Report of the EPA Board of Scientific Counselors
Sustainable and Healthy Communities Subcommittee

SHC Topic 3: Sustainable Approaches for Contaminated Sites and Materials Management

Prepared by the Sustainable and Healthy Communities Subcommittee

Submitted to the Board of Scientific Counselors Executive Committee
December 23, 2016

Sustainable and Healthy Communities Subcommittee

Robert B. Richardson, Ph.D., Subcommittee Chair, Associate Professor, Department of Community Sustainability, College of Agriculture and Natural Resources, Michigan State University

Courtney G. Flint, Ph.D., Subcommittee Vice-chair, Associate Professor, Department of Sociology, Social Work & Anthropology, Utah State University

Todd BenDor, Ph.D., Associate Professor, Department of City and Regional Planning, University of North Carolina at Chapel Hill

Robert Cervero, Ph.D., Professor and Chair, Department of City and Regional Planning, University of California, Berkeley

Andrew L. Dannenberg, M.D., MPH, Affiliate Professor, Department of Environmental & Occupational Health Sciences, School of Public Health, University of Washington

Richard Feiock, Ph.D., Professor and Eminent Scholar Chair, School of Public Administration and Policy, Florida State University

Elena G. Irwin, Ph.D., Professor, Department of Agricultural, Environmental, and Development Economics**,** Ohio State University

James Kelly, M.S., Minnesota Department of Health, Environmental Surveillance & Assessment

Carlos Martín, Ph.D., Senior Research Associate, Metropolitan Housing and Communities Policy Center, The Urban Institute

Peter B. Meyer, Ph.D., President and Chief Economist, The E.P. Systems Group, Inc.

Earthea Nance, Ph.D., PE, CFM, Associate Dean, School of Public Affairs; Associate Professor, Department of Urban Planning & Environmental Policy, Texas Southern University

Matthew Naud, Environmental Coordinator, Systems Planning Unit, City of Ann Arbor

I. Leslie Rubin, MD, Associate Professor, Department of Pediatrics, Morehouse School of Medicine; Co-director, Southeast Pediatric Environmental Health Specialty Unit, Emory University

Mike Steinhoff, Program Director, Tools & Technical Innovation, ICLEI-Local Governments for Sustainability USA

John Tharakan, Ph.D., Professor and Director of Graduate Studies, Department of Chemical Engineering, Howard University

Bill Tomlinson, Ph.D., Professor, Donald Bren School of Information and Computer Sciences, University of California, Irvine

List of Acronyms

ASTSWMO	Association of State and Territorial Solid Waste Management Officials
BOSC	Board of Scientific Counselors
CDC	Centers for Disease Control and Prevention
C-FERST	Community-Focused Exposure and Risk Screening Tool
DASEES	Decision Analysis for a Sustainable Environment, Economy, and Society
DOD	Department of Defense
DOE	Department of Energy
EC	Executive Committee
EPA	Environmental Protection Agency
EQI	Environmental Quality Index
FEGS	Final Ecosystem Goods and Services
FY	Fiscal Year
GHG	Greenhouse Gases
GLNPO	Great Lakes National Program
GPRA	Government Performance and Results Act
HELP	Hydrologic Evaluation of Landfill Performance
HWBI	Human Wellbeing Index
LUST	Leaking Underground Storage Tank
MSW	Municipal Solid Waste
MWiz	Materials Management Wizard
NCEE	National Center for Environmental Economics
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEWMOA	Northeast Waste Management Officials' Association
NIEHS	National Institute of Environmental Health Sciences
OBLR	Office of Brownfields and Land Revitalization
OECD	Organisation for Economic Co-operation and Development
OLEM	Office of Land and Emergency Management
ORCR	Office of Resource Conservation and Recovery
ORD	Office of Research and Development
OSWER	Office of Solid Waste and Emergency Response
PACT	Partner Alliance and Coordination Team
RARE	Regional Applied Research Effort
RESES	Regional Sustainability and Environmental Research Program
RESTORE	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies
RIMM	Risk-Informed Materials Management
ROE	Report on the Environment
SAB	Science Advisory Board
SEFA	Spreadsheets for Environmental Footprint Analysis
SHC	Sustainable and Healthy Communities
SHCRP	Sustainable and Healthy Communities Research Program
STL	Superfund and Technical Liaison
StRAP	Strategic Research Action Plan
TSC	Technical Support Center
Tribal-FERST	Tribal-Focused Environmental Risk and Sustainability Tool
WARM-LCA	Waste Reduction Model – Life Cycle Analysis

Table of Contents

Report of the EPA Board of Scientific Counselors
Sustainable and Healthy Communities Subcommittee

I. BACKGROUND

The BOSC Sustainable and Healthy Communities (SHC) Subcommittee was established to provide program-specific advice to EPA's Sustainable and Healthy Communities Research Program (SHCRP). The mission of the SCHRP is to conduct research and deliver products that improve the capability of EPA to carry out its responsibilities, including cleaning up communities, making a visible difference in communities, and working toward a sustainable future. SHCRP conducts applied, relevant research and aims to provide the knowledge, data, and tools needed to meet today's needs without compromising the ability of future generations to meet their needs in ways that are economically viable, beneficial to human health and wellbeing, and socially just, while supporting local communities seeking to become more sustainable. SHCRP plans to engage the Subcommittee over the next several years to provide advice on the Program's portfolio and to assess progress in addressing EPA's needs.

The Subcommittee met November 2-4, 2016 at EPA's Andrew W. Breidenbach Environmental Research Center in Cincinnati, Ohio. The focus of the meeting was on SHC Topic 3: Sustainable Approaches for Contaminated Sites and Materials Management. The meeting included discussions about research priorities for the Office of Land and Emergency Management (OLEM) as well as panel discussions and poster sessions related to the following three projects:

1. Project 3.61: Contaminated Sites
2. Project 3.62: Environmental Releases of Oils and Fuels
3. Project 3.63: Sustainable Materials Management (SMM)

II. CHARGE QUESTIONS AND CONTEXT

Overall Goal of BOSC Meeting

BOSC will provide SHCRP with feedback to shape its research in the areas of contaminated sites and sediments, environmental releases of oils and fuels, and sustainable materials management to be responsive to near- and long-term Agency, state, and community needs. The SHCRP is focused on securing a healthy environment for all. Its research portfolio is broad, comprising research on environmental public health, ecosystem services, indicators and indices, and sustainable approaches for contaminated sites and materials management. SHC's long-term goal is that this research is built into tools and structured decision-making methods that facilitate integrated risk and impact assessments, and that are accessible to and usable by communities, leading to sustainable communities and resources.

This review focuses on Sustainable Approaches for Contaminated Sites and Material Management. This research area links most closely to EPA's Office of Land and Emergency Management, with research focused on addressing pressing Agency needs for both near-term solutions and long-term strategies. Because of this and to follow up on the general charge questions from the initial BOSC subcommittee review, the first two charge questions focus of SHC's responsiveness to immediate and future needs in this area.

Charge Questions

The Subcommittee was charged with three questions. A description of the context for these charge questions is presented below, followed by the charge questions themselves.

Context: SHC's Objective 3 pledges to
Provide research and technical support for cleaning up communities, ground water, and oil spills; restore habitats and revitalize communities; and advance sustainable waste and materials management.

SHC has developed three research projects that specifically address this objective and describe the goals and planned products of these in the SHC Strategic Research Action Plan (StRAP) Fiscal Years 2016-2019, the SHC Outputs document, and the Project Plans, which were developed by each project team. Much of this Topic 3 research is oriented toward addressing near-term Agency needs in the areas of cleaning up contaminated sites and oil spills and supporting Agency and state-delegated programs with respect to waste and materials management. Some of the proposed research, however, is focused on longer-term goals, such as understanding the steps that will lead a community from remediation of a contaminated site to restoration of ecosystem services to community revitalization. Other longer-term research includes information to help states, communities, and organizations understand how to use locally available non-regulated agricultural or fisheries waste as a feedstock for materials that can sequester carbon or help to remediate contaminated sites.

There are two questions assigned to each of the three projects in Topic 3: Sustainable Approaches for Contaminated Sites and Materials. The Subcommittee's review of SHC's research plans (StRAP, Outputs, and Project Plans) and accomplishments (poster abstracts, FY15 products, and other supporting material), together with the outcomes of discussions with Program and Regional office partners about their research issues and national, state, and community issues in this topic area informed the subcommittee members' responses to the following questions:

Charge Question 1. How well do SHC's R&D accomplishments and proposed research address high priority Agency, state, and community needs in this area?

a. *Project 3.61 - Contaminated Sites*
b. *Project 3.62 - Environmental Releases of Oils and Fuels*
c. *Project 3.63 - Sustainable Materials Management*

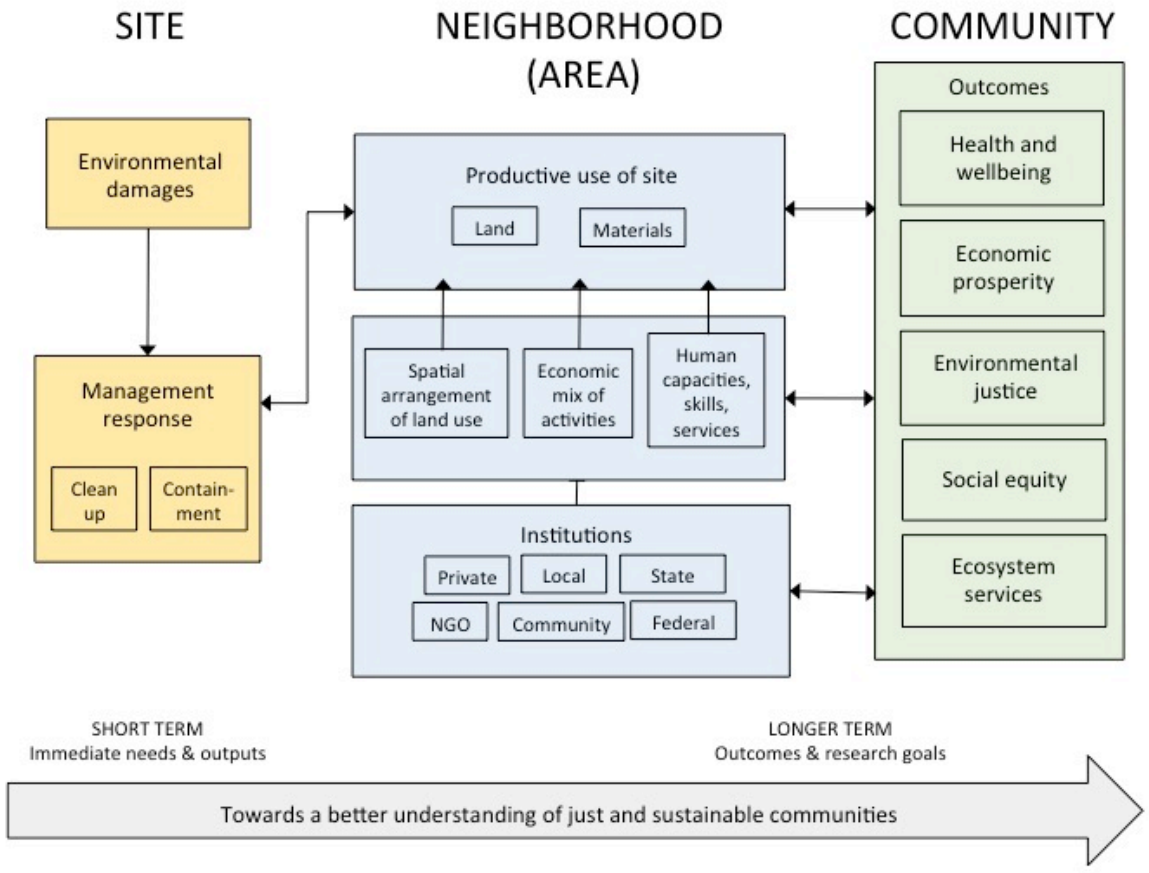
Charge Question 2. How well does SHC's planned research anticipate future problems in this area and address longer-term community sustainability and environmental justice goals?

a. *Project 3.61 - Contaminated Sites*
b. *Project 3.62 - Environmental Releases of Oils and Fuels*
c. *Project 3.63 - Sustainable Materials Management*

Additional Charge Question

Context: SHC holds that cleaning up contaminated sites and developing approaches to avoid the creation of new contamination and waste sites is prerequisite to communities achieving sustainability. In its initial (2015) review of SHC, the BOSC SHC subcommittee provided a preliminary framework for linking site-specific management with broader community social, economic, and environmental goals. This framework is provided below in Figure 1.

Figure 1: Conceptual framework for holistic approach to linking site-specific management with broader social, economic and environmental assessment of sustainable communities



Charge Question 3. How are SHC Sustainable Approaches for Contaminated Sites and Materials projects, and associated research from other parts of SHC, helping communities achieve sustainability?

III. RESEARCH TOPIC 3

Topic 3: Sustainable Approaches for Contaminated Sites and Materials Management

The SHC Strategic Research Action Plan (StRAP) outlines the ORD's role in achieving EPA's objectives for cleaning up communities, making a visible difference in communities, and working toward a sustainable future. Topic 3 is one of SHC's research topics that guide specific research and development activities for addressing the objective-specific "Science Challenges" as set forth in the SHC StRAP.

This topic provides research and technical support for cleaning up communities, ground water, and oil spills, restoring habitats and revitalizing communities, and advancing sustainable waste and materials management. Specifically, this work will help partners and stakeholders improve the efficiency and effectiveness of addressing contaminated sediments, land, and ground water and resultant vapor intrusion. SHC research will also provide and evaluate standards, products, data, and approaches to prevent, characterize, and cleanup environmental releases of petroleum and other fuel products. SHC methods, models, tools, and data will enhance sustainable materials management.

IV. PROCESS

Review of Materials

The SHC provided a suite of materials for the Subcommittee in October 2016, including:

Research Plans

- *Outputs
- *Product and Output Maps
- Project Plan 3.61: Contaminated Sites
- Project Plan 3.62: Environmental Releases of Oils and Fuels
- Project Plan 3.63: Sustainable Materials Management

Accomplishments

- *FY15 Accomplishments Report, excerpts from Topic 3
- FY15 Products and Outputs for Topic 3
- *Selected OLEM and OW actions supported by SHC Topic 3 Research
- *Successful Regional Partnerships
- SHC Topic 3 BOSC Poster Topics, Presenters, and Abstracts

Additional Materials Provided

- *Agenda - front pocket of BOSC Book
- *Topic 3 Fact Sheets - research plans section
- SHC Posters (44) – accomplishments section
- Additional abstract – accomplishments section
- Revised poster list – accomplishments section, replace existing list
- Stakeholder feedback summary – research plans section

Note: * indicates items SHC suggested reviewing first in case of limited time to prepare. Subcommittee members reviewed these documents prior to the face-to-face meeting.

Subcommittee Meeting

The Subcommittee convened for a public meeting to prepare the review of research Topic 3 at EPA's Andrew W. Breidenbach Environmental Research Center in Cincinnati, Ohio on November 2-4, 2016. The agenda is attached as an appendix to this report. The meeting included discussions of research priorities with staff from the OLEM (formerly Office of Solid Waste and Emergency Response), as well as poster sessions, partner panel discussions, and ORD research laboratory tours. The Subcommittee worked in full group and breakout groups to discuss and address the charge questions and associated recommendations. Interaction between OLEM and SHC staff and the Subcommittee throughout the meeting allowed for clarifications and are captured in the minutes from the meeting.

Post-Meeting Response to Charge Questions

Members continued to collaborate via e-mail in small groups to finalize the responses to the charge questions in the weeks after the face-to-face meeting. These responses were synthesized into this report, distributed to members for final consensus review, and finalized by the SHC Subcommittee chairs in December 2016.

V. SUBCOMMITTEE RESPONSES TO CHARGE QUESTIONS

Subcommittee Feedback on Charge Questions

General Observations

Based on the materials available and presented to the Subcommittee, our overwhelming reaction is that the basic science being conducted on environmental toxins, pollutants, and sustainable materials management and how these can be mitigated or eliminated is impressive. Overall the BOSC SHC Subcommittee was very impressed by the scope and quality of research that was presented in this regard.

ORD's Partner Alliance and Coordination Team (PACT) as proposed and currently being developed is a commendable effort and could make good progress towards its overarching goal of fostering two-way communication with Program and Regional Partners. Findings from a survey of ORD partners revealed high ranking of prioritizing research needs, disseminating research to potential Agency users, and jointly defining research outputs ranked highly. It would be helpful to know if the PACT intends to address those questions and needs and if they have any strategies to do so. The research road maps seem to be a good idea for integrating research across programs.

SHC faces a general challenge in connecting the implications of the environmental science research to contaminated sites, oils and fuels, and sustainable materials management to broader community sustainability and environmental justice goals. Such integration requires understanding not only of the basic science, but also of the human dimensions (e.g., economic, social, behavioral, and political factors), and the linkages between the human and environmental systems. Such applied dimensions investigate how the presence of environmental pollution and associated toxins, or sustainable materials management, affect the community, e.g., in terms of the environmental justice implications of remediation and how the impacts of environmental pollution translate into measures of individual and community well-being. Balancing these competing needs is exceedingly challenging in a highly resource-constrained environment.

The charge questions presented to the BOSC are oriented largely toward the applied dimensions of Topic 3 efforts, while much of the materials presented and discussed at the meeting focused on the basic science elements. In this report, we focus on the charge questions as given to us, with recognition of these inherent challenges.

Responses to each charge question are organized by general observations across projects and accompanying recommendations followed by project specific observations and recommendations.

Charge Question 1

How well do SHC's R&D accomplishments and proposed research address high priority Agency, state, and community needs in this area?

1.1 General Observations and Recommendations

Across all three projects, SHC appears to be engaging in exemplary research that supports the priorities of the Agency, and to a good extent, states and regions. While community needs are often indirectly incorporated into Topic 3 research, this is where we see the greatest need for direct attention, expanded resources (both funds and expertise), and institutional investment.

Overall, greater attention to *systematically* assessing Agency, state, and community needs is warranted. Towards this end, it may be possible to expand the PACT approach to create more interaction with these stakeholder groups and to collectively develop a research roadmap. Improvements in science communication will help to improve responsiveness to community needs across all Topic 3 efforts.

More robust formal planning efforts like PACTs should contribute significantly to ORD responsiveness. The Subcommittee supports this effort and only recommends providing more explicit deadlines and requirements of engagement to ensure that all stakeholders participate in a timely manner. SHC might consider approaches to the publication of research findings that enable partner organizations and local level technical assistance providers to design and deliver relevant information and resources tailored to meet the needs of their stakeholders.

> **General Recommendation 1.1. Gather input from various stakeholder groups via a systematic needs assessment on an annual basis to determine the necessary investments of resources (funds, staff, equipment) in research to be responsive to Agency, state and community needs**.
>
> **General Recommendation 1.2. Follow the principles of community engagement, e.g., build relationships from the ground up (versus top down) to build trust and ensure priorities are based on perceived local issues and needs. Work with communications experts and other social scientists to develop a set of metrics to gauge communication effectiveness as well as provide EPA program and regional staff with the tools for articulating actionable research agendas.**

1.2 Project Specific Observations and Recommendations

1.2.1 Project 3.61 - Contaminated Sites

Project 3.61 is engaging in exemplary research that supports the priorities of the Agency. For example, ORD provides technical support to OLEM's Office of Resource Conservation and Recovery (ORCR) to update and improve models, including the Waste Reduction Model (WARM) and Hydrologic Evaluation of Landfill Performance (HELP) models. OLEM works with ORD to update risk-informed materials management and multi-media models.

SHC is also addressing some of the most vexing questions that are relevant to states regarding contaminated sediments, emerging contaminants, and vapor intrusion. We saw ample evidence of involvement in a variety of projects in different states related to identifying toxins, measuring them and developing strategies for remediation, including: Sustainable Remediation of Arsenic and Chromium in Groundwater; Spatial and Temporal Variability at the Indianapolis Test Duplex; Determining Urban Lead Background Concentrations in the SE U.S.; Measuring Contaminant Mass Flux and Groundwater Velocity in a Fractured Rock Aquifer Using Passive Flux Meters; Tri-State Mining District Modeling,

Technical and Decision Support; Regional Applied Research Effort (RARE) Urban Background Study.

Successful partnerships between ORD and EPA Regions illustrate the critical role that SHC's Technical Support Centers play in addressing issues in remediating contaminated sites and the critical role that ORD plays more broadly in providing expertise, such as the partnership between Great Lakes National Program (GLNPO) and ORD and the technical support provided to Region 10 for lead remediation. The availability of funds to support these partnerships, including STL and RARE, funding, is critical and has generated high-valued applied research that responds to high-priority needs of the community and Regions. The project "Superfund Remedial Action Decision Process and Community Involvement Support with Decision Analysis for a Sustainable Environment, Economy, and Society (DASEES)" is an excellent example of how site-specific research has incorporated broader neighborhood and community concerns. Other examples of how ORD has been responsive to community concerns through engagement efforts include the ORD partnership with Region 10 that supports community engagement with Superfund sites; the engagement of the community in the Brownfield(s) program to address the unintended consequences of CERCLA; and GLNPO's use of local community groups to determine how to best eliminate Beneficial Use Impairments (BUIs) from Areas of Concern (AOCs).

ORD is conducting exemplary research that incorporates the broader concerns of communities into site-specific projects. For example, the "Remediation to Restoration to Revitalization Approach" (R2R2R) for the Great Lakes National Program Office Areas of Concern develops a more holistic framework for understanding the linkages between remediation and restoration activities and ecosystem health and service outcomes, and how these relate to revitalization. In addition, we commend the research summarized by the poster "Understanding and Evaluating Ecosystem Goods and Services (EGS) at Site Remediation Projects and Applying Their Benefits to Sustainability and Livability for Surrounding Communities" for linking ecosystems assessments to sustainable-communities practice. These provide excellent examples of how ORD is integrating consideration of broader community sustainability goals into research that responds to the core Agency mission of protecting human health and the environment at contaminated sites.

Nonetheless, the bulk of the work under Task 3.61 focuses on research to support site remediation and cleanup with limited consideration for broader community concerns or impacts. There remains a need for going beyond basic science and tools development to permit consideration of individual and community values, the impacts of contamination and the interventions on community health and well-being, and the consequences for community restoration and revitalization. Research related to revitalization efforts seem to be given relatively less emphasis than the charge of site remediation and restoration, as reflected by research conducted to date on Task 3.61. This may be due, in part, to the longer-term nature and diffuse impacts and beneficiaries of revitalization vis-à-vis remediation and restoration. Furthermore, the complexity of revitalization may require expanding the skill sets of the research team to integrate knowledge from the social sciences. We note that some of the tools that have been developed as part of other projects

(e.g., Human Wellbeing Index, EnviroAtlas, Eco-Health Relationship Browser) are incorporating the social sciences and moving in this direction.

We acknowledge that SHC faces a number of challenges related to carrying out research related to Task 3.61. In addition to the overarching challenge of operating in an environment with very scarce resources, SHC faces challenges in relating "on the ground" community needs to ORD science that is being conducted. This is in part due to the need to rely on partners to inform them of the community needs, given that ORD scientists are several steps removed from direct community engagement.

> **Project 3.61 Recommendation 1.2.1.R1 Improve community engagement by informing Task 1 (providing technical support) with information from Task 5 (tools for evaluating spatio-temporal impacts of contaminated sites on the environment).**
>
> **Project 3.61 Recommendation 1.2.1.R2 Use the AOCs as a model for engaging community stakeholders in determining the priorities and best approaches for remediation and clean up.**
>
> **Project 3.61 Recommendation 1.2.1.R3. Provide support for community stakeholders to interact regarding common concerns and communicating these concerns, e.g., EPA Region 1 is providing support for the urban sustainability director's network.**
>
> **Project 3.61 Recommendation 1.2.1.R4. Increase collaboration within ORD and across other federal agencies, such as CDC, DOE, DOD, NIEHS, etc. so research can be leveraged across agencies. Consider pro-active collaborations and joint-Agency initiatives such as the EPA-HUD-DOT sustainable communities program in order to advance the aims of site revitalization and urban regeneration.**

1.2.2 Project 3.62 – Environmental Releases of Oils and Fuels

The subcommittee concluded that the scientific research efforts associated with Environmental Releases of Oils and Fuels (Project 3.62) are exceptional and directly meet needs for information on a) behavior, fate, and effects of oil and spill agents; b) protocol development for the National Contingency Plan product schedule; c) leaking underground storage tanks; and d) research collaboration and dissemination.

Overall, there appear to be strong and very successful intra-Agency partnerships between ORD and OLEM's Office of Emergency Management (OEM), and Office of Underground Storage Tanks (OUST) in Project 3.62, and ORD appears to respond well to Agency requests for technical assistance and with information for first responders. The Agency has also collaborated with National Response Teams, EPA Regions, and the Canadian Government on its oil and fuels research. Project 3.62 has developed valuable tools and information and has disseminated its research findings to diverse audiences at federal, state, tribal, and

regional levels. Deliberations with EPA partners and other agencies have refined and focused research priorities. It is encouraging to know that ORD has Superfund and Technology Liaisons and Regional Science Liaisons (RSLs) to connect research and regions.

The Subcommittee notes that incorporating feedback from emergency response personnel working in the field would help to assess the applicability of research on oils and fuels and whether it is meeting partner, state and local needs. Further, there may be important information on oil and dispersant behavior in real spill situations that can be systematically collected from first responders that would inform future research efforts.

In providing critical information to spill responders as well as technical assistance more broadly, SHC research in Project 3.62 appears to be addressing needs from states and tribes. Furthermore, LUST research recognizes that states vary considerably in their objectives, policies, and practices related to leaking underground storage tanks. Recent conversations with state partners are expected to occur annually moving forward and this will continue to help ORD research address these needs.

Efforts to mitigate impacts from releases of oils and fuels certainly help to protect communities from these environmental hazards. Beyond that, however, direct response to community needs is the least explicit area in Project 3.62 reporting. Integrating external data sources, such as human health, income, and housing data, can help to identify vulnerable communities. Including communities in the development and dissemination of tools and models can increase the applicability, value, and relevance of the research to impacted communities. Furthermore, using real-world emergencies (i.e., case studies) to understand the direct impacts of oil and fuel releases on communities can offer a more holistic perspective and can help ground truth the basic research.

With regard to NCP products testing, more direct communication of research findings on dispersant effectiveness and toxicity would likely be appreciated by affected local communities, though we understand that these direct contacts may be the role of regional partners and OLEM staff more than the ORD SHC researchers themselves.

ORD should seek opportunities to meet directly with locals (e.g., cities) to insure that ORD develops tools are reaching their intended audiences and that local needs are elevated to EPA through states and regions. Some states are less restrictive in requiring LUST cleanup in areas served by municipal water. There is concern at the local level about the integrity of municipal waterline gaskets surrounded by VOC contamination and the ability of residual VOC contamination entering municipal stormwater and sanitary lines via infiltration. ORD's work on volatilization to indoor air is an important area of research that directly supports protection of public health in urban environments.

Addressing the backlog of 78,000 leaking underground storage tanks is also important to local communities. The contextualization of LUSTs with water supply well mapping shows the localized focus of LUST research that is important to addressing community needs. Working with states to improve data quality on interactions between backlogged LUST

sites and proximate water supplies will help to make the research more directly helpful for communities.

Project 3.62 Recommendation 1.2.2.R1. Facilitate feedback from state and local oil spill responders to assess utility of research in the field and to inform research on oil and dispersant behavior in real spill situations.

Project 3.62 Recommendation 1.2.2.R2. Incorporate more direct ways to respond to local community needs in the context of oil spills and leaking fuel tanks and to validate basic research in local settings.

Project 3.62 Recommendation 1.2.2.R3 Work with states to improve data quality on proximate water supplies to investigate interactions with backlog LUST sites.

1.2.3 Project 3.63 – Sustainable Materials Management

Despite fiscal constraints, SMM projects appear to be of both high methodological quality and generally well recognized by scholars, professionals, and policy advocates (especially WARM and HELP and potentially RIMM and MWiz).

Currently, SHC's Project 3.63 work appears to satisfactorily address the Agency's priorities based on program and regional testimony. Respondents describe the current state of ORD's responsiveness as significantly improving upon past efforts with regard to coordination of research needs and project execution.

To the extent that EPA programs and regions reflect state and community needs, SHC's work is also responsive to them. However it was noted among practitioners on the BOSC that there is a disconnect between the work that SHC develops for end users at the state level that does not always translate to local community decision makers. This is evident in both the challenges of downscaling SHC developed tools and datasets to local contexts as well as the existing partnerships that were highlighted in materials presented to the BOSC. For example, there were several points of reference to positive collaboration with the Association of State and Territorial Solid Waste Management Officials (ASTSWMO), but no examples were highlighted of working to incorporate needs of similar groups that work more closely at the local level such as the Northeast Waste Management Officials' Association (NEWMOA) or the Region 9 supported West Coast Climate and Materials Management Forum, two examples of such groups.

In terms of outcomes, there are numerous high quality and useful research products that currently come from the SMM program area. The WARM Model and the underlying research that powers the model are a foundational piece that GHG emissions management decision makers rely upon. Particularly commendable is the changes in recent years to publish extensive documentation about the model in ways that allow the research done for the development of WARM to be leveraged by other tool and technical assistance

providers. Similarly the annual MSW Facts and Figures report fills critical information gaps for many local practitioners who lack the capacity for local characterization studies. However there are examples of where R&D accomplishments do not currently meet the needs of community practitioners, such as the lack of coverage of the GHG implications of management options for biosolids in the WARM model despite the fact that it is a waste type, which with all communities must contend.

We recognize that for SHC research to be effective, OLEM must have the staff capacity to accurately gauge local/state government, industry, and civil sector research needs, and in turn translate SHC findings and disseminate tools appropriately and engage communities in pilots, demonstrations, or tool use. Included in this capacity is outreach and coordination with other Federal research efforts (such as USDA's agricultural waste research) that are critical to the study of comprehensive materials management but whose policy and program silo each component material or material process. Supporting these connections is key to SHC's success in meeting needs at multiple scales. Informal communications were noted as key contributors to successful partnerships in SMM. While PACT and other formalization efforts can assist in documentation and negotiation, they cannot replace the scholarly benefit and interpersonal trust developed informally. The Subcommittee recommends staff details across ORD and OLEM, more frequent presentations of works-in-progress, and similar informal strategies.

Project 3.63 Recommendation 1.2.3.R1. Formalize more opportunities for informal communications between OLEM and ORD's SHC staff to ensure longer-term input into SHC's research plans and responsiveness to research needs.

Project 3.63 Recommendation 1.2.3.R2. Increase fellowships and scholarly exposure for the broader research community to SHC laboratories and research facilities will increase staffing expertise and visibility where resources continue to be severely constrained. This engagement may also lead to leveraging funds with other Federal and academic researchers.

Project 3.63 Recommendation 1.2.3.R3. Increase efforts to survey the landscape of other SMM practitioners and potential partners that work directly in communities as opposed to reaching communities indirectly through states.

Charge Question 2

How well does SHC's planned research anticipate future problems in this area and address longer-term community sustainability and environmental justice goals?

2.1. General Observations and Recommendations

We recognize that funding levels and staffing constraints influence SHC's capacity to respond to future research needs. Research funding levels, including both the magnitude of resources in OLEM and that allocated by ORD, are often limited and fixed research resources. Furthermore, SHC staff availability and expertise, given recent retirements and the geographic disparate nature of ORD's researchers may also present complications.

> **General Recommendation 2.1. Increase opportunities for graduate students and post-doctoral fellows to work at EPA in short-term assignments (2-12 months) and to serve as a pipeline for future long-term employees in order to ensure the capacity to address long-term trends and needs, particularly considering an aging Agency workforce.**

2.2. Project Specific Observations and Recommendations

2.2.1. Project 3.61 - Contaminated Sites

Anticipating Future Problems: The planned research as articulated in the materials and presentations provided for this review shows that ORD is cognizant of doing research that is forward-looking and responsive to longer term community sustainability and environmental justice goals. For example, Dan Powell's presentation emphasized the need to go beyond research on remedy effectiveness (while also acknowledging that this remains an important area) to developing tools for assessing restoration effectiveness and conducting research on revitalization largely through proof of concept and case studies.

Addressing Long-Term Community Sustainability: One question is the extent to which ORD in its current configuration should be solely responsible for this component of the research, given the much broader set of disciplines and research expertise that this entails. A full consideration of community sustainability and environmental justice includes not just the health of people and ecosystems, but also economic impacts (e.g., jobs), ecosystem services, and social impacts (e.g., justice and inclusion). The necessary financial investment in a cleanup is usually very high and therefore a thoughtful cost-benefit analysis that considers personal and community health and economic and social impacts is critical.

Addressing Environmental Justice Goals: Another consideration is the lack of personnel to do the translational work in communicating science to public as well as social science expertise to inform and evaluate such endeavors. To effectively engage the community and communicate the science, there is a need for including outreach professionals into the planning and execution of projects. This goes beyond communicating results and training stakeholders in using decision-making tools. If the community can feel a part of the process

then it will be empowered to continue to protect its environment and prevent the likelihood of further contamination. Relatedly, communities may value different components of sustainability and environmental justice differently, emphasizing the need for participatory research in which the research outcomes and metrics are developed in partnership with community stakeholders. Addressing complex environmental problems such as site contamination require broad stakeholder engagement and a multi-disciplinary perspective throughout the process. Another aspect of community engagement is fostering environmental health literacy to develop a better understanding of the communities in which contamination occurs, including the cultural, social, and economic elements that both influence the location of contamination and are changed by it.

A challenge in conducting this broader research is moving beyond research on contaminated sites, which necessitates a historical view, to research that anticipates future trends and challenges and that focuses more on the link between preventing contamination and promoting community sustainability and environmental justice goals. This requires research that goes beyond the science of remediation and elimination of toxins to research that examines how and why the toxins came to be located at the site, the systemic factors that are associated with contaminated sites, and the costs and benefits of alternative strategies for mitigation and prevention. In particular, a better understanding of the social context is critical. For example, that contaminated sites are often in neighborhoods that are under-resourced, under-served, and under-represented, and the implications of these conditions for building institutional capacity and empowering under-resourced communities.

In casting an eye to the future, there are many uncertainties, such as demographic and income shifts, technological innovations, and climate change that will alter the incidence, spatial distribution, and impacts of contaminated sites and the availability and costs of strategies to address these. Population growth implies increased production of waste, new types of waste with changing technology (e.g. electronic waste), and contamination that spreads across the world in ways that link distant places. Changes in climate and weather interact in complex ways with food, energy, water and land resources and in ways that often have disproportionate effects on low-income populations. Energy transmission systems including weather-vulnerable transmission lines and pipelines that may experience spills pose very localized community risks. These broader forces have implications for the political economy of contaminated sites and their management to achieve longer-term community sustainability and environmental justice. Examples of these broader research areas include community engagement strategies for developing community sustainability and models for valuing community capital stocks, including non-contaminated land and other types of natural capital, that can be used to guide land use and management decisions and estimating the benefits and costs of alternative mitigation, remediation and prevention strategies to improve ecosystem services.

Project 3.61 Recommendation 2.2.1.R1. Strengthen internal and external partnerships to leverage resources to address broader community sustainability and environmental justice research questions by incorporating community engagement expertise as well as social science expertise in

economics, education, psychology, sociology, anthropology, health care and mental health, urban development and planning.

Project 3.61 Recommendation 2.2.1.R2. Over time, rebalance the mix of expertise that is represented by ORD and program scientists to include more social scientists to meet longer term CS and EJ research goals.

Project 3.61 Recommendation 2.2.1.R3. Develop a research roadmap specific to contaminated sites that outlines how ORD will develop research on broader community sustainability and environmental justice topics and prioritize research questions by those that are the most responsive to longer-term community needs.

Project 3.61 Recommendation 2.2.1.R4. Develop predictive modeling tools that can be used to explore alternative futures and the implications of future demographic, economic, social, environmental, and urban trends.

2.2.2. Project 3.62 – Environmental Releases of Oils and Fuels

Anticipating Future Problems: Subcommittee members suggested future casting out to 15 years or so to help anticipate future research needs. Increased drilling and gas and oil pipelines pose future problems with direct relevance to research on environmental releases of oils and fuels. Task 3.62.1 is addressing the changing context of oil spills by evaluating oil and dispersant behavior in hypersaline waters such as those that may occur due to coastal storms or rising seas. Consideration might also be given to extreme weather events and interactions with oil spills.

Task 3.62.3 anticipates changing groundwater conditions associated with climate change and extreme weather events, but might also consider additional water demand and land use related changes affecting groundwater and built infrastructure that might have implications for addressing leaking underground storage tanks and associated vapor intrusion.

In line with Project 3.62's focus on prevention, the subcommittee notes that anticipating increasing complexity in energy geography associated with new sources and types of fuels as well as changing transportation and utility networks is of critical importance. Tasks 3.62.1 and 3.62.2 are addressing changes in oil types and effectiveness of dispersants in their focus on unconventional oils such as diluted and synthetic bitumen crude oils. Maintaining research capacity to respond to emerging oils and dispersant options is essential. We see evidence of consideration of changes in the geography of oil production and transportation networks associated with oils and fuels in SHC research. It is important that this capacity be maintained and enhanced as needed to address new land-water-oil/fuel-dispersant interactions. Task 3.62.3 does address ethanol fuel and associated corrosion issues as a good example of responding to and anticipating emerging issues.

Maintaining adequate resources and staffing to ensure continuity and expansion of the knowledge base in the area of environmental releases of oils and fuels is essential. Furthermore, it is essential that reference oils and fuels for testing be procured for Project 3.62 research. We understand that comparing oils simulants with actual oil is a next research step and one that we agree is very important (also testing simulants and reference oils in different water salinities).

Project 3.62 Recommendation 2.2.2.R1. Expand research capacity to anticipate future changes in oil and fuel types as well as changing geographies associated with new extraction and transportation networks.

Project 3.62 Recommendation 2.2.2.R2. Consider additional impacts of changing water demand and land use that might affect underground storage tank and vapor plume interactions with groundwater and built infrastructure.

Project 3.62 Recommendation 2.2.2.R3. Maintain resource and staffing continuity to sustain and expand the knowledge base in the area of environmental releases of oils and fuels.

Project 3.62 Recommendation 2.2.2.R4. Prioritize the procurement of reference oils and fuels for testing.

Addressing Long-Term Community Sustainability: Communities affected by spills or leaking underground storage tanks are not just concerned with immediate risk mitigation, but also the longer-term restoration of their built and natural environments. However, the subcommittee recognizes constraints in place-based communities on links to regulatory structures (RESTORE Act) that may make restoration from oil spills and leaking underground storage tanks beyond the mandate for Project 3.62.

In terms of oil spills, the subcommittee acknowledges that critical technical assistance and information for first responders includes local communities. This focus, however, is only a short-term community need. Characterizing toxicity levels associated with products on the NCP list would help to avoid long-term community sustainability issues. It may not be too early to begin exploring the decarbonization of fuel supplies and the effects that may have on releases to the environment. For example, could we expect an increase in abandoned LUST sites as more vehicles move to alternative fuels, such as cheaper natural gas?

Project 3.62 Recommendation 2.2.2.R5. Characterize toxicity levels associated with products on the NCP list and make this information available to first responders and communities.

Project 3.62 Recommendation 2.2.2.R6. Explore the effect of decarbonization of fuel supplies on environmental releases and LUST site remediation.

Addressing Environmental Justice Goals: The subcommittee recognizes that the entire focus of Project 3.62 is on mitigating threats associated with oil spills and leaking fuel tanks, but

there is no explicit mention of environmental justice goals in this research. We see critical questions of environmental justice associated with this research and suggest partnering with other researchers within SHC to more directly address these issues including:

- Where do spill and leaks occur?
- What are the characteristics of populations exposed to oil spills and leaks from underground storage tanks?

When the answers to these questions indicate that exposed populations are in overburdened communities or create costly environmental inequities and disproportionate health and environment risks, these are environmental justice issues that must be addressed because of the costs they pose to the nation as a whole. By integrating environmental justice mapping with oil and fuels research, these goals can be more explicitly addressed through research.

The subcommittee notes that meeting long term community sustainability and environmental justice goals likely requires research partnership with social scientists and others who can systematically assess community vulnerabilities, contextual differences, and needs. Geographers, with spatial modeling capacities can support models that differ in resolution and scales.

> **Project 3.62 Recommendation 2.2.2.R7. Integrate social scientists and geographers with spatial modeling expertise into oil and fuel release research to identify disproportionately burdened communities and changing geographies of oil and fuel release hazards.**

2.2.3. Project 3.63 – Sustainable Materials Management

Anticipating Future Problems: While current needs appear to be adequately addressed, the SHC's capacity to address future SMM research needs appears to be a work in progress. Several respondents noted very preliminary discussions about future challenges in SMM that will require scientific exploration (e.g., climate change mitigation and adaptation, and the globalization of materials trade in both material sourcing and waste streams). Both OLEM and SHC staff describe the need to better integrate climate change adaptation into current LCA and materials analysis tools and research priorities. For example, the work that was presented for management of wood waste related to extreme weather events is a great example of the kind of analysis that is needed. The next step would be to extend the approach to the unique waste streams from the built environment following extreme weather events. In addition, an example of an application of the HELP model to assess the impact of changing precipitation rates on landfill performance illustrated that some climate adaptation considerations are being made in the development of new tools, but adaptation did not appear to be the primary motivation that drove the development of that particular capability.

Addressing Long-Term Community Sustainability and Environmental Justice Goals: The work of SHC to advance the practice of LCA and integrate that perspective into tools and other

resources is impressive and should be applauded for its comprehensive approach to climate mitigation considerations. However, because the LCA perspective is inherently not place-based, it can create conflict and misinterpretation of results from an environmental justice perspective where the physical distribution of impacts is a key consideration – potentially beyond U.S. borders. This would be of particular concern in the use of the Spreadsheets for Environmental Footprint Analysis (SEFA) tool.

The updated WARM LCA tool does a better job of identifying the individual processes responsible for increases or decreases in GHG emissions associated with different management options than previous versions of the tool. This visual depiction of impacts could be improved to better identify local versus non-local processes so that those nuances can be clearly communicated to the stakeholders of those practitioners using the tool. Similarly the work of advancing anaerobic digestion as part of Zero Waste community is of high quality and crucial for reducing GHGs. While the technology is certainly a potentially significant contributor to the national energy supply, there are still environmental justice concerns with the siting of those facilities related to the local air quality impacts they may exacerbate. Identifying those upfront and communicating them to users of SHC developed outputs may help to avoid environmental justice conflicts.

Conversations between the BOSC and poster presenters turned to the "human cost" of materials management, however this was not reflected in any of the research materials presented. Recognizing the impact of conflict minerals in electronics could help the development of markets to better recycle those materials. In addition, building a more circular economy will be an economic development effort. To the extent that the economic benefits of materials management jobs can be incorporated in the decision support tools produced by the program, communities could better weigh the tradeoffs between jobs and health impacts of siting an anaerobic digester, for example.

Project 3.63 Recommendation 2.2.3.R1. Increase the frequency and quality of landscaping efforts by SHC researchers (i.e., published literature reviews, outreach to program and regional staff, and publication, conference, and policy tracking) to accurately reflect the state of SHC knowledge.

Project 3.63 Recommendation 2.2.3.R2. Gather input regarding future SMM challenges and opportunity through relationships with OLEM, given their capacity to merge and prioritize research needs across Agency offices.

Project 3.63 Recommendation 2.2.3.R3. Use PACTs as an opportunity to identify long-term SMM trends as well as short-term research needs.

Project 3.63 Recommendation 2.2.3.R4. Continue investing in resources such as MWiz to ensure that the results of SHC's work are communicated and accessible by community level practitioners.

Charge Question 3

How are SHC Sustainable Approaches for Contaminated Sites and Materials projects, and associated research from other parts of SHC, helping communities achieve sustainability?

3.1 General Observations and Recommendations

Historically the US EPA has developed regulations and worked through the regional offices to ensure that these programs are effective through delegation to the states. While US EPA has a history of working with local governments, states have historically had relationships with local communities. As ORD seeks to grow its program of tools and other technical support for sustainable and healthy communities, ORD should look for opportunities to insure that local community priorities are recognized in the ORD research planning process. ORD has begun to partner with existing networks of cities sustainability directors. Similarly, regional networks of sustainability directors may benefit from a closer relationship with the regional offices. EPA Region 1 is already well engaged with northeast City sustainability directors.

At the same time, ORD needs to be careful not to inadvertently interfere in the working relationships that the program offices within OLEM have with grantee communities (in the case of OBLR and OUST) or superfund communities. Field testing tools and techniques is necessary, but test site selection should be careful to coordinate with the program and regional offices working with local communities so that ongoing projects are not compromised and tool successes or problems are not measured under abnormal conditions.

Data are largely unavailable to answer the question of how SHC projects and research are helping communities achieve sustainability, as are definitive metrics for the construct of sustainability. Research outputs often do not have clear links to community outcomes. Even when looking at the quality of outputs, the BOSC SHC committee could barely find information on output metrics (e.g, bibliometrics, user feedback, use volume compared to other tools, etc.). In those cases where SHC demonstrations or pilots are conducted in specific geographic communities, there are more immediate outcomes that can be tracked, but these are small in number, anecdotal, and not reflective of the broader outcomes that are likely occurring from replication of SHC tools and findings and the application of SHC-produced knowledge.

To help communities achieve sustainability, SHC would benefit from more active efforts to obtain feedback from communities on the usefulness of its tools and products, beyond a website link that invites comments. Clear articulation of how SHC-driven work can support long-term capabilities of programs and regions could relieve the tension between competing priorities. In presenting the full scope of current and possible research, SHC can negotiate more effectively with partners on priorities given limited resources. Partner-driven research is still a core function and mission of SHC, and should not be jeopardized.

General Recommendation 3.1. Continue to encourage research projects that may not reflect immediate partner needs, but evaluate these through the presentation of an EPA-mission rationale for the investment and expected timeframe for partner involvement and mapping to partner needs and relevance.

General Recommendation 3.2. Document formal assessments of partner needs in such as way that facilitates clear decision making around prioritization so that those decisions can be communicated transparently.

General Recommendation 3.3. Document formal and informal engagement processes to solicit needs so that clear lines can be drawn between the problem formulation stage and the development of a research or tool development project.

General Recommendation 3.4. Evaluate ORD's scientific activity in line with those conducted for other Federal research organizations to provide preliminary evidence of SHC's contributions to community sustainability in general and to help SHC develop reliable and easily maintained tools for tracking outputs and, eventually, outcomes.

VI. SUMMARY OF RECOMMENDATIONS AND CONCLUSIONS

The BOSC SHC Subcommittee reviewed materials provided in advance, as well as the applications presented in poster sessions and panel discussions, and other interactions at the Subcommittee meeting. As emphasized above, the overwhelming reaction of the Subcommittee is that the basic science being conducted on environmental toxins, pollutants, and sustainable materials management and how these can be mitigated or eliminated is noteworthy. Overall the BOSC SHC Subcommittee was very impressed by the quality of research that was presented in this regard.

The BOSC SHC Subcommittee recognizes the challenge in connecting the implications of the environmental science research on contaminated sites, oils and fuels, and sustainable materials management to broader community sustainability and environmental justice goals. The necessary level of integration requires understanding not only of the implications of basic science, but also of behavioral and social sciences (e.g., economic, social, cultural, and political factors), and the linkages between the human and environmental systems. Such applied dimensions investigate how the presence of environmental pollution and associated toxins, or sustainable materials management, affect the community, e.g., in terms of the environmental justice implications of remediation and how the impacts of environmental pollution translate into measures of individual and community well-being.

As emphasized in the Introduction, the charge questions presented to the BOSC SHC Subcommittee are oriented largely toward the applied dimensions of Topic 3 efforts, while much of the materials presented and discussed focused on the basic science elements. The Subcommittee agreed that Topic 3 research is important and relevant to environmental challenges faced by communities. The Subcommittee also recognizes the challenge in connecting the implications of the environmental science research on contaminated sites, oils and fuels, and sustainable materials management to broader community sustainability and environmental justice goals, given the bureaucratic nature of the organization and governance of research.

APPENDIX A: Meeting agenda

FINAL AGENDA

Board of Scientific Counselors, Sustainable and Healthy Communities (SHC) Subcommittee Meeting: Focus on SHC Theme 3: Sustainable Approaches for Contaminated Sites and Material Management

November 2-4, 2016 in Cincinnati, OH
EPA's Andrew W. Breidenbach Environmental Research Center (AWBERC)
26 W. Martin Luther King Dr.
Adobe Connect for Viewing and Listening Remotely: http://epawebconferencing.acms.com/shcteam
Conference Call for Presenters: 1-866-299-3188 Code: 202-564-3324#

Wednesday, Nov 2*	**Meeting Location: AWBERC Rms. 130-138**	**Presenter**
12:00 – 12:30 p.m.	Registration in AWBERC Rms. 130-138	
12:30 – 12:50	Welcome and Introductions of BOSC Members and Program Office/Regional Office (PO/RO) Visitors	Robert Richardson (SHC Subcommittee Chair) Andrew Geller (SHC Acting National Program Director)
12:50 – 12:55	Designated Federal Officer (DFO) Welcome	Jace Cujé (DFO)
12:55 – 1:00	SHC Welcome	Andrew Geller
1:00 – 1:10	Review of Charge Questions	Robert Richardson
1:10 – 1:20	Public Comments	TBD
1:20 – 1:30	Research Prioritization Process	Kathleen Raffaele, OLEM Diana Cutt, Region 2/ORD
Project 3.62: Environmental Releases of Oils and Fuels		
1:30 – 1:40	Program and Regional Office Overview of Research Needs: • What are your office's highest research priorities in regard to environmental releases of oils and fuels and underground storage tanks? • (optional, additional question) How do you differentiate what research priorities you share with ORD vs request from others (contractors)? *Goal: Speakers to help BOSC and other attendees understand pressing issues from a PO/RO perspective and how research connects to these.*	Stiven Foster, OLEM
1:40 – 2:00	Successful Partnerships: • What are one or two examples of how ORD research or support assisted your program on oil and fuel related issues? *Goal: Build a narrative illustrating ORD interaction with other parts of Agency*	Carolyn Hoskinson, OLEM (via phone) John Cardarelli, OLEM
2.00 – 2:15	SHC Overview: Overall goal of project and orient attendees toward the individual tasks, preview highlights of the project and future directions. Presentation may include a match-up between OLEM/Regional priorities and ongoing or proposed research.	Robyn Conmy, Project Lead for 3.62 Jim Weaver, Deputy Project Lead for 3.62
2:15 – 2:20	Break	

1

2:20 – 3:00	Poster Session	SHC Principal Investigators and Subcommittee
3:00 – 3:20	Partner Panel Discussion: Panelists provide feedback on research process, research provided, and Agency needs. BOSC asks questions.	Will Anderson, OLEM (via phone) Stiven Foster, OLEM John Cardarelli, OLEM
3:20 – 3:40	BOSC Discussion: BOSC to share observations on posters, presentations, and partners panel discussions.	Subcommittee
3:40 – 4:45	Visit ORD Labs in AWBERC	Cindy Sonich-Mullin, ORD Subcommittee
4:45 – 5:20	Travel to Center Hill Facility	Subcommittee
5:35 – 6:15	Tour Center Hill Facility	Subcommittee
6:20 – 6:40	Return to AWBERC via bus & Wrap-up and Adjourn**	Subcommittee Robert Richardson and Jace Cujé

Thursday, Nov 3*	**Meeting Location: AWBERC Rms. 130-138**	
Project 3.63:	**Sustainable Materials Management (SMM)**	
8:30 – 8:35 a.m.	Opening	Robert Richardson
8:35 – 8:45	Program and Regional Office Overview of Research Needs: • What are your office's highest research priorities in regard to managing materials sustainably? • (optional, additional question) How do you differentiate what research priorities you share with ORD vs request from others (contractors)? *Goal: Speakers to help BOSC and other attendees understand pressing issues from a PO/RO perspective and how research connects to these.*	Tim Taylor, OLEM
8:45 – 9:05	Successful Partnerships: • What are one or two examples of how ORD research or support assisted in issues related to managing materials sustainably? *Goal: Build a narrative illustrating ORD interaction with other parts of Agency*	Nickie DiForte, Region 2 (via phone) Tim Taylor, OLEM
9:05 – 9:20	SHC Overview: ORD to present overall goal of project and orient attendees toward the individual tasks, preview highlights of the project and future directions. Presentation may include a match-up between OLEM/Regional priorities and ongoing or proposed research.	Thabet Tolaymat, Project Lead for 3.63
9:20 – 9:30	Break	
9:30 – 10:45	Poster Session	SHC Principal Investigators and Subcommittee

10:45 – 11:00	Tool Demonstration: MWiz (Materials Management Wizard)	Mike Nye
11:00 – 11:30	Partner Panel Discussion: Panelists provide feedback on research process, research provided, and Agency needs. BOSC asks questions.	Liz Resek, OLEM (via phone) Tim Taylor, OLEM Nicole DiForte, Region 2 (via phone) Ann Carroll, OLEM (via phone)
11:30 a.m. – 12:00 p.m.	BOSC Discussion: BOSC to share observations on posters, presentations, and partners panel discussions.	Subcommittee
12:00 – 1:00	Break / Lunch	
1:00 – 1:20	RIMM (Risk-Informed Materials Management) demonstration	Justin Babendreier
1:20 – 1:40	WARM-LCA (Waste Reduction Model - Life Cycle Analysis) Demonstration	Wesley Ingwersen
1:40 – 1:50	Break	
Project 3.61: Contaminated Sites		
1:50 – 2:00 p.m.	Program and Regional Office Overview of Research Needs: • What are your office's highest research priorities in regard to contaminated sites? • (optional, additional question) How do you differentiate what research priorities you share with ORD vs request from others (contractors)? *Goal: Speakers to help BOSC and other attendees understand pressing issues from a PO/RO perspective and how research connects to these.*	Dan Powell, OLEM
2:00 – 2:20	Successful Partnerships: • What are one or two examples of how ORD research or support assisted in issues related to contaminated sites? *Goal: Build a narrative illustrating ORD interaction with other parts of Agency*	Kira Lynch, Region 10/ORD Amy Pelka, Great Lakes National Program Office
2:20 – 2:35	SHC Overview: Overall goal of project and orient attendees toward the individual tasks, preview highlights of the project and future directions. Presentation may include a match-up between OLEM/Regional priorities and ongoing or proposed research.	David Jewett, Project Lead for 3.61
2:35 – 2:45	Break	
2:45 – 4:15	Poster Session	SHC Principal Investigators and Subcommittee
4:15 – 4:45	Partner Panel Discussion: Panelists provide feedback on research process, research provided, and Agency needs. BOSC asks questions.,	Dan Powell, OLEM Kira Lynch, Region 10/ORD Amy Pelka, Great Lakes National Program Office Diana Cutt, Region 2/ORD

		Mike Scozzafava, OLEM (via phone)
4:45 – 5:15	BOSC Discussion: BOSC to share observations on posters, presentations, and partners panel discussions.	Subcommittee
5:15 – 5:45	Wrap-up and Adjourn	Robert Richardson and Jace Cujé

Friday, Nov 4* Meeting Location: AWBERC Rms. 130-138***		
Responding to Charge		
8:00 – 9 a.m.	BOSC Subcommittee Discussion & EPA Response to BOSC's Questions	SHC Leadership and Subcommittee
9 a.m. – 12:15 p.m.	Subcommittee Discussion and Writing	Subcommittee
12:15 – 1:00	Working Lunch	Subcommittee
1:00 – 1:45	Subcommittee Discussion and Writing	Subcommittee
1:45 – 2:00	Wrap Up and Adjourn	Robert Richardson and Jace Cujé

* All times noted are Eastern Time and are approximate.

** Wrap-up and adjournment may occur any time following the site visits, at the discretion of the DFO and Chairs.

*** Breaks will be at the Chairs' discretion.