston, Massachusetts  
NIH Integrated Res. Fac., Frederick, Maryland  
DHS NBACC (Phase 1), Frederick, Maryland  
USAMRIID (Phase 1), Frederick, Maryland  
USDA Planned Facility, Frederick, Maryland  
Univ. of Texas Medical Branch, Galveston  
Rocky Mountain Labs, Hamilton, Montana

#### Operational BSL-3 Facilities

Harvard University, Cambridge, MA  
Cornell University, Ithaca, New York  
DHS / USDA Plum Island, New York  
CALSPLAN-UB, Buffalo, New York  
SUNY, Stony Brook, New York  
PHRI, Newark, New Jersey  
Wadsworth Center, Albany, New York  
University of Pennsylvania, Philadelphia  
Thomas Jefferson University, Philadelphia  
University of Pittsburgh, Pittsburgh  
Armed Forces Inst. of Pathology, Washington, DC  
Naval Medical Research Ctr., Silver Spring, Maryland  
University of Maryland CARB, Rockville  
US Army SBCCOM, Aberdeen, Maryland  
University of Maryland, Baltimore  
Southern Research Institute, Frederick, Maryland  
Versar, Gaithersburg, Maryland  
The Pentagon, Northern Virginia  
American Type Culture Collection, Manassas, VA  
George Mason University, Manassas, Virginia  
Naval Surface Weapons Center, Dahlgren, VA  
Commonwealth Biotechnologies, Richmond, VA  
Virginia Commonwealth University, Richmond  
University of Kentucky, Lexington  
Oak Ridge National Laboratory, Tennessee  
Wake Forest University, Winston-Salem, NC  
Emory University, Atlanta, Georgia  
USDA PSIS / MDCPL, Athens, Georgia  
Midwest Research Institute, Palm Bay, Florida  
University of Miami, Florida  
US EPA, Cincinnati, Ohio  
 Battelle Memorial Inst., West Jefferson, Ohio  
ITRI, Chicago, Illinois  
University of Wisconsin-Madison  
St. Louis University, St. Louis, Missouri  
Midwest Research Inst., Kansas City, Missouri  
University of Nebraska, Lincoln  
Southern Research Inst., Birmingham, Alabama  
Louisiana State University, Baton Rouge  
University of Texas Health Science Center, Houston  
University of Texas Southwestern, Dallas  
University of Texas Health Science Center, San Antonio  
Lackland Air Force Base, San Antonio, TX  
Texas Technological University, Lubbock  
Texas A&M University, College Station  
Oklahoma State University, Stillwater  
Colorado State University, Ft. Collins, Colorado  
Centers for Disease Control, Ft. Collins, Colorado  
Los Alamos National Lab, Los Alamos, New Mexico  
Lovelace Institute, Albuquerque, New Mexico  
University of New Mexico, Albuquerque  
US Army Dugway Proving Ground, Utah  
Northern Arizona University, Flagstaff  
University of California, Irvine  
University of California, Los Angeles  
San Diego State University, California  
Scripps Research Inst., La Jolla, California  
Lawrence Livermore Lab, Livermore, California  
University of Washington, Seattle

#### (Major) Planned / Under Construction BSL-3 Facilities

Tufts University, Grafton, Massachusetts  
UMD of New Jersey, Newark  
University of Pittsburgh, Pennsylvania  
University of Maryland, Baltimore  
George Mason University, Fairfax, Virginia  
University of Louisville, Kentucky  
Duke University, Durham, North Carolina  
Medical University Of South Carolina, Charleston  
University of Georgia, Athens  
Scripps Institute, Palm Beach County, Florida  
University of Alabama at Birmingham  
University of Tennessee at Memphis  
Tulane Primate Center, Covington, Louisiana  
University of Missouri, Columbia  
University of Iowa, Iowa City (RCE planning)  
USDA / Iowa State University, Ames, IA  
Argonne National Lab, Argonne, Illinois  
Agricultural Biosecurity Ctr., Manhattan, Kansas  
Univ. of Minnesota, Minneapolis (RCE planning)  
University of Texas at El Paso  
US Army Dugway Proving Ground, Utah  
Centers for Disease Control, Ft. Collins, Colorado  
Colorado State University, Fort Collins  
Pacific Northwest National Lab, Richland, Washington  
University of Hawaii, Manoa

#### Bioweapons Agent Production Facilities

US Army Dugway Proving Ground, Utah

#### Biodefense Aerosol Facilities

CALSPLAN-UB, Buffalo, New York  
US Army Aberdeen Proving Ground, MD  
George Mason University, Manassas, VA  
Midwest Research Institute, Kansas City, MO  
Lovelace Institute, Albuquerque, NM  
US Army Dugway Proving Ground, Utah

#### Open-Air Testing Facilities

US Army Dugway Proving Ground, Utah  
Nevada Test Site (proposed)

White Sands Missile Range, NM (probable)

#### Classified or Secretive Research

US Army Aberdeen Proving Ground, MD  
USAMRIID Fort Detrick, Frederick, MD  
Versar, Gaithersburg, MD  
Commonwealth Biotechnologies, Richmond, VA  
Southern Research Institute, Birmingham, AL  
Battelle Institute, Columbus /W. Jefferson, OH  
Southwest Fdn for Biomed. Res., San Antonio, TX  
Texas Technological University, Lubbock  
DTRA et al., Kirtland / Albuquerque, NM  
US Army Dugway Proving Ground, UT  
DOE Nevada Test Site

#### Notable (Known) Recent US Accidents and Releases

Lab-acquired Tularemia (3x), Boston Univ, MA (2004)  
Plague-infected mice "lost", WMDNJ, Newark, NJ (2005)  
Lab-acquired E. coli O157:H7, USDA, Wyndmoor, PA (2002)  
Anthrax in letters from Ft. Detrick (probable), MD (2001)  
Anthrax-contaminated offices, Ft. Detrick, MD (2002)  
Ebola needle stick, Ft. Detrick, MD (2004)  
Lab-acquired E. coli O157:H7, USDA, Beltsville, MD (2003)  
Live anthrax shipped as "dead", SRI, Frederick, MD (2004)  
H2N2 flu in test kits, Meridian Biosci., Cincinnati, OH (2005)  
Thomas Butler Case, Texas Tech Univ., Lubbock (2003)  
Q Fever exposure, Rocky Mtn. Lab, Hamilton, MT (2005)  
Faulty aerosol chamber infects 3, IDRI, Seattle, WA (2004)  
Live anthrax mishandled, Oakland Childrens Hosp, CA (2004)

#### Wants to Construct a BSL-4 Lab (not indicated on map)

Webworth Center, Albany, New York  
Oak Ridge National Laboratory, Tennessee  
University of Illinois, Chicago  
Texas Technological University, Lubbock  
University of Nebraska Medical Ctr, Omaha  
University of New Mexico, Albuquerque  
University of California, Davis  
Oregon Health Sciences University, Portland

REPRODUCTION OF THIS MAP IS SUBJECT TO THE CONDITIONS STATED AT [HTTP://WWW.SUNSHINE-PROJECT.ORG/BIODEFENSE](http://WWW.SUNSHINE-PROJECT.ORG/BIODEFENSE) | V2.55 (20 Feb 2006)

## Appendix D – Trans-Federal Task Force on Optimizing Biosafety and Biocontainment Oversight – Summary of Recommendations (July 2009)<sup>530</sup>

Objectives	Recommendations
1. Enhance the overarching framework for biosafety and biocontainment oversight of high and maximum containment research through improved coordination of oversight activities.	<p>1.1: Identify or establish a Federal entity to coordinate biosafety and biocontainment oversight activities, and to ensure comprehensive and effective Federal oversight for all high and maximum containment research facilities and activities in all sectors.</p> <p>1.2: Develop a registry of all high and maximum containment facilities in the United States.</p> <p>1.3: Require that all institutions conducting high and maximum containment research designate: (1) a senior official with the appropriate knowledge, authority, and accountability who is responsible for institutional compliance with biosafety and biocontainment regulations and guidelines; (2) a credentialed biosafety professional (see Recommendation 3.3) who is responsible for oversight of biosafety and biocontainment programs.</p> <p>1.4: Require that, at all institutions conducting high or maximum containment research, an appropriately constituted review body performs a thorough risk assessment of all laboratory protocols potentially requiring high or maximum containment.</p>
2. Encourage a robust culture of accountability characterized by individual and institutional compliance with biosafety and biocontainment regulations, guidelines, standards, and policies.	<p>2.1: Mandate compliance with Federal biosafety and biocontainment guidelines, including the BMBL and the NIH Guidelines, for all high and maximum containment research institutions in all sectors.</p> <p>2.2: Support the development of an accreditation system for biosafety/biocontainment management programs at high and maximum containment research institutions.</p>
3. Develop a national strategy to enable and ensure the appropriate training and technical competence of all individuals who work in, oversee, support, or manage high or maximum containment research laboratories.	<p>3.1: Establish national, position-specific training standards and core competencies in biosafety and biocontainment for all research, managerial, and support personnel at high and maximum containment research laboratories in all sectors.</p> <p>3.2: Require institutions to ensure that all individuals who work in, oversee, support, or manage high or maximum containment research laboratories are appropriately trained and competent in biosafety and biocontainment.</p> <p>3.3: Implement a phased-in requirement that the designated biosafety professional (Biological Safety Officer or equivalent) at all high and maximum containment research facilities be credentialed.</p>
4. Obtain and analyze information about laboratory incidents to enable trend analysis, minimize future incidents, and share lessons learned, with the overall goals of optimizing laboratory safety and oversight.	4.1: Establish: (1) a new voluntary, non-punitive incident-reporting system for high and maximum containment research laboratories that would ensure the protection of sensitive and private information, as necessary; and (2) a centralized, integrated mechanism for analyzing incidents and sharing information and lessons learned from both current mandatory reports and the new voluntary reporting system.
5. Ensure that biosafety and biocontainment regulations and guidelines cover current and emerging hazardous biological agents, and develop an agricultural equivalent of the BMBL.	<p>5.1: Develop comprehensive biocontainment guidelines comparable to those of the BMBL to cover research, including high and maximum containment research, on plant, livestock, and other agriculturally significant pests and pathogens.</p> <p>5.2: Maintain rigorous and comprehensive processes for the review and updating of biosafety and biocontainment regulations and guidelines, and ensure that these processes include broad-based participation by all relevant stakeholders.</p>
6. Ensure that the infrastructure and equipment necessary for biosafety and biocontainment at high and maximum containment research facilities are in place and properly maintained.	<p>6.1: Require that all institutions with high or maximum containment laboratories ensure proper installation of and preventive and ongoing maintenance programs for biosafety and biocontainment infrastructure and equipment.</p> <p>6.2: Develop a mechanism for sharing information and best practices about infrastructure and equipment design, operations, and maintenance among all high and maximum containment research facilities.</p>
7. Develop and support a national research agenda for applied biosafety and biocontainment to improve the management of biohazard risks.	7.1: Develop and maintain a robust program of applied biosafety and biocontainment research to create additional and update existing evidence-based practices and technologies.
8. Improve and share strategies to ensure effective public communication, outreach, and transparency about biosafety and biocontainment issues.	8.1: Develop comprehensive strategies to improve public communication, outreach, and transparency about biosafety and biocontainment issues and activities at high and maximum containment research facilities.

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<sup>530</sup> *Trans-Federal Report on Biosafety and Biocontainment Oversight*, 127-128

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