Summary Minutes of the United States Environmental Protection Agency (U.S. EPA)
Science Advisory Board (SAB) Meeting
November 9 – November 10, 2009

Board Members: See Board Roster provided in Attachment A.

Date and Time: Monday, November 9, 2009, 8:00 a.m. - 5:30 p.m.
Tuesday, November 10, 2009, 8:30 a.m. – 2:30 p.m.

Location: Embassy Suites Hotel
201 Harrison Oaks Blvd.
Cary, NC 27513

Purpose: The purpose of this meeting was to discuss the status of the U.S. EPA ORD strategic research planning for FY 2009-2015; to conduct a quality review of a draft SAB report; and to discuss the SAB's operating plan for 2010. The Agenda is in Attachment B and the *Federal Register* announcement of the meeting is in Attachment C.

SAB Participants:

Dr. Deborah L. Swackhamer, Chair
Dr. David Allen
Dr. Tim Buckley
Dr. James Bus
Dr. Deborah Cory-Slechta
Dr. George Daston
Dr. Costel Denson
Dr. Otto Doering
Dr. Taylor Eighmy
Dr. Elaine Faustman
Dr. John Giesy
Dr. Jeffrey Griffiths
Dr. Steve Heeringa (phone for QR)
Dr. James H. Johnson
Dr. Bernd Kahn
Dr. Nancy Kim
Dr. Cathy Kling
Dr. Kai Lee
Dr. Jill Lipoti (phone for QR)
Dr. Floyd Malveaux
Dr. LD McMullen
Dr. Judy Meyer
Dr. Jana Milford
Dr. Eileen Murphy
Dr. Duncan Patten
Dr. Stephen Polasky
Dr. Stephen M. Roberts
Dr. Amanda Rodewald
Dr. Joan Rose (phone for QR)
Dr. Jerald Schnoor
Dr. Kathleen Segerson
Dr. Herman Taylor
Dr. Valerie Thomas
Dr. Tom Wallsten
Dr. Robert Watts
Dr. Lauren Zeise

Meeting Summary:

Discussion at the meeting followed the issues and timing as presented in the meeting agenda (Attachment B).

Monday November 9, 2009

1. Convene Meeting

Mr. Thomas Miller, SAB DFO, convened the meeting and welcomed the group. He noted that the meeting was an official Federal Advisory Committee Act (FACA) meeting and that the Board adheres to that act and to the procedures of EPA and the SAB in regard to advisory committee meetings. One major item in FACA is that meetings must be held in public and that the public be extended the opportunity to participate by providing oral or written information on issues being considered by the Board. No member of the public provided written information for SAB consideration and no time was requested to make a public statement.

2. Director's Welcome

Dr. Vanessa Vu, the SAB Staff Office Director welcomed the group, and thanked the Members and U.S. EPA staff for their participation in the meeting. She noted that the meeting would primarily focus on an update to the strategic research directions for EPA ORD. Dr. Vu recognized those retiring SAB members for their service by presenting plaques to Drs. Lauren Zeise, James Bus, James Johnson, and Valerie Thomas.

3. Introduction of SAB Members & Meeting Purpose and Approach

Dr. Deborah Swackhamer, the SAB Chair, welcomed the members and EPA staff. She noted that the strategic directions activity discussions for this meeting are a part of an ongoing SAB – EPA interaction and, though separated from the review of the ORD budget, provides background knowledge that is relevant during that review. This meeting considers the longer-term vision for research while the budget review focuses on the actions intended for Agency pursuit during the coming year. The SAB review of the ORD research budget will occur during February or March 2010. She encouraged members and EPA staff to be as interactive as possible during this meeting. She noted the poster session and the quality review that are a part of this meeting.

Members, agency representatives and members of the public then introduced themselves and provided brief statements about their affiliation and research focus. See Attachment A for a list of Members attending the meeting and Attachment D for the sign-in sheets for others.

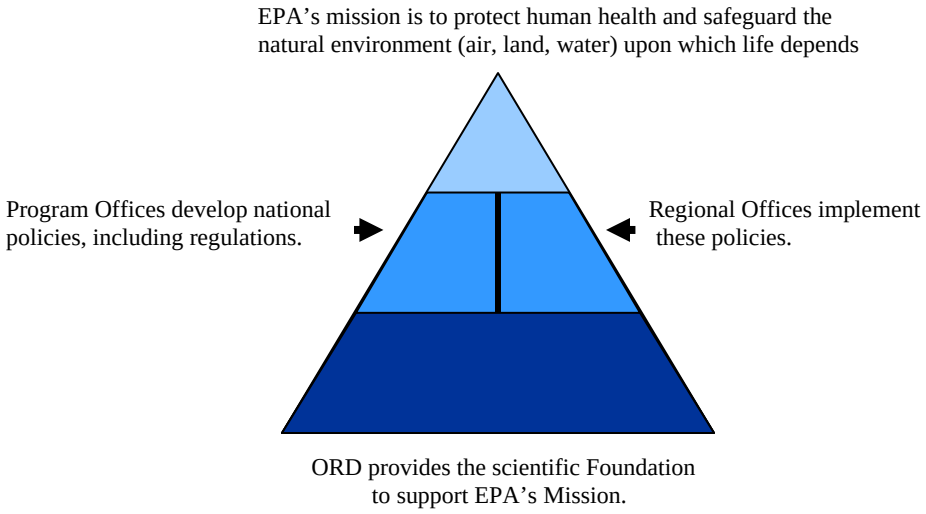
4. Overview of EPA's Office of Research and Development (Dr. Kevin Teichman – See Attachments E and F):

Dr. Teichman noted ORD's multiple missions that are intended to provide the scientific foundation to support the EPA's mission by:

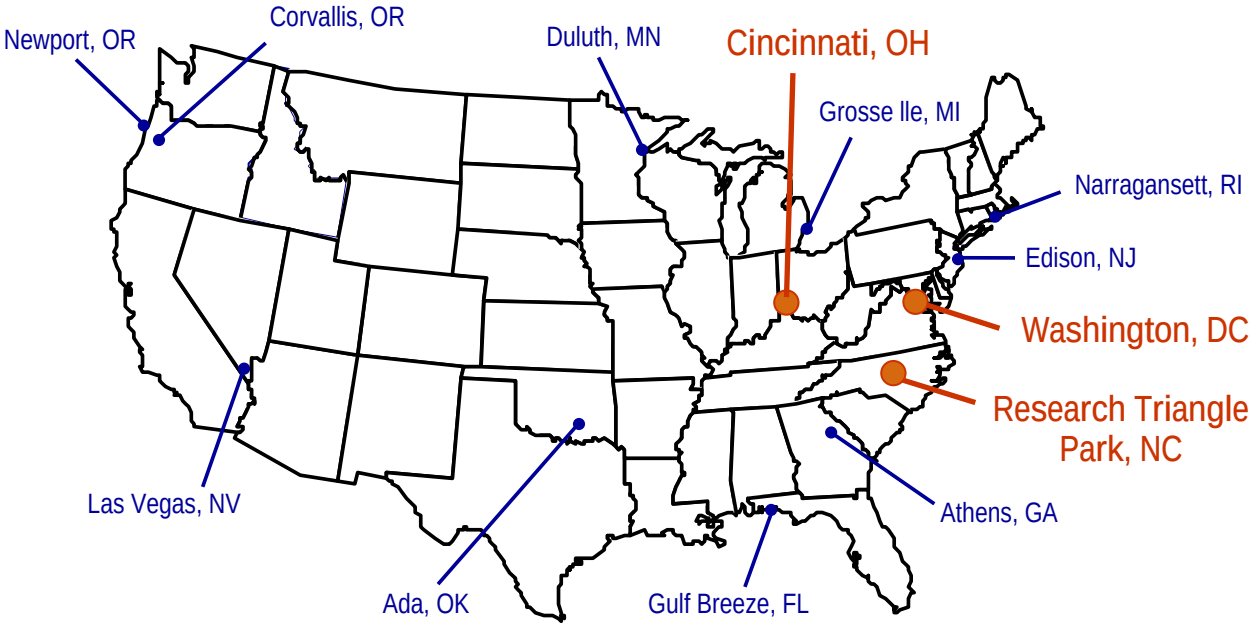
- **Conducting research and development** to identify, understand, and solve current and future environmental problems,
- **Providing responsive technical support** to EPA's Programs and Regions,
- **Collaborating with our scientific partners** in academia and other agencies, private-sector organizations, state and tribal governments, and other nations; and

- **Exercising leadership** in addressing emerging environmental issues and advancing the science and technology of risk assessment and risk management.

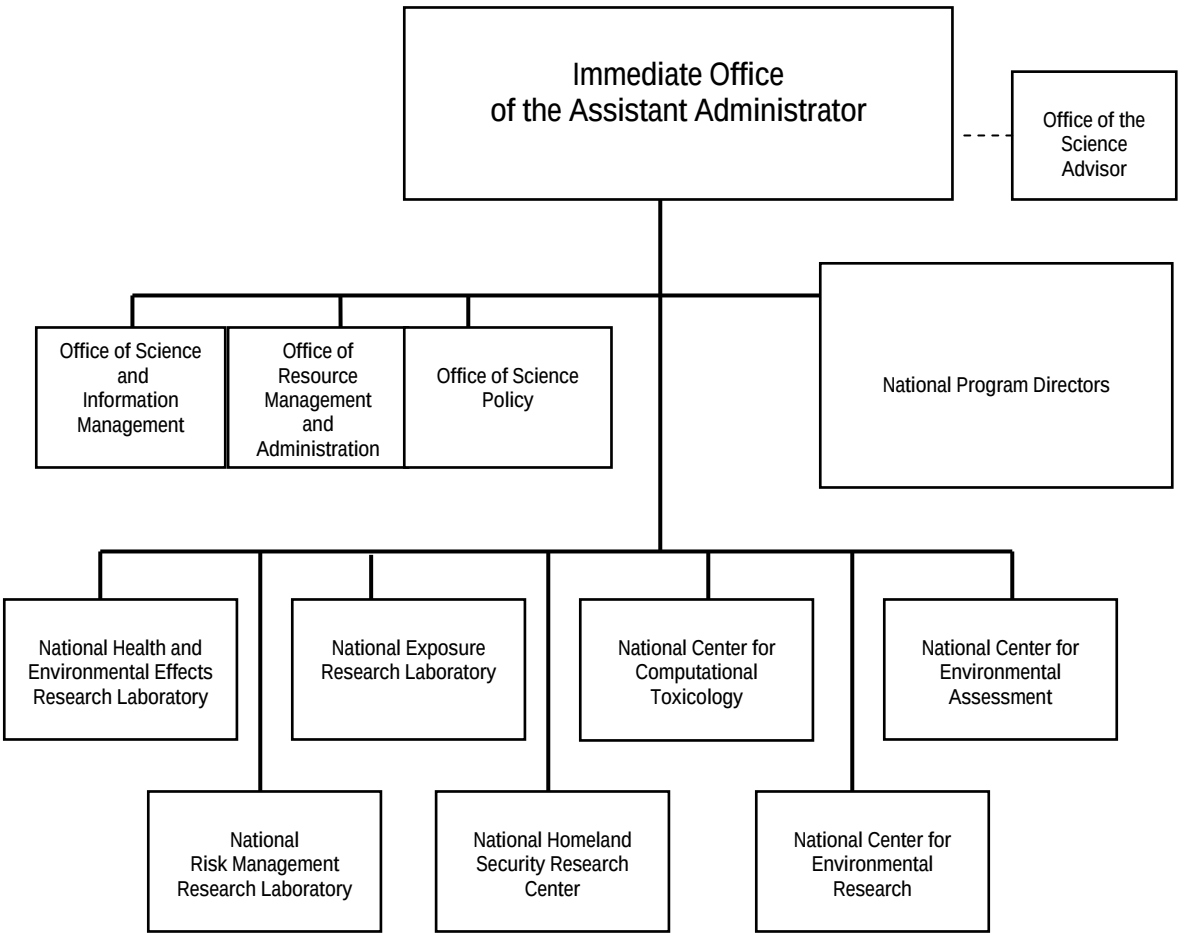
EPA's Organization Chart is in Attachment E to these minutes. The organization consists of Program Offices, support offices, and Regional Offices. Dr. Teichman characterized the role of different EPA offices using the following diagram.



He also showed the EPA organizational chart and a profile of the ORD research budget for FY 2010. The total budget is $587 million budget. This includes a $63 million extramural research grant program, 1,911 Full Time Equivalents (essentially employees). ORD has Labs, Centers, and Offices in 13 locations:



ORD is organized around a series of national laboratories and centers that focus their work in a number of disciplinary areas that roughly reflect the Risk Management framework developed by the National Academies in 1983.



Research Programs conducted by ORD are influenced by many factors and organizations (i.e., our Decision Inputs). Organizations such as the U.S. Congress, EPA Program and Regional Offices, the Administrator, various advisory groups (e.g., SAB, NAS, BOSC), and stakeholders outside EPA "suggest" topics that need research support. The EPA Strategic Plan incorporates some of this and adds additional information that identifies research needs. In addition, many of these same groups as well as OMB provide evaluations of our programs and program results that provide feedback to the research program planning/implementation processes. Within ORD, the ORD Executive Council oversees the process that identifies "what" ORD does and "how" they do it. On the research planning side, National Program Directors consider the advice from Program and Regional Offices, as well as others who direct, advise, or evaluate ORD's programs and "decide what research area-specific work ORD will do and when it might be pursued. They interact with Lab and Center Directors who determine how ORD will produce its research products. On the implementation side Lab and Center Directors then ensure the programs are implemented and research products developed as envisioned in ORD's planning and then the NPDs are responsible for communicating about the products and delivery to ORD's clients.

Dr. Teichman also discussed the ORD Planning and Budgeting Activities as they play out over time. At any point, several budget years are pertinent to ORD's activities. For example, currently (November 2009) ORD is implementing the FY 2010 budget (actually, implementing the activities included within the Congressional Appropriation that provides resources to fund the activities). While implementing the 2010 research program, ORD is reporting on the outcomes of its 2009 program, preparing its inputs to the final President's Budget for FY 2011, and continuing their planning efforts for FY 2012. Thus, any input from the SAB at this current meeting, can influence only Congressional action on the FY 2011 budget and EPA – ORD's activities to prepare the FY 2012 budget.

Overlaying all of this is the Strategic Planning Activity of ORD that looks at a rolling 5+ year window of activities that they should consider as parts of their program that supports the EPA mission. The SAB's Strategic Research Directions activity is in essence a continuing dialogue with ORD at this research program level. The budget review conducted by the SAB each year comments on how the SAB thinks that the coming activities for that specific "budget year" will allow ORD to move forward with the research that is envisioned in the strategic plan.

Dr. Teichman noted that not all science at EPA is conducted by ORD. Program and Regional Offices, as well as the National Center for Environmental Economics also have science roles and activities (some of which are similar to ORD activities). EPA Science is funded by a variety of Appropriation Accounts. The Environmental Science and Technology account (S&T) funds most of ORD's research and development; however, some of the S&T account is used by Program Offices to carry out their science activities. (DFO's NOTE: The Environmental Program Management account (EPM) provides funds for much of the Program and Regional Science activities and the Superfund account also comes into play for conducting some science. State and Technological Assistance Grants fund a large variety of projects, some of which involve science, but they do not usually provide funds to support research. ORD's program is predominantly funded under the S&T account. ORD also receives smaller amount of funding from the Superfund, Oil Spills, and Leaking Underground Storage Tanks accounts.)

Dr. Teichman noted that an important perspective for viewing the ORD research program areas is in terms of their focus. Some are targeted to respond to the specific needs of specific EPA programs while other programs have a cross-program influence. Looking at the ORD programs in this way, they can be loosely categorized as:

Cross-Program Research (Dollars and FTE)
- Human Health ($63 M, 195)
- Ecosystem Services ($71M, 272)
- Human Health Risk Assessment ($49M, 189)
- Global Change ($21M, 36)
- Mercury ($5M, 11)
- Endocrine Disrupting Chemicals ($11M, 50)
- Computational Toxicology ($20M, 33)
- Nanotechnology ($18M, 33-in multiple areas)
- Science and Technology for Sustainability ($24M, 71)
- Fellowships ($11M, 3)
- Economics and Decision Sciences (NCEE)

Program-Targeted Research (Dollars and FTE)
- Air ($83M, 270)
- Drinking Water ($48M, 190)
- Water Quality ($63M, 237)
- Land Preservation and Restoration ($36M, 155)
- Safe Pesticides and Products ($128M, 137)
- Homeland Security ($36M, 58)

FY 2010 resources total $587 M (note, the above list will not add to this amount because of how resources are listed for crosscutting issues). Dr. Teichman noted the EPA appropriation was signed by the President on October 30, 2009. He identified highlights that affect ORD's programs (see Attachment F).

Dr. Teichman's desired outcomes for the meeting, in essence, **the SAB's charge** for this activity were clarified on day two of the meeting as follows:

- **How do the research programs balance national problems with Agency programmatic needs**?
    - Given ORD's mission to conduct research and development to identify, understand, and solve current and future environmental problems, how well is ORD demonstrating leadership in producing the science the nation needs to solve its most important environmental problems, while also addressing the need to help EPA's Program and Regional Offices meet EPA's specific statutory mandates? This question recognizes that today's most pressing environmental needs may not align precisely with the statute-driven needs of EPA's regulatory programs.
    - It is expected that the balance will be different not only between ORD's program-targeted research areas and its cross-program research areas, but also within the research areas in these two categories, e.g., the balance could be different among the different program-targeted research areas.

- **What is the right "mix" of national vs. Agency focus**?
    - Given Administrator Jackson's priorities for EPA, as well as the perspectives of the Program and Regional Offices as noted during this meeting relative to their science needs to achieve these priorities. See the notes that follow from these groups – does ORD have the right mix of research areas, and within these areas, the right mix of activities to help the Agency achieve the Administrator's priorities?

- **How can each program's key strengths be leveraged (across other ORD and EPA programs, and with non-EPA programs) to improve synergies and provide the best information to support decisions**?
    - ORD has approximately 25% of the Agency's scientists and engineers and a portion (undetermined) of the Agency's science budget. ORD has approximately 7% of the Federal government's budget for environmental research and development.
    - How can ORD best leverage the resources both inside EPA and in other Federal agencies to provide the best scientific information to inform EPA and others' environmental decisions?

- **What is the best path forward for building additional areas of ORD strength**?
    - Building on ORD's current strengths, are there additional research areas (or activities within existing research areas) that ORD should undertake? Are there areas of research that ORD should develop that are not a current area of strength?

- If so, are there research areas (or activities within existing research areas) that ORD should deemphasize?
- What is the best path forward for ORD to accomplish your recommendation?

SAB Questions and Comments:

- Congratulations for recognizing that clients for research extend beyond those who are directly involved in policy decisions and include all stakeholders.
- The evaluators list in ORD's planning diagram could include the SAB.
- ORD's level of collaboration with other federal researchers is not clear. {ORD noted that they definitely have many examples of such collaboration. Climate change is a good example of extensive collaboration. Breakout discussions should identify other good examples.}
- It is not clear who decides on who does which work. {The planning diagram addressed this to a degree. Once the program areas are set, it is normally up to the various Lab and Center Directors to match specific projects to those who have the requisite expertise to do the work.}
- The difference between Human Health Research and HH Risk Assessment is not clear. {Human Health generally focuses on developing methods for data development and knowledge generation that can be used in risk assessment. HHRA generally focuses on how to improve methods for conducting technical risk assessments and its component parts.}
- Some states are short on science resources and scientists. Does ORD have mechanisms to work with states to learn of their needs? {There is some interaction, e.g., through the National Governors Association and the Environmental Council of the States. Some examples of leveraging research with state organizations exist. More could be done.}

5. Transforming ORD: Building a Successful Future: Dr. Larry Reiter (Attachment G)

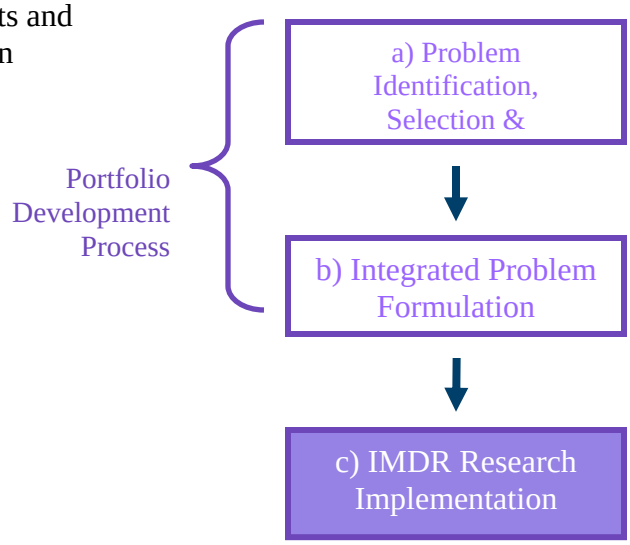
Dr. Reiter discussed the stats of the ORD "Transformation" effort. Dr. Reiter noted that Transformation intends to change what ORD does and how it is done: 1) in order to ensure that research addresses the most important environmental problems facing EPA and the Nation and 2) capitalize on the organization's special ability to conduct integrated, multidisciplinary research to solve problems. The goal is to develop better products more efficiently to match the decision context of issues faced by EPA.

ORD's decision support principles focus on engagement and are informed by recent NAS publications on research (e.g., Science and Decisions, NRC, 2009 and Informing Decisions in a Changing Climate, NRC, 2009). They begin with 1) the user's needs (not necessarily science priorities), 2) give priority to processes that foster communication; 3) link scientists who produce research results to users in a sustained dialog; 4) build connections across disciplines and organizations that often have different values and cultures; 5) seeks long term institutional stability; and 6) involve mutual learning to ensue flexibility and adaptability.

A series of workshops within ORD identified a number of attributes that are desirable for the process leading to transformation to an Integrated Multidisciplinary Research Program. These include:

Transparency –	criteria/documentation
Flexibility –	mid course corrections
Consistency –	across all programs
Responsiveness –	meet needs in timely manner
Inclusiveness –	dialogue/dialogue/dialogue
Representativeness –	diversity of perspectives
Appropriateness –	optimize transaction costs

In terms of what ORD's transformed research portfolio should include (i.e., what they do), ORD will use a model that identifies, selects and prioritizes problems, and then employing an integrated problem formulation approach, determine how research can address the problem. ORD will then implement an Integrated Multidisciplinary Research program to address the problem.



Recently, ORD has drafted a process for accomplishing this, worked with programs to build their understanding of and support for the approach, learned from these groups, and has continued its planning efforts for the next steps in IMDR development and implementation.

The goal of IMDR is to achieve a program that balances the research program portfolio so that the appropriate amount of research can be directed toward highly targeted programs on the one hand and problems of broad national significance on the other.

Key features of the process components identified in the diagram above, include:

a) Problem Identification, Selection & Prioritization
- Clear multilateral agreement on Priorities (high level)
- Preliminary resource scoping
- Understand business plan (context)
- Initial screening using decision criteria – explicit
- Consider other science venues (including program offices)
- Make provisions for disinvestments & sunsetting

b) Integrated Problem Formulation
- Develop conceptual model (how the world works)
- Represent decision context (i.e. decision alternatives)

- Describe science questions and disciplines
- Set boundaries

c) IMDR should:
- Have continuous participation of internal & external stakeholders
- Provides for periodic review & mid-course correction
- Build in product development and delivery

ORD activities to build understanding and buy-in include approximately 20 interactive briefings since April, 2009, and work to develop an Intramural Web Site (Rationale, Animation, Q&A, Briefing packages and memo's).

Listening and Learning has included: Tier 2 Workshops (June), ORD Executive Council (July), ORD Division Director "Conclave" (Jun - Aug) (round tables, workshop, recommendations) and Senior level Partner Workshops (Tier 3) (Oct 27: OPPTS, OIA, Regions, OCFO, OECA, etc.; Dec 8 : OSWER, OAR, OW, OCHPEE, etc.).

The Next Steps:
- Finalize Task Force recommendations (*Incorporate "Tier 3" input)*
- Establish Transition Team to implement Transformation in ORD
- Pilot programs - two Administrator priorities identified for realignment (*Managing chemical risk; Sustainable water infrastructure)*
- National Program Directors: IMDR targets of opportunity

In concluding, Dr. Reiter noted that, "Sound science is the foundation of our success, but solving environmental problems is the true measure of our success."

SAB Questions and Comments:

- The Criteria are good. Having process transparency at the top was applauded. It would help the transparency issue if there were timelines associated with IMDR development. {Good point, we are faced with an ongoing program and planning for IMDR concurrent with that and not adding an explicit timeline reflects a desire that the IMDR development not implode in the face of existing program needs.}
- Stakeholders are not explicitly included in the conceptualization of IMDR. {Involvement of Stakeholders in ongoing and anticipated to be a part of IMDR planning.}
- The SAB is very interested n IMDR because of its holistic (integrated) thinking. How will ORD be able to transcend the narrow reg-focused approach to planning and implementation that now prevails? {Several groups have articulated science priorities (Administrator, the Science Policy Council, NRC, etc.). Overarching science issues were important in all of these efforts. It appears that priorities are gravitating toward the right side of the continuum in these efforts. We need to trust that the IMDR process, that will involve program and regional offices, will lead in this direction as these other efforts have.}
- IMDR presumes a cultural change. How will you measure if that change is happening and IMDR is working? {ORD is establishing a transition team to work on IMDR

planning. ORD already has a matrix management nature for some of its work and this will need to be strengthened to make IMDR work. The Team will have to both the process, how to gain cultural change, and how to measure that change (metrics). An encouraging aspect of efforts so far is that our Division Directors self-organized to begin to think of this already and they are developing recommendations.

- Concern was registered with the 'decision support principle' suggesting that you "Begin with users needs, not science priorities." This looks more like politics and not science. (Another member later restated this concern). {This may be more a semantics issue and less a political issue. It comes from statements in some earlier climate change planners who noted that developing a plan first without end-user input resulted ultimately in a great deal of elegant science but not science that those considering decisions found to be useful. This is really an intent to ensure that end users needs are considered early so that good science can be designed to provide products that are relevant to solving real problems. Dr. Reiter added at a later point in the meeting that this is similar to the intent of the new framework for improving the utility of risk assessments in the NAS "Science and Decisions" report (NRC, 2009). It implies looking at user needs early so that assessments are designed to get answers needed to inform decision making. That framework seems equally applicable to designing research agendas as it is in designing technical assessments for optimal risk management utility.}
- How are users being defined? {Users need to be thought of broadly, similar to the need to define stakeholders very broadly. "Science and Decisions" was cited in regard to making sure breadth is attained.}
- The "consistency" attribute is not clear. {Consistency is not intended to be done for consistency-sake. It is necessary that we recognize that different programs look at things differently. We need to ensure that as the approach is applied to different systems that we not be inconsistent in application to various ones, in ways that leads to errors. It is a call to explain things so inconsistencies, and the need for them, are understood.}
- Being responsive to "users" is difficult. Often their programs change more rapidly than research change can accommodate. There will be some failures, but we don't know what the failure rate would be at this point. What failure rate would make IMDR not workable? This is an area that the SAB might be able to work with EPA on to develop some insights. {This will be a good issue for further discussion with the SAB. An underlying issue in balancing the research portfolio is that the items on the left side can encompass a large "laundry list" of needs that continue. There is always a fast turn-around associated with such listed items. Broad research on the right side of the continuum takes time. Thus, funding must be sustained for many years to allow for success. The tension of left side needs in the programs often makes it difficult for the right side programs to be conducted. Yet, it is often the programs on the right side of the continuum that allow for the needs on the left side to be met. A dialog is needed to ensure that the priorities for research recognize this and that real priorities, not just short term data needs, are identified.}.

- The stakeholder, and/or end-user (client) needs you refer to are the province of social sciences activity to determine. The SAB has often stated this, as well as the need for EPA research in social sciences. So far there has been no discussion of social sciences, not even economics, which we recognize is conducted by the OPEI National Center for

Environmental Economics. How can IMDR be practiced without early input from social scientists, especially since this body of science is separated from ORD's programs (i.e., the province of NCEE)? {ORD recognizes the need for social sciences. We are reaching out to NCEE (reference our Tier 3 activities in IMDR planning). We would welcome additional SAB advice in this area.

6. The Administrator's Priorities and the Role of Science: Dr. Kevin Teichman (See Attachment H)

The Administrator's Guiding Principles for EPA is that:

- Science must be the backbone for EPA programs,
- EPA must follow the rule of law, and
- EPA's actions must be transparent. (It must be clear what science is underpinning our efforts, what science can tell us as well as what it can't, and what the Administrator was thinking in exercising discretion under the various environmental statutes that we implement).

We must not try to cover our preferences merely by saying that "the science made me do it."

The Administrator's Priority Issues include:

- Reducing Greenhouse gas (GHG) emissions,
- Improving air quality,
- Managing chemical risks,
- Cleaning up hazardous-waste sites,
- Protecting America's water, and
- Expanding the conversation on **environmentalism.**

In regard to **environmentalism**, it is clear that for many years environmentalism has been considered the enclave of the privileged. It was not thought much of in terms of inner city health problems associated with urban environments (e.g., differences in outcomes associated with ethnicity, less clean drinking water, and environmental threats that are associated with education, health care and the economy). When we have unclean communities we send a message to our children about our values.

Dr. Teichman then briefly discussed a number of recent EPA accomplishments in areas such as reducing GHG emissions, improving air quality, managing chemical risks, cleaning up hazardous waste sites, and protecting America's waters.

Dr. Teichman restated the EPA Science Policy Council (SPC) Science Priorities that are intended to move EPA away from media-specific thinking alone to one that is more cross-cutting. These include:

- Climate and Energy,
- Environmental Contaminants,
- Homeland Security and Emergency Response, and
- Modernization of (Water) Infrastructure.

Dr. Teichman provided a chart comparing the Administrator's Priorities, SPC Priorities, and ORD's Research Areas.

Administrator's Priorities	**SPC Science Priorities**	**ORD Research Areas**
▪ Reducing GHG Emissions	▪ Climate and Energy	▪ Air
▪ Improving Air Quality	▪ Environmental Contaminants	▪ Drinking Water
▪ Managing Chemical Risks	▪ Homeland Security and Emergency Response	▪ Water Quality
▪ Cleaning Up Hazardous-Waste Sites	▪ Modernization of Infrastructure	▪ Land Preservation and Restoration
▪ Protecting America's Water		▪ Safe Pesticides and Products
▪ Expanding Environmentalism		▪ Homeland Security
		▪ Human Health
		▪ Ecosystem Services
		▪ Human Health Risk Assessment
		▪ Global Change / Mercury
		▪ Endocrine Disrupting Chemicals
		▪ Computational Toxicology
		▪ Nanotechnology
		▪ Science and Technology for Sustainability

Dr. Teichman discussed exemplary accomplishments and the strategic direction highlights for the ecosystem services and nanotechnology research programs as an example of the information available on each of the ORD research programs to be discussed in the breakout groups. (See Attachment H).

The Charge to keep in mind while conducting discussions in the Break Out sessions is shown above in these minutes (pages 6 – 7). **Break Out Teams** are grouped for the afternoon sessions as follows:

a) Ecosystems, Water Quality, and Drinking Water

b) Human Health, Human Health Risk Assessment, Endocrine Disrupting Compounds, Safe Pesticides / Safe Products, Computational Toxicology, Nanotechnology

c) Land Preservation, Homeland Security, Global Earth Observation System of Systems (GEOSS)

d) Air, Global, Sustainability, Economics and Decision Sciences

SAB Questions and Comments:

- The expanded of the concept of environmentalism was applauded. {Decisions relevant to this broader view mean that EJ issues are on the table frequently. Even though some aspects of local decisions are more the province of the Regional Offices, the enhanced view does make possible types of research that explore the root causes of environmentally-linked disease. For example, EPA is doing work on near-road air pollutant exposures with a focus on schools.
- In regard to the green house gas reporting rule, does ORD have a part in this? {The rule is an Office of Air and Radiation responsibility. ORD's role at this point is to look at the adaptation issues as part of the climate change program.}
- For GHG's is ORD involved with fugitive emissions research? {ORD has important research in this area (e..g., barge emissions in Louisiana). More can be said about this in the breakout sessions.
- As you have acknowledged, not all science at EPA is in ORD. The distribution of science resources across EPA is not clear. It is difficult to address the focus and content of ORD's research without having some sense of what the Program and Regional Offices themselves are doing. {More information for the SAB on program and regional science is needed. We are trying to bring that into our discussions with the SAB increasingly in the future and intend that it be more completely discussed during the budget review that will come in March of 2010. It will be difficult to tease out the actual science investments outside ORD, but useful information can be given. As for the S&T account, ORD receives about $560M of the total $800M available there. Its use in Program Offices and Regional Offices is not as easily identified and will need to come from those offices. Much is invested in actual rulemaking support.}

7. Discussion of Program/Regional Office Perspectives for Meeting the Administrator's Priorities Through Science

a) Dr. Michael Shapiro, Water Program Science Needs (see Attachment I)

Dr. Shapiro is the Deputy Assistant Administrator for the Office of Water (OW). Water issues are a high priority for EPA. This is born out by water issues being a priority issue with the Administrator (Protecting America's Water) and by a major water issue, Modernization of Water Infrastructure, being one of the four Science Priorities on the EPA Science Policy Council's list.

Because OW has multiple legislative mandates (Clean Water Act, Safe Drinking Water Act, Food Quality Protection Act, Beaches Environmental & Coastal Health Act, Coastal Zone Management Act, and the Endangered Species Act) the science needs of OW are broad and complex. OW considers issues such as: 1) human and ecological health; 2)

multiple uses of ambient water from drinking to recreation; 3) multiple media such as water, fish, sediment, and sludge; 4) multiple exposure routes; and 5) water security, treatment and delivery. ORD is critical to OW in meeting the science needs that support its mission.

Contaminants: OW regulates "classic" contaminants in drinking water using a complex process that considers health risk, monitor feasibility, and treatment feasibility among other factors. There are many "emerging" contaminants that also must be addressed in drinking water (PFOA, PPCPs are notable recent examples).

Human Health Data: Because SDWA does not allow EPA to require health data submissions from the regulated community, OW relies on ORD and outside parties for screening, bioassays, mode of action data, and data for dose-response assessment. For microbial pathogens, the program requires indicators of the presence of microbial pathogens. The need here is for rapid detection methods and data that link pathogens to human disease outbreaks.

Water Quantity and Quality: There are long-term research needs in the area of water quality and quantity. OW needs research on: 1) water re-use, 2) impacts of changing surface water quantity on water quality; 3) data to support our movement to numeric nutrient criteria and standards; 4) hypoxia in the Gulf of Mexico; and 5) Ecosystems services (e.g., relative to defining, quantifying and monetizing services).

Infrastructure Modernization: We need research information on waste water treatment. Water treatment plants are aging and breaking down. OW needs information to support movement to green infrastructure here. There is a need for information on biofilm impact, e.g., on outbreak incidence. There are significant needs in the area of performance effectiveness for existing and innovative treatments (e.g., control of emerging contaminants such as PPCPs, nanomaterials, and prions; exacerbation of problems as changing climate affects the number, severity and location of severe weather events and information on effects of storm sewer overflow.

Climate Change: Climate change affects all aspects of water programs. OW produced a Water Program Climate Change Strategy to address these problems. It addresses mitigation (ameliorating change) and adaptation (dealing with extant change). We believe that it is important to manage waste water infrastructure to make it more efficient in terms of energy and water use.

Decision Tools: OW needs tools to be developed to help decision-makers handle uncertainty relative to climate change. We need information and tools to support proactive policy and management decisions (e.g., simulation tools, predictive models, remote sensing technologies, ambient monitoring methods, classification methods, mapping techniques, rapid assessment field methods). OW needs support for choices in many areas including carbon sequestration, selection of remediation sites, water quality/wetland/nutrient trading, placement of BMPs within a watershed, land use/protection, and built infrastructure sustainability. We need to have a better ability to

understand the impacts of alternative uses on water quality and quantity, as well as ecosystem and human uses.

National Water Program Research Strategy: OW is in the final stages of drafting a broad research strategy aimed at all who have an interest in water related research. The strategy will complement the ORD research strategies. The plan has four organizing themes:

1) Healthy Watersheds and Coastal Waters;
2) Safe Drinking Water;
3) Sustainable Water Infrastructure; and
4) Water Security.

For each theme, there are five areas of investigation:

a) Aquatic Life Health Effects (not applicable to drinking water);
b) Human Health Effects;
c) Occurrence and Exposure;
d) Method Development; and
e) Treatment Effectiveness.

The strategy also incorporates 3 Tiers that reflect timeframes associated with the research needs:

i) *Tier 1*. Research on the critical path to satisfy a statutory, regulatory, court ordered, or Agency/Office strategic obligation.
ii) *Tier 2*. Research that supports or improves existing tools, guidance and policy (or enhance a critical path).
iii) *Tier 3*. Future oriented (potential environmental concerns) or opportunistic (takes advantage of serendipitous opportunity to leverage resources).

SAB Comments and Questions:

- The areas of investigation in relation to themes is not clear. {The intent is to have for each issue, a discussion and needs in each of the five areas. So for "Healthy Watersheds and Coastal Waters" we would do research on effects to aquatic organisms and humans. In addition, research would explore occurrence and exposure of contaminants, develop methods for a variety of needs, and finally address issues of treatment effectiveness.}
- For some issues, e.g., non-point source, others have significant interests and conduct research on a variety of factors (e.g., USDA). How does EPA tie its work to the work of those other agencies? {OW tries to work in a complementary fashion with those agencies. For non-point source issues, USDA is working on runoff models for agricultural lands. We have funded enhancements to their work that address EPA-specific needs. We have done the same with pharmaceuticals with FDA.}
- How will the OW research strategy be implemented? {In this regard, OW must rely on the "kindness of strangers." The OW strategy shows the issues as we see them. We work with ORD on many issues. Some of these are research and here

ORD has the lead. Other issues are applied and often OW is the lead there. This issue is at the cutting edge of applied research where we are getting tremendous assistance from ORD. We will continue to work with ORD on research implementation as in the past.

- The American Society of Civil Engineers says there are about $2 Trillion in water infrastructure needs that must be addressed. What is EPA doing? Does it have the lead? {We are putting about $6 Billion into that area. It is small in relation to the total need but for EPA it's a huge increase. Much of the critical infrastructure is underground and out of sight. Thus, it is difficult for the public to see what the issue involves until something fails and becomes visible to them. There is a major public education need in this area and EPA has to be involved in that.}
- For research under your Human Health area, how are you getting support? There is some work being done outside EPA, but most of our needs are under the purview of ORD. OW scientists do look broadly for relevant research outside of EPA as well. Even without the ability of SDWA to require studies, there is some ability for EPA to ask for it under other statutes in some cases, e.g., Pesticides can ask for information on endocrine disrupting chemicals used as pesticides.
- The SAB asked that the OW Research Strategy be sent to the SAB so we can understand how it relates to the ORD efforts.

b) **Mr. Jim Jones, Deputy Assistant Administrator for Prevention, Pesticides and Toxic Substances**: OPPTS focuses on risk management for toxic industrial chemicals and for chemicals and other agents used as pesticides. We talk with ORD frequently about our needs. Our science challenges fit into six areas where we need ORD help. These are:

- Assessment of Chemical Risk: There are some 30,000 industrial chemicals in commerce and as many as 80,000 in our inventory. TSCA has limitations as to what must be done to obtain information to support assessment. With so many chemicals and such limited ability to obtain data from industry, we are greatly interested in the Computational Toxicology research program. We can never do all the needed assessments in a timely fashion with traditional risk assessment techniques. We have been actively involved with ORD from the beginning on Computational Toxicology and will continue to be involved. We are also seeking changes in the statute to address TSCA's limitations in this regard.
- Endocrine Disruptors: There are potentially 3,000 pesticide chemicals needing to be screened for endocrine disrupting activity. We are looking for research to help with this task. We have partnered with ORD in ToxCast in order to get more expeditious screening accomplished in this area.
- Nanotechnology: Here we seem to face a needle-in-the-haystack problem. We need to quickly, effectively and efficiently find the (by)products of nanotechnology production that are a problem. We are developing a research strategy with ORD to address these issues. We also work with OECD and others on this issue.
- Environmental Justice: There are big environmental justice issues associated with our area of responsibility. Cumulative toxicity and risk associated with many chemicals in our communities disproportionately affect disadvantaged

communities. There is high interest in better understanding this issue so that it can be addressed in our regulations.

- Endangered Species: Both TSCA and FIFRA (pesticides act) require that we consider endangered species. Assessment of possible effects to endangered species from the wide variety of agents we consider is difficult and we need tools to do that.
- Mitigation: There are many legacy chemicals in the environment that are in need of mitigation. PFOA/PFOS is a good example. These chemicals have been used for long periods and they are persistent. We need techniques to effectively mitigate those that are problematic.

c) Mr. Larry Starfield, Acting Regional Administrator, US EPA Region 6: Region 6's headquarters are in Dallas, TX and the Region includes the states of New Mexico, Texas, Oklahoma, Arkansas, and Louisiana.

A key factor with most Regional issues is that they require rapid responses and they are made with incomplete information. There are many examples of ORD's effective support of Regional needs. One was the sampling protocol Region 6 had to implement after Hurricane Katrina. ORD, as well as the SAB, were helpful in reviewing and improving our sampling protocols for that situation. We expect that type of short-term technical support to continue in the future. Other examples of effective ORD support include ORD's Regional Applied Research (RARE) program that provided grants that were used to study fugitive emissions from large facilities.

Regional Offices have an important interest in ORD's conduct of a research program that balances short term and long-term efforts.

All the Administrator's priorities are relevant to Region 6. For example, for:

- Healthy Communities - identifying communities most at risk runs into problem; for example, we lack baseline health data on lead exposure.
- Cumulative risk -- communities want to know combined risk from multiple facilities. Helping communities understand such combined cancer and non-cancer risk in understandable ways is important.
- Rapid monitoring is important and we need data that are reliable enough for enforcement. With costs at a half-million dollars per monitoring station this is not likely. New monitoring technologies could improve information available for that and for other decisions.
- Risk communication is a difficult issue in helping communities to understand health impacts.
- Greenhouse gases - sequestration; we need improved modeling, and better pollution control equipment to remove methane. We need climate modeling at community or regional levels to inform these debates. Wind-farm based energy is difficult to transmit to urban areas.
- How to deal with nonpoint source pollution to control nutrient pollution that is associated with hypoxia in the Gulf of Mexico.
- Pharmaceuticals and new chemicals present new issues or increase old ones.

SAB Questions and Comments:

- Kudos for recognizing the need for better ways to address cumulative risk.
- Many environmental issues erupt quickly and present an immediate need. How does ORD achieve/retain the nimbleness to address issues that arise sporadically? {It is difficult. In some cases, ORD research has provided data that are useful in addressing such issues. In other cases ORD must react rapidly by shifting resources to allow us to address them. One of the important "products" that can be attained by doing broader, longer-term research is that it often helps us to be nimble and have a base of knowledge, and sometimes specific data, to apply to these rapidly emerging problems.
- ORD has a need to conduct a balanced research program that includes program-targeted to broad, cross-program research. How well are ORD's programs meeting the types of research needs mentioned by the three presenters for EPA?
    - For OW, about 75% of the things we need come from ORD. Others such as AWWA provide smaller increments.
    - For OPPTS, there is a long history of successful collaboration with ORD. We need short and long term efforts. We recognize a health tension between these two types of research efforts. We do get some of our short-term needs as a result of ORD's long-term research efforts. Regions are highly dependent on ORD.
    - Regions are getting a better seat at the table with ORD. This is important because we have a need for both types of research and we believe we should have nearly a daily interaction with ORD to ensure we communicate our needs.
- Have programs and regions been involved in ORD's IMDR development?
    - OPPTS has discussed the conceptual approach with Dr. Reiter. IMDR has the potential to help us with the many multi-disciplinary and multi-media issues we face. The fact the EPA is organized by statute means that we can miss things that IMDR might consider. We want to consider talking about IMDR.
    - Regions were very involved in the IMDR workshops. IMDR will be important as we continue to discuss short-term vs. long-term research needs and programs.
    - OW has talked to ORD a number of times about IMDR. This research will be important in a world that is increasingly presenting multi-media problems. The question is will there still be support for water-specific issues that are perceived as narrower.

Tuesday, November 10, 2009

8. Comments from EPA Administrator Ms. Lisa Jackson: Administrator Jackson thanked the members for their continued service to EPA through the SAB. She complimented those who are retiring from the Board for their past service and also welcomed those new members who are just joining the SAB.

For those involved in the recent leadership changes, the recent SAB reports on our strategic research directions, the research budget, and other issues have been quite helpful to us as we have waited for a new Assistant Administrator to be confirmed for ORD.

Administrator Jackson pointed to the significance of the SAB in the work that EPA does. It is important to challenge our own scientists to ensure that good science remains first in our work. An important part of EPA policy and communications is for science to help translate the difficult technical issues for those who make decisions and for those on the Hill who have an interest in those decisions. There is a need to rebuild the public, and other's trust in our policy and how they relate to science. This rebuilding of trust is an important concern to the President.

Environmental laws rely on science for their effectiveness. Science can help us address environmental needs even when it is not perfect. The SAB is key for us in explaining the science that supports our activities. Environmental science is complex and even scientists do not always agree on what it reveals about specific situations. However, a robust debate on science is important to arriving at the best decisions. We need honest discussions of issues and the SAB can help us in that area.

In closing, the Administrator recognized Chairperson Swackhamer's impending receipt of the Founders' Award from the Society of Environmental Toxicology and Chemistry (SETAC) for her outstanding career accomplishments that promote research, education, communication, and training in the environmental sciences.

9. Breakout Sessions

SAB Members and ORD representatives held separate and concurrent breakout discussions of clusters of ORD's research program areas. Attachment J lists the component programs in the four sessions as well as the SAB Members and ORD National Program Directors participating in each.

Discussions in each breakout cluster were informed by background information provided to the Board prior to the meeting. This information included four groups of research program updates that provided information on each research program area in the cluster in outline form (in fact, these were mostly in the form of PowerPoint slides). The general format of this information was to give the program context and research goals for each area; to list activities that are a part of each program; and to provide specific information on important efforts and achievements within each program area.

Background information was provided to Members for the following groups of research programs:

a) **Ecosystems, Water Quality and Drinking Water** (see Attachment K)

b) **Human Health, Human Health Risk Assessment, Endocrine Disrupting Compounds, Safe Pesticides/Safe Products, Computational Toxicology, Nanotechnology** (see Attachment L)

c) **Land Preservation, GEOSS/AMI, Homeland Security** (see Attachment M)

d) **Air, Global, Sustainability, Economics and Decision Sciences** (see Attachment N)

These "bulleted" slides were designed to update SAB members on efforts in each area in relation to the background information that was given to the Board to summarize each research program area's content when the SAB began its strategic research dialog with ORD (October 2007) (see Attachment O - located in the physical FACA file and on the SAB Web site at: http://yosemite.epa.gov/sab/sabproduct.nsf/31BBFB1AF6031EAA8525765D00401667/$File/Compilation+ORD+2007+for+11-9-09+Board+Mtg.pdf). Also included in the background information sent to Members was a report from the SAB on ORD's strategic research directions (see Attachment P – located in the physical FACA file and on the SAB Web site at: http://yosemite.epa.gov/sab/sabproduct.nsf/91D82AEF8C131E848525765D003F7334/$File/2++EPA-SAB-09-006-STRAT+Res+Dir+2008+for+Board+11-9-09+Mtg.pdf); the Administrator's response to that report (see Attachment Q – located in the physical FACA file and on the SAB Web site at: http://yosemite.epa.gov/sab/sabproduct.nsf/C0CCE734A33785638525765D003FBED6/$File/EPA-SAB-09-006+Response+04-21-2009+for+11-9-09+Board+Mtg.pdf); and a letter to Administrator Jackson on some important science issues (see Attachment R – located in the physical FACA file and on the SAB Web site at: http://yosemite.epa.gov/sab/sabproduct.nsf/3C2AC7F2402866628525765D003FDF4B/$File/EPA-SAB-09-013-Immed+Needs+11-9-09+Board+Mtg.pdf).

10. Poster Session with ORD Scientists: The day's activities concluded with a poster session held by scientists from the Office of Research and Development. Posters were organized according to the structure of the breakout groups and Board members had an informative session interacting as individuals with individual scientists on these posters that presented results of research projects in these various areas. Members were very appreciative of the effort made to hold the session and of the work that each poster presented.

Tuesday, November 10, 2009

11. Plenary Session

a) **General Discussion:** Dr. Teichman expanded on the charge questions to the SAB for this meeting to ensure they were clear. This clarification is reflected in the charge discussion above (**see item 4 on page 6**).

Members noted the difficulties in answering specific charge questions because of the sparse information available. For example, to advise on the proper balance for the research portfolio, some thought it might be important to know what research is not

being done. Also, the details of the decision process that led to the existing portfolio – and more importantly to knowing what is not being conducted – is not clear. {Dr. Teichman noted his discussion of the factors/people that influence the research portfolio's content and how ORD internally decides what research programs to pursue. Specific projects to conduct within each program are the responsibility of the Lab and Center Directors. Often this means the decision is driven by focusing on projects that we believe most influence risk reduction and which are in our areas of strength. Also, we avoid doing specific projects that others are doing. It is difficult to identify what research is not being done in terms of specific projects because the next project may reflect what the current project reveals and achieves.}

Members recognized that ORD's activities are very complex and that the SAB's ability to know all we need to give thorough answers will be limited. This might mean that the SAB might comment best on the process and some rough indication of what we think is missing, as well as the balance of ORD's current program.

b) <u>Reports from Breakout Sessions</u>:

i) **<u>Ecosystems, Water Quality and Drinking Water</u>:** Member comments and reflections on this breakout session noted the following. (Judy Meyer; Jeffrey Griffiths – see Attachment S)

- **Balance of Research for Addressing Most Pressing National Environmental Problems vs. Statute-Driven-Program-Specific Issues –** ORD responsibilities and activities span a continuum from reacting to "brush fires" and predictable science activities associated with support of regulatory requirement to broad national issues. It is very important to recognize that ORD activities to address broad national issues also contribute to EPA's capacity to respond to brush-fire associated with program needs. Balance varies with the program area of emphasis.

  Integrating ORD's activities across program lines can contribute to better balance in this Grouping.

- **Mix of Research to Meet the Administrator's Priorities –** Criteria used to evaluate R&D programs (e.g., PART) emphasize usefulness to client programs. This evaluation approach tends to focus on near term, program-specific needs and moves the research program balance to left on the continuum that goes from program-targeted to broad national issues (cross-cutting) research. If EPA is serious about dealing with future problems evaluation metrics/benchmarks need to be reconsidered. The SAB might be able to help with this.

- **Leveraging ORD Strengths to Improve Synergy and Improve Information to Support Decisions:** ORD has more needs to address than people to so. Integration and prioritization is essential in this regard. Multi-year planning helps with this. Individual scientists need to work across programs. Scientists, NPDs, and managers working in different areas should communicate more with each other to gain better recognition of possible

linkages. Link with other agencies too. Some integration already occurs where individual scientists are working in more than one area. Make technical information more able to be transferred across "brushfires."

- **What additional ORD research areas should be considered based on ORD's current strengths? Are there needed areas where ORD is not now strong? What Path should ORD follow to move forward in that regard? Areas to deemphasize?** Did not focus as much on what is missing, but it isn't so much research areas are missing as it is a need for integration and synthesis of programs. Ecosystem Services needs social science expertise to link ecosystem services with human health and well-being to help design decisions support systems that are more useful. Water Quality should be linked to land use planning. ORD needs to hire flexible, broad thinkers who can deal with many issues over their careers. There is a need for outreach (marketing) for ORD programs to show their value and contributions.
- **Other Comments:**

  Discussions suggested that Integration might increase research efficiency and there seemed to be a fear that greater efficiency would lead to cuts in scientists at EPA.

  Water Quantity (not just water quality) influences many areas not just Drinking Water.

  Discussions during the poster session it became clear that how research questions are framed can be a factor in facilitating partnerships. Framing can invite others in, even issues that are associated with program-targeted issues in the near term can do this, thus we need to become aware of how other agencies frame their research so we can find links that facilitate easier collaboration. Tampa Bay was cited as an example of this.

  EPA participants did not readily share what research areas they would pursue to look for the next big issue that could be coming in 10 to 20 years (e.g., the next "train wreck" -- global change was such an issue 20 years ago). It is difficult to predict the future for many things. We can't do it well. Thus, we must have broad thinkers available, supported by sound basic research programs to ensure a better ability to mobilize science to address these issues when they do emerge.

  Is EPA at the table when other agencies consider grant programs for proposals? Some NSF and NASA proposals have links to EPA needs and it isn't clear if EPA gets to influence topics requested or benefit from the work. Often these programs have significant resources to apply and leveraging there could be useful. {We work with NSF on some things (green buildings) and others, such as USGS (GEOSS-working on this and have more to do; specifically EPA needs to know what USGS will be able to provide so we can see if there are ways to tweek it to get something more useful to EPA) but we need to do more in that regard.) We have more to do.}

Dr. Teichman reflected on the message he took from the comments offered by Members and offered some thoughts of his own. He heard:

- A strong endorsement of ORD's IMDR approach. More integration, collaboration, and synthesis of results needed here to make it more useful for users.
- There needs to be more attention given to having a flexible workforce and in their ability to work on integration.
- Evaluation metrics favor the short-run programs and a short-run focus is not the best for ORD. We need to help others see that longer run research supports the short run needs of programs. This can come from IMDR. And,
- He was disappointed that the SAB feels that we didn't get a good discussion of strategic research needs, because that is the intent of this meeting – can't do it in a budget review. One problem is that people may be reluctant to discuss what might be deemphasized. NPD's, lab and center directors, as well as the SAB, need to be willing to have this discussion. ORD can work with the SAB Chair in future on this issue to see how we can get a better discussion. One Member noted that the Ecosystem Services committee had actually had such a discussion.

ii) **Human Health, Human Health Risk Assessment, Endocrine Disrupting Compounds, Safe Pesticides/Safe Products, Computational Toxicology, Nanotechnology** (Dr. Cory-Slechta and Dr. George Daston– see Attachment T**)**

- There is a broad range of programs in this area. Some are highly focused (IRIS profiles) while others look very far upstream (Computational Toxicology). The program does address the Administrator's priorities, especially in the area of managing chemical risk.
- Programmatic needs are a major influence in setting the agenda in the health area. Many needs are in response to short-term mandates for EPA (e.g., drinking water standards under SDWA, and FQPA's endocrine disruptors testing). ORD has to conduct work on this.
- Even with all the regulatory needs, work in the Health programs must balance the needs of individual EPA offices that are a legacy of EPA's structure with the broader view. The group was impressed that even with the rigid regulatory needs at EPA, ORD finds ways to work on interpretive efforts and on the bigger picture that these short-term needs fall within.
- Emerging Programs in human health are important. Computational Toxicology responds to the reality that current methods for managing chemical risk (especially traditional risk assessment) is not sustainable. REACH is the poster child for this. It isn't certain that the Computational Toxicology program will solve this problem for the some 30,000 chemicals in commerce, but it is an example of risk taking that is needed to solve such complex issues. In addition, it is clear that CT is already showing utility.

- Cumulative Risk Assessment is an important area. But, there is a need for more leveraging in this effort. How CRA can be integrated to tie in epidemiology and specific efforts like the National Children's Study need to be considered. EPA needs to move forward on CRA. It appears that they are behind FDA in this regard. CRA is clearly cross-cutting and it provides a great opportunity for EPA to work with other agencies. EPA should probably take the lead in this area.
- ORD is highly leveraged and there are many examples of ORD's interactions with other groups in the health area (e.g., NTP, NIEHS, and CDC, among others).
- ORD needs to do more about communicating its accomplishments in foundational areas of science that underpin key decisions. Some scientists feel frustration when ORD's foundational work is not recognized when decisions are made on big issues.
- Computational Toxicology is an important and longer-term effort. However, we should, in this area and other broad research areas, look for opportunities to find intermediate products that are applicable to the shorter term. Currently there does not appear to be enough going into efforts to mine these longer term efforts in that regard.
- One member was emphatic in advising on efforts that might be deemphasized. She recommended that EPA should stop thinking in terms of single chemicals. Multi-stressor and CRA provide great opportunities for integrating ecosystem and human health research. Others noted that thinking of multiple stressors can provide information that allows EPA to consider the impacts of various tradeoffs associated with looking at multiple issues concurrently. The contaminant-by-contaminant focus is deeply flawed. As expert groups consider human health issues, all eventually recognize the need for a different way to deal with the large number of contaminants that need to be considered. It is clear that the public really gets it. They do not understand why we do not do more holistic assessments. This is an international issue, not just US. This topic would be good as a workshop focus where participants could explore which contaminants should be studied together.
- Nanotechnology came to the table when people asked about Human Health research there. Now nanotechnology is an element in ORD's research program. Any talk about other technologies in your group to see if they are a part of the future consideration for Human Health? {Such work is being planned.}
- Also epigenetics has been discussed in the past with the SAB, but not today. We think this area has potentially significant implications for future risk assessment practice improvement. {There is research there. BOSC reviews have discussed this.}

Dr. Teichman's Reflections:

Dr. Teichman noted the message he took from these comments offered some comments. He heard:

- EPA's efforts to consider risk assessment for the 21st Century are responsive to the multi-stressor view. NCEA is also beginning an effort to look at chemicals that have similar modes of action or chemical compositions.
- The Administrator's expansion of the concept of "environmentalism" implies the need for a cumulative risk approach.
- In thinking of problems at specific places, CDC and EPA work from different directions in trying to understand health effects. CDC looks at problems when an outbreak occurs in specific communities with the intent of finding and ameliorating the cause. EPA looks at exposures to specific contaminants and predicts outcomes from exposures that might occur at a specific location.
- The HERO database that is being developed for the NAAQS process will allow EPA to collect and evaluate new science studies since last cyclic review of a specific criteria pollutant and give us a database of all air related effects and factors for use in enhanced predictive assessments for EPA. It might also lead to more integrated assessments.
- In addition, our involvement in things like the National Childrens' Study, gives us an opportunity to see issues in a way that should help us link problems with causes.
- ORD does need to communicate better about its accomplishments. Getting information out not only helps people to understand the issues better, but this understanding also helps us obtain continued resource streams for research on specific issues. We are working to expand ORD's Web presence to help with communications. Also, ORD is looking for ways in which scientists can get recognition for IMDR activities – rewards should recognize contributions to integrated work.
- We did not specifically discuss the pilot IMDR projects relative to managing chemical risks. This was intentional because we need to continue to work with others at EPA on the IMDR design. We will share information on the pilots with the SAB in future.}

iii) **Land Preservation, GEOSS/AMI, Homeland Security** (Dr. Taylor Eighmy and Costel Denson. See Attachment U)

- An overarching theme of the group was the need for ORD to retain its leadership role in environmental research and development. How can EPA continue to play an important role in these issues?
- For Land Preservation – Balance --This program seems unbalanced because of the importance legacy issues (e.g., Superfund). Even though EPA still has to deal with these issues there are future needs here as well. The research is

responsive to Administrator priorities though there are needs must still be met. The NPDs have shown nimbleness in being responsive to program needs and to allowing ORD to continue to look forward. EPA has also responded to SAB input. There remains an important need for an entity to learn what other science is being conducted in this area, who is doing it, and where it is being done. This can be an important role for EPA in the future (e.g., in terms of how land use affects water and air quality as well as how to work with agricultural, forestry and other entities on these issues). An integrated, thinking organization must emerge across government for future land use issues relative to the environment -- this is what we would like "our beloved EPA" to do. There is a lot of leveraged strength now in ORD, but there remain opportunities for more in terms of agriculture (USDA LTAR), SERDP, and others. The path forward will require additional coordination across ORD.

- GEOSS/AMI – The program structure leads to its balance. This is a hybrid program involving many organizations. It is responsive to past SAB input. There is a good mix of efforts -- the program already has significant leveraging, but other leveraging opportunities remain. There is also an opportunity to connect with the NSF waters program. To move forward, ORD should fill the need for a meaningful clearing house operation, a gatekeeper, for information coming from all the parts of the program across many agencies. EPA could seize this opportunity for the future.
- Homeland Security – The program is balanced by mandate – different agencies have different mandates under law and Presidential Directive. It is responsive to past SAB input. There is a need to continue to focus on dual benefit from this work on this – this work also allows application natural to both human caused, episodic events and to natural disasters. There is much leveraging here. Most agencies have more resources than ORD and ORD is working well with them. Here, there is also an opportunity to explore use of ecosystems as sensors (or sentinels) applies here. Not just a human focus. SAB HSAC commented on the need for better risk communications and the incorporation of social sciences work in order for EPA to be better prepared for these events. Though there is some effort in risk communications, it is only a small fraction of overall need for social sciences research in this area.

Dr. Teichman's Reflections: Dr. Teichman noted the message he took from these comments offered some comments. He heard:

- Will be nice to see the phrase "beloved EPA or ORD" in report.
- Legacy regarding Superfund – This is an important issue because EPA is trying to clean up as many sites as possible. The number of sites remediated is used as a measure of management success in this area. ORD is evaluating the impact of ORD-technology development on Superfund. The money saved because of this effort can be applied to work at other sites. The extent of

ORD's contributions do not seem to be well recognized in the Program Office.

- We did not discuss ORD's IMDR Pilots in future. The land use notion for a program focus is an important example of IMDR.
- GEOSS work in climate change is an important direction, but I will continue to press potential users of the GEOSS data to tell us more about the utility of the data is to them.
- Homeland Security – Dual benefits are important. I look with keen interest on the chronic scenarios piece you mention because it is important to recognize that after the immediate emergency is passed, the first responders usually turn things over to EPA for "remediation" over time. The chronic implications from emergency events, over time, is of interest to ORD. ORD would like to learn more of the notion of ecosystems as sensors.

iv) **Air, Global, Sustainability, Economics and Decision Sciences** (Jerald Schnoor and Cathy Kling– see Attachment V)

Dr. Kling prefaced her remarks by noting the number of *Suidae* breeding herd population for of various states and acknowledged a possible classification error for one locality.

- In regard to the research balance question, the group chose to add a layer of complexity to the national vs. programmatic needs classification question. They submit that it is more accurate to consider a classification as in the following matrix.

	Applied Research (Short term)	Anticipatory (Long-term)
Mandate-driven Research		
Research that is not Mandate-driven		

The group discussed the rough amounts of each research program area that would be within each classification.

- The group discussed whether the programs had the right research mix and they concluded that the appropriate mix would likely vary for each of the programs and it would likely vary over time as well.
- In regard to balance and mix, the group believes that EPA's ability to be nimble in regard to reaction to emerging issues that having sufficient resources and time to do research in the lower right hand group was important. Resources there provides the time for discovery and for new ideas, and it ensures that research addresses EPA's broad mandates associated with human health and environmental protection.

- The group believes that this is not entirely a zero-sum game where one type, or the other, wins out. Rather, successful agency science (and scientists as well as programs) were programs that find ways to do both. It also allows EPA to find and fill a niche not addressed by other research organizations. Having this dual scope creates a positive synergy across both types of research.
- For the air program, the group saw a need for more coordination with outside organizations. In climate change there is a need for more social sciences capability since that will be the key to adaptive efforts, more researchers, and more coordination across EPA programs. For sustainability the group recognized that the U.S. was behind the European Union in materials management thus leading to a coordination opportunity.
- For Economics and decision sciences, the issue needs to be reframed more broadly and recognize that the need is for not just economics, but also social sciences and behavioral sciences. The need for this is demonstrated clearly by the Administrator's new idea for a broader definition of "environmentalism." Further, economics research is inadequately integrated with other factors and disciplines in many areas (climate change, ecosystem services, biofuels, etc.).
- To move forward, EPA needs to develop strategies to "protect" research in the lower right-hand box; look at relative benefits/risk reduction potential. EPA should identify social sciences research that will enhance the pay-off from other EPA research and should work on sustainability metrics.
- Based on the poster session held during this meeting, it is clear that some ORD researchers recognize the importance of human behavioral sciences to their work. Much of EPA's future success for major issues, e.g., "Climate Change" will require changes in human behavior, thus there is a need for this addition to research. Unfortunately, ORD does not have such a research capacity.
- Adapting to climate change is complex and involves engineering problems with needs for engineering infrastructure to deal with the problem, as well as other adaptive needs.
- It appears that nothing in our discussions focused on the upcoming talks in Copenhagen (climate change). EPA has a key role in this area that is not yet met.
- The climate change program is an example of why Integrated Multidisciplinary research (IMDR) is necessary.
- Indoor air makes major contributions to the level of asthma in children. It did not seem to be a research focus. Events such as hurricane Katrina have links to respiratory disease. There is a need for a capacity to respond to these events with studies that monitor the health of populations over time.
- Katrina's effects were exacerbated by our past mismanagement of coastal areas in the years prior to the storm.
- There is a need for research on voluntary risk management approaches. We need more information to inform decisions on voluntary systems that might be viable for risk management.

- The SAB might try an exercise in the future to see how it might allocate a set sum of resources to the research needs in the lower right hand box. It could be a way to start a rich conversation with ORD on how to proceed to allocate resources in that critical sector.

Dr. Teichman's Reflections:

Dr. Teichman noted the message he took from the Board's comments offered some reflections. He:

- Noted that in nanotechnology, there is fate and transport research, but also there are research efforts focused on ecological and human health effects.
- Stated that the 2 X 2 matrix is a useful way of thinking about investment categories in regard to near-term vs longer-term efforts. He acknowledged that investments in the lower right hand box are important to ORD. It helps ORD prepare for future near-term needs.
- Was pleased that the Air and Climate Change research programs were working together, and that they recognize that effects in one area such as temperature also affect others (such as SIPs). Temperature changes will affect snow pack levels and that will impact water quantity as well as quality.
- Given that disasters will occur, we do need to be prepared to respond with monitoring, epidemiology, and other research.
- Social Science research is recognized as important by ORD. It will be critical in our IMDR work. How it can be conducted and integrated into the research programs conducted by ORD is not so clear, and this will take additional thought.
- One of the most important efforts EPA has ever been involved with was environmental tobacco smoke assessment. It was primarily an indoor air issue. With indoor air, our authorities for action are not substantial. The program is primarily voluntary thus the research here is in the lower right hand box. Indoor air has a need for social sciences research (human behavior, risk communications at least). It is a good area for IMDR.

12. SAB Intentions for Followup to the Strategic Research Discusions

Members agreed that the Board did have advice to give that merited some sort of a report to the Administrator. Key items noted by members included:

- EPA must respond to its mandates. Thus, there needs to be applied research to help risk managers deal with these "firefighting" issues in the short term.
- Even though the short-term needs are important for EPA, it is very important that research in the "lower right-hand box" be protected (this is research that is "anticipatory, systems-oriented" and which is not driven by the short-term mandates of EPA).

- The market for the "lower right-hand box" should be the US Congress. In that regard, one needs to articulate why this type of research is important. It might be helpful to communicating about this to think of the values that various organizations. Universities, often focus on the lower right-hand box for its research. Universities value credibility and this research builds credibility. Legitimacy is a major concern of political institutions. Salience, what is important now – what is news is the focus of journalists. EPA is not really any of the above types of organizations. For EPA, the major need is to connect information to people (i.e., to set environmental policy in a way that responds to their needs).
- EPA's research program seems out of balance. It seems to respond too much to the short-term, mandate-driven needs of the program offices. In some ways, this could be the result of being too oriented toward identifying research that responds to short-term "client needs." ORD needs some independence in setting the research agenda so that it can evaluate how best to provide for the capacity to respond to program needs over the long term. Conducting this fundamental research is critical to providing the science needed by program and regional offices over time.
- IMDR is a type of research that can help scientists and programs work together to provide the capacity to solve near-term problems.
- In deciding on what research to do, efforts like the "Report on the Environment" can help to identify EPA's success, or lack of success, and from that to identify the types of research that will be needed to support EPA's mission over time.
- The SAB report from this meeting might help best by showing why research that fits into the "lower right-hand box" is important to EPA's success in the short-term as well as over time.
- It is important to have a balance among the various types of research. Applied research can help move the state of science forward. This is the case in areas like particulate matter regulation in the NAAQS program. It is not just one type or the opposite extreme. Both are critical. A reasonable amount of research is necessary in each of the categories.
- As it stands, the process used by ORD to set the research agenda seems to be robust and it gives emphasis both to ORD's vision and to program/regional office needs. Integration was noted as an important concept that can ensure that EPA science needs are met through time. ORD must do more fundamental work so that EPA can have knowledge and flexibility to respond to new problems as they emerge. ORD has to help provide the science to respond in the short-term as these needs emerge, but it is the more fundamental research that is conducted over longer time intervals that provides the knowledge that allows EPA science to be flexible and agile in the short runt and respond to real world problems they face.
- There is a need to continue to learn about the IMDR planning process to be able to say that it is robust.
- When thinking of the "end-user" or "client" for ORD's work, it is important to expand the vision of who is included in these categories. EPA functions in

protecting public health from environmentally risks. Strategic communications is necessary to the important task of showing citizens how ORD's contributions help EPA to provide this protection.

- Over the years, ORD has reduced the amount of exploratory research and research that is conducted through cooperative agreements. The S.T. (Title 42 authorities) program was also a good example of a program that provided research on future issues. These programs allowed people to think of and do research on new

Dr. Teichman's Reflections:

Dr. Teichman stated that:

- ORD would indeed like written reflections from the SAB on the program described at the meeting.
- The Title 42 program is of value to us. Currently NAS is doing a review of the program.
- ORD's Ecosystems Services is using an approach to obtaining specialized expertise that involves accessing scientists via the Special Government Employee route. It is a flexible approach to getting such expertise for limited amounts of time.
- We have a planning process for our work that involves Lab Directors, our Executive Council and the National Program Directors. We expect and desire some level of tension among these representatives because of the diverse needs that are out there.
- ORD does plan to meet shorter term client needs as well as to do more forward looking research. Having SAB support of the longer term programs helps our clients to think more of the benefits to be gained from that type of research. That work does influence how we respond to their future requirements.
- Considering ROE as part of the evaluation process is an interesting suggestion. If ROE is to discuss status and trends, then it can be one way of looking at past successes and shortcomings that lead to future research needs.

With this, the interactions on strategic research directions concluded.

13. Quality Review: Draft DWC-Enhanced Report *Review of EPA's Revised total Coliform Rule.* (see Attachment W)

Dr. Swackhamer introduced the review noting that this is a traditional SAB Quality Review of a draft report from an SAB Standing Committee. The charge to the Board for the review is to determine whether:

a) The original charge questions from EPA have been adequately addressed;
b) The draft report is clear and logical; and

c) Conclusions drawn and recommendations made are supported by the body of the draft report.

Dr. Joan Rose summarized the DWC's activity and deferred to the report for other information. Most of the SAB members who spoke during the teleconference, mentioned their written comments (Attachment X). Comments focused on:

- Clarified that the focus was on the science analysis for the "agreement in principle" that will eventually lead to a rule;
- Noted editorial and style preferences;
- There are some disconnects between the executive summary, the letter and the body of the report that need to be corrected mostly edits but some with rephrasing;
- The need to clarify how the charge element on subpopulations was handled since it is not clear in the draft as written; and
- The lack of economists on the review panel even though the issue involves economics.

The Chair summarized the major issues as the need to articulate the charge in the beginning of the document, clarifications needed on sensitive subpopulations, removing the economics paragraph to ensure DWC does not overstep the bounds of its expertise, and the need to clearly describe the documents that are referred to in the current text.

With that, a motion was made to approve the report subject to final approval by several vettors (including Drs. Nancy Kim, LD McMullen and Jeffrey Griffiths). A vote was taken and the motion approved.

14. SAB Accomplishments and Operating Plan for 2010.

Dr. Vanessa Vu discussed the FY 2009 Accomplishments of the Board and the Operating Plan that is currently envisioned for FY 2010. These are as shown in Attachment Y.

15. Action Items

a) Strategic Research Directions Letter to the Administrator: the intention is to produce a letter report that will be from 6 to 10 pages. Attachments will be allowed for some added detail. The format will be as follows:

i. Approximately 2 pages of overarching recommendations on research program themes
ii. Approximately 4 pages to deliver the summary comments of each Break Out Group (about one page each)
iii. Closing comments to reflect on future activities on EPA's strategic research
iv. An appendix containing the "top 3" ideas for future EPA research from each SAB member. This will focus on emerging topics but it could be on

emerging needs within current research topics. This information is intended to be advice that can influence the 2012 planning cycle.

Break Out Group Leaders and Reporters should work together to prepare and submit a narrative writeup that incorporates the points made by their groups during the November 10 report out session by November 30, 2009.

Other participating SAB Members should submit their contributions for the Appendix by November 30, 2009

b) Written Review of the Draft 2009 SAB Scientific and Technological Achievement Awards Report: The DFO will send the draft report to members for review and comment by email. This review is routinely conducted by "mail" because of the nature of the review and the report itself. The report will be sent to members as soon as possible.

c) Total Coliform Rule - SAB Advisory: The DWC Chair and DFO will revise the report and have it reviewed for final approval by the vettors as soon as practicable.

d) Scheduling of Future Meetings: The SAB DFO will request availability dates from Members so that an SAB meeting can be schedule at the end of February or in early March 2010. The primary topic will be review of the FY 2011 EPA ORD research budget to determine how well it supports implementation of the next steps of the EPA strategic research vision. A retreat may be held for SAB planning purposes in association with this meeting that will likely be scheduled for 2½ days.

e) Teleconferences for SAB Quality Reviews: Staff anticipates the need for a January 2010 teleconference of SAB Members to conduct one or more quality reviews. The DFO will survey the Members for available dates for such a teleconference.

Adjourn the Meeting

The Designated Federal Officer adjourned the meeting.

Respectfully Submitted:

/Signed/

Mr. Thomas Miller
SAB DFO

Certified as True:

/Signed/

Dr. Deborah L. Swackhamer
SAB Chair

ATTACHMENTS

Attachment A:	Board Roster
Attachment B:	Agenda
Attachment C:	FR Notice
Attachment D:	Sign In Sheets (Physical FACA File only)
Attachment E:	EPA Organization Chart
Attachment F:	Overview of EPA ORD (Dr. Teichman)
Attachment G:	ORD Transformation Update (Dr. Reiter)
Attachment H:	The Administrator's Priorities (Dr. Teichman)
Attachment I:	Water Program Science Needs (Dr. Shapiro)
Attachment J:	Breakout Teams
Attachment K:	Ecosystems, Water Quality and Drinking Water
Attachment L:	Human Health, Human Health Risk Assessment, Endocrine Disrupting Compounds, Safe Pesticides/Safe Products, Computational Toxicology, Nanotechnology
Attachment M:	Land Preservation, GEOSS/AMI, Homeland Security
Attachment N:	Air, Global, Sustainability, Economics and Decision Sciences
Attachment O:	Compilation of EPA ORD Research Program Descriptions (October 2, 2007)
Attachment P:	Advisory Report to the Administrator of November 26, 2008
Attachment Q:	Administrator's Letter to the SAB Chair, April 21, 2009
Attachment R:	SAB Letter to the Administrator of May 5, 2009
Attachment S:	Report Out from the Ecosystem Services, Water Quality, and Drinking Water Team
Attachment T:	Report Out from the Health Team
Attachment U:	Report out from the Technology Team
Attachment V:	Report Out from the Air, Global Change, Sustainability, and Economics/Decision Sciences Team
Attachment W:	Draft Report: Review of EPA's Revised Total Coliform Rule
Attachment X:	Compilation of SAB Member Comments on Draft Total Coliform Advisory
Attachment Y:	FY 2009 Accomplishments and FY 2010 Operating Plan-SAB