

**Science Advisory Board (SAB) /Board of Scientific Councilors (BOSC) Revised Draft Executive Summary (01/11/15 Revisions) to Assist Meeting Deliberations -- Do Not Cite or Quote –**

This draft is a work in progress, does not reflect consensus advice or recommendations, has not been reviewed or approved by the chartered SAB or BOSC and does not represent EPA policy.

## **1. EXECUTIVE SUMMARY**

In 2011 and 2012, the Science Advisory Board (SAB) and the Board of Scientific Counselors (BOSC) Executive Committee provided advice to the EPA's Office of Research and Development (ORD) on strategic directions as ORD realigned its research into six integrated programs. The initial research plans guided ORD for 2012-2016. ORD is now beginning the development of Strategic Research Action Plans (StRAPs) to address research needs from 2016 - 2019 for the six programs:

- Air, Climate and Energy
- Safe and Sustainable Water Resources
- Chemical Safety for Sustainability
- Sustainable and Healthy Communities
- Human Health Risk Assessment
- Homeland Security

The update of these plans is in the formative stages, providing an opportunity to solicit early input and insights from the Chartered SAB and the BOSC Executive Committee. A joint meeting was held July 24-25, 2014, to discuss these StRAPs in the context of specific charge questions (provided in Appendix A). The results of that meeting are presented in this report. The first charge question focuses on the relationship of the StRAPs to overall priorities of the agency as described in the new EPA Strategic Plan (2014-2018). The second charge question relates to ORD's ability to anticipate the science that will be needed for environmental protection for 2020 and beyond. The next set of charge questions is specific to each research program. The remaining charge questions address specific examples of crosscutting, coordinated and transdisciplinary research across programs as demonstrated through draft roadmaps for four cross-cutting research topics identified by ORD (Children's Environmental Health, Nitrogen and Co-pollutants, Climate Change, and Environmental Justice) and for ORD research overall. Summarized below are the major topics addressed by the SAB and the BOSC and their major recommendations.

### **Relationship to the EPA Strategic Plan**

ORD's draft StRAPs and roadmaps demonstrate high-level strategic thinking in linking ORD's efforts to the EPA strategic plan and in framing, in a coordinated way, how ORD programs support sustainability. This represents a major change in the EPA's research planning. The draft documents can be used as powerful tools for communicating how the EPA's complex and inter-related research relates to the agency's mission. Although the ORD plans are impressive, it is challenging to evaluate the StRAPs and roadmaps as internal strategic planning documents without a better understanding of ORD resources, personnel, and personnel backgrounds and capabilities.

**Science Advisory Board (SAB) /Board of Scientific Councilors (BOSC) Revised Draft Executive Summary (01/11/15 Revisions) to Assist Meeting Deliberations -- Do Not Cite or Quote --**

This draft is a work in progress, does not reflect consensus advice or recommendations, has not been reviewed or approved by the chartered SAB or BOSC and does not represent EPA policy.

Recommendations:

- Communicate more consistently in the StRAPs and roadmaps the EPA's specific research niche and how ORD plans to partner with other entities, including international organizations and other federal agencies.
- Use the StRAPs and roadmaps to communicate the most important priorities for ORD to address.
- Communicate more clearly how research is being planned to inform specific agency decisions.
- Describe how decision makers will access information about the uncertainties associated with ORD-generated tools and data.
- Clarify how sustainability relates to the specific research planned in each program and how sustainability is operationally defined in each program.
- Explain how ORD will develop or access the social, economic and behavioral sciences needed to achieve the goals of the EPA's Strategic Plan.

**Overall perspectives on proposed research to address environmental issues of 2020 and beyond**

ORD has made significant progress through the StRAPs and roadmaps in placing its research in a framework of the major environmental challenges confronting the United States. However, given that the ORD draft planning documents did not explicitly address longer-term vs. near-term needs, it is difficult for the SAB and BOSC to evaluate *whether the proposed research areas will address the key environmental issues facing the agency in 2020 and beyond.*

Recommendations:

- Provide a more explicit description of the approach used to identify research necessary to anticipate emerging environmental issues.
- Add a section to each StRAP and roadmap whose purpose is to describe anticipated research needs for the next decade.

**Air, Climate and Energy**

The EPA's Air, Climate, and Energy research program (ACE) has a strong strategic plan, linking well to the EPA Strategic Plan and agency priorities, and addressing some of the most important current and emerging issues facing environmental quality, human health, and society in the coming decades. The program is exceptionally broad, with its scope encompassing criteria air pollutants, greenhouse gases, climate change, and energy. Energy, in particular is an extensive component, as the life cycle of energy influences all elements of the environment, and overlaps with the other five program areas.

Recommendations:

- Document progress in agency programs addressing greenhouse gases and plan the research needed to inform future decisions.

**Science Advisory Board (SAB) /Board of Scientific Councilors (BOSC) Revised Draft Executive Summary (01/11/15 Revisions) to Assist Meeting Deliberations -- Do Not Cite or Quote –**

This draft is a work in progress, does not reflect consensus advice or recommendations, has not been reviewed or approved by the chartered SAB or BOSC and does not represent EPA policy.

- Include a conceptual framework linking elements of the ACE program in the ACE StRAP
- Clarify relative priorities, with respect to budget distribution and interactions with other agencies.
- Elaborate and/or expand the research to be conducted on mitigation of climate change impacts.
- Focus the distributed monitoring of air quality on quality data collection and distribution to citizens.
- Consider explicit focus on and analysis of agricultural sources and other land use contributions to air pollution.
- Provide more specific targets for the short-term research aims.
- Consider specifying projects that will integrate ACE with other programs.
- Consider incorporating energy efficiency/conservation research.
- Plan to incorporate renewable energy scenarios and pathways developed by other organizations in ORD's analysis of environmental impacts.

### **Safe and Sustainable Water Resources**

The Safe and Sustainable Water Resources (SSWR) StRAP outlines research activities in support of the EPA's Strategic Plan's goal of *Protecting America's Waters*. The major research topics were developed from an overarching theme of maintaining environmental, social and economic sustainability in the face of significant stressors, including climate change, extreme events, land use, aging infrastructure and population growth.

#### Recommendations:

- Prioritize research and leverage partnerships in order to allocate financial and human resources across research areas (strengthening HHRA and ACE integration), while balancing immediate and long-term needs and leveraging areas of strength completed by partnerships.
- Build on the EPA's dual role of research and regulation to identify a unique research role in moving toward a sustainable water-energy future, with particular emphasis on the Nation's changing regional needs and demographic shifts.
- Utilize EPA's research and regulatory role to pursue the concept that wastewater is a valuable resource.

### **Chemical Safety for Sustainability and Human Health Risk Assessment Research**

Overall, the draft StRAPs for the EPA's Chemical Safety for Sustainability (CSS) and Human Health Risk Assessment (HHRA) research programs are scientifically robust and well aligned to the overarching EPA Strategic Plan. In fact, the programs were considered to be on a path to revolutionize chemical safety assessment and viewed as cutting edge and leading the field.

**Science Advisory Board (SAB) /Board of Scientific Councilors (BOSC) Revised Draft Executive Summary (01/11/15 Revisions) to Assist Meeting Deliberations -- Do Not Cite or Quote --**

This draft is a work in progress, does not reflect consensus advice or recommendations, has not been reviewed or approved by the chartered SAB or BOSC and does not represent EPA policy.

Recommendations:

- Communicate more effectively the priorities within the programs and the approach to priority setting.
- As these two programs are effectively driving construction of a new paradigm for safety assessment, it is critical that the intended uses of new tools be specified as a key element of the architectural plan for the new paradigm.
- Advance exposure-based approaches.

**Sustainable and Healthy Communities**

ORD's Sustainable and Healthy Communities (SHC) StRAP provides a thoughtful, applied roadmap for advancing high priority agency research. SHC focuses on conducting basic research on community-oriented environmental and health issues, and providing information to communities and the agency's regional offices concerning the development and application of sustainable practices relating to environment, society and economy.

Recommendations:

- Develop a decision-support framework that is responsive to varied contextual and situational needs of decision makers. An effective suite of decision-support tools will be applicable across a wide range of contexts, and will be accessible to a wide range of stakeholders and decision-makers. A "one-size fits all" approach to decision-support is unlikely to provide effective support for the range of problems and opportunities facing communities.
- Place additional emphasis on research focused on the fundamental values, concerns, and objectives that comprise environmental health and sustainability. Because these values, concerns, and objectives are important inputs to decision-making processes, addressing this need will require bilateral communication channels across many very different communities, as well as with researchers working in different aspects of environmental and social systems.
- Include an increased focus on environmental health as a critical component of sustainability. The current emphasis on the social and community aspects of sustainability do not adequately account for the environmental risks and ecological concerns identified in the agency Strategic Plan. Planned SHC research on sustainability indicators and sustainability objectives related to decision making focuses too narrowly on social and economic metrics, which may be at odds with ecological constraints; this, in turn, may result in a failure to account for the critical importance of environmental health as a driver of overall human well-being.

**Science Advisory Board (SAB) /Board of Scientific Councilors (BOSC) Revised Draft Executive Summary (01/11/15 Revisions) to Assist Meeting Deliberations -- Do Not Cite or Quote –**

This draft is a work in progress, does not reflect consensus advice or recommendations, has not been reviewed or approved by the chartered SAB or BOSC and does not represent EPA policy.

## **Homeland Security**

The Homeland Security research program (HSRP) has a primary mandate of performing research related to the EPA goals of protecting water supplies and on post-disaster clean-up in both indoor and outdoor environments. The original focus was on chemical, biological, and radiological threats from terrorists but the mission has recently been broadened in the draft StRAP to include "all threats" to water supplies and post-disaster cleanup regardless of the source (e.g., terrorist, natural disasters).

### Recommendations:

- Find approaches to deal with limited resources given expansion of mission to “all threats”, including developing additional partnerships with other disaster-related agencies and with EPA regional offices.
- Integrate terrorism-related and non-terrorism related disaster and prevention research into the HSRP program and expand tools relevant to multiple hazards.
- Clarify, develop, and expand appropriate systems approaches to research planning to meet the expanded mission of the HSRP.

## **Children's Environmental Health**

The Children’s Environmental Health (CEH) cross-cutting roadmap preliminary draft is superbly developed and represents a great start to integrating research on CEH across the six programs. The EPA’s ORD has a unique niche and important leadership role in selecting CEH as a cross cutting area.

### Recommendations:

- Develop a more comprehensive translation research strategy to enhance the links from basic and observational science to intervention/implementation science to community action/policy toward the goal of improving children’s health.
- Clarify and support research on communities’ roles and involvement and leverage partnerships.
- More clearly describe how research themes in the StRAPs will be integrated to support the issues described in the CEH roadmap including development of more clearly specified research priorities.

## **Nitrogen and Co-pollutants**

Research on the biogeochemical cycling of nitrogen and co-pollutants spans multiple environmental media and requires integration of basic science, models and mechanisms across multiple EPA program areas. Consequently it is an excellent choice for cross-cutting research and integration across ORD program areas. The Nitrogen and co-pollutants roadmap is well

**Science Advisory Board (SAB) /Board of Scientific Councilors (BOSC) Revised Draft Executive Summary (01/11/15 Revisions) to Assist Meeting Deliberations -- Do Not Cite or Quote –**

This draft is a work in progress, does not reflect consensus advice or recommendations, has not been reviewed or approved by the chartered SAB or BOSC and does not represent EPA policy.

written and well organized. It is highly responsive to previous SAB input and recommendations (U.S. EPA SAB 2011b).

Recommendations:

- Expand discussion of agriculture and agriculture-related research.
- Include an extended discussion of uncertainties associated with modeling and assessment of impacts of proposed management actions.
- Clarify how research priorities are set based on gap analyses and consider a “value of information assessment” approach.

**Climate Change**

Creating the EPA climate change cross-cutting roadmap is a challenge and the current draft roadmap on climate change is somewhat disappointing. The EPA’s resources devoted to climate change, a critical environmental issue, are a small percentage of the overall federal climate change budget. ORD can best approach this budget challenge by focusing resources on “actionable science” that informs ways the EPA can help address how climate influences air and water quality.

Recommendations:

- Describe how planned research will inform future EPA decision making and guide research.
- Describe more clearly the ORD climate change research niche - “actionable science”- and how it works with other international and federal partners to meet EPA’s science needs.
- Improve the flow of the climate change roadmap, better identify research priorities and expand discussion of social sciences, uncertainties, decision-relevant scale, and the synthesis.

**Environmental Justice**

*The Environmental Justice roadmap provides a good framework for a research path in environmental justice. Although the problem statement is well described, specific goals and objectives are not. Without anticipated achievements, it is difficult to know which steps should be taken in a research roadmap to lead to effective results.*

Recommendations:

- Incorporate input from communities to identify problems associated with environmental, biological, behavioral, social, economic and spatial stressors, and how they interrelate.
- Integrate community participation throughout each science challenge and have community individuals inform the research process.
- Consider including examples to illustrate relationships to ORD’s six research areas and employing Community-Based Participatory Research (CBPR) to promote research relevance.

**Science Advisory Board (SAB) /Board of Scientific Councilors (BOSC) Revised Draft Executive Summary (01/11/15 Revisions) to Assist Meeting Deliberations -- Do Not Cite or Quote –**

This draft is a work in progress, does not reflect consensus advice or recommendations, has not been reviewed or approved by the chartered SAB or BOSC and does not represent EPA policy.

**Integration across ORD programs**

Integration is critical given the EPA's resource-limited environment and the interdisciplinary and cross-program nature and application of the science data, tools, knowledge and products ORD plans to produce. Integration must occur internally within the EPA, external to the EPA within the United States with the agency's partners, and internationally. The ORD's cross-cutting roadmaps represent a very important step forward. The SAB and BOSC commend ORD's progress in undertaking this integrated planning, and offer recommendations for strengthening the roadmaps and making them more consistent, moving from research planning to research execution, and defining a successful process for providing research to decision makers that incorporates institutional learning about that process.

**Recommendations:**

- Identify and communicate ORD research priorities in the roadmaps and commit ORD resources to them.
- Acknowledge and plan for integration, which requires active collaboration and human and information resources.
- Implement a process for identifying ORD cross-cutting research topics and managing their life cycle, including criteria and a process for evaluating research "results that advance EPA's ability to address complex problems."