



Annual Report 2014

National Urban Security Technology Laboratory



Homeland
Security

Science and Technology

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INTRODUCTION

The National Urban Security Technology Laboratory (NUSTL) celebrates another exceptional year in which it delivered on its mission to test, evaluate and analyze homeland security capabilities, while serving as a technical authority to the first responders protecting our cities. NUSTL's 2014 Annual Report details its accomplishments and recognizes our staff that made such accomplishments possible.

Some of NUSTL's most notable achievements in 2014 included:

- Reaching a performance testing and evaluation milestone on testing 10,000 radiation detectors that are being used by law enforcement in New York, New Jersey and Connecticut.
- Conducting operational field assessments on cutting edge first responder technologies, such as structural firefighting gloves for firefighters.
- Publishing 18 technical reports on homeland security technologies that will aid the first responder community's technology acquisition decisions.

In addition, NUSTL also expanded its Radiological/Nuclear Response and Recovery (RNRR) Research and Development (R&D) portfolio by initiating six new projects that aim to identify gaps in training, provide a transportation hub with the capability to detect the presence of radiation and initiate the development of a handbook that details guidance and field operational job tools.

NUSTL also strengthened its relationships with the federal, interagency, local and state first responders, academia and private sector entities this year through extensive outreach by collaborating with more than 110 organizations. This was done primarily through NUSTL's New York Area Science and Technology Forum (NYAST). In 2014, NUSTL held NYAST meetings on virtual training for first responders, electromagnetic pulse effects on first responder equipment and on the latest advancements in surveillance technologies. More than 100 NYAST members, representing numerous

organizations across the Homeland Security Enterprise (HSE) attended the three NYAST meetings in person and virtually through the NYAST webinar.



NUSTL holds 32nd NYAST Meeting on the topic of "Virtual Training: Preparing First Responders for Active Shooter Response" with DHS S&T First Responders Group (FRG) Program Manager Christine Lee and partners from the U.S. Army Research Lab Simulation and Training Technology Center.

Also in 2014, the New York City Police Department (NYPD) tested NUSTL's Radiological Emergency Management System (REMS) for use in its "Supersmart" NYPD Cruiser to assist in its efforts to detect illicit radiological material. The Wall Street Journal wrote [Technology Fuels New Police Cruiser](#) and the New York Daily News published [Supersmart NYPD cruiser being tested in Brooklyn](#) about the tests.

All of the many successes and accomplishments NUSTL had in 2014 were a direct result of the hard work and dedication of the laboratory's multi-talented staff. In fact, two of NUSTL staff members, RNRR Division Director Benjamin Stevenson and Engineer Bhargav Patel, were honored at the 2014 S&T Under Secretary's Award Ceremony for their exceptional work and leadership excellence. The NUSTL team is proud of their efforts as their work helped to improve our Nation's first responders' ability to secure our homeland.

HIGHLIGHTS

10,000 units tested – NUSTL reached a radiological/nuclear detector testing milestone. In October 2014, NUSTL's Performance Test and Evaluation at NUSTL (PTEN) program officially reached the milestone of 10,000 radiological/nuclear detection units tested. Since 2009, the PTEN program, led by NUSTL Program Manager Ethel Davis, has been conducting unit functional tests of first responder radiological/nuclear detection equipment to ensure operational readiness of deployed units such as Personal Radiation Detectors (PRD), Backpack Detectors, Mobile Detection Systems and Radioisotope Identifiers. NUSTL regularly tests such equipment for many tri-state area first responder organizations, including the NYPD, the Port Authority of New York and New Jersey Police Department, the Fire Department of New York and the Connecticut State Police; and for federal entities such as the United States Coast Guard.



NUSTL PTEN Program Manager Ethel Davis provides an overview of NUSTL's PTEN program to students from the Stevens Institute of Technology, DHS Center of Excellence for Maritime Security during their visit and tour of NUSTL.

NUSTL tested radiation dosimeters for the Fire Department of New York Hazardous Materials Battalion.

The New York City Fire Department (FDNY) contacted NUSTL for assistance in comparing personal radiation detector and dosimeter capabilities and specifications to FDNY operational needs. The FDNY selected three models of radiation detectors for use by firefighters in various emergency response operations, but wanted to ensure the equipment was assessed for operational performance and mission suitability. Building from the desired use case

and FDNY operations plan, NUSTL developed a test concept in support of the equipment acquisition and to ensure FDNY Hazardous Materials Officers better understood how their equipment responded to variations in radiation fields and energies.

In July 2014, once FDNY approved the test concept, NUSTL worked with the Hazardous Materials Battalion to develop a detailed test plan and procedure to obtain the data needed through laboratory studies on representative instruments that FDNY provided. In August 2014, NUSTL tested radiation dosimeters (*Thermo Scientific RadEye GF-10-EX, the Thermo Scientific RadEye PRD-ER and the Landauer RadWatch*) for the FDNY Hazardous Materials Battalion. NUSTL staff performed battery and equipment interface testing onsite in New York City, and conducted radiation testing in cooperation with Pacific Northwest National Laboratory and Brookhaven National Laboratory. The final results and analysis of equipment performance, including guidance on best practices for FDNY dosimeter deployment and use, were captured in *NUSTL's Characterization and Comparison Test Results Report: Personal Radiation Detectors for Exposure Control*. In short, the test report indicated the equipment tested was suitable and met FDNY requirements for radiological response.



NUSTL Test Scientist Gladys Klemic briefs the results of NUSTL's dosimeter testing to Chief Richard Schlueck of the FDNY Hazardous Materials Battalion. Also pictured are NUSTL test team members including Matthew Monetti, Cecilia Murtagh, Ben Stevenson, Ethel Davis and Bhargav Patel.

NUSTL briefed Chief Richard Schlueck of the FDNY Hazardous Materials Battalion on the test results in October 2014. NUSTL's test report analyzed each dosimeter's ability to meet FDNY requirements and provided guidance on best practices for dosimeter deployment and use.

During the brief, FDNY requested additional NUSTL support; including acceptance testing of FDNY purchased radiation detection equipment. NUSTL and FDNY discussed having NUSTL provide testing of this equipment between calibration years to help ensure functionality and enhance availability. Additionally, the FDNY requested NUSTL's technical expertise in the planning of community reception centers to screen people following a radiological event. The FDNY Hazardous Materials Battalion is examining radiation cross-talk between radiation portals to maximize the screening rate. The FDNY provided one radiation portal to NUSTL to perform initial tests and explore the most practical spacing/ arrangement of portals to account for cross-talk and to maximize throughput.

NUSTL supports the FDNY through the Memorandum of Agreement (MOA) between DHS S&T First Responders Group (FRG) and FDNY by providing test and evaluation services and technical advisory services. The purpose of the MOA is to improve the development of technologies and increase knowledge to enhance the safety and effectiveness of first responders. By developing a collaborative arrangement between DHS S&T and the FDNY, federal program managers have access to fire, rescue and emergency medical personnel to help gather FDNY requirements, assist FDNY with technical development, assess prototypes and consult the FDNY on implementation requirements. This will improve the successful transfer of new technologies to field use.

NUSTL employees honored at the S&T 2014 Annual Awards Ceremony. At S&T's 2014 Annual Awards Ceremony, S&T honored NUSTL Division Director Benjamin Stevenson and Test Scientist Bhargav Patel.

Ben received S&T's "Excellence in Leadership" award for demonstrating exceptional leadership in raising S&T's profile as an interagency focal point of coordination and collaboration for RNRR R&D activities. He was also recognized for his role in promoting a positive workplace and culture at NUSTL.

Bhargav received S&T's "Rising Star" award due to his exemplary support to the First Responder Technologies Operational Field Assessments Program and related initiatives at NUSTL. Through his enthusiasm, innovative ideas and keen technical acumen, Bhargav established himself as an integral member of the Directorate and strengthened the ability of the FRG and NUSTL to integrate their mission requirements.



NUSTL's Radiological/Nuclear Response & Recovery Division Director Ben Stevenson, recipient of the S&T "Excellence in Leadership" Award.



NUSTL's Test Scientist Bhargav Patel, recipient of the S&T "Excellence in Leadership" Award.

PROJECTS

System Assessment and Validation for Emergency Responders

The DHS S&T FRG System Assessment and Validation for Emergency Responders (SAVER) program objectively evaluates first responder tools for the purpose of informing purchasing decisions, as well as enhancing safety. As a SAVER Technical Agent, NUSTL develops knowledge products that help first responders to better select, procure, use and maintain their equipment.

In 2014, NUSTL generated 18 such knowledge products, including TechNotes, market survey reports and a handbook that analyzed various homeland security tools and technologies to aid first responders in making decisions on technology acquisition. These reports are listed below and can be found on [FirstResponder.gov](http://www.firstresponder.gov) at <http://www.firstresponder.gov/saver>:

- **Personal Radiation Detectors TechNote.** February 27.
- **Handheld Radiation Survey Meters TechNote.** February 27.
- **Dosimeters for Response and Recovery TechNote.** February 27.
- **Encryption Software Tools Market Survey Report.** March 27.
- **Handheld Radionuclide Identification Devices TechNote.** April 1.
- **Public Safety Personal Protective Equipment for Disposal of Explosive Devices TechNote.** April 4.
- **Environmental (Weather) Surveillance Equipment Market Survey Report.** April 15.
- **Biological Agent Detection Equipment Handbook.** May 9.
- **Personal Cooling Systems Market Survey Report.** May 15.
- **Walk-through Metal Detectors Market Survey Report.** May 21.

- **Self-Contained Breathing Apparatus, Full Facepiece, Closed Circuit TechNote.** July 17.
- **Portal Radiation Portal Monitors TechNote.** July 23.
- **Flame- and Photo-Ionization Detectors, Portable TechNote.** September 17.
- **Chemical, Biological, Radiological, Nuclear (CBRN) Self-Contained Breathing Apparatus (SCBA) TechNote.** September 17.
- **Small Package X-Ray Systems TechNote.** September 17.
- **Structural Firefighting Glove Market Survey Report.** October 23.
- **CBRN Air-Purifying Escape Respirators TechNote.** November 18.
- **Extrication Devices Market Survey Report.** December 2.

Biological Agent Detection Equipment Focus Group

NUSTL convened and facilitated a focus group comprised of first responders from the Chicago and New York City metropolitan areas to assess and develop suitable evaluation criteria for the assessment of Biological Agent Detection Equipment (BADE) products. The focus group was conducted as part of the FRG SAVER program. The focus group was facilitated and recorded by NUSTL Test Scientists Nathalie Velarde, Ethel Davis and Gladys Klemic. The first responder participants included representatives from the Aurora Fire Department (Illinois), Orlando Fire Protection District (Illinois), Oakton Community College (Illinois), Bedford Park Fire Department (Illinois), New Jersey Transit Police, New York City Fire Department, Port Authority of New York and New Jersey Police Department, New York City Police Department and the Pacific Northwest National Laboratory. August 21.

Technical Agents Meeting

NUSTL participated in a SAVER Technical Agents meeting at the National Nuclear Security Administration Nevada Field Office in Las Vegas, Nevada to discuss the transition of SAVER to FRG, including administrative and programmatic changes to the program, and to ensure that it is most useful to the first responder community. April 22.

Radiological/Nuclear Response and Recovery Research and Development

In 2014, NUSTL's RNRR Research and Development (R&D) program continued its work on improving the first responder community's ability to respond and recover from radiological and nuclear incidents through R&D advancements in knowledge, technology, policy and procedures. The RNRR Portfolio's three goals are:

- GOAL 1** Enhance first responders capability to manage and characterize catastrophic radiological/nuclear incidents and integrate with federal assets.
- GOAL 2** Improve responder ability to save lives during the initial response operations of a radiological incident.
- GOAL 3** Minimize impact to community and economy through improved methods of incident stabilization, radiological clean-up, and recovery.

During 2014, the RNRR program defined investment priorities, continued to establish partnerships with the federal interagency and local and state first responders and collaborated to initiate six new projects that meet the program's goals. The RNRR program focuses on identifying and addressing capability gaps for first responders, developing first responder technology and knowledge products and providing scientific guidance and job aids for RNRR R&D. This document details those activities.

Defining Radiological/Nuclear Response and Recovery Investment Priorities

The Homeland Security Studies and Analysis Institute (HSSAI) developed the RNRR R&D Investment Plan that identifies RNRR capability priorities and potential response technology objectives to meet these capability gaps. The Investment Plan was created through a series of facilitated discussions with first responders and technology subject matter experts to better understand how state-of-the-art technology could meet the operational needs of state and

local agencies. The report details six response technology objectives to which DHS Science & Technology (S&T) can coordinate investment with interagency partners. The 2014 activities included:

- NUSTL and HSSAI hosted four focus groups of first responders and technologists to discuss priorities for the RNRR portfolio. The meeting included responders from diverse backgrounds, specialties and jurisdictions. The meetings aimed to identify existing or emerging technology solutions that meet responder mission needs for RNRR. The meetings occurred on December 11-12, 2013 in Chicago, Illinois; January 15-16, 2014 in Livermore, California; January 28-29, 2014 in Albuquerque, New Mexico; and February 11-12, 2014 in New York, New York.
- HSSAI delivered the final RNRR R&D Investment Strategy to NUSTL and FRG. The document has also been released to the Federal Emergency Management Agency's (FEMA) Chemical Biological Radiological Nuclear Explosives (CBRNE) Scientific Support Working Group (SSWG) and Communications Working Group, as well as other interagency committees working on radiological and nuclear R&D. The RNRR fiscal year (FY) 2015 funding will be spent to begin closing the gaps and response needs now outlined in the new DHS S&T Strategic Plan 2015-2019. *June 15, November 20.*

Partnering with the Federal Interagency on Radiological/Nuclear Response and Recovery Efforts

Key components to the success of the RNRR portfolio are the working relationships and partnerships with the federal interagency that have core competencies, authorities and responsibilities for RNRR. These partnerships have led to new initiatives, a better understanding of what the federal response to a radiological and nuclear incident will look like and improved products and resources for local and state first responders. This also aligns with the strategic initiative in the foundation documents of the RNRR R&D Portfolio to establish close working relationships and partnerships with the HSE.

Participating in Discussions on Federal Radiological and Nuclear Policy Needs and Future Investments

NUSTL participated in many formal interagency discussions focused on policy issues related to radiological and nuclear incidents, new technology investments and budget priorities. The 2014 activities included:

- Representatives from the Department of Energy (DOE), Environmental Protection Agency (EPA), FEMA, DHS Policy and S&T met to discuss mission requirements and responder needs associated with long-term recovery from a radiological incident. One of the shortfalls of existing research, guidance documents and response strategies is that they lack a clear plan for continuing resolutions of long-term issues associated with full recovery, repopulation and returning the impact area to a new normal state. The group will continue to meet annually and provide recommendations on next steps and potential programs for interagency funding during the next fiscal year. *May 12.*
- NUSTL's Director acted as the S&T representative at the Federal Radiological Preparedness Coordinating Committee (FRPCC) quarterly meeting. The FRPCC, as per 44 CFR 351, assists federal agencies and bodies (e.g., *Domestic Resilience Group, National Security Staff, White House Office of Science and Technology Policy*) on policy development and direction concerning Federal Assistance to state, local and tribal governments in their radiological and nuclear emergency planning and preparedness activities. FEMA's Technical Hazards Division and the Planning Division of FEMA's Response Directorate co-chair the FRPCC. The FRPCC charter includes the identification of R&D needs, which is pertinent to NUSTL's role as lead R&D sponsor, for RNRR. *March, 28, June 16, and October 3.*
- The Domestic Nuclear Detection Office (DNDO) held its annual Academic Research Initiative Program Review meeting to discuss advances in radiological detection, interdiction and material forensics. NUSTL attended the conference to learn how technology commonly used by first responders in a preventative mission can translate to response and recovery operations. *June 24–26.*

- NUSTL participated in the review of capability improvement proposals for the Nuclear Incident Response Team (NIRT), a specialized federal interagency asset, tasked with supporting the national response to a nuclear detonation. A panel of interagency participants from FEMA, S&T, DOE and EPA reviewed technical proposals for capability development and expansion, and advised the NIRT on budget priorities based on interagency strategies and response preparedness activities. *October 16.*

Co-Chairing Federal Emergency Management Agency's Chemical, Biological, Radiological, Nuclear and Explosives Scientific Support Working Group

NUSTL serves with FEMA as co-chair of the Scientific Support Working Group (SSWG). The group includes scientists, technologists and other subject matter experts who are both researching and developing new tools and technologies to support Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) response and recovery. The SSWG held regular meetings to discuss interagency coordination and preparedness for federal RNRR operations and planning. The 2014 activities included:

- Speakers that briefed the SSWG on their research include:
 - Phillip Palin, from the National Capitol Region Catastrophic Planning Grant Program, on supply chain management during catastrophic disasters. *January 28.*
 - Grover Cleveland, from the Department of Agriculture, on the federal assets that comprise the "Advance" team, which is prepared to offer radiological incident management and decision support to local jurisdictions and agencies. *February 25.*
 - Jud Stailey, from the Office of the Federal Coordinator for Meteorology, on National Oceanic and Atmospheric Administration's (NOAA) R&D projects focused on atmospheric transport and dispersion. *March 26.*

- Dr. Chris Barrett, from Virginia Polytechnic Institute and State University, on research funded by the Defense Threat Reduction Agency (DTRA) on the social implications of an Improvised Nuclear Device (IND) detonation in the National Capitol Region. *May 22.*
- Dr. Kirk Clawson, from NOAA, on Project Sagebrush, a project of the Air Resources Laboratory to conduct test releases and study short range dispersion in open terrain. *July 30.*
- Representatives from the Air Force on their ongoing R&D of tools to promptly diagnose, identify and capture data on the detonation of a nuclear weapon anywhere in the world. *October 23.*
- Sang Don Lee of the EPA on his ongoing work as an Embassy Science Fellow to the Japanese Government and his participation in planning and executing clean-up operations following the incident at the Fukushima Nuclear Power Plant. *October 23.*
- NUSTL briefed the SSWG twice on the RNRR portfolio focusing on technologies for improved identification and characterization of multiple hazards, contaminant migration modeling and prediction, technology solutions for translating radiological and nuclear data in detection points, and tools specifically designed to assist local agencies and offices in making protective action decisions, as identified in the HSAI Investment Plan. *August 20 and September 25.*

Working with Federal Emergency Management Agency and the Department of Energy to Establish Radiological Operations Support Specialist Position

In 2014, NUSTL partnered with the FEMA and the DOE to understand the program requirements for a new position in the Incident Command System (ICS) called the Radiological Operations Support Specialist (ROSS). A working group made up of first responders identified the ROSS position as a need. FEMA, DOE and NUSTL are working together to map out program management requirements, write position descriptions, and identify required skills, essential training,

and tools to support a ROSS during an incident. Current and future RNRR projects will be focused on improving the tools and trainings for a ROSS position.

Initiating Projects to Address Capability Gaps for First Responders

In 2014, RNRR added six new projects to its existing portfolio. With all of these projects, NUSTL teamed with federal partners and first responders to scope out mission needs and deliverables that are actionable and accessible to first responders.

Study on Effects of Electromagnetic Pulse – Initiated in 2013, Completed in 2014

NUSTL completed a project with DTRA to better understand how an Electromagnetic Pulse (EMP) would impact the initial response to an IND detonation, and provide information to first responders on impacts to electronic equipment, public alerts systems and response communications. The 2014 activities included:

- DTRA coordinated with the S&T Office of Standards to provide information on the potential for a draft civilian standard for EMP survivability of responder equipment. Based on cost concerns, the Office of Standards worked with DTRA to review current military equipment specifications and standards, and compile information on electronic survivability and the potential for adaptation by the commercial sector. NUSTL will make additional decisions concerning the advancement of the draft standard as a part of the RNRR R&D portfolio in conjunction with the Office of Standards. *June 30.*
- DTRA scheduled out-briefs with response agencies involved in equipment selection to discuss test results and lessons learned. Specifically, this included a discussion with Washington, DC responders on their repeaters and radio communications systems and FEMA on the Integrated Public Alert and Warning System (IPAWS) and public alert systems. All test results and information gathered have been integrated into the Electronic Reliability and Effects Predictions (EMREP) system. DTRA maintains the EMREP system, which can provide response agencies with information on impact

and reliability of communications equipment based on technology type. Test documents and reports were released to project partners in November and December of 2014.

Gross Decontamination and Waste Management Technology

NUSTL continued its partnership with the EPA to develop a tool that provides guidance to first responders on techniques, procedures and uses of commonly available equipment to reduce and control contamination following a radiological incident, minimizing exposure to hazards to responders and citizens. The project consists of three areas of focus: contamination containment, gross mitigation/decontamination and early phase waste management.

The 2014 activities included:

- NUSTL and the EPA cohosted a Radiological Mitigation and Waste Management Stakeholder Workshop in Arlington, Virginia. Attendees included local hazardous material responders from Virginia, California and Georgia; state health representatives from New Jersey, Vermont and Texas; EPA Regional Field Response Coordinators; and a representative from Japan's National Institute for Environmental Studies. The purpose of the workshop was to discuss and document current responder techniques and technology for minimizing radiological exposure to the public and responders through the containment of contamination, rapid gross decontamination and early phase waste management. In addition to reviewing current best practices, the workshop focused on obtaining stakeholder input on how to best research and test new technologies and techniques for mitigation and waste management that could improve their ability to respond to and recover from catastrophic radiological and nuclear incidents. *April 1.*
- NUSTL and EPA held three stakeholder feedback and information sessions focused on understanding state and local agency needs for RNR. Specifically, meeting goals were to solicit feedback on the EPA's completed literature reviews, best practices and technology tables for radiological containment of contamination, gross

decontamination, early phase radiological waste management and to develop user requirements for a final electronic application tool. The sessions also included briefings to responders by a representative from Public Health England on the United Kingdom's Radiation Response Handbook, a resource the project team is leveraging for data adaptation in the final electronic application. The visited cities, Burlington, Vermont, Charlotte, North Carolina and Los Angeles, California represent varying responder capabilities, urban area density and climate. *June 17, 19 and 25.*

- The Gross Decontamination Project Team, which includes representatives from NUSTL, the EPA and the U.S. Public Health Service, released compiled meeting notes and responder feedback that was collected in June and during stakeholder meetings. Participants were encouraged to share the notes and compiled feedback with others in their organizations and provided additional details on responder requirements and needs to the project team. The overarching consensus from feedback forms provided by individual responders during the individual stakeholder engagement process was that there is a significant need for tools that assist local agencies with radiological decontamination, clean-up and recovery, but the tools need to be useful for both operational responders in the field and senior agency officials working in an emergency operations center. *August 19.*



NUSTL RNR Division Director Ben Stevenson presents at the Radiological Mitigation and Waste Management Stakeholder Workshop in Arlington, Virginia.

- The Containment Stabilization Technology Gap Report was completed. It examines various containment technologies that can be employed in the early phase of a radiological and nuclear incident response, lists stakeholder feedback on technology preference and outlines recommendations for further experimental testing. Laboratory and full scale demonstration of these technologies will occur in 2015. *November 30.*

Scientific Guidance and Preparedness Support for Radiological Dispersal Device Response and Recovery

NUSTL initiated this project with Brookhaven National Laboratory (BNL) and Sandia National Laboratories (SNL) to develop tactical recommendations and actionable planning tools for a local response to a Radiological Dispersal Device (RDD) detonation based on previous scientific research. The effort includes piloting materials developed by the National Laboratories in Urban Area Security Initiative (UASI) cities to incorporate lessons learned into final deliverables. The 2014 activities included:

- NUSTL and BNL began identifying potential UASI cities to participate in the pilot process. Pilot cities will assemble and maintain an interagency working group, participate in pre- and post-planning activities with interagency partners, and hold three meetings over a three- to six-month timeframe. Through the course of these three planning sessions, UASI cities will receive scientific research, response guidance and other tools to help each city develop their own First 100 Minutes Response to an RDD Plan. *November 30.*
- Representatives from BNL, SNL, FDNY and NUSTL held a working meeting to discuss “The First 100 Minutes of an RDD Response” presentation materials that will be used for the initial planning meeting with the UASI cities. The presentation will include scientific research and pragmatic guidance for first responders and incident commanders to leverage in the first 100 minutes of an RDD response. Discussion and refinement of planning materials continued after the in-person meeting to ensure completeness and ease of use and understanding. *December 2.*

Expansion of TurboFRMAC for State and Local Agency Use — Initiated in 2014

NUSTL initiated this project with SNL to expand the Turbo Federal Radiological Monitoring and Assessment Center (TurboFRMAC) to state and local response agencies. TurboFRMAC is a radiological data management and modeling software currently used by specialized federal teams. NUSTL is sponsoring SNL to refine the tool to include building protection factors, develop new user training and build a cloud-based solution for distribution of tools to state/local users. The 2014 activities included:

- SNL, in coordination with LLNL, researched and evaluated numerous methods and studies used to determine shielding factors for different types of buildings from radiological and nuclear incidents. The evaluations completed through this project and FRMAC Assessment Working Group meetings will form an interagency consensus on what shielding factors should be incorporated into software data solutions, ultimately allowing response agencies to make better decisions to protect their responders and citizens. *November and December.*
- SNL coordinated with the Remote Sensing Laboratory (RSL) to share information on the TurboFRMAC software and discuss potential technology issues that will need to be addressed as TurboFRMAC is readied for the cloud. This ongoing collaboration and solution development is key to the transition path for this project, as DOE’s RSL will support the operations and maintenance of the final solution of TurboFRMAC in the cloud. *November and December.*

Local Radiation Planning Job Aide and National Nuclear Security Administration Support to First Responders

In partnership with the National Nuclear Security Administration (NNSA), this project seeks to develop a handbook for state and local responders detailing key guidance and field operational job tools. The tools include radiation-specific forms to assist responders in following ICS protocols. This effort also includes NNSA support for transitioning TurboFRMAC into the cloud, and subject matter

expert review of responder training material developed by the RNR portfolio to ensure consistency with previous DOE and FEMA radiological/nuclear materials and terminology.

Grand Central Terminal: Radiological Incident Awareness System and CONOPs Development

This project provides the New York City Metropolitan Transportation Authority (MTA) with a capability to be alerted to the presence of radiation during an emergency response through the installation of REMS units in Grand Central Terminal. NUSTL will assist the MTA and Metro-North Railroad in developing a concept of operations (CONOPs) for equipment use, developing performance metrics and test parameters, testing equipment and CONOPs execution. The 2014 activities included:

- NUSTL met with the MTA to gain a better understanding of MTA's requirements for standoff hazard monitoring and document the technical challenges associated with installing and operating a radiological monitoring system in this setting. The NUSTL technical team provided the MTA with a demonstration of the proposed system and associated software to be used in this pilot. *October 17.*
- NUSTL visited the Lower Manhattan Security Coordination Center (LMSCC) to allow the MTA Police to discuss radiation level monitoring lessons learned with the NYPD. The purpose of the visit was to show the Metro-North Railroad Security Director how the NYPD had integrated radiological data and the REMS sensors into their command center technology interface, and it allowed for a discussion on how the sensors are integrated into a security monitoring and leadership notification concept of operations. *December 11.*

State and Local Support to Radiological/Nuclear Emergency Planning and Response Procedures

This effort will research available radiological response training for the Radiological Operations Support Specialist (ROSS) position, identify associated gaps in training, improve the fidelity of modeling algorithms currently used for prediction of dispersion in urban environments, and

develop technical requirements and recommendations for a rapid consequence assessment and decision support tool. The 2014 activities included:

- LLNL coordinated the development of draft Skills, Knowledge, Abilities for the ROSS position in conjunction with NUSTL, FEMA and DOE that will be used later in this project to map training opportunities.
- LLNL initiated a weather study for various U.S. regions, gathering historical weather data and developing a statistical approach to analyze data and identify trends for IND scenario simulations that will be used to develop the Any City Planning Tool, a project being sponsored by FEMA.
- LLNL is working with SNL to review and evaluate methods and studies on building protection factor work, assembling documentation on completed work and beginning to work on the design of a database and software that is needed to utilize the building protection factors in the National Atmospheric Release Advisory Center (NARAC) dose predictions.



REMS sensor installation in New York City.

Research on Improving Improvised Nuclear Device Decision Making through Virtual Training Skill Transfer

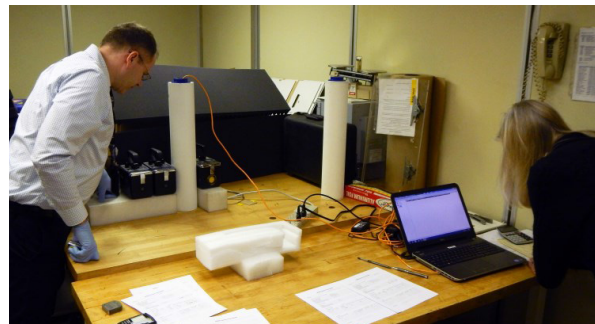
In 2014, NUSTL and FEMA initiated a project with the Department of Defense’s Massachusetts Institute of Technology Lincoln Laboratory (MIT LL) to research emergency decision making during an IND detonation. The aim is to understand which decision making skills can be directly transferred from virtual training/video games into real world missions successfully. The 2014 activities included:

- Project summary materials were created to begin engaging partners in the video game and training industry. The goal is to generate interest with select video game companies to conduct research into identifying decision-making skills in video games and how skills may develop as a player progresses in gameplay ability. Collaboration with video game industry members will provide expertise and knowledge of gaming and help identify the manifestation of IND-related decision-making skills. Interested parties later attended a focus group to review research findings and provide recommendations on next steps for training innovation and operational implementation of skill transfer exercises. *October 15.*
- MIT LL completed 15 interviews with IND subject matter experts (SMEs) identified by NUSTL and FEMA. These interviews helped MIT LL understand the IND decision-making process and required skills needed to make these decisions. The information gathered will serve as a major source of information for the project, including the first two reports. *December 16.*
- The Project Team, which included representatives from FEMA CBRNE, MIT LL and NUSTL, met at NUSTL to discuss aggregate information gathered during interviews with IND SMEs and initial game options for critical skill transfer. *December 16.*

Radiological Emergency Management Systems

The REMS is a network of gamma radiation sensors that provides real-time citywide data for response and recovery

from a radiological or nuclear event. REMS was designed at NUSTL and field tested over the course of five years. Through a cooperative research and development agreement (CRADA), the REMS concept and design was commercialized, enabling the NYPD, as well as other customers, to purchase the system in the commercial marketplace. The NYPD implemented the commercialized system and REMS is now operational in the New York City area.



NUSTL’s Test Scientist Karin Decker and Electrical Engineer Brian Albert perform testing and evaluation of the REMS.

In 2014, NUSTL supported the NYPD with the installation and quality assurance testing of REMS sensors throughout New York City, updated its quality assurance test plan, and will be available to perform quality assurance testing of REMS sensors according to NYPD’s needs and schedule. NUSTL also explored expanding the REMS program with the Port Authority of New York and New Jersey (PANYNJ) and the Metropolitan Transportation Authority (MTA). Additionally, the Project Manager presented and demonstrated the capabilities of REMS throughout the year.

Quality Assurance

NUSTL performed quality assurance testing for the NYPD’s REMS sensors as outlined below.

- Tested four REMS sensors, which revealed problems with the vendor’s dose rate calibration and isotope identification performance that needs to be corrected. *February 4.*
- Based on the quality assurance tests performed in February and discussions with the NYPD, NUSTL updated its test plan and purchased additional test equipment to better determine vendor compliance

with NYPD requirements. As a result, NUSTL's quality assurance testing will be conducted more efficiently and will ensure that the vendor meets NYPD's requirements. *March 31–April 25.*

- Tested a large batch of new REMS sensors, which revealed that the radiation dose rate accuracy of many sensors did not meet the vendor's specification. Furthermore, after the sensor was flooded with a strong radiation source, some sensors went into an error mode in which all gamma spectra were distorted. A re-initialization was needed to correct the problem. Sensors also failed to indicate an over-range condition. NUSTL has recommended to the NYPD that they ask the vendor to update its software in order to correct the problems. *June 9–19.*
- Completed tests for the REMS sensors and submitted its reports and recommendations to the NYPD. As a result, the NYPD returned a large batch of sensors to the vendor because they did not meet the vendor's own specifications. The NYPD is considering developing new specifications for the REMS sensor and awarding a new contract based on competitive bidding. The NYPD requested that NUSTL assist with the development of specifications for the sensor and act as the quality assurance laboratory for REMS. *June 30–August 16.*

Specification Development

The NYPD started the acquisition process for a new sensor for the REMS network in New York City to facilitate all new installations. As requested, NUSTL assisted the NYPD in developing specifications for the new REMS sensor. A preliminary specifications document was prepared. NUSTL performed a comprehensive review of the draft specifications and provided the NYPD with review comments. The specifications document will be included in a Request for Proposal for the new sensor to be issued by the NYPD. *October 15–December 22.*

Expansion

In 2014, REMS explored expanding their REMS network by partnering with the PANYNJ and the MTA. On February 21, NUSTL hosted a meeting with representatives from PANYNJ to discuss their interest in setting up REMS sites at PANYNJ facilities to expand the current REMS network. Adding these sites would increase the coverage of REMS to other parts of the New York City metropolitan area that may be affected by a release of radioactive material during a radiological/nuclear event. NUSTL offered its quality assurance testing and advisory services to PANYNJ to support the possible expansion. Additionally, NUSTL began a pilot project with the Metropolitan Transportation Authority (MTA) and Metro North Railroad in which REMS sensors will be installed at Grand Central Terminal. The project will determine the usefulness for indoor radiation detection in a crowded transportation hub and will allow for development of a CONOPs. For updates on this project, see NUSTL's RNRR portfolio.

Speaking Engagements

REMS Project Manager Brian Albert demonstrated and presented the capabilities of REMS throughout the year to audiences including Congress, state and local police departments, the Domestic Nuclear Detection Office Executive Steering Council, emergency managers, and various other government officials. REMS was positively received and resulted in considerable interest in the program and technology.

- NUSTL demonstrated REMS for Congress at the "DHS Day on the Hill" technology exhibit. *January 16.*
- NUSTL gave a presentation on REMS at the Domestic Nuclear Detection Office Executive Steering Council meeting. *January 23.*
- NUSTL presented REMS as part of a 90-minute panel discussion at the National Homeland Security Conference in Philadelphia, Pennsylvania. The panel discussion included presentations from four S&T speakers and a question and answer session. *May 22.*

Responder Training and Exercise Support for Securing the Cities

Managed by the DHS DND0, and supported by NUSTL, Securing the Cities (STC) is a cooperative federal, state and local program initially piloted in the NYC metro area. The program seeks to design and implement architecture for coordinated and integrated detection and interdiction of illicit radiological materials that may be used as a weapon within the region. NUSTL's Responder Training and Exercise (RT&E) program provides support to STC trainings and workshops on radiation detection, and provides hands on technical support and advice on an as-needed basis to STC partners.

In 2014, NUSTL's RT&E program assisted federal, state and local first responders with their radiation training activities by providing radioactive sources, equipment and technical staff. Radiation training activities included training on Radiation Dispersal Devices, Improvised Nuclear Devices and Personal Radiation Detectors. NUSTL's efforts assisted in the training of 420 first responders during 17 events, involving six federal, state and local agencies that continue to come back year after year for NUSTL responder training and exercise support.

NUSTL provided radiation sources, equipment and/or technical support for the trainings performed by the following agencies:

- Nassau County Police Department (New York);
- Suffolk County Police Department (New York);
- Westchester County Police Department (New York);
- Port Authority of New York and New Jersey Police Department;
- FBI New York Office, Special Agent Bomb Technician Program, Stabilization Program; and
- New York City Police Department Harbor Unit.

NUSTL also advised the FDNY on a major procurement of a maritime radiation detection system by counseling FDNY on system options, as well as informing them of various reports and evaluations of different systems. *February 18.*



NUSTL provides radioactive sources and technical assistance to the FBI Stabilization Program.



Radioactive sources are transported to the training site and distributed for each exercise from the source distribution point seen above.

NUSTL Receives Praise from Port Authority Police Department

NUSTL received a letter of appreciation from the Port Authority of New York and New Jersey Police Department's (PAPD) Chief of Department, Louie Koumoutsos. The Chief of Department is the PAPD's highest rank for uniformed officers. The letter thanked NUSTL for the support it provided to the PAPD's 113th Recruit Class Academy. NUSTL, as part of its Responder Training and Exercise program, provided the PAPD with radiation sources, equipment and staff to assist in the training of the entire class of police recruits on personal radiological detection. The training has significantly increased the PAPD's radiation detection equipment footprint and security capabilities. *August 15.*

Responder Technologies Testing Support

NUSTL supports FRG's First Responder Technologies program by planning and managing the testing of first responder technologies in operational and laboratory settings. NUSTL assesses the capabilities and operational suitability of Responder Technologies (R-Tech) funded solutions to assist in the quick transition of these technologies to the commercial market.

In 2014, NUSTL conducted an Operational Field Assessment (OFA) on Structural Firefighting Gloves, and published three test reports to FirstResponder.gov from the OFAs it conducted on the [Virtual Trainer Simulation Program](#), [Conventional Fixed Station Interface](#) and the [Improved Structural Firefighting Glove](#).

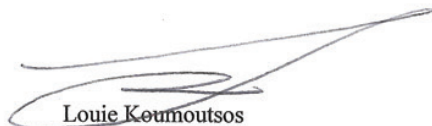
NUSTL Published Test Report on the Operational Field Assessment of the Virtual Trainer Simulation Program

In February 2014, NUSTL published its findings from an Operational Field Assessment it conducted on the Virtual Trainer Simulation Program held in November 2013. The Virtual Trainer Simulation Program leverages existing government funding investments and technological advances made by the military, specifically the U.S. Army Training and Doctrine Command's (TRADOC) prototype virtual environment called Enhanced Dynamic Geo-Social Environment (EDGE). The pilot adapted and developed for DHS S&T focused around an active shooter scenario. This scenario required multiple jurisdictions to coordinate and respond efficiently to be most effective in ending the threat and saving lives.

Dear Mr. Hutter:

I hope this correspondence finds you well. I would like to take the opportunity to thank you for the support your staff provided over the duration of the Port Authority Police 113th Recruit Class Training Academy. Through their tireless efforts and consummate professionalism, the Port Authority Police Academy staff was successful in training an additional 260 Police Recruits on the Personal Radiological Detection, Rad Eye Pager instrumentation. This endeavor will significantly increase the Port Authority Radiation Detection Equipment footprint and greatly enhance the Secure the Cities Ring of Steel capabilities.

The size and scope of the effort to incorporate basic radiation detection training into the recruit training curriculum is without precedent. It was an accomplishment with which, the Port Authority Police expresses gratitude and appreciation to you and your staff.


Louie Koumoutsos
Chief of Department
Port Authority Police



Port Authority Technical Center
241 Erie Street, Room 302
Jersey City, NJ 07310

More than 30 first responders participated at the OFA, which was held at the Sacramento Police Department Headquarters. OFA participants included police, emergency medical technicians, firefighters, dispatchers and incident commanders from Sacramento, California. Representatives from the InterAgency Board and the Los Angeles Fire Department were present as observers. Representatives from the U.S. Army were present to oversee the transition. The exercise included an active shooter scenario in a high-rise hotel with multiple fires. It brought to light current issues of communication and protocol between members of SWAT and the fire department.

NUSTL Test Scientist Bhargav Patel developed the test report. The report highlights the software's value that may be seen at higher levels of decision making and communication, particularly at incident command levels and dispatch.

NUSTL's test report can be found on FirstResponder.gov at [Virtual Trainer Simulation Program](#). February 15.

NUSTL Published Test Report on the Conventional Fixed Station Interface for Legacy Base Station Equipment Operational Field Assessment

In March 2014, NUSTL published its findings from the Conventional Fixed Station Interface (CFSI) OFA that was conducted in November 2013. The OFA was conducted in Denver, Colorado with the assistance of Noel Newberg and Ken Monington from the Department of Interior, who provided the needed facilities and equipment, as well as their expertise. First responders included Chris Lewis (*U.S. Marshals Service*), Police Chief James Burack (*Miliken, Colorado*) and Todd Simkins (*DHS*). The OFA was driven by a requirement to evaluate a prototype CFSI as a solution for law enforcement and emergency response organizations with legacy base station equipment.

During the OFA, the system's compatibility was tested with a Motorola Legacy Base Station and several different consoles. The majority of limitations in functionality were due to the various configurations of the consoles themselves and not necessarily the interface box. Richard Brockway of Christine Wireless, Inc. also demonstrated several

new pieces of functionality, including the addition of an Autonomous Mode that allows for the remote update of firmware and the ability to route voice, data and control information to different IP addresses on a network.

The CFSI received positive feedback from the participating first responders. The first responders were encouraged to learn that implementation of an interface box could result in significant savings in funding, as well as operation and maintenance time. The representative for the U.S. Marshals Service was particularly impressed with the autonomous mode features, which went beyond the scope of work for the project.

NUSTL's test report can be found on FirstResponder.gov at [CFSI Test Report](#). March 20.

Structural Firefighting Gloves Operational Field Assessment

In April 2014, NUSTL conducted an OFA on structural firefighting gloves at the Northern Illinois Public Safety Training Academy (NIPSTA) in Glenview, Illinois. The OFA was conducted by NUSTL Test Scientists Gladys Klemic, Bhargav Patel, and Nathalie Velarde; and FRG R-Tech Project Manager Greg Price.

At the OFA, six firefighters from San Diego Fire-Rescue Department, Montgomery County Fire and Rescue, Calumet City Fire Department, University of Illinois Fire Service Institute and Morton Grove Fire Department evaluated the structural fighting gloves performance in various operational activities. The operational test activities included: operating a hydraulic extrication device, self-contained breathing apparatus and communication radio; working with fire hose couplings, ropes, hydrant, extinguisher and ladders; rescue simulations involving ceiling breach, forcible entry and mannequin drag; and wet and dry donning and doffing of the gloves.

The conclusion drawn from the testing was that the Improved Structural Firefighting Gloves are an improvement over the firefighters' current gloves for intricate tasks requiring dexterity and tactility, and for donning and doffing when

wet or dry. In addition, the prototype gloves were found to be nearly equivalent for gripping and using larger tools. Based on these observations, the evaluators found that the Improved Structural Firefighting Glove addresses firefighters' critical need of performing manual tasks such as connecting hose couplings, using hand and power tools, operating radios and using a self-contained breathing apparatus, which require dexterity and grip.

NUSTL's test report can be found on FirstResponder.gov at [Firefighting Glove Test Report](#). April 23–24.



A firefighter connects a hydraulic hose to an extrication tool using prototype structural firefighting gloves during the operational field assessment held at NIPSTA in Glenview, Illinois.

Performance Testing and Evaluation at NUSTL

PTEN conducts unit functional tests of first responder equipment to ensure operational readiness of deployed units.

PTEN promotes local and state responder confidence in their equipment through functional tests for incoming purchases. In February, NUSTL developed a new equipment check-in procedure, which utilizes vendor barcodes for Securing the Cities equipment. This new procedure increases the accuracy of NUSTL's equipment verification processes by eliminating

human error. In October, the PTEN Program Manager participated in the Securing the Cities Equipment/Training and Exercise Meeting. As a follow-up to the meeting, NYPD requested that equipment fault and repair information be used for a meeting with their equipment vendor.

10,000 Units Tested – NUSTL Reaches Radiological/Nuclear Detector Testing Milestone

In October 2014, the PTEN program officially reached the milestone of 10,000 radiological/nuclear detection units tested. NUSTL Program Manager Ethel Davis has led PTEN since the program's initiation in 2009. PTEN has been conducting unit functional tests of first responder radiological/nuclear detection equipment to ensure operational readiness of deployed units, such as Personal Radiation Detectors (PRD), Backpack Detectors, Mobile Detection Systems, Radioisotope Identifiers and Radiation Detection Kits. NUSTL tests this equipment for many tri-state area first responder organizations.

In 2014, NUSTL staff completed radiation detector equipment testing and transfers for the following first responder partners:

- Connecticut State Police;
- Department of Environmental Protection Police Department (New York);
- New Jersey State Police;
- New York City Police Department;
- Nassau County Police Department (New York);
- New York State Division of Homeland Security and Emergency Services;
- Port Authority of NY and NJ Police Department;
- Rockland County Police Department;
- Suffolk County Police Department;
- Westchester Police Department (New York); and
- Metropolitan Transportation Authority Police Department.

NUSTL completed testing on 62 percent more radiation detection equipment units in 2014 than 2013. In summary,

2014 accomplishments included:

- NUSTL received and tested:
 - 3,934 Personal Radiation Detectors;
 - 45 Backpack Detectors;
 - 160 Radioactive Isotope Identifiers (IdentiFinder II/Detectives);
 - 6 Detector Suites; and
 - 4 Portable Detection Systems.
- NUSTL deployed:
 - 3,294 Personal Radiation Detectors;
 - 45 Backpack Detectors;
 - 7 Radioactive Isotope Identifiers (IdentiFinder II/Detectives);
 - 6 Detector Suites; and
 - 4 Portable Detection Systems.

NUSTL Tests Radiation Detectors for Super Bowl

In coordination with DND0 and as part of the PTEN program, NUSTL tested approximately 40 radiation detectors and provided technical assistance to the Amtrak Police Department to support their efforts in securing the Super Bowl. DND0 supplied the radiation detection equipment to NUSTL, who then tested and configured equipment in support of training for the Amtrak Police Department. The [Secure Super Bowl](#) article was published on [FirstResponder.gov](#). February 2.

Neutron Benchmarking

In 2014, NUSTL Physicist, Paul Goldhagen, Ph.D., continued to analyze the laboratory's measurements of cosmic-ray-induced background neutrons on container ships and on land to provide ground-truth benchmarks for calculating background neutrons on a global matrix of locations. The calculations will enable determination of the neutron background in any location/situation, improving ability to detect hidden nuclear materials and devices.

Dr. Goldhagen also served as a trusted federal technical resource on cosmic-ray-induced neutrons and other neutron

measurements and calculations to numerous federal agencies, law enforcement, universities, private industry, research laboratories and standards organizations.

In 2014, Dr. Goldhagen responded to technical inquiries from:

- The Nuclear and Radiation Engineering Program of the University of Texas, Austin for reference information on NUSTL's measurements of cosmic-ray neutron spectra and fluxes. The university is using the measurement data to benchmark calculations of the background production rate of argon-37 in the ground. Argon-37 could be used in on-site inspections for the Comprehensive Test Ban Treaty to verify a suspected nuclear weapon test. *January 9.*
- The Columbia University Radiological Research Accelerator Facility for advice on calculating the response of instruments and unfolding neutron spectra from measurements that will be used to design a facility to produce a neutron source with an energy spectrum similar to that experienced by the survivors of the Hiroshima atomic bomb detonation. The neutron irradiation facility will be used to study biological effects of neutrons that could be used as post-event indicators of the radiation dose to people exposed to neutrons from the detonation of a terrorist improvised nuclear device, guiding appropriate medical treatment. *February 10, April 8.*
- The University of Tennessee, Knoxville for advice on calculating cosmic-ray-induced neutron background as it affects a large mobile system designed to detect and locate nuclear threats at standoff distances. NUSTL provided detailed instructions for performing such calculations using the new cosmic-ray source subroutine in the MCNP6 radiation transport code, the calculation tool being verified by the Neutron Benchmarking project. *February 10, May 20, June 2-4.*
- DHS U.S. Customs and Border Protection for data on the cosmic-ray-induced background neutron spectrum. NUSTL provided data from its measurements and advice on how to use the data to calculate the effect

of the neutron background on the effectiveness of radiation portal monitors used to detect potential nuclear threats in vehicles. *May 28.*

- The Radiological Protection Research and Instrumentation group at Atomic Energy of Canada for data from NUSTL's measurements of cosmic-ray neutron spectra and fluxes, and advice on calculating those quantities for cosmic-ray neutrons in the atmosphere. The NUSTL data will be used to benchmark their calculations. *July 1, 28.*
- The Federal Aviation Administration Civil Aerospace Medical Institute for cosmic-ray neutron fluxes to benchmark their calculations for the radiation dose rate to airplane crews and passengers. *July 24, 29.*
- The IBM Watson Research Center for cosmic-ray neutron data for use in revising an industry standard on cosmic-ray-induced soft errors in semiconductor devices. *July 31.*

In addition to responding to numerous inquiries, in 2014 Dr. Goldhagen:

- Attended a DNDO Transformational and Applied Research Directorate program review of the Los Alamos National Laboratory project "MCNP Physical Model Interoperability and Validation." A task of that project is producing the detailed calculations of the cosmic-ray-induced neutron background that are being benchmarked by NUSTL. *January 23.*
- Presented "Neutron Background from Cosmic Rays," at the Enabling Capabilities Gamma Ray and Neutron Background Workshop organized by the Department of Energy National Nuclear Security Agency Office of Defense Nuclear Nonproliferation Research and Development. The goal of the two-day workshop was to better coordinate research and development efforts related to background data collection, simulation and modeling, algorithms, and data management across the interagency. *February 19.*
- Toured the facilities of the Naval Research Laboratory (NRL) Space Sciences Division, examined their ultra-large mobile radiation detection systems, and

discussed cooperation between NUSTL and NRL in determining neutron backgrounds. *February 20.*

- Discussed radiation produced by thunderstorms—high-energy X-rays and possibly neutrons—with the head of the High Energy Astrophysics Section of the Naval Research Laboratory Space Sciences Division. Dr. Goldhagen advised that increased rates of neutrons will be observed during storms even if the storm itself produces no radiation because air pressure and density drop during storms, allowing more cosmic-ray-produced neutrons to reach the ground. *March 7.*
- Contributed to writing *Dosimetry for Exposure to Cosmic Radiation in Civilian Aircraft – Part 3: Measurements at Aviation Altitudes*. After all countries voted in favor, the International Standards Organization (ISO) Secretariat approved the draft of this standard. *March 20.*
- Served on the External Advisory Committee for the Columbia University Radiological Research Accelerator Facility (RARAF) development grant from the National Institutes of Health. RARAF develops and provides unique irradiation facilities for radiobiological research, including a new facility that will be used to study biological effects that could be used as post-event indicators of the radiation dose to people exposed to neutrons from the detonation of a terrorist improvised nuclear device, guiding appropriate medical treatment. *May 16.*
- Submitted a peer review critique of a paper on measuring and calculating cosmic-ray-induced neutrons for the journal *Nuclear Instruments and Methods in Physics Research, A*. *June 16.*
- Hosted two graduate students from the University of Missouri, Kansas City to assist them with optimizing designs of a new type of portable neutron spectrometer. *July 9–11.*
- Submitted a peer review critique of a paper on neutron background fluctuation in an urban area for the journal *Nuclear Instruments and Methods in Physics Research, A*. *September 3.*
- Coauthored a paper with J.-F. Bottollier-Depois, F. Wissmann, D. T. Bartlett, L.G.I. Bennett, A. Esposito,

and P. Goldhagen, “New ISO Standards for the Radiation Protection of Aircraft Crew,” International Atomic Energy Agency International Conference on Occupational Radiation Protection, 1–5 December 2014, *Book of Contributed Papers*, IAEA CN-223. The paper describes the four parts of the ISO International Standard “Dosimetry for exposures to cosmic radiation in civilian aircraft.” *December 1.*

Domestic Nuclear Detection Office Test and Evaluation

NUSTL supports various DNDO test campaigns with test scientists and managers, who design, prepare, execute, analyze and report on tests of homeland security technologies.

In 2014, DNDO and NUSTL worked jointly on the following projects: Radiation Awareness and Interdiction Network (RAIN), Small Vessel Standoff Detection (SVSD) and Shielded Nuclear Alarm Resolution (SNAR) programs. NUSTL facilitated the testing, evaluation and reporting mechanisms for these ongoing DNDO projects and continues to provide support to DNDO on these initiatives.

Radiation Awareness and Interdiction Network

DNDO’s Advanced Technology Demonstration (ATD) of RAIN assesses vehicle monitoring technologies in free flowing traffic corridors for radiological/nuclear threats. RAIN will occur in NYC in collaboration with the NYPD and will demonstrate a new capability for high-confidence, high precision detection, identification and localization of vehicle-borne radiological or nuclear threats in free-flowing traffic.

In May, NUSTL initiated support to DNDO’s ATD of RAIN. In support of RAIN, NUSTL will assist an exchange of information between DNDO and NYPD, aid development of RAIN and help facilitate technology demonstrations.

- NUSTL participated in the kick-off meeting with Port Authority of New York and New Jersey on possible data collection efforts at the George Washington Bridge and/or the Lincoln Tunnel for its RAIN system. *June 30.*
- NUSTL completed a technical review of 12 vendor proposals received for the development of the RAIN system. *June 30.*
- NUSTL is assisting with and has already done a site visit to the PANYNJ for data collection efforts at the George Washington Bridge and/or Lincoln Tunnel for its RAIN. *August 20.*
- As part of this project, NUSTL reviewed the Lawrence Livermore National Laboratory’s (LLNL) data collection plan for the collection of radiation signatures in commercial traffic. The plan calls for making measurements with a gamma spectrometer at two locations, the George Washington Bridge and Lincoln Tunnel, for a period of twelve days. *September 19.*
- DNDO selected three vendors, GE Global Research, Passport Systems, Inc. and Physical Sciences, Inc. to develop a prototype RAIN system. The three contracts awarded each have different technical approaches and will therefore provide a better understanding of how to best accomplish the detection, identification and localization of sources transported on roadways. *September 30.*
- NUSTL participated in the RAIN ATD stakeholder kickoff meeting in Washington, DC. The meeting included presentations by DNDO, LLNL and the NYPD to discuss the significance of the ATD and relationship to other activities. Vendors (e.g., *GE Global Research, Passport Systems Inc. and Physical Sciences*) were selected to develop a RAIN prototype, then provided background on their proposed approach and initial planning. Each vendor met with the technical advisory team and government managers to review and discuss details and risks of their approach. *October 23.*
- NUSTL participated in the RAIN ATD preliminary design review teleconference held with GE Global Research, one of three companies contracted to develop a prototype. GE Global research presented its proposed system design in great detail to DNDO LLNL. The meeting helped to identify aspects that will require the most attention and management tracking. *November 24.*
- NUSTL received LLNL’s radiation detection equipment

to be used to collect data on the radiation signatures of vehicles transiting into NYC. *November 12.*

- NUSTL supported the installation of LLNL's radiation detection equipment at two PANYNJ sites, George Washington Bridge and Lincoln Tunnel, in order to collect data on the radiation signatures of vehicles transiting into New York City. All radiation detection equipment was received by NUSTL prior to deployment. NUSTL monitored the systems to ensure they were functioning properly during the deployment. The detectors at the Lincoln Tunnel will be removed in January and will be returned to NUSTL, while the detectors at George Washington Bridge will continue to collect data. The data will provide background data on radiation in a stream of commerce and assist in the development of the RAIN system. *December 3.*
- NUSTL participated in the RAIN ATD progress review meetings held with the three vendors (*GE Global Research, Passport Systems Inc. and Physical Sciences*). The meetings were a follow-up to monthly reports submitted to DNDO to track the progress of the work, as well as to determine if any issues exist and to discuss the best ways to mitigate. *December 18.*

Small Vessel Standoff Detection

SVSD addresses the ability of radiation detection systems to meet specific requirements set for SVSD in a maritime environment. NUSTL provided a lead test scientist on a performance test, which was designed to evaluate five detection systems: the system that the USCG uses for searches when boarding, along with two variants of it and two commercially available spectroscopic detection systems. The test execution was completed in October 2013.

- A review of analysis results of the (SVSD) Performance Test—which addresses the ability of radiation detection systems to meet specific requirements for SVSD in a maritime environment—was held to ensure all analyses were completed. A first draft of the report was developed and reviewed. *February 12.*
- NUSTL Test Scientist Matthew Monetti met with the Airborne Radiation Enhanced-sensor System (ARES)

project team from DNDO's Transformational Applied Research Directorate to provide guidance to DNDO involving aerial detection and to discuss Gryphon testing. He also met with the SVSD Program Manager and Test Manager to discuss the possibility of including testing of an air-to-boat approach for detection of radioactive sources on the water. *April 30.*

DNDO submitted and reviewed the SVSD performance test report. The analysis team addressed the comments and three products were delivered and signed: unclassified report, Milestone 5 and a classified report. *May 12, 20, 22.*

Shielded Nuclear Alarm Resolution Program

This DNDO SNAR program aims to develop new cargo scanning technologies that will enhance the nation's ability to reliably detect special nuclear material in cargo passing through ports, border crossings, etc. NUSTL scientists and engineers oversee testing of the cargo scanner prototypes to ensure compliance with the program's test plan.

NUSTL performed testing oversight/data collection efforts for SNAR. NUSTL's test team, which includes John Kada, Bhargav Patel, Norman Chiu, Ramy Ghaly and William Van Steveninck, traveled to Moffett Field in California to oversee 10 weeks of testing of cargo scanner prototypes to ensure compliance with the program's test plan. NUSTL staff provided onsite test oversight by verifying that each day's test work was carried out as specified per the test plan. The test work involved placing test objects of various types (e.g., objects made of different chemical elements of different shapes and sizes) in shipping containers containing a wide variety of cargoes to assess the ability of the prototype to properly identify the test objects in real commercial cargoes. Test data was also collected using highly idealized cargo container geometries to collect data for modeling purposes. *August 15.*

S&T Urban Operational Experimentation Hosted by NUSTL

Urban Operational Experimentation (Urban OpEx) is a joint effort to stage emerging technologies in realistic



Representatives from Sensor Concepts and Applications loading a cargo container on the systems conveyor tracks, as part of the SNAR program.

scenarios in an operational urban setting. The Urban OpEx event is designed to facilitate the development, transition and adoption of new technologies by first responder communities. NUSTL will host a three day event that will provide an assessment on selected technologies and identify ways in which the products can be modified to make them better suited to first responders in urban areas.

In early September, NUSTL staff members attended Urban Shield in Alameda County, California to meet with the sheriff's department staff and discuss planning activities that may be relevant to Urban Shield. The staff also observed several of the events that were included in Urban Shield. This group from NUSTL would later form the Urban OpEx working group.

A fact sheet that describes the project was developed for distribution to provide awareness about the S&T Urban OpEx event and to help solicit necessary interest and support from the first responder community.

Initial Event Development

On October 1, the Urban OpEx working group was formed. The working group, led by NUSTL staff, included participants from the FRG, S&T's Research and Technology Development Group, Office of Public-Private Partnership and contract support from Obsidian Analysis, Inc. that was appointed by the Research Development Partnerships (RDP) group. The working group met via teleconference on a biweekly basis to discuss Urban OpEx planning and progress.

The working group captured information technologies to consider, as well as points of contact within the region, to seek collaboration opportunities. NUSTL met with RDP's Director, Dr. Keith Holtermann, in November to discuss the vision for the Urban OpEx event. This meeting helped solidify the planning of this multi-group effort.

On November 4, the Request for Information (RFI) to obtain information on potential technologies to be demonstrated at the Urban OpEx was published to Federal Business Opportunities (see [Urban OpEx RFI](#)). This RFI was broadcasted further by RDP's Public-Private Partnership (PPP) division through a post in the GovDelivery system in November. The RFI closed on December 10, 2014 and received information on more than 130 different products. These technology products, along with those identified by other means, resulted in a list of more than 200 technologies to be considered for the Urban OpEx event.

During the event, participating first responder organizations will become directly aware of several new technologies and witness firsthand the capabilities they have available, which is an important component of whether they will gain operational acceptance. The direct feedback received from the technology experimentation is intended to be used to refine the products so they better suit the needs of first responders.

OUTREACH

New York Area Science and Technology Forum

NUSTL manages the NYAST, a consortium of federal, state and local government organizations, first responders, academia and private sector groups who regularly meet to promote and discuss advances in science and technology applications. NUSTL created NYAST after 9/11 to provide a forum for communicating developments in science and technology. NYAST also serves as an opportunity for presenters to gather valuable feedback from field operators and draw out their most pressing issues and needs in homeland security. It encourages first responder members to interact and develop contacts across the homeland security community. NYAST members can access slides from the meeting on the NYAST community page on the First Responder Communities of Practice website at <http://communities.firstresponder.gov>.

NYAST has more than 300 members from 90 different organizations comprised of federal, state and local government, as well as academia and the private sector. Some of the organizations include:

- Department of Energy Laboratories
- Federal Bureau of Investigation
- Louisville Metropolitan Police Department
- Nassau County Police Department
- New York City Fire Department
- New York City Office of Emergency Management
- New York City Police Department
- Port Authority of New York and New Jersey
- Stevens Institute of Technology
- U.S. Environmental Protection Agency

NUSTL has hosted 34 NYAST meetings since 2003, on topics such as radiological/nuclear detection, biological agent detection, storm surge mitigation, electric grid resiliency and feature attribute screening technology, among many others. These meetings assisted in bridging the gap between technology developers and end-user operators.

NUSTL held NYAST meetings on virtual training for first responders, electromagnetic pulse effects on first responder equipment and on the latest advances in surveillance technologies. More than 100 members, attended the three NYAST meetings in person and virtually through the NYAST webinar.

NYAST 32 – “Virtual Training: Preparing First Responders for Active Shooter Response”

At NUSTL’s 32nd NYAST Meeting, DHS S&T FRG Program Manager Christine Lee and partners from the U.S. Army Research Lab Simulation and Training Technology Center highlighted FRG’s work with the U.S. Army to arm responders from across agencies, disciplines and jurisdictions with the tools needed for a unified response to an active shooter situation.

In addition to providing an overview of FRG’s Virtual Training platform, the Virtual Training team conducted a live demonstration of the gaming scenario so that responders could offer direct input as to how their agencies would benefit from this tool. Following the meeting, one responder from U.S. Customs and Border Protection at the Port of New York/Newark said “I want it. I want my organization to have [the Virtual Training program] right now.” *February 4.*

NYAST 33 – “Electromagnetic Pulse: What First Responders Need to Know”

NUSTL’s 33rd NYAST Meeting, “Electromagnetic Pulse (EMP): What First Responders Need to Know,” featured Michael Rooney and Michael Bollen of the Defense Threat Reduction Agency (DTRA).

For the first time, the NYAST meeting was broadcast live to NYAST members via webinar. As a result, the meeting was a huge success with more than 80 members representing federal, state and local agencies; first responders; academia; and private industry.

During the meeting, Michael Bollen explained how an EMP after the detonation of a nuclear weapon can devastate our nation’s critical infrastructure, including our power grid and telecommunications systems. He also described how

it could impact various first responder technologies, such as hand-held radios, vehicle radios and first responder radiobroadcast station(s), potentially reducing these agencies' ability to respond during such an event. Michael Rooney discussed DTRA's partnership with NUSTL in examining EMP effects on first responder technologies. Specifically, as part of this partnership, DTRA led testing that measured EMP effects on first responder equipment, a FEMA backup radio station and other infrastructure. *May 29.*

NYAST 34 - "Advances in Surveillance Technologies"

NUSTL's 34th NYAST Meeting "Advances in Surveillance Technologies" featured Dr. John Fortune of the S&T Resilient Systems Division and Dr. Timothy Dasey of MIT LL.

The meeting was a success with nearly 50 NYAST members, representing numerous federal, state and local entities of the homeland security community, who attended in person and via webinar. Some participating organizations included the New York City Police Department Counterterrorism Division and Science and Technology Group, New York City Fire Department, Louisville Police Department, Transportation Security Administration, U.S. Customs and Border Protection, Federal Emergency Management Agency, Environmental Protection Agency, and the City University of New York - Christian Regenhard Center for Emergency Response Studies.

The presenters highlighted the need to fuse and integrate disparate surveillance data, and to provide detailed and actionable information to decision makers in near real time to quickly support response, recovery, forensics and related operations. They described two DHS S&T RSD projects aimed at meeting these surveillance needs and improving state-of-the-art surveillance systems: Imaging System for Immersive Surveillance and Scalable Integration of Geo-Dispersed Monitoring Assets (SIGMA). These projects provide facial recognition quality imagery at long ranges and improve the efficiency and effectiveness of video review. *September 18.*



Dr. John Fortune of the DHS S&T Resilient Systems Division and Dr. Timothy Dasey of Massachusetts Institute of Technology Lincoln Laboratory present at NYAST 34, "Advances in Surveillance Technologies."



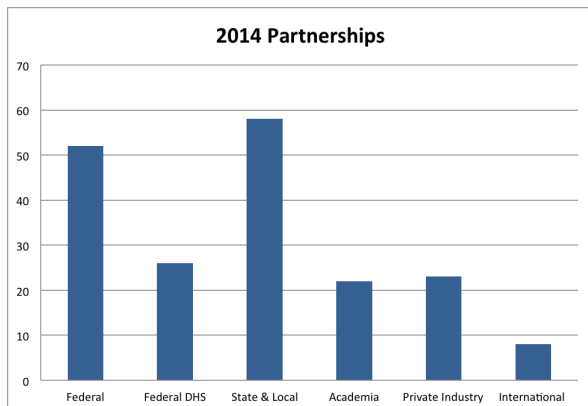
FDNY representatives participate in the Virtual Training Demonstration at NUSTL.



Michael Rooney and Michael Bollen of the Defense Threat Reduction Agency present at NYAST 33, "Electromagnetic Pulse (EMP): What First Responders Need to Know."

COLLABORATION

NUSTL partnered with numerous international, academic, federal, state and local entities to more effectively perform its mission, meet the needs of its stakeholders and to better serve the first responder community.



Some highlights from our collaboration include:

NUSTL held a Virtual Training Demonstration for New York Area First Responders. Through FRG's R-Tech program, NUSTL hosted a demonstration of the EDGE Virtual Training simulation platform for first responders in the New York City area. This hands-on demonstration walked first responders through a Mumbai-like attack of a hotel with fire, demonstrating the full scope of the capabilities of this software. As a result of this demonstration, FDNY expressed interest in using the software in a large-scale exercise with first responders in different jurisdictions, to include law enforcement, emergency medical services and others. *February 5.*

NUSTL participated in World Trade Center Technical Support Meetings. The NUSTL Director met with representatives from the Federal Protective Service (FPS) and Office of Infrastructure Protection to discuss the FPS role for conducting facility security assessments at General Services Agreement-leased space in the World Trade Center (WTC) and to update FPS representatives on continuing initiatives to support chemical, biological, radiological, and nuclear plans and countermeasures. Recent correspondence between U.S. Senator Charles E. Schumer and DHS Secretary Jeh Johnson regarding WTC security precipitated this meeting. Also, NUSTL staff met with representatives from the Port Authority of New York and New Jersey and equipment providers to discuss NUSTL support of acceptance testing at the WTC Vehicle Screening Center. *May 8 and 13.*

NUSTL hosted classified briefings on countering the Unmanned Aerial Systems threat. NUSTL hosted classified (S/NSI) briefings for the NYPD, PAPD, United States Secret Service (USSS), the Transportation Security Administration (TSA) and other New York City area first responders on technologies to counter the Unmanned Aerial Systems (UAS) threat. The briefings included Massachusetts Institute of Technology Lincoln Lab results from DHS S&T-sponsored analysis of alternatives to the detection and tracking of a small UAS in urban environments. *December 2-3.*



A drone flying over Brooklyn, New York. Photo credit ¼ New York Post

Federal Partnerships

DHS – Improvised Nuclear Device Scientific Support Working Group

In 2014, NUSTL and FEMA served as co-chairs of the Scientific Support Working Group (SSWG) and held numerous meetings to discuss ongoing interagency coordination and preparedness for RNR. The SSWG was established in September 2010. It incorporated the work of the White House Office of Science and Technology Policy (OSTP) Nuclear Defense Research and Development (NDRD) Response and Recovery WG (RRWG), the FEMA Modeling and Analysis Coordination WG (MACWG), the DHS S&T and DND Radiological/Nuclear Terrorism Risk Assessment and the FRPCC Science and Technology WG (S&TWG). The IND SSWG is intended to support the implementation of the DHS Strategy. The IND SSWG aims to provide a structured and unified coordination and planning effort to enhance the ability of the United States to respond to and recover from an IND incident. The WG process is also designed to provide a mechanism to discuss, coordinate, decide and implement a national approach to IND planning efforts.

- Phillip Palin, of the National Capitol Region Catastrophic Planning Grant Program, briefed the SSWG on supply chain management during catastrophic disasters. *January 28.*
- Grover Cleveland, of the Department of Agriculture, briefed the SSWG on the federal assets that comprise the “Advance” team, which is prepared to offer radiological incident management and decision support to local jurisdictions and agencies. *February 25.*
- Jud Stailey, Office of the Federal Coordination for Meteorology with the National Oceanic and Atmospheric Administration (NOAA), briefed the SSWG on research and development projects focused on atmospheric transport and dispersion. In addition, FEMA’s Communications Working Group presented on some of its activities that support decision makers and relevant stakeholders communicate with the public following an IND detonation. *March 26.*
- Dr. Chris Barrett, of Virginia Tech University, briefed the SSWG regarding the ongoing efforts in place to build

out a collaboration network for FEMA Chemical, Biological, Radiological, and Explosives (CBRNE) Coordinators in each region to share documents, best practices and documents related to preparedness activities. Dr. Barrett has been researching the social implications of an improvised nuclear device detonation in the National Capitol Region. His work consists primarily of super-computer modeling that shows how people would react to an IND detonation, and based on the infinite number of variables (*this includes: family, work, finance and health*), what actions they would take in the 48 hours following the incident. The research was funded by DTRA, and will be leveraged by the interagency working groups developing tools, guidance and plans to better understand and prepare for the public’s reaction and associated government response. *May 22.*

- Dr. Kirk Clawson, from NOAA, briefed the SSWG on Project Sagebrush, a project of the Air Resources Laboratory to conduct test releases and study short-range dispersion in open terrain. *July 30.*
- NUSTL RNR Division Director Benjamin Stevenson updated the SSWG on the DHS RNR Investment Strategy and discussed in-depth two Responder Technology projects contained in the document *Improved Identification and Characterization of Multiple Hazards, and Contaminant Migration Modeling and Prediction*. The group provided critical feedback, interesting discussion of the state of technology in those responder priority areas, and information on the stakeholders and partner agencies for DHS S&T to consider when moving forward to meet first responder needs. *August 20.*
- For the second month in a row, Benjamin Stevenson continued to inform the group on the DHS RNR Investment Strategy and had an in-depth discussion on two Responder Technology Objects contained in the document: (1) Technology solutions for translating radiological/nuclear technical data into decision points and products that are easy for responders to understand; and (2) the tools specifically designed to assist local agencies and officials in making protective

action decisions during a radiological incident. The group provided critical feedback and discussed the current state of technology in those responder priority areas, as well as information on the stakeholders and partner agencies for DHS S&T to consider when moving forward to meet first responder needs. *September 25.*

- Representatives of the U.S. Air Force briefed the SSWG regarding their ongoing research and development of tools to promptly diagnose, identify and capture data on the detonation of a nuclear weapon anywhere in the world. Sang Don Lee of the EPA, gave a second briefing on his ongoing work as an Embassy Science Fellow to the Japanese Government and his participation in planning and executing clean-up operations following the incident at the Fukushima Nuclear Power Plant. *October 23.*

DHS – Federal Radiological Preparedness Coordinating Committee Meetings

FEMA's Technical Hazards Division and the Planning Division of FEMA's Response Directorate co-chair the FRPCC. The FRPCC charter includes the identification of research and development needs, which is pertinent to NUSTL's role as the lead R&D sponsor for RNRD.

- The NUSTL Director acted as the DHS S&T representative to the FRPCC quarterly meeting. The FRPCC, as per 44 CFR 351, assists Federal agencies and bodies (e.g., *Domestic Resilience Group, National Security Staff, White House Office of Science and Technology Policy*) on policy development and direction concerning federal assistance to state, local and tribal governments in their radiological/nuclear emergency planning and preparedness activities. The NUSTL Director updated the committee on activities associated with the Scientific Support Working Group and the S&T RNRD R&D planning. *March 6.*
- The NUSTL Director acted as the DHS S&T representative to the FRPCC quarterly meeting. The FRPCC covers policy issues related to the areas discussed in the Nuclear Radiation Incident Annex of the National Response Framework. Specifically covered are: (1) inadvertent and otherwise accidental nuclear and

radiological releases (e.g., *commercial nuclear power plant accidents*), and (2) deliberate acts causing a nuclear or radiological release (e.g., *terrorist acts*). The FRPCC is co-chaired by FEMA's Technical Hazards Division and the Planning Division of FEMA's Response Directorate. *October 1.*

DHS – DoD Capabilities Development Working Group

- The NUSTL Director attended the quarterly Capabilities Development Working Group (CDWG) meeting at the Pentagon to provide an update on activities for the Countering Weapons of Mass Destruction subgroup. The CDWG was formed in 2007 to foster joint Department of Defense (DoD)–Department of Homeland Security initiatives to nurture new collaborative research, development, experimentation, test and acquisition opportunities, while avoiding duplication of efforts. *December 16.*

DHS – American National Standards Institute

- NUSTL Program Manager Matthew Monetti is a member of the American National Standards Institute (ANSI) N42.35 working group. The committee worked on a revision of ANSI standard N42.35 – American National Standard for Evaluation and Performance of Radiation Detection Portal Monitors for Use in Homeland Security. There were five working group discussions held to discuss and propose changes to the standard. In November 2014, the chair, Leticia Pibida from National Institute of Standards and Technologies, submitted a draft to ANSI for review. *January 24, February 3, May 12, June 17, July 15.*
- NUSTL Physicist Paul Goldhagen, as a member of the working group revising the American National Standards Institute Standard N42.32 “Performance Criteria for Alarming Personal Radiation Detectors for Homeland Security,” reviewed the latest draft of the standard and submitted detailed comments. *July 23.*

DHS – Biowatch meeting held at NUSTL

- At the request of DHS Office of Health Affairs and DHS Intelligence & Analysis, NUSTL hosted a classified

meeting on recent Biowatch study results. Approximately two dozen participants attended the meeting, including state, local and federal law enforcement and emergency responder agencies. Leveraging its collaboration space, NUSTL continues to host meetings for DHS stakeholders to address technology issues and concerns. *February 24.*

DHS – Bottom Up Review

- The USST presided over a Bottom Up Review of the R&D investment portfolios that included all Homeland Security Advanced Research Projects Agency (HSARPA) and FRG Divisions. The NUSTL Laboratory Director and Deputy Director participated by providing a brief lab overview and a review of the RNRR R&D portfolio. *May 5.*

DHS – Deputy Under Secretary for Science and Technology

- Shortly after being named Acting Deputy Under Secretary (DUS) for Science and Technology, Dr. Robert Griffin visited NUSTL and held an All-Hands meeting with NUSTL staff. Dr. Griffin thanked NUSTL staff for overall lab progress and valuable contributions to the first responder community. *May 16.*
- The DUS for Science and Technology Dr. Robert Griffin visited NUSTL to discuss S&T priorities and NUSTL activities. The DUS toured the main NUSTL facility, speaking with staff and thanking them for their service. *December 4.*

DHS – Domestic Nuclear Detection Office

- NUSTL presented a REMS overview and lessons learned briefing to the DHS DNDO Executive Steering Committee (ESC). The DNDO ESC is comprised of approximately two dozen senior representatives from state and local emergency responder agencies from across the nation. This ESC meeting, held at DNDO's offices in Washington, DC, included presentations and discussions on the radiological and nuclear threat, preparedness, prevention, detection, response and recovery. The DNDO ESC showed substantial interest in REMS and requested access to the REMS Lessons

Learned and Guidance Report, which was developed by NUSTL. Emergency management officials in New York City use REMS as a response and recovery tool in the event of a release of radioactive material in or around the city. The system consists of gamma radiation sensors distributed throughout the city that transmit real-time data to NYPD's central command center. REMS was designed at NUSTL and field tested over the course of five years. Through a cooperative research and development agreement, REMS was commercialized, enabling the NYPD and other customers to purchase the system in the commercial marketplace. The NYPD implemented the commercialized system and REMS is now operational in the New York City area. The report describes REMS, provides guidance on operating practices, and details the lessons learned from installing and operating it in New York City. REMS has served as a model for radiological response and recovery in other cities. *January 23.*

- Sandia National Laboratory has been commissioned to produce a 60-minute video on the formation and history of the DHS DNDO. Due to the history of many radiological/nuclear initiatives tracing back to New York City, the production team traveled to NUSTL to tape interviews and additional video footage. As one of the first detailees to DNDO in 2005, NUSTL's Lab Director was interviewed to provide his and NUSTL's perspective on how state and local participation in various efforts have evolved since 9/11. In addition, NUSTL staff coordinated visits to the NYPD Counterterrorism Division offices, the George Washington Bridge, Port Newark and elsewhere so the production team could capture shots of the city's critical infrastructure and iconic locations. *June 24-26.*

DHS – First Responder Group Strategic Planning Session

- The NUSTL Director participated in the kickoff meeting for the FRG's strategic planning exercise. The FRG Deputy Director is leading the execution of developing the plan, with participation from the Office of Interoperability

and Communications, Responder-Technologies, and NUSTL. Several sessions will follow over the next few months, with a draft being ready for the FRG Director by July 1. *March 19.*

DHS – First Responder Resource Group

- NUSTL staff attended the First Responder Resource Group (FRRG) Annual meeting in Washington, DC. FRRG is a group of operational experts representing the first responder community who come together to validate and prioritize focus areas and requirements. This group is essential to the First Responders Group's process for making investment decisions and functions as a primary information-sharing conduit to state and local responders. Approximately 100 first responders from across the country participated in the three-day conference. *June 10–12.*

DHS – Global Nuclear Detection Architecture Roadmap

- The NUSTL Director is part of a Systems Analysis team that is looking to provide insight and guidance to DNDO for the direction of the Global Nuclear Detection Architecture (GNDA) strategy. Members of the Futures Study team held a kickoff meeting at Sandia National Laboratories to discuss the project scope and develop the project approach. A briefing to the DNDO Director is slated for March to provide options for a path forward for the detailed road-mapping analysis. *February 3–4.*

DHS – National Nuclear Security Administration Review

- In an effort to coordinate interagency R&D activities, the NUSTL Director attended a review of the National Nuclear Security Administration's (NNSA) Office of Emergency Management (NA-42) Radiological/Nuclear Consequence Management R&D proposals for FY15. NA-42's focus is on improving technologies and their mission area, specifically their Radiological Assistance Program and other response assets under their management. Attending federal agencies' planning meetings such as this review fosters coordination of the

S&T RNRR R&D portfolio with interagency players, as well as ensures the pursuit of high priority, impactful research. *June 17.*

DHS – Office of Management and Budget Deep Dive

- The core mission of the Office of Management and Budget (OMB) is to serve the President of the United States in implementing his vision across the Executive Branch. As such, OMB examiners work with Executive Departments to align budget resources with work direction and activities. DHS S&T held a full day of briefings and discussions to inform and educate the newly assigned OMB representative to S&T. The NUSTL Director participated by giving a short lab overview presentation as part of the FRG session. *June 30.*

DHS – Office of National Laboratories Director's Meetings

- The S&T Laboratory Directors from Chemical Security Analysis Center (CSAC), National Biodefense Analysis and Countermeasures Center (NBACC), Plum Island Animal Disease Center (PIADC), Transportation Security Laboratory (TSL), and NUSTL met in Washington, DC, to discuss fiscal year 2014 Performance Objectives, laboratory performance assessments and mutual administrative and management issues. Representatives from S&T's Human Capital Office, Chief Administrative Office, Information Technology Office and Legislative Affairs attended to discuss specific issues. *January 24.*
- The five S&T Laboratory Directors and Deputy Directors presented fiscal year 2016–20 budget requests to the Office of National Laboratories (ONL) as part of the annual Resource Allocation Plan. *March 20.*
- The USST was briefed on the five S&T Labs: CSAC, NBACC, PIADC, TSL and NUSTL. At the meeting, the Laboratory Directors presented accomplishments and plans for the next six months, as well as an overview of the fiscal year 2015 budget. The meeting drew approximately 30 attendees from the S&T leadership team, including Group Leads and/or their Deputies, Division Chiefs and others. *May 1.*

- DHS S&T Office of National Laboratories organizes the S&T Laboratory Directors' bi-annual meetings to discuss areas of mutual interest and concern, including budget planning, facilities, security, safety, intellectual property and export control. The NUSTL Deputy Director attended, along with Directors from the TSL, PIADC, CSAC and NBACC. The meeting was noteworthy as the TSL Director, Dr. Susan Hallowell, participated for the last time as she has announced her retirement after forty years of federal service, including over ten years as the TSL Laboratory Director. *July 30.*

DHS – Radiological Nuclear Terrorism Risk Assessment Meeting

- The NUSTL Director participated in a special meeting of the Radiological Nuclear Terrorism Risk Assessment (RNTRA) Interagency Working Group held in Washington, DC. The meeting focused on understanding the consequences of a radiological or nuclear attack as a way of providing input to risk assessment models for prioritizing initiatives of the Global Nuclear Detection Architecture. Approximately 50 representatives from numerous federal agencies, including DOE Laboratories, participated. *March 25.*

DHS – S&T Office of General Counsel

- Representatives from S&T's Office of General Counsel (OGC) met at NUSTL to better understand NUSTL's mission and work activities. At the request of the Under Secretary for S&T, OGC and the Office of National Laboratories are developing policies and a guidance manual for managing Intellectual Property within S&T. *September 11.*

DHS – S&T Prioritization Meetings

- The NUSTL Director participated in a series of meetings in an effort to prioritize fiscal year 2015 and 2016 projects across S&T, also referred to as the "FY15 1 to N Prioritization." The Division Heads in FRG and HSARPA prioritized all projects using criteria developed by the team and with Navigant. The USST kicked off the

initiative by providing priorities and emphasis for this effort, followed by four working sessions. The NUSTL Deputy Director participated in the closeout meeting where the HSARPA and FRG Divisions discussed the processes, results and lessons learned to the USST and the former Acting DUSST, Dr. Griffin.

DHS – S&T Research and Development Partnership Group Lead Visits NUSTL

- Keith Holterman visited NUSTL to become more acquainted with NUSTL's mission and partners and to discuss future opportunities. During the visit, NUSTL staff provided several technology demonstrations, including Training and Exercise Support, SAVER, REMS, Neutron Benchmarking and PTEN. Continued dialog between Research and Development Partnerships and NUSTL is expected regarding NUSTL's potential role in supporting Operational Experimentation field demonstrations and exercises. *February 24.*

DHS – Safety Stand-Down

- Following high-profile biosafety and biosecurity incidents at the Centers for Disease Control and Prevention, the National Institutes of Health, and the U.S. Food and Drug Administration, the White House required all federal laboratories that possess or use any biological agents to participate in a Safety Stand-Down exercise. As a proactive measure, S&T required all labs to conduct a Safety Stand-Down for the specific areas of greatest potential threat or injury. In response, NUSTL conducted a Safety Stand-Down focusing on the safety and security regarding the storage, handling and transportation of the radioactive materials inventory held under a U.S. Nuclear Regulatory Commission (NRC) license. NUSTL's management team regularly reviews existing engineering and administrative controls, and has an established Radiation Protection Program that is executed on an annual cycle, including trainings, staff certification, program self-assessments, second and third party audits, and compliance with the U.S. NRC Materials License. In addition, during the Safety

Stand-Down, a series of briefings and discussions were held to discuss general safety and results of relevant recent audits and compliance reviews. *September 24.*

DHS – Under Secretary for Science and Technology

- The USST held a meeting with S&T Division Chiefs to discuss priorities and initiatives. The NUSTL Director participated, along with personnel who report to S&T Group Leads (FRG, HSARPA, ASOA and RDP). *April 25.*

DHS – World Trade Center Task Force Meetings

- At the request of DHS/National Preparedness and Programs Directorate/Office of Infrastructure Protection, NUSTL hosted two meetings addressing DHS efforts to support chemical, biological, radiological and nuclear countermeasures at the World Trade Center. One meeting was for “Indoor Airflow and Dispersion Modeling – World Trade Center – A Briefing of Complete Results and Detailed Analysis,” and the second was a final out brief for “Biological Agent (Indoor) Sampling Strategies and Considerations.” NUSTL has been closely involved with the DHS Task Force since its inception in 2010 by the DHS Secretary following a request from both the Port Authority of New York and New Jersey and the NYPD. *September 23.*



NUSTL hosts a World Trade Center Task Force Meeting.

DoD – NUSTL Hosts Department of Defense Representatives to Discuss Areas of Potential Collaboration

- NUSTL hosted the Competency Manager, Homeland and Interactive Technology Division from the U.S. Army Armament Research, Development and Engineering Center (ARDEC) at Picatinny Arsenal, New Jersey.

Picatinny Arsenal developed a test bed for explosives detection and countermeasure technologies. At the meeting, the discussion focused on ways to better utilize Picatinny’s test bed in support of NUSTL’s test and evaluation activities. Follow-up meetings are planned, including a NUSTL staff visit to Picatinny to observe and better understand the capabilities and opportunities for collaboration. *September 26.*

DOE – Brookhaven National Laboratory Meetings

- The NUSTL Director met with several Brookhaven National Laboratory (BNL) representatives, including the interim Associate Laboratory Director Dr. Martin Schoonen, Nonproliferation and National Security Department Chair Dr. Carol Kessler, and several other BNL staff members. The meeting covered a range of topics highlighted by a discussion to finalize a Memorandum of Understanding between BNL and NUSTL to enable easier collaboration and sharing of resources. *September 10.*
- The NUSTL Director met with Warren Stern, current senior advisor at BNL, to discuss the U.S. Department of Energy/National Nuclear Security Administration’s Global Threat Reduction Initiative (GTRI), to which BNL is under contract. The GTRI program works around the world to secure radioactive sources at their working location in order to lessen the risk of the materials being stolen and used for malicious purposes. The GTRI program is looking to work in the New York City area and NUSTL’s expertise with state and local agencies are being sought out as plans are being developed. *November 7.*

DOE – Sandia National Laboratory, Nuclear Weapons/Radiological Dispersal Device Course Participation

- The NUSTL Director, along with representatives from DND, FBI, National Counter Terrorism Center and other DOE Laboratories, participated in a three-day course, hosted by Sandia National Laboratory, to better understand the potential use of nuclear weapons and radiological dispersal devices for terrorism. The class is by invitation only and held at the Top Secret level.

The course included a tour of the DoD/DTRA classified atomic weapon museum at the Kirtland Air Force Base. *November 11-13.*

Defense Threat Reduction Agency – Meeting with Former Homeland Security Council Senior Director

- Dr. Robert Kadlec, of the Defense Threat Reduction Agency (DTRA), and the NUSTL Director met to discuss concepts of operations and technologies to counter the radiological/nuclear threat. Dr. Kadlec served as the Special Assistant to the President and Senior Director for Biodefense Policy on the Homeland Security Council. *November 18.*



The U.S. Army Armament Research, Development and Engineering Center at Picatinny Arsenal, New Jersey.

U.S. Army – NUSTL Tours Armament Research, Development and Engineering Center

- NUSTL staff visited the Armament Research, Development and Engineering Center (ARDEC) to tour its facility, assess their capabilities, and discuss the potential for utilizing ARDEC as a potential test bed for NUSTL’s future operational experimentation event (NUSTL OpEx). ARDEC is an internationally acknowledged hub for the advancement of armament technologies and engineering innovation. ARDEC’s installation encompasses 64 laboratories, and a workforce of more than 4,000 government and support personnel. NUSTL previously hosted ARDEC’s Robert Giarratano and Italo Grasso from ARDEC’s Homeland and Interactive Technology Division, which includes oversight of the S&T Explosives Division-sponsored Counterterrorism Technology Evaluation Center (CTTEC). NUSTL and ARDEC plan to continue

discussions regarding potential areas of collaboration. *November 25.*

State and Local First Responder Partnerships

NUSTL’s collaborative efforts with state and local first responders strengthened in 2014. Leveraging resources from state and local entities allows for a single, integrated effort focused on protecting the New York City Metropolitan area.

New York City Police Department

- The NYPD invited the NUSTL Director to participate in a Biowatch meeting with the New York City stakeholders. Attending the meeting were representatives from numerous NYC first responder agencies and transportation authorities, as well as the DHS Office of Health Affairs Biowatch Program Manager Michael Walter. These Biowatch stakeholder meetings are held to discuss issues with the many Biowatch participants. As advisors to NYPD, NUSTL will continue to be invited to such meetings. *February 19.*



DHS Secretary Jeh Johnson visits New York City Police Department.

- The NUSTL Director attended two NYPD SHIELD conferences, one which featured DHS Secretary Jeh Johnson and NYPD Commissioner William Bratton. The second conference featured a speaker from the NYPD Counterterrorism and Intelligence Department on “Global Terrorism” and the former Boston Police Commissioner who gave a talk on “Analysis and Lessons Learned from the Boston Marathon Bombings.” Also at the second conference, NYPD Police Commissioner William Bratton and NYPD Deputy Commissioner for Intelligence and Counterterrorism John Miller provided remarks. NYPD SHIELD is an umbrella program that coordinates both public and private security efforts. SHIELD partners with private sector security managers to protect New York City from terrorist attacks by providing best practices, lessons learned training and information sharing. *April 2, July 16.*
- At the request of the NYPD Counterterrorism Division, the NUSTL Director attended a briefing of the results of the Subway-Surface AirFlow Exchange (S-SAFE) study. The S-SAFE study was commissioned by the NYPD and funded through a \$3.4 million Department of Homeland Security Transit Security Grant. Brookhaven, Argonne and Los Alamos National Laboratories conducted the study. The study tracked the movement of tracer gases detected by air sampling devices placed in select locations on the street and in the subway system. While the study focused on air flow and dispersion of airborne contaminants resulting from the release of a chemical, biological or radiological agent, the findings also enable New York City agencies to better understand dispersion characteristics of other potential inhalational hazards, such as smoke or fumes from chemical spills, ultimately helping authorities refine emergency evacuation and response plans. *August 19.*

NYPD – Counter-Terrorism Bureau

- The NUSTL Director met with NYPD’s Counterterrorism Bureau’s Medical Director to discuss a more effective approach for general science and technology information exchange between NYPD and DHS/S&T. Next steps include discussions within S&T Groups and

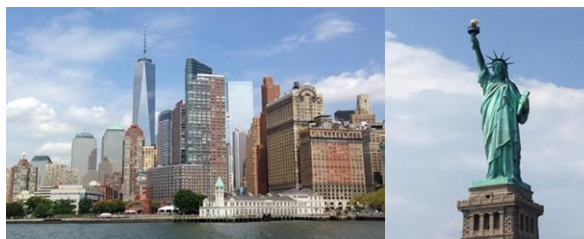
Divisions regarding improved coordination with NYPD. *January 29.*

NYPD – Harbor Unit

- The NYPD Harbor Unit invited NUSTL on a New York harbor tour to show their appreciation for the support NUSTL has provided to the NYPD through its Responder Training and Exercise program, which provides radiation sources, technical staff and materials to first responders’ radiation detector trainings. Stevens Institute of Technology’s Center for Secure and Resilient Maritime Commerce students were also invited. The trip highlighted the technologies that NYPD used to conduct a range of security patrol and rescue missions in the busy urban estuary. The trip provided a unique opportunity to observe first-hand the activities of local law enforcement in securing critical infrastructure and national landmarks along the water front, ensuring public safety aboard public and private commercial vessels, and in search and rescue operations. *August 21.*

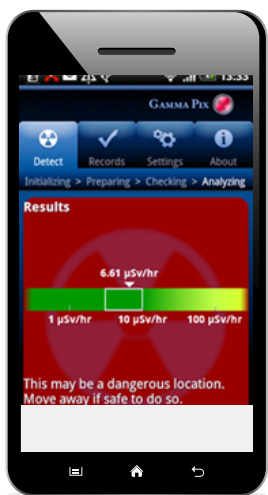


NUSTL staff (Back Row): Carl Schopfer, Paul Goldhagen, Mathew Monetti, Karin Decker, Alfred Crescenzi, Norman Chiu (Front Row): Alice Hong, Bhargav Patel, and Adam Hutter, with the NYPD Harbor Unit and Stevens Institute students after the Harbor Tour.



NYPD – Science and Technology Group

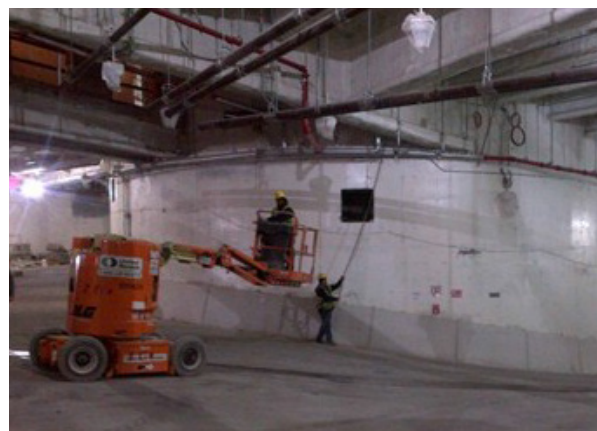
- The NYPD is exploring options to test and deploy a software application, GammapiX, which utilizes existing surveillance cameras as radiation detectors. GammapiX analyzes images and video feeds for radiation signatures and may be a low cost and effective supplement to other systems in use by the NYPD. The NYPD has asked NUSTL to assess the technology for potential deployment. *March 17.*
- A permanent workspace for the NYPD S&T Group has been established at NUSTL to increase communication and collaboration. NUSTL is working with the NYPD's Management Analysis and Planning, Science and Technology Group to formalize its requirement gathering process and to review new and emerging technology against documented requirements.
- NUSTL met with NYPD's S&T group, which included the new Assistant Commissioner of the Office of Analysis and Planning, Ronald Wilhelmy. NUSTL discussed its role within DHS S&T and reaffirmed its objective of being a conduit for the NYPD to connect with emerging technology and knowledge products to help them achieve their mission. NUSTL has arranged for NYPD to have office space in its facility to strengthen the NUSTL/NYPD relationship and enhance communication. *September 30.*



A GammaPix radiation detection application on a smartphone.

Port Authority of New York and New Jersey – World Trade Center Task Force

- At the request of the PANYNJ and the NYPD, DHS formed a Task Force to support the redevelopment of the World Trade Center for planning countermeasures and response to chemical, biological, radiological and nuclear threats. The NUSTL Director chairs the Command, Control, Communication, Computers and Intelligence (C4I) Working Group, which is one of several working groups formed. The NUSTL Director attended a stakeholder meeting to discuss sampling strategies in the event of a chemical release in the subways. Participants included DOE National Laboratories, PANYNJ and several federal, state and local response agencies. *January 7.*
- NUSTL provided ongoing technical assistance to the PANYNJ on implementation of the World Trade Center (WTC) Vehicle Screen Center (VSC), including: providing feedback on proposals, plans and CONOPs; observing development and testing of systems within the center; and providing operational assessments on the performance of systems. At the request of the PANYNJ, NUSTL surveyed the countermeasure technologies being deployed at the WTC VSC. The PANYNJ has asked NUSTL to review documentation from the vendors, observe vendor acceptance testing and advise them on best practices. NUSTL will partner with the TSL to provide the PANYNJ with comprehensive technology guidance. *March 5.*



Inside the World Trade Center Vehicle Screening Center.

- As part of their ongoing partnership with the PANYNJ, NUSTL provided direct support to the WTC Security Director for radiological/nuclear countermeasure technologies. As part of these support initiatives, NUSTL coordinated with the PANYNJ to bring in expertise resident at S&T's TSL for explosives detection technologies. An initial meeting was held with representatives from NUSTL, TSL and WTC Security Director's staff at their offices in Manhattan and was followed by a tour of the WTC VSC. Additional meetings are taking place for the S&T labs to support technology deployments at the WTC VSC. *April 15.*

New Jersey Office of Homeland Security and Preparedness

- The NUSTL Director attended the annual New Jersey Office of Homeland Security and Preparedness (OHSP) conference, which was held at Monmouth University. Kicked off by the OHSP Director Chris Rodriquez, speakers included federal, state, local and private industry representatives, with a theme of global terrorism and cybersecurity. The keynote speaker was former USCG Commandant Thad Allen. Approximately 450 participants representing first responder disciplines attended. *October 16.*

Suffolk County Police Department

- As part of its Responder Training and Exercise program, NUSTL provided radiation sources, training equipment and staff to support the Suffolk County Police Department's (SCPD) Personal Radiation Detector training at the Suffolk County Police Academy located in Brentwood, New York. NUSTL's Responder Training and Exercise program was established to provide support for STC, which is managed by the DHS DNDO. STC is a cooperative federal, state and local program, initially piloted in the NYC metro area. The program seeks to design and implement architecture for coordinated and integrated detection and interdiction of illicit radiological materials that may be used as a weapon within the region. *March 30.*



Suffolk County Police Department Officers participating in radiation detector training at their training facility in Brentwood, New York.



Suffolk County Police Department Officers participating in radiation detector training at their training facility in Brentwood, New York.

Urban Shield

- NUSTL representatives, along with S&T HQ representatives, participated in Urban Shield 2014 as observers. Urban Shield is a comprehensive, full-scale regional preparedness exercise that assesses the overall Bay Area Urban Area Security Initiative (UASI) region's response capabilities related to multi-discipline planning, policies, procedures, organization, equipment and training. Urban Shield tests regional integrated systems for prevention, protection, response and recovery in a high-threat, high-density urban area. The exercise evaluates the region's existing level of preparedness and overall capabilities to identify what is done well and any areas of improvement. *September 4-8.*

Academia

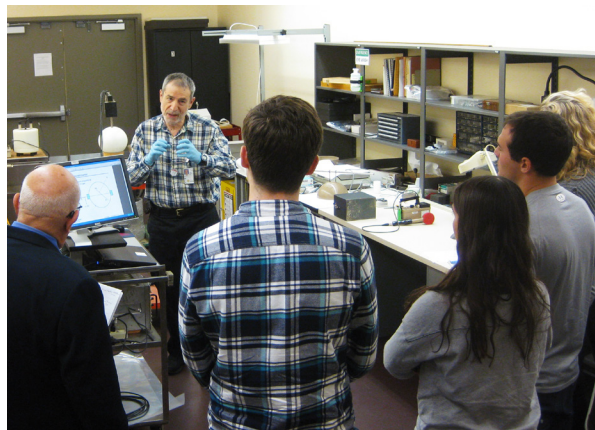
Stevens Institute of Technology's DHS Center of Excellence for Secure and Resilient Maritime Commerce

- NUSTL hosted representatives from DHS Center of Excellence, Stevens Institute of Technology's Center for Secure and Resilient Maritime Commerce (CSR) and

the National Science Foundations' National Center for Atmospheric Research (NCAR). The discussions focused on a proposed Coastal-Urban Dispersion Field Exercise jointly executed by CSR and NCAR. Additional discussions will take place to include emergency response stakeholders. In managing the research and development portfolio for RNRR, NUSTL is considering dedicating a portion of funding for university-based research and development. Accordingly, NUSTL staff visited CSR to discuss potential working arrangements between DHS Centers of Excellence and NUSTL. *January 14 and 31.*

- NUSTL staff, including the Lab Director, attended the Stevens Institute of Technology CSR fifth annual Summer Research Institute (SRI) symposium, which included student research presentations of homeland security related topics. Eighteen undergraduate and graduate-level students attended the SRI. Throughout the eight-week program, the students collaborated with CSR researchers and networked with practitioners from various federal, state and local agencies, including NUSTL, to conduct research with the objective of enhancing the situational awareness, surveillance capabilities, and emergency response and preparedness of first responders and emergency management personnel. Also in attendance were several dozen representatives from regional agencies, such as the PANYNJ, U.S. Coast Guard and DHS/ Customs and Border Protection. *July 24.*
- NUSTL hosted several students from the Stevens Institute of Technology's DHS National Center of Excellence for Maritime Security. The students are enrolled in Stevens' Nuclear Security and Terrorism course, which includes a component on radiological/ nuclear detection technologies. NUSTL scientists provided the students with a tour of the NUSTL facility and conducted hands-on demonstrations of NUSTL technology. Technology demonstrations included NUSTL's REMS sensors, the RadTruck, Gamma Detectors, PRDs and Radiation Isotope Identifier Devices (RIIDs). *October 30.*

- NUSTL's RNRR Division was invited to participate in a Nuclear Security and Terrorism Course at Stevens Institute to listen to the students' final projects on the impacts of an IND denotation in two U.S. cities. The students presented their research and findings, and the NUSTL team members asked questions and sparked further discussion and dialogue on the IND hazard, including public messaging, detection capabilities, and other key response and recovery objectives and operations. *December 4.*



NUSTL Physicist Paul Goldhagen presents the Neutron Benchmarking Program to Stevens Institute of Technology DHS Center of Excellence for Maritime Security students and professors.



NUSTL Director Adam Hutter with Stevens Institute of Technology DHS National Center of Excellence for Maritime Security Director Julie Pullen, students, and Professor Edward Friedman pictured in front of World Trade Center steel donated to NUSTL by the Port Authority of New York and New Jersey Police Department.

Harvard University – National Preparedness Leadership Initiative

- The NUSTL Director is participating in Cohort XII of Harvard University’s National Preparedness Leadership Initiative (NPLI), which is run by the Kennedy School of Government and the School of Public Health. Course attendees come from across the nation from all levels of government and industry to develop leadership. The NPLI’s mission is to equip our nation’s leaders with the skills, knowledge and abilities required to effectively lead during crisis in the 21st century. The course involves two-week in-residency programs, as well as participation in a group project that furthers the development of course skills while adding to the nation’s preparedness. *December 7-12.*

Rutgers University

- The NUSTL Director attended the Inaugural Conference of the Rutgers Institute for Emergency Preparedness and Homeland Security (IEPHS). The IEPHS “is a university-wide, multidisciplinary center of excellence, blending expertise and experience in the sciences and humanities from all campuses statewide to protect and enhance the lives, health and wellness of individuals and populations—and to safeguard the physical, economic, and societal infrastructure—through national and international collaboration in research, education, community outreach, and practice.” The meeting entailed several affiliated centers within Rutgers providing overview presentations to the audience of approximately 400 people. *June 6.*

Study of Terrorism and Responses to Terrorism

- NUSTL staff was interviewed as part of a study conducted by the S&T Center of Excellence National Consortium for the Study of Terrorism and Response to Terrorism (START). The project entitled “Visiting Faculty Scholars for DHS S&T Transition and Commercialization Issues” will provide project managers and leadership with new perspectives, approaches and tools to enhance the prospects for successful transition of technologies. *October 24.*

International

In 2014, NUSTL collaborated with international organizations from Germany, Israel and the United Kingdom, which afforded DHS and NUSTL the opportunity to discuss mutual areas of interest and explore future endeavors.

Fraunhofer Institute of Germany

- In coordination with S&T/Research and Development Partnership’s (RDP) International Cooperative Programs Office (ICPO), NUSTL hosted a representative from the Fraunhofer Institute of Germany. Fraunhofer is Europe’s largest organization for applied science, including specialties in health, nutrition and environment; safety and security; information and communication; transportation and mobility; energy and living; and production and environment. The NUSTL Deputy Director and Division Directors met with Ulrich Meissen, Fraunhofer’s Director of the Competence Center for Electronic Safety and Security Systems for the Public and Industries. NUSTL and Fraunhofer plan to continue discussions regarding mutual areas of interest and future collaboration, especially in the area of Fraunhofer’s first responder equipment databases. *February 25.*

United Kingdom Cabinet Office’s Civil Contingency Secretariat

- The NUSTL Director participated in a video conference with representatives from the United Kingdom (UK) Home Office and the Civil Contingency Secretariat (CCS) to discuss RNRR R&D. A bilateral agreement between the UK and DHS/S&T fosters information sharing and collaboration on areas of mutual interest. NUSTL will continue to work with UK officials on the results of R&D projects. *April 9.*

Israel's Ministry of Public Security

- NUSTL staff arranged and hosted an Israeli delegation as part of the DHS/S&T-Israeli Ministry of Public Security bilateral agreement, which included a meeting with the PANYNJ Security Director, a tour of the 9/11 Memorial Museum and a visit the Lower Manhattan Security Coordination Center (LMSCC). The Israeli visitors were very interested in state-of-the-art situational awareness and video analytic tools, which they were able to see at the LMSCC. The 9/11 Memorial Museum provided a moving reminder of the terrorist threat we face domestically and internationally. *June 23.*



Inside the 9/11 Memorial Museum showing the original slurry wall remnant and last column.

Private Industry

In 2014, NUSTL continued to collaborate with private industry entities in order to convey future needs of first responders and to facilitate homeland security efforts.

Symetrica, Inc.

- In March, NUSTL and NYPD Harbor Unit representatives met with Symetrica, Inc. to discuss the company's line of equipment for radiation detection, which included RadSeeker Handheld, fixed and mobile portal systems, wearable 3 HE-free neutron vest, miniature detector systems and the future needs for first responder applications.

Underwriters Laboratory

- In September, NUSTL Director Adam Hutter met with a representative of the Underwriters Laboratory (UL) in Melville, New York to discuss potential methods for collaboration to assist with homeland security efforts. The UL is a test and evaluation service and is widely recognized for conducting safety tests on nearly every electrical device sold in the United States.

SUPPORT OFFICES

The Support Offices, comprised of staff from the Administrative Division, facilitate daily operational activities to ensure that NUSTL runs both safely and efficiently. In addition to the day-to-day tasks, the Support Offices also oversee: personal property management; information technology; the decommissioning and decontamination of the fifth floor; the Safety, Health, Environment Management (SHEMS) program; and training and records management as highlighted below.

9/11 “Flag of Heroes” installed at NUSTL. In honor of 9/11, NUSTL framed and mounted a 10th Anniversary Flag of Heroes at NUSTL’s entrance (pictured right). The “Flag of Heroes” lists the names of emergency service personnel who gave their lives to save others in the terrorist attacks of 9/11. The flag was one of three thousand flown at the Field of Honor as a part of the official 9/11 Tenth Anniversary Commemoration in New York City. *September 15.*

NUSTL renames conference and meeting rooms. NUSTL held a laboratory-wide contest to name each of NUSTL’s seven meeting rooms. Ideas were sought from all NUSTL staff for conference room themes to ensure consistency throughout the lab. After thoroughly reviewing all of the suggestions, the theme “New York City landmarks” was selected. This theme was chosen to celebrate the laboratory’s rich history and partnership with the New York City community. The name “Empire Conference Room,” formerly the “Director’s Conference Room,” was chosen because of its view of the Empire State Building. Also, “Grand Central Terminal,”



Anniversary Flag of Heroes and recovered World Trade Center Steel provided to NUSTL by the PAPD.

formerly known as the “Large Conference Room,” was selected because of its central lab location and for its frequent use. *November 15.*

Personal Property Management

Excess Property

In 2014, NUSTL extensively transferred, donated, sold and recycled excess property, valued at over \$190,000, to contribute to our environmental sustainability goals, as outlined below. Additionally, in May, NUSTL registered to participate in the United States Postal Service recycling program “Blue Earth,” which enables federal agencies to dispose of their e-waste more efficiently and effectively at no cost.

Donated

- Four printers to the New York City Public School 721M as part of the Computers for Learning Program. *January 16.*
- One plasma television to Dantzler Foundation in Wilmington, Delaware. *February 10.*
- One plasma television to the Federal Job Corps Program in Brooklyn, New York. The Job Corps Program is a free education and training program that helps young people obtain a high school diploma or General Education Development, and to both find and maintain a good job. *February 20.*
- Three computer monitors to New York City Public School 136. *July 24.*
- Donated a forklift cage to the Town of Masonville Highway Department in upstate New York. *September 30.*

Sold

- One security locker through General Services Agreement (GSA) sales. *November 18.*

Transferred

- Seventeen radiation detectors and two ion chambers no longer required by NUSTL operations, to the Office of Naval Research. *January 22 and May 29.*

Property Management of the Performance Testing and Evaluation at NUSTL Program

In support of the PTEN program, NUSTL's Property Manager Robert Stocco deployed its existing property inventory program with new scanner hardware for use with PTEN's Personal Radiation Detector barcoding process. The new system allows for accurate comparison of invoices with items delivered, which eliminates human error. *February 21.*

Property manager Robert Stocco also collaborated with PTEN Program Manager Ethel Davis to implement improved scanning technology into the PTEN lifecycle process. This resulted in a rapid and efficient check-in process, while improving data integrity. The process improvements include integrating manufacturer's barcodes and calibration dates into the check-in process, along with creating tracking numbers to associate with NUSTL test documentation. Barcode scanning to track serial numbers saves time and improves the integrity of NUSTL records and the data provided to NUSTL customers. *October 1.*

Property Inventory

S&T Assessment Management performed an audit of NUSTL's personal property accountability procedures and property inventory. No deficiencies were identified. *July 8.*

Information Technology

Throughout 2014, there were vast improvements made through Information Technology (IT) at NUSTL. In January, the pre-existing HP copiers/printers were replaced with new Ricoh devices that can print, copy and scan. NUSTL staff members were trained on the capabilities of the new multifunctional printers by a Ricoh technician. Additionally, NUSTL property manager Robert Stocco updated the HQ issued IT and legacy inventory, resulting in more than 400 items being cataloged in the Staff Management System.

In order to increase the technical capabilities of our meeting spaces, the following improvements were made:

- The secure VTC system in the Limited Room became operational. *January 17.*

- Additional data circuits were installed the First Responder Training Room, which allows for increased connectivity to IT hardware. *May 30.*
- A portable webcam was tested and verified for use in the Empire Conference Room. *July 29.*

Additionally, network and software updates were made to better facilitate the work of NUSTL staff and to meet agency requirements. These updates include:

- The migration of 30 personal, Reach back and Share computers to Windows 7 without disruption of operation. *April 10.*
- An upgrade on A-LAN connection circuit from T1 to DS3. *May 7.*
- The completion of the A-LAN switch expansion project, which increased connectivity to all areas of the laboratory. *July 12.*
- An upgrade of the HSDN and Personal Access Control System to Windows 7. *August 29, September 9.*

Decommissioning and Decontamination

The fifth floor's former research areas, in particular the radiochemistry laboratories, the division offices and computer/server space, were free released to General Services Administration (GSA). NUSTL's Director of Administration Alfred Crescenzi, the S&T CAO Real Property Manager and ONL Lab Operations representative comprised the DHS Decommissioning and Decontamination (D&D) Team to collaborate with the GSA Real Estate and Environmental staff to finalize a plan to have the remaining fifth floor space free released to GSA. This remaining fifth floor space has contaminated pipe & ductwork that requires removal and disposal. GSA and the D&D Team agreed to enter into a MOA and action plan. The plan is to have GSA remove and dispose the pipe & ductwork under a Reimbursable Work Authorization. To coordinate this effort, the action plan entails the agreed upon conditions, actions and steps required to remove and dispose the remaining pipe and ductwork offsite. Per the action plan, GSA will provide to the D&D Team with the approved pipe and duct work removal procedures, waste manifests and certificates

of disposal. These documents and the procedures used by GSA to D&D the pipe & ductwork will be documented in an addendum to the final D&D report. The final report, upon acceptance by GSA, will result in the return of the remaining fifth floor footprint to GSA. This will conclude the D&D of the fifth floor that was performed in accordance with AIHA/ANSI Standard for Laboratory Decommissioning Z9-11-2008 and the DHS-GSA MOA. The MOA was signed by ONL and GSA on December 11, 2014.

On June 26, GSA Public Building Service (PBS) R2 Portfolio finalized the justification for the rent credits already due to DHS and began to obtain approval from GSA's PBS central office. In addition, GSA PBS R2 Portfolio Manager forwarded a rent exception to stop billing DHS for the completed decommissioned areas on the fifth floor; the rent credit was processed on July 25.

When the Reimbursable Work Authorization for removal and disposal of the contaminated pipe and duct work on the fifth floor was signed by DHS, GSA created a new Occupancy Agreement (OA) for the ninth floor, first floor and basement dated September 29, 2014. The OA included rent credits for the previously vacated 5th floor space. When the credits were received by ONL, the new ninth floor Occupancy Agreement was signed by the acting S&T CAO on November 14.

On October 24, DHS requested that GSA's Environmental Specialist address the S&T/ONL/NUSTL submitted objections and comments on GSA Contractor's Work Plan for the removal of contaminated pipe and duct work. NUSTL found the work plan was insufficient in providing adequate containment procedures to prevent re-entrainment of contaminants in previously cleaned areas by DHS contractors. Subsequently GSA had an internal meeting with their contractor to determine a resolution that will address our concerns.

The DHS-GSA Action Plan Agreement for the decommissioning of NUSTL's former space on the fifth floor was signed by the ONL Acting Deputy Director, and counter signed by the GSA Portfolio Management Director. The last remaining

item in the agreement to be completed concerns the duct removal work plan, which went under review by the GSA Environmental Specialist at the end of 2014.

Safety, Health, and Environmental Management System

The Safety, Health, and Environmental Management System (SHEMS) was created to assist NUSTL's facility with the management of its environmental and safety related activities in accordance with federal, state and local regulations. Throughout the year, SHEMS Manager Alfred Crescenzi is responsible for all activities relating to SHEMS, which includes the scheduling of audits and responding to data calls as outlined below.

SHEMS Audits

NUSTL successfully completed the combined SHEMS Awareness and Environment, Occupational Safety and Health Radiation Safety (EOSH Rad) Compliance Second Party Audit, which was conducted August 11-15. The EOSH Audit resulted in only negligible findings, some corrected on the spot, with no findings for the Radiation Safety Program. The SHEMS Awareness audit resulted in one positive finding and identified for our consideration four opportunities for improvement for the SHEMS. Both audits were conducted by the Loch Harbour Group-Mabbet Associates, who are contract support for the S&T Office of Safety and Environmental Programs. The second party auditors concluded that both the NUSTL EOSH Rad Compliance and SHEMS Programs were in compliance with applicable DHS, Occupational Safety and Health Administration (OSHA) and EPA regulations.

Hazardous Material Management

- An inspector from the New York City Department of Environmental Protection's Right-to-Know (RTK) Local Law 28 bureau was on site to verify NUSTL's hazardous material inventory and storage as reported on the annual SARA Title III Community (RTK) Chemical Inventory Report. There were no findings of noncompliance with the law. *April 30.*

Energy Management

- NUSTL reported in the FY 2014 Annual Report on Federal Government Energy Management a reduction in its fuel consumption by 10 percent. This accomplishment has mitigated the impact of Green House Gas emissions from the use of our motor vehicles for field work in FY14 compared to FY13. *November 30.*

Security

- NUSTL hosted two classified meetings, BioWatch and Countering Unmanned Aerial Systems (UAS) that were attended by DHS partners and local law enforcement agencies. *January 14, December 1–3.*
- An upgrade to the HSDN IT system in the Limited Area was completed. *August 11.*

Training

Every year NUSTL staff attends various training activities to ensure that they are appropriately prepared for their position requirements and potentially dangerous situations, to raise general awareness, and to facilitate compliance with agency regulations. Below outlines 2014 training activities.

- NUSTL's Facility Assistant Christian Madera successfully completed the required OSHA Powered Industrial Truck Fork Lift Training. *June 26.*
- SHEMS Annual Awareness training was given to all staff in preparation for the Annual SHEMS Awareness Audit. The SHEMS Officer reviewed with staff the SHEMS structure that provides awareness of Occupational Health Risks and Environmental Sustainability Goals. Awareness is accomplished through senior management commitment to the NUSTL Environmental Safety and Health (ES&H) Policy and employee participation in the implementation of Operational Management Plans for activities that have significant hazards and/or environmental impacts. *July 14.*
- A Safety Stand-down town hall meeting was presented to all staff to review safety practices and procedures applicable to NUSTL's operations. The safety stand down was ordered by the Director of ONL in response to a



NUSTL staff members participate in adult CPR training. NUSTL staff members were also trained on First Aid, infant CPR and AED use.

White House Memorandum to all government-owned laboratories. The safety stand down included: a statement by the NUSTL Director on his commitment to a safe workplace as expressed in our ES&H Policy; presentations given by the SHEMS Officer on the safety practices, policies and procedures in the revised NUSTL Safety Manual; review of the findings and corrective actions taken resulting from the 2014 Safety & Health Compliance and SHEMS Assessments that were conducted by a 2nd party Auditor; and the Radiation Safety Officer presented on Radiological Safety. *September 24.*

- Several NUSTL staff members volunteered to be trained and certified in First Aid, Cardiopulmonary Resuscitation (CPR) and Automated External Defibrillator (AED) use by a representative of the American Red Cross. *October 14.*
- DHS Protective Security Advisors Brian Lacey and Kevin Peterson trained NUSTL staff on Active Shooter Awareness. Their presentations highlighted Active Shooter incident characteristics, general programmatic propositions, the "Run.Hide.Fight." methodology, and preparedness measures and DHS resources. *December 15.*

Records Management

In August, NUSTL conducted an internal file and records audit. Based on those findings, NUSTL released their Records and File Management Internal Audit Report on November 15. The audit report contained recommendations for improvement, including consolidating file rooms and re-formatting NUSTL's project folder structure. To develop the audit report, NUSTL's internal audit team conducted interviews of all NUSTL records custodians, inspected all of NUSTL's file rooms and cabinets, and reviewed NUSTL's SharePoint Site to determine whether NUSTL's records and file keeping practices were in compliance with its ISO 9001 Records and File Management Policy and Procedure.

MEET THE STAFF

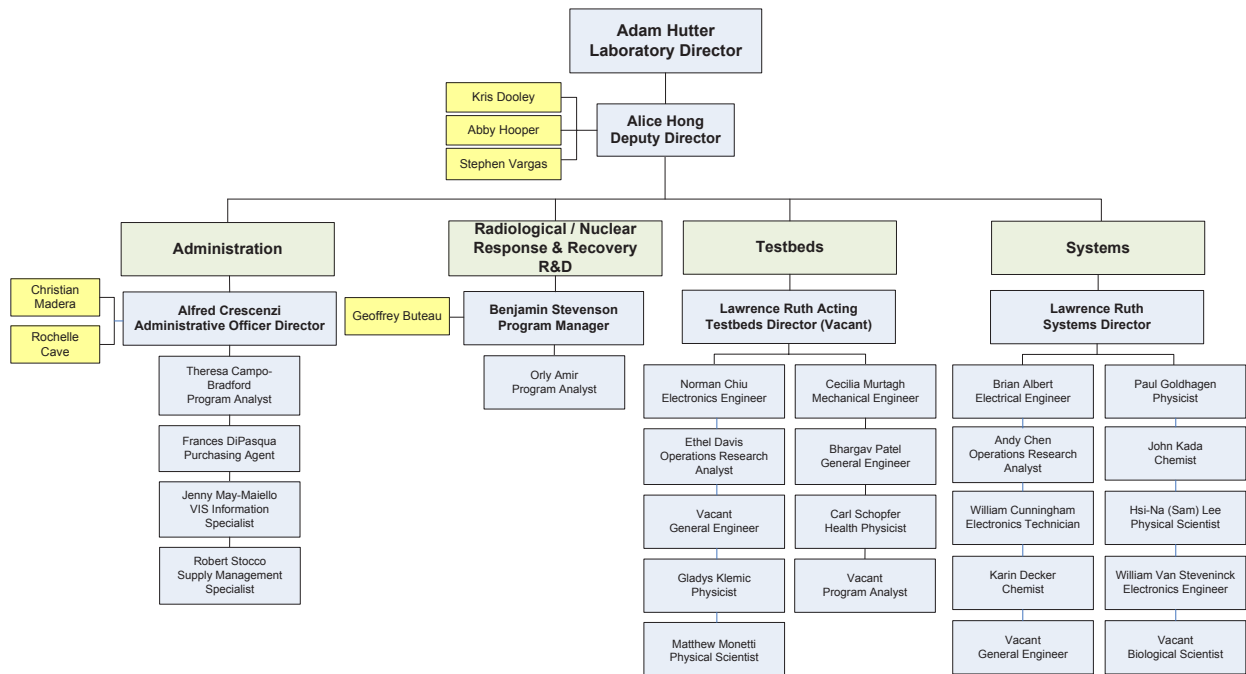
NUSTL's vital mission to conduct tests, evaluations and operational field assessments of homeland security technologies for the national first responder community requires the dedication of its staff. Throughout 2014, NUSTL staff facilitated this mission by seeking out technological advances, generating technical reports, and strengthening relationships with first responders by hosting collaborative meetings and establishing permanent work space at NUSTL.

NUSTL's expertise is a direct correlation between education and experience of its staff. Throughout the years, NUSTL has collaborated with numerous government entities and organizations to gain perspective into the first responder community's needs. That in conjunction with NUSTL's

education levels and fields has led NUSTL to being successful in our mission. Below you can find our full organizational chart.

NUSTL is led by Director Adam Hutter and Deputy Director Alice Hong. Together, as the Front Office, they oversee four divisions – Administration, Radiological/Nuclear Response and Recovery R&D, Testbeds and Systems. Each division has a dynamic leader with unique responsibilities that contribute to ensuring NUSTL's mission is met. To learn more about the Director, Deputy Director and division leaders, please see their biographies on the following pages.

National Urban Security Technology Laboratory S&T / FRG / NUSTL



Federal (26)
Support Contractors (6)

10/22/2015

M-OC-1



Adam Hutter, Ph.D.
Director

National Urban Security Technology Laboratory
Science and Technology Directorate
U.S. Department of Homeland Security
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Adam Hutter is the Director of the National Urban Security Technology Laboratory (NUSTL), a government-owned and government-operated lab of the U.S. Department of Homeland Security's Science & Technology Directorate. Adam is the seventh permanent Director in the lab's 65+ year history.

Under Dr. Hutter's leadership, NUSTL conducts programs to test, evaluate and assess homeland security technologies and systems, as well as supporting First Responders to effectively transition technologies into operational use. In addition, NUSTL conducts and sponsors research and development in the field of radiological and nuclear response and recovery.

Adam started federal service in 1987 at the U.S. Department of Energy's Environmental Measurements Laboratory. His career highlights include serving as a Subject Matter Expert on International Atomic Energy Agency missions in Russia and Kazakhstan, leading U.S. Government delegations to transfer characterization, monitoring and sensor technologies from the Former Soviet Union academies, research institutes, and Nuclear Complex facilities, and serving as a Technical Advisor to federal, state, and local governments on the integration of counterterrorism technologies into everyday use to help ensure the nation's safety and security. As a federal executive and leader, Adam develops and maintains strong partnerships among federal, state and local government agencies in support of the homeland security mission.

Among Dr. Hutter's honors are the Meritorious Service Award from the DHS/Domestic Nuclear Detection Office (DNDO), DHS/Under Secretary's Awards for Leadership, Program Management and as part of a team that won the DHS/Under Secretary's Award for Science & Technology. He was nominated for The Samuel J. Heyman Service to America Medals for Career Achievement. Adam earned a B.S. degree from the University of Delaware, a M.S. degree from the Pennsylvania State University and a Ph.D. from the City University of New York.



Alice Hong
Deputy Director

National Urban Security Technology Laboratory
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Alice Hong is the Deputy Director of the National Urban Security Technology Laboratory (NUSTL), a government-owned and government-operated laboratory of the U.S. Department of Homeland Security's Science and Technology Directorate.

Ms. Hong supports the Laboratory Director Dr. Adam Hutter in leading NUSTL staff in the successful development, evaluation and transition of homeland security technologies into field use for law enforcement, fire and other emergency response agencies. Ms. Hong is a critical proponent of NUSTL's mission to serve local first responders and has both established and sustained

strength in partnerships within the homeland security community. She provides oversight and management of research and development projects for improving the testing, analysis and development of tools and technologies supporting first responders.

Prior to joining NUSTL in February 2008, Ms. Hong was the Special Projects Manager in the Human Factors Division of S&T at DHS for two years. Ms. Hong was also the Strategic Planning and Special Projects Lead for the former Office of Systems Engineering and Development, also within S&T. In addition, she previously served as a Senior Associate of Economic and Valuation Services at KPMG, a U.S. audit, tax and advisory services firm and as a Consultant in the Development Economics Research Group at The World Bank.

Ms. Hong earned a Master of Public Policy (M.P.P.) degree from Georgetown University and a B.A. degree in Government from University of Maryland College Park. In 2009, she received an award from the Partnership for Public Service Excellence in Government Fellow.



Alfred Crescenzi

Director, Administrative Service Division

National Urban Security Technology Laboratory
Science and Technology Directorate
U.S. Department of Homeland Security

Mr. Alfred Crescenzi is the Director, Administrative Services Division the National Urban Security Technology Laboratory (NUSTL), a government-owned and government-operated laboratory of the U.S. Department of Homeland Security's Science and Technology Directorate.

Under Mr. Crescenzi's leadership, the Administration Services Division provides NUSTL with operations support in building and facilities management, procurement, shipping and receiving, communications, courier services, information technology (IT) services, property management, security, worker safety and health, and environmental sustainability. The Administrative Services

Division managed the decommissioning of the former DHS-Environmental Measurement Laboratories (EML) radiochemistry laboratories and mechanical fabrication facilities prior to moving to the new NUSTL Facility.

Mr. Crescenzi served as the NUSTL (formerly DOE-EML) Industrial Hygienist -Laboratory Safety and Environmental Protection Officer since 1991. Prior to his promotion to Division Director in May 2009, Mr. Crescenzi also served as a Reachback Spectroscopy Specialist for the DNDO Regional Reachback Program to assist state or local law enforcement in resolving radiation detection alarms during the initial stages of a potential Weapons of Mass Destruction nuclear detection incident. In this capacity as a Spectroscopist, Mr. Crescenzi augmented the U.S. Customs and Border Patrol site testing of the Advanced Spectroscopic Portals at the Laredo, Texas Port of Entry and The Port of Long Beach, California. Mr. Crescenzi began his federal career in the Department of Veterans Affairs Medical Center (VAMC) in Brooklyn, New York. At the VAMC, Mr. Crescenzi served as the Industrial Hygiene and Safety Manager where he developed, implemented and managed a comprehensive Industrial Hygiene and Safety Program. Prior to Mr. Crescenzi's entry into the federal sector, he worked in the private sector as an analytical chemist.

Mr. Crescenzi received a Special Act Award from the Acting Under Secretary for Science and Technology Brad Buswell, April 16, 2009, in recognition of taking on additional responsibilities beyond his own job of an Industrial Hygienist, as the NUSTL (EML) acting Administration Director. He earned his M.S. degree in Environmental Health Sciences from the Hunter College of the City University of New York, and a B.S. from the City College of New York. In addition, he has completed course work in the field of administrative management and project management.



Lawrence Ruth, Ph.D.

Director, Systems Division

National Urban Security Technology Laboratory
 Science and Technology Directorate
 U.S. Department of Homeland Security

Dr. Lawrence A. Ruth is the Director, Systems Division, at the National Urban Security Technology Laboratory (NUSTL), First Responders Group, Science and Technology Directorate, U.S. Department of Homeland Security. He is responsible for managing homeland security programs including those related to technical analysis and evaluation in support of operational field testing, specialized science-based studies, and technical support and outreach to the homeland security community. Since 2011, he has led NUSTL's System Assessment and Validation for Emergency Responders team. He managed the New York Area Science and Technology Workgroup, a forum for information sharing among 300 government and private sector

members involved in homeland security. He also directed the development and successful piloting of the REMS, a fixed radiation sensor network, which was commercialized through a Cooperative Research and Development Agreement with a major instrument manufacturer. REMS is now an operational capability of the New York Police Department.

Before joining NUSTL in 2003 (then the Environmental Measurements Laboratory), Dr. Ruth was Senior Advisor at the U.S. Department of Energy's National Energy Technology Laboratory in Pittsburgh, Pennsylvania where, working with private industry, academia and government leaders, he managed key programs valued at \$340 million to develop pollution-free, fossil fuel-based power plants. Prior to joining the Energy Department, he was Vice President at Energy and Environmental Research Corporation and Engineering Associate at Exxon Research and Engineering Company. Dr. Ruth has a Ph.D. in chemical engineering from the City University of New York.



Benjamin Stevenson
Director, Radiological/Nuclear Response and Recovery Research & Development

National Urban Security Technology Laboratory
Science and Technology Directorate
U.S. Department of Homeland Security

Benjamin Stevenson is the Division Director of the Radiological/Nuclear Response and Recovery (RNRR) Research & Development (R&D) Portfolio at the National Urban Security Technology Laboratory (NUSTL), a government-owned and government-operated laboratory of the U.S. Department of Homeland Security's Science and Technology Directorate.

Mr. Stevenson's work on the RNRR R&D Portfolio is focused on increasing local and state capability during a radiological emergency. Because of the "no-notice" nature of a radiological/nuclear incident, federal support would not be immediately available, and there will be a period of

time early in a radiological response when first responders would have to rely on their own technical resources to perform critical missions and operations. Through R&D, DHS S&T seeks to increase capability to manage complex incident data, save lives through mitigating the hazard of radiation, and minimize the impact of the incident on individuals, families and businesses.

Previously, Mr. Stevenson served as a Commissioned Officer in the Coast Guard, and has held positions at the Domestic Nuclear Detection Office, Department of Homeland Security Headquarters, and the Regional Catastrophic Grant Program, supporting the States of New York, New Jersey, Connecticut and Pennsylvania in regional preparedness and planning for radiological and nuclear incidents.

Mr. Stevenson is originally from Washington State and is a graduate of the United States Coast Guard Academy.

ACRONYMS

2014 NUSTL Accomplishments Acronym List	
AED	Automated External Defibrillator
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
ARDEC	Armament Research, Development and Engineering Center
ARES	Airborne Radiation Enhanced-sensor System
ASOA	Acquisition Support and Operations Analysis
ATD	Advanced Technology Demonstration
BADE	Biological Agent Detection Equipment
BNL	Brookhaven National Laboratory
CAO	Chief Administrative Office
CBP	Customs and Border Protection
CBRNE	Chemical, Biological, Radiological and Explosives
CCS	Civil Contingency Secretariat
CDWG	Capabilities Development Working Group
CFSI	Conventional Fixed Station Interface
CONOPs	Concept of Operations
CPR	Cardiopulmonary Resuscitation
CSAC	Chemical Security Analysis Center
CSR	Center for Secure and Resilient Maritime Commerce
CTTEC	Counter Terrorism Technology Evaluation Center
D&D	Decommissioning and Decontamination
DHS	Department of Homeland Security
DNDO	Domestic Nuclear Detection Office
DoD	Department of Defense
DOE	Department of Energy
DTRA	Defense Threat Reduction Agency

DUS	Deputy Under Secretary
DUSST	Deputy Under Secretary for Science and Technology
EDGE	Enhanced Dynamic Geo-Social Environment
EMP	Electromagnetic Pulse
EMREP	Electronic Reliability and Effects Predictions
EOSH Rad	Environmental Occupational Safety and Health Radiation
EPA	Environmental Protection Agency
ESC	Executive Steering Committee
ES&H	Environmental Safety and Health
FBI	Federal Bureau of Investigation
FDNY	Fire Department of New York
FEMA	Federal Emergency Management Agency
FPS	Federal Protection Service
FRG	First Responders Group
FRRG	First Responder Resource Group
FRMAC	Federal Radiological Monitoring and Assessment Center
FRPCC	Federal Radiological Preparedness Coordinating Committee
GCT	Grand Central Terminal
GSA	General Services Administration
GSA	General Services Agreement
GTRI	Global Threat Reduction Initiative
HP	Hewlett Packard
HQ	Headquarters
HSARPA	Homeland Security Advanced Research Projects Agency
HSDN	Homeland Secure Data Network
HSE	Homeland Security Enterprise
HSSAI	Homeland Security Studies and Analysis Institute
ICPO	International Cooperative Programs Office
ICS	Incident Command System
IEPHS	Institute for Emergency Preparedness and Homeland Security

IND	Improvised Nuclear Device
IPAWS	Integrated Public Alert and Warning System
ISO	International Standardization Organization
IT	Information Technology
LLNL	Lawrence Livermore National Laboratory
MACWG	Modeling and Analysis Coordination Working Group
MIT LL	Massachusetts Institute of Technology Lincoln Laboratory
MOA	Memorandum of Agreement
MTA	Metropolitan Transit Authority
NARAC	National Atmospheric Release Advisory Center
NBACC	National Biodefense Analysis and Countermeasures Center
NCAR	National Center for Atmospheric Research
NCTC	National Counter Terrorism Center
NDRD	Nuclear Defense Research and Development
NIPSTA	Northern Illinois Public Safety Training Academy
NIRT	Nuclear Incident Response Team
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NPLI	National Preparedness Leadership Initiative
NRC	Nuclear Regulatory Commission
NRL	Naval Research Laboratory
NUSTL	National Urban Security Technology Laboratory
NYAST	New York Area Science and Technology Forum
NYC	New York City
NYPD	New York City Police Department
OFA	Operational Field Assessment
OGC	Office of General Council
OHSP	Office of Homeland Security and Preparedness
OMB	Office of Management and Budget
ONL	Office of National Laboratories

OpEx	Operational Experimentation
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
OSTP	Office of Science and Technology Policy
PANYNJ	Port Authority of New York and New Jersey
PAPD	Port Authority of New York and New Jersey Police Department
PIADC	Plum Island Animal Disease Center
PRD	Personal Radiation Detector
PTEN	Performance Test and Evaluation at NUSTL
R&D	Research and Development
RAIN	Radiation Awareness and Interdiction Network
RARAF	Radiological Research Accelerator Facility
R-TECH	Responder Technologies
RDD	Radiological Dispersal Device
RDP	Research and Development Partnership
REMS	Radiological Emergency Management System
RFI	Request for Information
RIID	Radiation Isotope Identifier Device
RNRR	Radiological / Nuclear Response and Recovery
RNTRA	Radiological Nuclear Terrorism Risk Assessment
ROSS	Radiological Operations Support Specialists
RRWG	Response and Recovery Working Group
RSD	Resilient Systems Division
RSL	Remote Sensing Laboratory
RT&E	Responder Training & Exercise
RTK	Right-to-Know
S&T	Science and Technology Directorate
S/NSI	Secret/National Security Information
S-SAFE	Subway-Surface AirFlow Exchange
S&TWG	Science & Technology Working Group

SAVER	System Assessment and Validation for Emergency Responders
SCPD	Suffolk County Police Department
SHEMS	Safety, Health, Environmental Management System
SIGMA	Scalable Integration of Geo-Dispersed Monitoring Assets
SME	Subject Matter Expert
SNAR	Shielded Nuclear Alarm Resolution
SNL	Sandia National Laboratory
SRI	Summer Research Institute
SSWG	Scientific Support Working Group
START	Study of Terrorism and Response to Terrorism
STC	Securing the Cities
SVSD	Small Vehicle Stand-Off Detection
SWAT	Special Weapons and Tactics
TRADOC	Training and Doctrine Command
TSA	Transportation Security Administration
TSL	Transportation Security Laboratory
UAS	Unmanned Aerial Systems
UASI	Urban Area Security Initiative
UK	United Kingdom
UL	Underwriters Laboratory
US	United States
USCG	United States Coast Guard
USPS	United States Postal Services
USSS	United States Secret Service
USST	Under Secretary for Science and Technology
VAMC	Veterans Affairs Medical Center
VSC	Vehicle Screening Center
VTC	Video Teleconference
WG	Working Group
WTC	World Trade Center



