U.S. Environmental Protection Agency (EPA) Board of Scientific Counselors (BOSC)

Homeland Security (HS) Subcommittee

Meeting Summary

December 12–14, 2018

Dates and Times: December 12, 2018, 8:30 a.m. to 5:00 p.m.; December 13, 2018, 8:30 a.m. to 4:45 p.m.; December 14, 2018, 8:30 a.m. to 12:00 p.m. Eastern Time

Location: EPA Research Triangle Park Research Facility, 109 TW Alexander Drive, Durham, North Carolina

Executive Summary

On December 12–14, 2018, EPA's BOSC HS subcommittee convened in Research Triangle Park, North Carolina. The goals of the three-day meeting were to review the HS Research Program's (HSRP's) draft Strategic Research Action Plan (StRAP)[1] and propose research strategies therein, and provide overall direction to HSRP by responding to several charge questions. HSRP staff members were available during the meeting to address StRAP content and specific areas of input from the BOSC. The meeting format allowed for presentations, open dialogue, program feedback, subcommittee questions, and EPA responses to questions.

Days 1 and 2 consisted of presentations and demonstrations outlining HSRP's seven research areas, and review and discussion of the six Agency-provided charge questions. The subcommittee then formed 2–3 person BOSC workgroups to develop strengths, suggestions, and recommendations for each charge question. Day 3 consisted of continued discussion between the subcommittee and HSRP staff, followed by each workgroup's report-out on each charge question.

Dr. Bruce Rodan, Deputy Assistant Administrator for Science, Office of Research and Development (ORD), explained that EPA staff members engaged heavily with EPA program and regional offices and states to identify research needs, and they strived to present HSRP's success to the BOSC through the draft StRAP. Mr. David Dunlap, Deputy Assistant Administrator of ORD, was in attendance. Mr. Tom Tracy served as the Designated Federal Official from ORD.

HSRP Research Area Overviews, Demonstrations, and Group Discussion

Dr. Gregory Sayles, National Program Director, HSRP, first described HSRP's foundation, purpose, and objectives, and noted that statutory mandates and presidential directives determine the program's roles and responsibilities. He outlined HSRP's framework of responsibilities through specific scenarios including wide area decontamination, wide area hot spot contamination, water system contamination, and oil spills. Dr. Sayles concluded by summarizing HSRP's research needs involving sampling, contaminant movement, cleanup, and water systems protection.

[1] https://www.epa.gov/research/homeland-security-strategic-research-action-plan-2016-2019

Dr. Shawn Ryan, Acting Deputy Director, HSRP, discussed the HSRP design. He highlighted that all research areas in HSRP interconnect, and there is a need to optimize knowledge in each research area to address customer-driven research needs and create resilient communities.

Dr. Paul Lemieux, HSRP, presented the first research area overview on contaminant fate, transport, and exposure surrounding indoor environments, outdoor environments, and water systems. He noted that fate and transport of contaminants is scenario-dependent and knowing the best approach to each scenario informs waste management. Dr. Lemieux provided scenario examples including the River Street warehouse fire in Portland, Oregon, chemical warfare agents on indoor surfaces, and wildfires. The research area demonstration exhibited a three-dimensional city for fate and transport visualization.

Dr. Sarah Taft, HSRP, presented the research area overview on contaminant detection and environmental sampling and analysis. She emphasized that HSRP requires sampling and analysis strategies and methods to support EPA response, remediation, and recovery. Dr. Taft explained that sampling and analysis was crucial to the River Street warehouse fire Dr. Lemieux raised, as HSRP modeled the asbestos-containing material plume following the fire. The research area demonstration included innovative sampling approaches, application to wide area response, activity-based air sampling, and water sampling and processing.

Dr. Sang Don Lee, HSRP, described the research area overview on wide area decontamination. He stated that EPA will help local and state governments develop decontamination strategies or directly decontaminate impacted areas, but EPA cannot test all media and devise proper decontamination methods for all. Wide-area incidents can affect multiple areas, and each area might require different decontamination approaches. Dr. Lee emphasized that the goal of HSRP is to meet the cleanup decontamination level that the public can withstand. Dr. Lee's research area demonstration presented bench-scale decontamination testing, bench- to pilot-scale decontamination testing, and wide area decontamination application.

Dr. Ryan introduced a wide area decontamination field study named the Analysis for Coastal Operational Resiliency (AnCOR), which is a collaboration between EPA, the Department of Homeland Security, and the U.S. Coast Guard to address common needs involving biological research and decontamination.

Dr. Robyn Conmy, National Risk Management Research Laboratory, presented the research area overview on oil spill response support, which EPA previously embedded within the BOSC Sustainable and Healthy Communities subcommittee. She explained that the oil spill support team aims to develop efficient and effective approaches for the management of oil releases. Second, EPA's regulatory authority establishes protocols for regulations and spill response efforts. Finally, HSRP provides scientific and technical support to program and regional offices that respond to oil spills.

Oil spill responses are diverse, but EPA has learned much about the state of the science after Deepwater Horizon. She noted that there has been a large government investment to improve drone technology and capabilities to visually look at spills, and the chronic leak in the Gulf of Mexico has served as a great test bed for EPA research. Dr. Conmy's research area demonstration included a slick and oil plume simulation.

Dr. Kelly Dipolt, HSRP, described the research area overview on water treatment and infrastructure decontamination. She explained that because EPA is the sector lead for water, EPA is also part of the Critical Infrastructure Partner Advisory Council (CIPAC), which provides the roadmap for water and wastewater resiliency and security. Regarding wastewater, Dr. Dipolt noted that HSRP needs ways to inform disposal companies and wastewater treatment plants on how they can accept chemical, biological, and radiological (CBR) waste. The research area demonstration, presented by Dr. Jeff Szabo, HSRP, highlighted EPA's water security test bed.

Dr. Emily Snyder, Acting Deputy National Program Directory, HSRP, presented the research area overview on waste management. She explained that waste generates following decontamination, and it grows exponentially. Dr. Snyder provided several waste management examples including the Ebola incident in New York City and the nuclear incident in Fukushima, Japan. HSRP strives to understand how sampling and decontamination decisions affect waste. The research area demonstration included EPA's on-site water treatment cart, WOW Cart.

Dr. Dipolt described the last research area overview on tools to support system's-based decision making. She stated that HSRP aims to inform and balance planning, response, decontamination, logistics, and disposal decisions with their system's-based decision support tools. She noted that the endeavor requires both time and money, but HSRP is making the most of available resources. The most urgent need is for water infrastructure tools. The research area demonstration included tools demonstrations on EPA's Environmental Sampling and Analytical Methods (ESAM) Tool, Riverine Spill Modeling System (RSMS), RemediAtion Data Repository (RADAR), and the Waste Estimation Support Tool (WEST).

HS subcommittee members and EPA staff members engaged in discussion on various topics surrounding each research area, including providing data to stakeholders, HSRP expertise needs, program responsibilities with respect to budget, and HSRP's ability to respond to emerging threats. Other topics of discussion included providing tools to users in the field and cybersecurity.

Subcommittee Discussion of Charge Questions and EPA Response to Questions

The HS subcommittee discussed each of the six charge questions including the HS subcommittee-specific charge question on addressing unforeseen challenges in public health and the environment.

Dr. Sayles suggested that the HS subcommittee provide several prioritized recommendations. The subcommittee formed 2–3 person workgroups to address each charge question, with the goal to produce a draft response on Day 3.

Subcommittee Report-Out and Summary of Preliminary Recommendations

Each workgroup identified strengths, suggestions, and preliminary recommendations pertaining to the draft HS StRAP and their specific charge question. The HS subcommittee discussed the recommendations of each workgroup and presented an initial summary for HSRP staff on Day 3. These recommendations and supporting suggestions will be reviewed and refined by the subcommittee over the next few months and finalized in a draft report to be reviewed at the BOSC Executive Committee (EC) meeting.

Charge Question 1a – Does the research outlined for the 2019-2022 timeframe support the relevant Agency priorities as described in the EPA and ORD Strategic Plans?

- The body of research planning and presented to the BOSC advances EPA and ORD strategic goals of advancing critical science to provide the American public clean air, water, and land by furthering the identification, remediation, and waste management phases of CBRN cleanup efforts.
- The workgroup highlighted HSRP's system's-based decision making tools including ESAM, RSMS, RADAR, and WEST.
- EPA's response to global incidences has provided the Agency with knowledge that they can extrapolate and interpolate into similar events within the United States.
- Cooperative Research and Development Agreements (CRADA) partnerships provide opportunity for collaborative and cost-saving efforts, and should be maximized to include the regulated community to obtain chemical characterization, fate and transport, and advanced remediation knowledge.
- The workgroup suggested providing decision makers valuable tools during events to encourage dissemination to incident (state, local, and tribal) responders.
- HSRP should further test and exercise scalability of analytical tools, development of clearance procedures for successful remediation and re-occupation of contaminated spaces, and coordination with other agencies to establish an acceptable "minimum exposure level" for *Bacillus anthracis* to use in clearance procedures.

Charge Question 1b – Each ORD research program undertook a rigorous engagement process to provide additional detail on specific EPA program and region, state, and tribal needs, the results of which are summarized in the StRAP objectives and explanations of research topics and areas. How well does the proposed research program respond to these partner-identified needs?

- The workgroup agreed that HSRP addresses and engages partner needs and has developed a well-planned priority list (e.g., AnCOR). However, there is concern about the partner ability to utilize given tools (i.e., ESAM, WEST, and RSMS) without a dashboard to integrate them. There is also a gap in serving populations with limited access and capabilities to utilize the internet or software-based resources and tools.
- HSRP works well to engage CIPAC and on-scene coordinators to provide input to program development. However, HSRP should consider engaging state, county, and local responders as well as citizens and stakeholder organizations (e.g., real estate, homeowners' associations, banks, and insurance industry groups) for input.
- The workgroup applauded HSRP's water research for piping decontamination. However, they should consider expanding their water research portfolio to include materials other than ductile iron and concrete-lined piping, and develop a strategy to study emergent materials.
- HSRP should consider adapting mobile platforms for tools to apps for the next generation. The workgroup encouraged HSRP to incorporate a means by which product updates, new versions of guidance, and changes to existing topic areas could be emailed to users of electronic tools.

- The workgroup suggested HSRP expand collaboration with cyber experts when conducting research into critical software operating and Supervisory Control and Data Acquisition (SCADA) systems.

Charge Question 1c – Does the StRAP, including the topics, research areas, and proposed outputs, clearly describe the strategic vision of the program? Given the environmental problems and research objectives articulated, please comment on the extent to which the StRAP provides a coherent structure toward making progress on these objectives in the 2019-2022 time frame.

For this charge question, the workgroup did not report key recommendations, but rather they identified strengths and weaknesses for improvements to the draft HS StRAP.

- HSRP incorporates best practices in communicating risk to stakeholders and the public.
- HSRP engages subject-matter experts as needed to address problems that arise, and they publish research findings in reports, peer-reviewed journals, and factsheets for emergency responders and on-scene coordinators.
- HSRP should utilize whole genome sequencing technology where appropriate and maintain relationships with partners to develop strategies to respond to emerging and re-emerging diseases.
- There is a need for a template or online process to collect and report data effectively to stakeholders.
- The workgroup raised concern related to capability and capacity to respond to a radiochemical event.
- HSRP's timeline and outputs might be ambitious given ongoing response needs of stakeholders.

Charge Question 1d – Recognizing ORD's focus on addressing identified partner research needs, in the presence of reduced scientific staff and resources, are there any other critical emerging environmental needs or fields of expertise and/or new research methods where this program should consider investing resources?

For this charge question, the workgroup did not report key recommendations, but rather they identified strengths and weaknesses for improvements to the draft HS StRAP.

- The workgroup applauded EPA's water security test bed in Idaho, and stated that it gives HSRP the ability to respond to emergent needs affecting the country's water infrastructure.
- The workgroup was impressed with HSRP's ability to leverage their resources and personnel.
- HSRP's decontamination strategy with a microbial focus on *Bacillus anthracis* and surrogate organisms is an excellent approach.
- The integration of oil spill issues into the HSRP portfolio provides for increased synergy and advances. However, the workgroup suggested HSRP integrate the oil spill research and waste management teams, as oil spills generate a lot of waste.

- The workgroup suggested that research related to community-level risk communication should expand, and HSRP should provide professional development for those working within social and behavioral sciences to expand risk communication.
- HSRP should expand focus to more mixtures and degradation products, consider complex climate-related interactions, and expand methods and strategies for characterizing solid waste from various disaster events.
- HSRP should expand relationships with the National Institute of Environmental Health Sciences, U.S. Navy, U.S. Army Medical Research Institute of Infectious Diseases, U.S. Department of Agriculture, and Occupational Safety and Health Administration.
- The workgroup proposed HSRP increase expertise and research on waste volume reduction and concentration technologies for radiological solid and liquid waste.

Charge Question 1e – What are some specific ideas for innovation (including prizes/challenges) and market-based approaches that the program could use to advance solutions to existing and emerging environmental problems?

For this charge question, the workgroup did not report key recommendations, but rather they identified strengths and weaknesses for improvements to the draft HS StRAP.

- The workgroup acknowledged that the National Homeland Security Research Center's innovativeness, capabilities, and productivity benefit from collaborating with other organizations, especially to reduce cost.
- HSRP collaborates with organizations to guide funding to qualified researchers to work on specific problems, and the workgroup suggested HSRP investigate options for crowdsourcing research and development with similar organizations. They also proposed HSRP investigate companies for crowdsourcing innovative solutions to problems (e.g., InnoCentive).
- HSRP should use social justice movements to identify vulnerable populations.

Charge Question 2 – Homeland Security Research is designed to address known threats and vulnerabilities. At the same time, the Nation regularly faces unforeseen challenges in public health and the environment (e.g., Ebola and Zika viruses, opioid misuse). Please comment on the extent to which the Program's design enables use of its scientific contributions in also addressing unforeseen needs of the EPA programs and regions, states, and tribes. How can HSRP improve its applicability to unanticipated urgent threats?

- HSRP has adaptable tools that answer stakeholder questions during actual response efforts, they have a system's approach to decision making, and they tackle the most difficult agents and high-impact scenarios that can be extrapolated to lower impact events and fewer persistent agents.
- The workgroup suggested HSRP continue to pursue relevant stakeholders and sponsors for pilot and field demonstrations, review and analyze data and products developed to determine if extrapolation can achieve for potential emerging threats, and consider detailing or integrating HSRP staff with interagency intelligence teams and fusion centers to analyze current data streams for potential emerging threats.

- HSRP should engage and leverage CBRN Horizon Scanning agencies to increase knowledge about potentially emerging threats, particularly in the rapidly changing biothreat and chemical threat space.
- The workgroup recommended HSRP refine or define what would constitute an unforeseen event that would fall outside current capabilities to address (i.e., outside of chemical space, biological space, and environmental space). This document or matrix would serve as a guide for prioritizing data gaps and research priorities.

Conclusion

The combined responses from each workgroup's recommendations will be compiled into the draft HS StRAP review report. The subcommittee will convene via teleconference to discuss the final revisions as a group before the BOSC EC meeting, which will convene in June 2019. The EC will consider the subcommittees' recommendations and finalize the overall BOSC report, which will include reviews of each research program.

Meeting Agenda and Charge Questions

The agenda and the draft charge can be accessed at https://www.epa.gov/bosc/homeland-security-subcommittee-december-12-14-2018-rtp-nc.

Meeting Participants

BOSC Homeland Security Subcommittee Members:

Paula Olsiewski, *Chair*
Lance Brooks, *Vice Chair*
Charles Barton
Murray Cohen
Kari Cutting
Andrew DeGraca**
Shawn Gibbs
Edward Hackney**
David Klein**
Debra R. Reinhart
Edwin A. Roehl, Jr.
Monica L. Schoch-Spana
Robert Scudder
Justin Teeguarden
Dana Tulis
Michael Wichman

**participated via phone*
***did not attend*

EPA Designated Federal Official (DFO): Tom Tracy, *Office of Research and Development*

EPA Presenters:

Timothy Boe, *Geographer, Homeland Security Research Program*
Worth Calfee, *Microbiologist, Homeland Security Research Program*
Robyn Conmy, *Research Ecologist, National Risk Management Research Laboratory*
Kelly Dipolt, *Scientist, Homeland Security Research Program*
Sang Don Lee, *Environmental Scientist, Homeland Security Research Program*
Jim Goodrich, *Sr. Science Advisor, Homeland Security Research Program*
Paul Lemieux, *Associate Division Director, Homeland Security Research Program*
Anne Mikelonis, *Environmental Engineer, Homeland Security Research Program*
Lukas Oudejans, *Physical Scientist, Homeland Security Research Program*
Shawn Ryan, *Acting Deputy Director, Homeland Security Research Program*
Gregory Sayles, *National Program Director, Homeland Security Research Program*
Emily Snyder, *Acting Deputy National Program Director, Homeland Security Research Program*
Jeff Szabo, *Scientist, Homeland Security Research Program*
Sarah Taft, *Scientist, Homeland Security Research Program*

Other EPA Attendees:

Janet Burke
Romy Campisano
David Dunlap
Hiba Ernst
Brian Kleinman
Tonya Nichols
Kathy Nickel
Bruce Rodan
Erin Silvestri
Mya Sjogren
Kelly Smith
Russell Wiener
Joseph Wood

Other Participants:

Lucinda Johnson, *Vice Chair, BOSC Executive Committee*

Contractor Support (ICF):

Canden Byrd
Delaney Reilly
Blake Riley