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Madam Chairwoman and members of the Subcommittee, thank you for the opportunity to testify again this year on the Department of Energy (DOE) National Nuclear Security Administration's (NNSA) Nonproliferation and Verification Research and Development Program. The environment is considerably different this year in terms of both our national security posture and our budget request. Where last year we discussed the potential of a terrorist act, it is now a shocking reality. And thanks to Administration and Congressional action our budget request this year is up \$113 million over last year's request in terms of actual R&D funding – an increase of 66 percent.

The NNSA's Nonproliferation and Verification Research and Development (R&D) Program develops technologies for application by the operational users whose mission it is to strengthen the United States response to current and projected threats to national security posed by the proliferation of nuclear, chemical, and biological weapons and diversion of special nuclear material. The technologies are developed for a wide range of government users including the Department of Defense (DoD) and the Intelligence community.

Our laboratories possess the vast majority of our nation's expertise in nuclear weapons design and production. Because of this expertise, the labs have historically supplied the technical capability for the U.S. government to detect and characterize nuclear proliferation activities in their early stages. The goal of our R&D program is to continue to provide the technical solutions to enhance U.S. national security. In order to meet this goal, the emphasis is on maintaining the technology base and conducting the applied research needed to develop the technologies necessary to detect and deter nuclear proliferation, to meet U.S. nuclear explosion monitoring goals, and to develop and demonstrate chemical and biological detection and related technologies to enable us to better prepare for and respond to the threat of domestic chemical and biological attacks. To address the broad array of mission challenges our program objectives are to:

- Develop and demonstrate technologies needed to remotely detect the early stages of a proliferant nation's nuclear weapons program.
- Develop, demonstrate, and deliver technologies to detect, locate, identify, and characterize nuclear explosions underground, underwater, in the atmosphere, and in space.

- Develop and demonstrate technologies to improve our national capability to detect nuclear materials, to counter nuclear smuggling, and to identify the origins of nuclear materials.
- Develop and demonstrate technologies and systems that dramatically improve our ability to detect the proliferation or use of chemical and biological agents, and to minimize the consequences of potential terrorist use of chemical or biological agents.

COLLABORATION

The importance of stemming the proliferation of weapons of mass destruction and the NNSA's role in related technology development is unquestioned. The Nonproliferation and Verification R&D program fills a gap between basic research and users' application-specific acquisitions as well as providing the technical expertise not resident in many agencies charged with homeland security. Longer term technology needs are not always well understood nor well documented, but are based upon DoD or intelligence community realization that there are gaps in capability and that current technology will eventually become obsolete and/or understood by adversaries, thus new capabilities must be constantly pursued.

As I noted earlier, maintaining the nonproliferation technology base is a goal of our program. It is key to our ability to respond to other agencies' changing operational requirements and changes in national policy. With our emphasis on the technology base and not having day-to-day operational mission responsibilities, we are able to take a longer-term focus and stay the development course while maturing the technology and to pursue revolutionary, higher risk solutions that frequently push the state of the art. Having NNSA fund this type of R&D allows us to marshal multi-disciplinary, inter-laboratory teams from the national laboratories to address these very challenging technical, science, and engineering problems.

Leveraging our past nuclear testing program, NNSA has the responsibility to apply the scientific understanding gained during testing to develop the sensor capability for the U.S. national nuclear explosion monitoring system to meet U.S. goals to detect very low yield nuclear explosions underground, in the atmosphere, in the oceans, and in space with space-based and ground-based sensor systems. Our commitment to this responsibility was recognized during a recent U.S. Nuclear Detonation Detection System National Review where senior members from the Office of the Secretary of Defense, Strategic Command, Space Command, State Department, multiple Air Force Organizations, and NNSA recommended that all space-based nuclear explosion detection sensor work be funded by a single organization. This budget request reflects that recommendation with a \$15 million transfer from the Air Force to our program to produce the electromagnetic pulse sensor for the next generation of Global Positioning Satellites.

Our tie to the operational community is strongest in the nuclear explosion monitoring area where we have an almost 40 year history of working together. We provide

remarkably capable and robust hardware for space systems, as well as expert advice in analyzing the data they produce, and are enabling the Air Force Technical Applications Center's modernization of their seismic monitoring capability. Our relationship with the operators of the space and ground nuclear explosion monitoring systems is close and productive, and they acknowledge us as critical to the success of their efforts.

In addition to our connections to individual operational organizations, we also work closely with other developers like the Defense Threat Reduction Agency (DTRA). Our collaboration with DTRA includes a variety of cooperative mechanisms from developing joint technical roadmaps for chem/bio to characterizing gamma ray detectors and specific radiation signatures to support the DTRA base and port defense demonstration project as part of our homeland security initiatives.

While we have very close ties to individual developers and operational users within the DoD and the intelligence community, because of homeland security issues we have reinvigorated a previous relationship with the U.S. Customs Service. The goal is to support their development of operational concepts to interdict nuclear materials at international borders with new and existing radiation detection and transportation security technologies. Part of our support includes the establishment of a nuclear testbed to evaluate detection concepts and technologies against actual nuclear materials in maritime and airborne shipping containers. Technologies developed and demonstrated to detect nuclear weapons can also detect less catastrophic, but equally disruptive, radiologic dispersal devices.

An area of significant multi-agency homeland security collaboration is in genetic sequencing of microbes with possible terrorist implications. The effort is being coordinated through OSTP's Interagency Microbe Project Working Group. All agencies (NSF, NIH, CDC, DOE, DARPA, USAMRIID, CIA, and Agriculture) doing genetic sequencing are participating and agreeing on what should be sequenced, to what level and quality, and who will do the sequencing. This is a real success story as multiple agencies are pooling their resources to attack a part of the bioterrorism threat.

Another success story of our chem/bio program has been the transition of some decontamination technology we developed to the private sector. Commercial vendors now produce the decontamination foam that was used to clean up some of the House offices.

We are also working on transitioning technology developed for nonproliferation applications to support the warfighter. We are finalizing a classified MOU with multiple DoD organizations for a Multispectral Thermal Imager Joint User Multispectral Demonstration program using our MTI technology demonstration small satellite.

TECHNOLOGY CHALLENGES

I have noted a few of our successful transitions and collaborations, now let me briefly highlight some of the technical challenges we face.

Nuclear Explosion Monitoring: The primary challenges we face are in our ability to detect smaller nuclear detonations and discriminate them from natural and industrial activity. This challenge is extreme as the potential for false alarms goes up significantly as we lower our detection threshold. Most of the solutions are very computationally intensive whether ground-based processing or satellite on-board processing.

Homeland Defense: In chem/bio area, the chief challenge facing researchers is biological detection, specifically distinguishing a threat pathogen from its harmless, very close relatives. This is a key reason why the interagency microbe sequencing collaboration is so important. As these distinctions are developed, we must develop detection methods to exploit these differences and rapidly identify threat pathogens.

For the nuclear realm, the ability to detect plutonium and highly enriched uranium at stand-off distances and with sufficient speed so that commerce is not impeded is driving us to explore not only new radiation detection materials, but also new detection system concepts. In addition to new detectors and materials, we are confronted with the need to develop new concepts for networking a collection of sensors into an integrated architecture for layered defense networks and perimeter monitoring systems.

Proliferation Detection: Now let me move to our technology supporting national efforts to detect and understand WMD proliferation at its source. The challenge is to catch clandestine WMD programs at the earliest stage of development. Potential adversaries, terrorist or nation states, are well aware of our traditional monitoring methods and have taken steps to disguise suspect activities. Our challenge is to obtain sufficient information to enable us to distinguish steps in a weapons production program from closely related legitimate industrial activities. New sensors that detect new kinds of signatures are necessary, and advanced processing and exploitation methods must be developed to make sense of this data.

Our ability to successfully address these challenges is rooted in the technology base that this program maintains at the DOE national laboratories. Its foundation comes from the historical expertise of the DOE's nuclear weapons program and intimate involvement with both DoD organizations and the intelligence community. This technology base ensures that we can respond rapidly to solve urgent needs and to changing national priorities.

CONCLUSION

The NNSA Nonproliferation and Verification R&D Program remains essential to the agencies responsible for non/counterproliferation, and now homeland security, being able to fulfill their operational missions. The program is well coordinated with individual users and other developers.

Our technology will get even better -- because it must. Rogue countries, terrorists and the suppliers of the nuclear, biological, and chemical tools of their trade are using

increasingly sophisticated means to evade detection. Our methods and technology must outpace this growing threat.

There is no simple solution to this problem, and we alone cannot solve it. With the support of Congress and through continued collaboration with DoD and others and the necessary advances in technology and analysis techniques, we can make a quantum leap in our ability to detect and understand these threats to the American people.

I would be pleased to answer any questions you may have.