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Committee on Appropriations, Subcommittee on Homeland Security
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Introduction

Good morning Chairman Aderholt, Ranking Member Price, and distinguished members of the Subcommittee. It is an honor to appear before you today to discuss President Obama's Fiscal Year (FY) 2013 budget request for the Department of Homeland Security (DHS) Science and Technology Directorate (S&T). I will describe how S&T, in support of the third largest federal agency in a time of austere budgets, delivers value to make the homeland security enterprise (HSE) more efficient and capable.

The Importance of Balancing Investments in R&D and Facilities

Many emerging fields of science and technology cannot be pursued without major new investments in research infrastructure. Today, when new facilities or major infrastructure repairs are required, agency leaders and Congress often face the choice of having to use research budgets to fund infrastructure costs or pursuing promising research while delaying needed repairs and construction. Shifting research funds to infrastructure often means accepting the loss of existing, not-yet-matured research investments and facing significant opportunity costs. Likewise, because scientific research and technology development do not happen on predictable schedules, these research investments almost always require more than a single federal budget cycle to become mature and productive.

One such example that the Department faces today is the National Bio and Agro defense Facility (NBAF), which was authorized for construction under the Department of Homeland Security Appropriations Act, 2009 (P.L. 110-329, Div. D. Sec. 540) and at the time, was expected to be fully offset by the proceeds from the sale of Plum Island. Since then, the financial landscape has changed significantly. Today, we face the overall funding constraints of the Budget Control Act of 2011 (P.L. 112-25), which are impacting both the Department and S&T's budgets. Additionally, due to the current fiscal climate, the sale of Plum Island is not likely to provide adequate funds in the foreseeable future requiring appropriated funds for construction, and estimated construction costs for NBAF have increased by more than 30% as a result of construction delays and additional safety engineering requirements. At the same time, Congressional appropriations have not kept pace with the costs to build the facility expeditiously.[1] Given these fiscal challenges while considering the evolving security threats to U.S. agriculture, we have asked the NAS to convene an expert committee, in conjunction with the interagency, to conduct a scientific assessment of the requirements for a large-animal foreign and emerging diseases research and diagnostic laboratory in the United States, as described in more detail below.

[1] In the FY 2012 budget, Congress appropriated $50 million of the $150 million the Administration requested for NBAF.

While there is no current large animal Biosafety Level 4 (BSL4) facility like NBAF operating in the US, the challenge of building NBAF highlights the challenge faced by all Federal government research and development (R&D) organizations in a constrained budget environment where there is a need for funds to invest in *both* infrastructure and in research. Effective innovation is the core of the U.S. economy and U.S. national security; it requires investment in both facilities and research and development (R&D). The U.S. must robustly fund both of these activities in order to maintain the capability needed to respond to the diverse threats against which the DHS is charged to protect the United States.

U.S. Agricultural Security

Agriculture contributes over $1 trillion dollars annually to U.S. GDP. One of every eight Americans is employed in the agricultural sector, which includes farmlands, feedlots, processing plants, warehouses, research facilities, factories for food preparation and packaging, and the national and global distribution network.[i] The economic impact of an agricultural biological threat – deliberate or natural – could include direct loss of livestock and assets; losses in upstream and downstream markets; lost export markets; significant price effects; and a reduction in economic growth caused by re-allocation of resources. For example, the estimated economic impact of the 2001 Foot and Mouth Disease outbreak in the United Kingdom was $11 billion. Quarantines affected large areas of the countryside, devastating the tourist trade. Over six million animals were killed, destroying decades of investment in breeding stocks. Sixty farm owners committed suicide.

Congress as well as past and present Administrations have recognized the importance of this issue to both our national and economic security. The creation of a robust R&D and diagnostic capability to defend U.S. agriculture against agro-terrorism, foreign animal diseases and emerging infectious diseases has been the intention of many federal laws and Presidential Directives dating back to the Homeland Security Act of 2002, which transferred Plum Island from the Department of Agriculture to the Department of Homeland Security and Homeland Security Presidential Directive-9 (HSPD-9) in 2004, which tasked the Secretaries of Agriculture and Homeland Security to "develop a plan to provide safe, secure, and state-of-the-art agriculture biocontainment laboratories that research and develop diagnostic capabilities for foreign animal and zoonotic diseases."

Potential Large-scale Threats to US Agriculture

As detailed in numerous studies, large-scale threats to U.S. agriculture are likely to arise from one of three main sources: inadvertent introduction of a Foreign Animal Disease (FAD), emergence of a new infectious agent, or deliberate introduction via a terrorist act. There are dozens of endemic diseases overseas not currently found in the U.S., including Foot and Mouth Disease, Classical and African Swine Fever, and many more. The U.S. faces an increasing risk of accidental introduction of such diseases as a result of rapid, large-scale market movements of animals, illicit trade (including smuggling of exotic animals), and northward migration of some insect-borne diseases. Moreover, many of these pathogens occur naturally or are less regulated than human disease agents and hence potentially available to would-be agro-terrorists.

The number of emerging infectious disease events of significance is rising over time due to economic, social, and commercial factors. Between 1940 and 2004, 60% of these new diseases

were *zoonoses*, which are diseases that infect both humans and animals. Examples of recently emerged zoonoses include HIV-AIDs, West Nile Fever, and Severe Acute Respiratory Syndrome (SARS). SARS originated in exotic food animals in China and over a period of several months in 2003, spread to 30 countries, infected 8,000 people, 800 of whom died, and it had an $8 billion effect on the global economy.

Many lethal and contagious diseases affecting plants and animals are endemic abroad, and hence available. The location of many food animals in open pastures makes them difficult to guard, and the concentration of thousands of livestock in feedlots and slaughter houses facilitates the subsequent spread. International trade in animals and food is frequently linked to certification of disease-free status. Loss of such status – or even rumors to this effect – can quickly stop exports and change consumption patterns.

The decisive factor in limiting damage due to a disease outbreak among U.S. agricultural animals -whether the origin of the outbreak is natural or a deliberate bioterrorist attack - is the ability to rapidly respond to the event. In the absence of effective animal vaccines or countermeasures, killing infected or possibly infected animals is the only option. For some zoonotic diseases such as Rift Valley Fever, the best protection of the human population may be the early detection of the agent in animals and development of animal vaccines.

What a Biosafety Level 4 (BSL4) Laboratory Brings to the U.S. Agro-defense Mission
Over the past decade, multiple expert studies and reports have recommended the construction of a new, state-of-the-art BSL4, high-containment laboratory to replace the aging Plum Island facility and to enable a full spectrum of agro-defense research and development activities[ii], [iii], [iv], [v]. Such a laboratory would offer several advantages to U.S. agricultural research including the ability to work with dangerous zoonoses on U.S. soil and enhanced capacities for the development of animal diagnostic tests and vaccines.

The Plum Island Animal Disease Center (PIADC), located off the eastern shore of Long Island, New York, has been the key research and development facility in the U.S. for countering agricultural biological threats since 1954. However, the facility does not possess a BSL4 containment capability, meaning that any outbreak of emerging or zoonotic disease requiring this biocontainment level could not involve direct livestock research, which would severely inhibit U.S. response capability. As a BSL3 facility, PIADC has a limited capacity to perform research and development. The current facility lacks the overall capacity to simultaneously work with the number of pathogens USDA and the Institute of Medicine deem "critical."

The physical facility at PIADC, built in 1954, is at the end of its lifecycle. Significant recapitalization is needed to ensure safe operation of the laboratory. The most urgent repair work includes upgrades to the wastewater thermal decontamination treatment facility, which processes waste from the laboratory prior to it going to the wastewater treatment plant, and repairs to the bulkhead at the ferry dock. If a new laboratory is built, it will take five years to construct- on an expedited schedule- and another two years for accreditation by USDA and CDC. During that time PIADC will require $60 to $90 million in facility upgrades to maintain safe operations. DHS S&T is currently conducting an engineering study to identify possible upgrades that may be needed for longer term maintenance and safe operation.

Assessing the Optimal Path Forward for NBAF
To ensure that NBAF is the most effective method to protect our Nation's agriculture infrastructure and public health, DHS, in coordination with the National Academy of Sciences (NAS), is convening a panel of experts and stakeholders, in conjunction with the interagency, to conduct a comprehensive assessment to examine 1) the current threats from terrorism, foreign animals and the global migration of zoonotic diseases to U.S. agriculture; and 2) the project's viability in the current budget environment, evaluating the cost, capacities, and capabilities of the current plan as well as potential alternatives to construct and operate NBAF.

The panel will assess the threat posed to livestock by infectious diseases originating from zoonoses, new and emerging diseases, and bioterrorism while identifying the U.S. laboratory infrastructure needed to counter the threat and meet the public health and food security needs of the United States. A variety of options will be considered by the committee including building NBAF as proposed, modifying the scope of NBAF, as well as maintaining current capabilities at PIADC while leveraging BSL-4 laboratory capacity (for large livestock) through foreign laboratories. Given the extensive site selection process from 2006-2009 and the recently-updated NBAF Site-Specific Risk Assessment, the panel will not revisit the site selection or consider alternative locations for NBAF. However, the panel will evaluate the capacity, capabilities, and liabilities of these options and will provide consensus advice on how the laboratory infrastructure needed to address foreign animal, emerging and zoonotic disease threats could be assembled.

Panel membership will include subject matter experts in animal and human health, the livestock industry, national security aspects of agriculture, cost/benefit analysis, biosafety, biosecurity and stakeholder backgrounds to address key questions pertinent to known and emerging foreign animal and zoonotic diseases relevant to livestock biocontainment.

S&T Directorate's FY13 Budget Request
S&T's FY 2013 budget request is $831.5 million; this includes $138 million for Management and Administration, which funds salaries and benefits and business expenses, and $693.5 million for Research, Development, Acquisition and Operations (RDA&O). RDA&O funds Laboratory Facilities ($127.4 million), Acquisition and Operations Support ($48 million), University Programs ($40 million) and Research Development and Innovation (RD&I) ($478 million). The RD&I budget is S&T's discretionary R&D. This is the funding S&T uses to deliver needed technology products to strengthen the operations of DHS components and the Homeland Security Enterprise. Within RDA&O, the FY 2013 budget provides $10 million to complement ongoing research at the Plum Island Animal Disease Center by accelerating research programs focused on zoonotic diseases and emerging foreign animal diseases at Kansas State University.

After S&T's R&D budget was cut by 43 percent in FY 2012, eliminating over 100 ongoing projects, the FY 2013 budget request restores these cuts and includes funding for critical R&D programs to improve homeland security through state-of-the-art solutions and technology. The request supports 107 ongoing projects and 12 new starts reflecting a more robust R&D program capable of delivering new technologies. The proposed R&D funding level in FY 2013 increases by $212.3 million compared to FY 2012 and restores R&D funding to the FY 2011 enacted level. This increase will enable S&T to support the needs of frontline operational Components and

provide resources to ongoing efforts that are driving towards near-term delivery and transition while resuming R&D work cut in the FY 2012 funding in priority areas such as: Explosives (aviation security), Bio-Threat Security, Cyber Security, and First Responders.

S&T Delivers New Technology and Knowledge Products that Enhance Capabilities across the HSE.

A core focus of S&T is the rapid delivery of new technologies that address the mission needs of DHS components, the first responder community, and (in the case of cybersecurity) industry. Over the past year, S&T has utilized RD&I funding to develop technologies and knowledge products important to a range of Homeland Security activities and customers.

Some examples of S&T's recent technology and knowledge product successes include:

Technology successes

- The Controlled Impact Rescue Tool (CIRT): Decreases by 85 percent the time it takes to breach reinforced concrete walls while increasing first responder's control and overall safety. Demonstrated and transferred CIRT to Fairfax County Fire and Rescue, who routinely deploy internationally to assist in rescues from disasters both natural and manmade. CIRT is now commercially available from Raytheon Corporation, which also shared development costs with S&T.
- DNS Security Extensions (DNSSEC) protocol: DNSSEC protects internet users from being redirected to malicious websites without knowing it. The Internet uses the Domain Name System (DNS) to translate web addresses from text (for example, congress.gov) to numeric addresses (140.147.249.9'). DNSSEC has been adopted by over thirty of the top level domains, such as .com, .org, .us, and .uk. DNSSEC received a national award in 2011 from the SANS Institute for Substantial Cyber Risk Reduction.
- Virtual USA® (vUSA): This information sharing program accesses all levels of government and all types of responders. vUSA is a blend of process and technology that provides a virtual pipeline to allow data (such as the operational status of critical infrastructure or emergency vehicle locations) to be shared by different systems and operating platforms with no changes to the current system. Selected as a White House Open Government Initiative, vUSA is currently in use in 23 states.
- SportEvac: This is computer modeling software developed by S&T that provides simulation of evacuations allowing venue operators to determine the safest evacuation and optimum plans and procedures. The Indianapolis Department of Public Safety utilized SportEvac in their security and safety planning for this year's NFL Super Bowl. This technology is covered by the SAFETY Act.
- Foot and Mouth Disease (FMD) vaccine: S&T, working with USDA, has developed a next generation vaccine against a strain of FMD. It has been submitted to USDA for a conditional license, a key step towards full manufacturing and use.
- Commercial Mobile Alert Service (CMAS): This program provides a national capability to deliver relevant, timely, and geographically-targeted messages to mobile devices. In December 2011, New York City partnered with S&T and FEMA to conduct the first end-to-end test of the CMAS tool. S&T will launch CMAS later this year.
- Disposable Backboard Cover: Repurposing the Tyvex ™ material used to wrap houses in construction, S&T developed a disposable backboard cover to better protect patients and

responders from disease and contanimants. This product was developed, tested, and commercialized in under eight months.

- Explosives Trace Detection: For checked baggage screening, this next generation device is ten times more sensitive than existing systems, can detect narcotics as well as explosives, and is similarly priced to existing machines. The system is currently undergoing operational testing with the Transportation Security Administration (TSA) and will be commercially available within a year.
- Self-Contained Breathing Apparatus (SCBA): S&T partnered with the Mine Safety Appliance Company (MSA) to integrate and certify S&T's lighter and smaller profile SCBA cylinder array into a full SCBA ensemble that has been tested and certified for use by firefighters. This represents the first major redesign in decades of this critical piece of first responder safety equipment.
- Multi-Band Radio (MBR): To provide a successful coordinated response, emergency responders must be able to effectively communicate with all partners across jurisdictional lines, including local, regional, state, and Federal entities. Until recently, no public safety radio existed that was capable of operating on more than one radio band. S&T developed the requirements for a hand-held MBR that allows first responders to communicate with partner agencies, regardless of the band on which they operate. The first responder communities in Chicago, Illinois, Miami, Florida, and New Orleans, Louisiana participated in highly successful pilots of the technology. S&T's efforts sparked industry interest- MBRs are now commercially available from three manufacturers.
- Geo-spatial Location Accountability and Navigation System for Emergency Responders (GLANSER): A tool which allows incident commanders to locate and track personnel inside enclosed areas. Honeywell, Inc. has begun to commercialize GLANSER.

Knowledge Product successes:

- Analysis of small, dark aircraft: Working in partnership with Customs and Border Patrol (CBP), S&T conducted an analysis and demonstration of CBP's capabilities to detect and track small dark aircraft that are often used to transit elicit materials over the border. S&T's technical input identified how CBP could substantially improve the performance of their air interdiction resources at no additional cost.
- Qualification testing on white powder detector: S&T completed qualification testing for a commercially available system that allows first responders to determine if suspicious white powders contain threat agents. The process relied upon the S&T-developed Public-Safety Actionable Assay standards that ensure local jurisdictions are using technology that meets rigorous specifications for accuracy and sensitivity**.**
- Storm surge predictions: The Coastal Hazards Center of Excellence (COE) assisted the U.S. Coast Guard (USCG) by tracking the likely storm surge/wave impact of Hurricane Irene. This modeling information led the USCG to relocate its Command Center just before its previous location was damaged by the hurricane.
- Analysis of the SPOT program: The TSA asked S&T to assess the validity of the Screening of Passengers by Observation Techniques (SPOT) program's indicators. The indicators are behavioral cues that TSA agents use to identify individuals that may intend to cause harm or conduct illegal activity. S&T determined that the indicators provided a much more efficient and effective screening method than random searches.

- New standard for explosive detection systems: S&T led development of the Digital Imaging and Communications in Security (DICOS) standard between hardware and software for checked baggage explosives detection systems (EDS). This standard will allow *any* software developer to design detection systems and algorithms to be used in EDS, whereas previously the hardware manufacturers used proprietary code. By enabling private sector competition, this openness greatly increases the level of innovation, fueling increased security and ultimately saving money.
- Recovery and resiliency post-biological attack: The Interagency Biological Restoration Demonstration (IBRD) program was conducted in Seattle in partnership with the Department of Defense's (DoD) Defense Threat Reduction Agency (DTRA) to reduce the time and resources necessary to recover from an anthrax attack in an urban area. IBRD has helped enhance the efficacy and efficiency of recovering large urban areas from biological attack by developing consequence management guidance and establishing key relationships across the federal, regional, and local stakeholders. Its success has resulted in a follow-on program in Denver called the Wide Area Recovery and Resiliency Program (WARPP), in partnership with DTRA and with support from the Department of Health and Human Services (HHS), Department of State, Environmental Protection Agency (EPA), and the Federal Emergency and Management Agency (FEMA).
- Assistant for Randomizing Monitoring Over Routes (ARMOR): A randomization algorithm developed by a S&T University Center of Excellence (COE) used by the USCG to deploy available monitoring assets for maximum impact. The outcome has been a significant increase in capability without any additional staffing costs. The pilot effort in Boston Harbor was so successful that the USCG has moved to a new phase of testing with the Port Authority of New York and New Jersey.

Strong Partnerships with DHS Operators Deliver Results

Apex projects are cross-cutting, multi-disciplinary efforts requested by DHS Components that are high priority, high-value, and short turn-around in nature. They are intended to solve problems of strategic operational importance identified by a Component leader and exemplify the DHS model for working with Components, based on top-level commitment, collaborative partnerships, and multidisciplinary teams.

Each Apex project is codified in a signed charter agreement between the head of a DHS Component and the Under Secretary for S&T. Together, we approve the project's goals and approach, providing a leadership imprimatur that energizes both S&T and the partner organization. The S&T team is then mirrored by an equally able, multidisciplinary team from the partner Component.

The first Apex effort focuses on improving the remote protective operations of the U.S. Secret Service (USSS) and has proven very successful. The team is delivering an operational systems analysis map for better integrating technology with human networks protecting government leaders and designated personnel traveling across the country. USSS Director Mark Sullivan complimented the Apex team, saying "S&T has lived up to and met every commitment it has made to the Service."

S&T Technical Expertise Assists DHS Acquisition Efforts

S&T is working with the DHS Management Directorate to applying its engineering expertise toward development of a more disciplined and efficient approach to DHS's acquisition cycle. In the initial stages of an acquisition, our Office of Acquisition Support and Operational Analysis (ASOA) helps components analyze and translate mission needs into testable requirements, ensuring that DHS procurements work as expected, deliver on time, and develop within budget.

S&T is currently supporting development of CBP's next generation radio project, TacNet. DHS Joint Wireless Program Executive Director John Santo described S&T as "essential for achieving success." S&T is also working with the Under Secretary for Management to expand S&T's role and authority within DHS's Integrated Investment Life Cycle Model. Lastly, in its late stage role in acquisitions, S&T is responsible for operational testing and evaluation of major acquisition programs across DHS and oversees major acquisition programs (e.g. those with total life cycle cost estimates exceeding $1 billion). In 2011, S&T managed operational testing of eight major acquisition programs, including the National Protection and Programs Directorate's (NPPD) highly successful National Cyber Security Program Block 2.1.

Conclusion

Congress charged S&T with applying similar ingenuity and innovation in service of homeland security. In a world where technology is increasingly becoming a larger part of our lives, it is essential that DHS develop new tools to keep the country safe and secure. Indeed, constant innovation is essential for combating the broad and rapidly evolving threats that confront the Nation. I believe S&T continues to make major contributions to this mission, and I am proud of S&T's record of harnessing science and engineering in ways that meet the needs of our many partners.

The FY 2013 budget request prudently strengthens our security posture by restoring S&T's funding of research investments, ensuring that DHS avoids long term vulnerability in areas such as border security, counterterrorism, and disaster resilience. Effective innovation requires adequate investment in *both* infrastructure and in research. Together, they provide a strong foundation for robust research and innovation in support of DHS's mission to secure our country.

[ii] Institute of Medicine. The Emergence of Zoonotic Diseases: Understanding the Impact on Animal and Human Health (2002)

[iii] National Academies of Science. Critical Needs for Research in Veterinary Science (2005)

[iv] TERRENCE K. KELLY, PETER CHALK, JAMES BONOMO, JOHN PARACHINI, BRIAN A. JACKSON, GARY CECCHINE. The Office of Science and Technology Policy Blue Ribbon Panel on the Threat of Biological Terrorism Directed Against Livestock (April 2004)

[v] Evaluation of a Site-Specific Risk Assessment for the Department of Homeland Security's Planned National Bio- and Agro-Defense Facility in Manhattan, Kansas (2010), National Academies of Science, Board on Life Sciences (BLS)