Summary Minutes of the US Environmental Protection Agency
Science Advisory Board Meeting
June 19 to 20, 2007
Meeting Location:
US EPA Science Advisory Board Conference Room
Room 3705
Woodies Building
1025 F Street, NW
Washington, DC 20004
(202) 343-9999

1. Purpose of the Meeting: The Meeting was held to continue the SAB's discussion of disaster and emergency response planning and approaches at the US EPA. In addition, the SAB conducted two quality reviews of draft SAB panel reports, and discussed the scope of the upcoming October, 2007 SAB interaction with EPA Office of Research and Development (ORD) representatives on strategic research directions. The meeting agenda is in Attachment A. The Board Roster is in Attachment B. The *Federal Register* announcement for the meeting is in Attachment C. Attachment D is the sign-in log for the meeting.

2. Members Participating in the Meeting:

Dr. M. Granger Morgan, Chair
Dr. Deborah Cory-Slechta
Dr, James Galloway
Dr. James Johnson
Dr. Cathy Kling
Dr. Jill Lipoti
Dr. Judy Meyer
Dr. Rebecca Parkin
Dr. Steve Roberts
Dr. Jerald Schnoor
Dr. Deborah Swackhamer
Dr. Valerie Thomas
Dr. James Bus
Dr. Ken Dickson
Dr. Rogene Henderson
Dr. Meryl Karol
Dr. George Lambert
Dr. Michael McFarland
Dr. Jana Milford
Mr. David Rejeski
Dr. Joan Rose
Dr. Phil Singer
Dr. Thomas Theis
Dr. Lauren Zeise
Dr. Dan Walsh-SAB/HSAC Liaison
Dr. Terry Young (via Teleconference on June 19)
Dr. Virginia Dale (via Teleconference on June 19)

3. MEETING SUMMARY (Tuesday, June 19, 2007)

a) Convene the Meeting

Mr. Thomas Miller, SAB Designated Federal Officer, convened the meeting noting that it was an official meeting of the Chartered US EPA Science Advisory Board and that the meeting would be conducted in compliance with requirements of the FACA and EPA policies for expert advisory committees. Mr. Miller introduced the SAB Staff Director, Dr. Vanessa Vu who welcomed members, agency officials and the public to the meeting.

b) Introductory Remarks – Dr. Granger Morgan, Chair, EPA Science Advisory Board

Dr. Morgan welcomed members, agency representatives and the public to the meeting. He provided an overview of the agenda for the meeting.

c) Members' General Discussion of Emergency Response Lessons and Identification of Issues for Break-Out Group Discussions

Dr. Morgan summarized the past activities on this project and noted that the SAB had been introduced to EPA's environmental disaster response issue in the aftermath of Hurricane Katrina. At the time, many who participated in the Board's rapid turn-around review of agency monitoring protocols were troubled by EPA's use of routine protocols for emergency situations. He noted that subsequent EPA efforts revealed that the agency had evolved beyond that situation but the Board remained concerned with the burden on large organizations like EPA who are faced with the need to innovate rapidly in the face of dynamic situations. Thus, the Board suggested to the EPA Administrator that it would be willing to look at the situation and to see if it might have some advice on how to enhance EPA's capacity to be prepared to respond to future environmental disasters. He noted that in December 2006 the SAB was briefed by emergency response personnel from a number of industrial (railways, chemical producers, nuclear energy), governmental (Chemical Safety Board), and non-governmental organizations (American Red Cross) on how the prepare for and respond to emergencies. Dr. Morgan captured a number of the lessons learned from these interactions in a memo to the SAB dated May 1, 2007 (Attachment E). Dr. Morgan characterized the work in front of Board Members for this meeting as deliberation to determine the message that it wants to deliver to the Administrator on this topic and drafting that message.

Dr. Morgan asked Members if they had any general comments on the points in his May 1, 2007 Memorandum to the Board (see Attachment E). Members' comments included:

i) Even though the Agency responds within a response structure that coordinates all activities on nationally significant events, the SAB should encourage EPA to be active in all disasters and not just those to which they are formally assigned (i.e., EPA should at least have a Team that identifies what happened, who was affected, what actions were/are needed, and they should be proactive regarding communications about the current situation).

ii) Is there long-term monitoring after an episode, and if so how is it done? This provides a great opportunity to learn and apply the learning to future events.

iii) The SAB should suggest that EPA clarify the decision rules that are followed for applied to the data and how that influences messages that are communicated to the public on what actions they should take relative to potential risks.

iv) EPA should consider phased procedures for extracting information for public guidance during an event, and in periods following the event. The requirements for data gathering and analysis immediately after an event should be different (possibly less stringent) than later when actions shift from emergency response to long term remediation.

v) It is important to clarify who should be giving advice on public health implications associated with releases during an event – it seems important that advice on staying/leaving an area should be the responsibility of jurisdictions closer to the event (local).

vi) It is not clear how EPA determines whether its communications is improving from one incident to the next.

vii) Dr. Walsh offered his perspective gained from his experiences in responding to and in evaluating responses. He noted that there are many overlapping goals and objectives within an event. For example, if terrorism is involved, certain areas are treated as a crime scene. Objectives during an investigation (e.g., dust control after the World Trade Center – WTC - collapse could make evidence gathering difficult or impossible). Exercises are now conducted among diverse agencies to attempt to learn about such conflicting goals and to develop approaches to resolve problems that arise. Intentional events often give novel site conditions that are not amenable to control by routine, standardized practices (e.g., asbestos release at the WTC caused conditions that were not previously recognized as issues in routine responses – inhalation of fibers – which became major problems in this event). In major environmental disasters, a political overlay emerge that can confound responses (e.g., poor communications among the responding agencies can impede response actions). Traffic flows can be degraded leading to effects such as poor debris removal. The notion that it is EPA that steps in and takes charge in these situations is not the case in real events. EPA manages less than 1% of the day-to-day releases of chemical and hazardous materials. Often, EPA has no role and OSHA has only a small role. Most of these day-to-day events are handled by local authorities using local resources. EPA is not leading the charge. Even waving certain aspects of environmental regulations during a response, though a delicate issue, is done elsewhere (e.g., in New Jersey the Governor has authority to suspend environmental regulations and templates are ready for use in doing this. There also the Office of Environmental Management has representatives available to advise the Governor when this is considered) and not Environmental Managers. It seems to be that environmental protection, as a goal, is brought into the picture over time. It might be necessary to have Public Health and Environmental Management people working within the police and fire departments so the environmental message can be heard. The SAB might suggest things such as: aa) integration of environmental and public health ideas into police and fire planning; bb) advance planning for Expert Panels who could be the "go-to" people for expert advice in events; and cc) flexible response approaches; dd) use of advance planning around scenarios; ee) use think-tanks to help evaluate response scenarios that are

unexpected – multiple events that coincide and involve a variety of threats; ff) provide expertise to advise first responders during an event; gg) recognize that EPA is not usually the first responder nor is it often the long-term responder so recognize this and be directed toward those who are on site and need advice.

viii) EPA experience is mostly with low-end exposure scenarios and there is relatively little research focused on high-end, multi-stressor, and mixtures scenarios.

ix) Scenario preparation should also consider sensitive populations and not just healthy adults.

x) The Board advice should recognize that EPA is not the go-to organization in most cases and that environmental issues are only a piece of the disaster response picture – thus we might focus on EPA's real mission now and over time work on advice that expands that "box."

xi) In risk communications, we need to recognize that there is a new "media-environment' available – The Web – and consider how that might influence the 6-day turn-around time in getting data onto the EPA website during an event ("rapid communications).

xii) People will respond with appropriate actions only if they believe the source of advice is trusted. How people perceive risk and respond is an important part of the issue that needs research attention.

xiii) It would be good to know how other agencies have done in responding "within their own boxes". Advice should recognize the need for the best possible reactions and not just reactions that stay within one box or another.

xiv) EPA has another venue for operating and that is helping to make releases during transportation less vulnerable – proactive activity in this area could decrease the need for some responses or at least lessen the severity of some transportation releases.

xv) During Hurricane Katrina's aftermath, EPA was perceived as an honest broker for science. Responders on site should have the benefit of the outcome of sound technical "arguments" among experts acting independently.

xvi) EPA might include within its purview a role in spatial analysis of releases (e.g., use of GIS techniques).

xvii) HSAC is considering specific tools for use in EPA response activities. The SAB might encourage development of a description of what tools exist, what needs they address, what is EPA's 15-year plan for tool development. Tools like ECAT will ultimately develop useful information for responses – we should encourage more of this development.

xviii) SAB advice might emphasize how agencies might better interface – a "not my responsibility" mentality is not helpful.

d) <u>Discussions with Ms. Debbie Dietrich, Director, US EPA Office of Emergency Management (OEM)</u>

In introducing Ms. Debbie Dietrich, Director, EPA OSWER Office of Emergency Management, and Ms. Dana Tulis, Dr. Morgan noted that the SAB effort was intended to assist EPA as it moves forward to respond to environmental disasters.

Ms. Dietrich opened with several comments. She noted that at EPA, and for the nation, the World Trade Center attack was a turning point in responding to disasters. The issue continues to impact the Agency. Additional situations with contamination of Congressional offices brought EPA into additional large, high profile responses and through that the Agency response approach evolved and improved. Hurricane Katrina was EPA's biggest challenge in response to date. EPA's activities in response to Katrina were given a fairly positive evaluation by the Inspector General. The Agency's substantial response record in that event reflected learning that occurred as a result of EPA experience during earlier emergencies, as well as EPA's experience gained during its long history of responding to oil and hazardous material releases. The Agency continues to work with others to learn more from its experience and to prepare for future responses.

The Board then asked questions and commented on several issues, including:

i) Will EPA's planned activities include research? There is no risk communications expertise. We believe that having prepared messages in place and available is important. More importantly, these messages should be empirically tested to ensure that they can be understood and followed by citizens who are at risk. The Board seems to be seeing that information flow may be a problem (e.g., timing, who develops the message, how does it get to those who need to take action either inside the response structure or citizens at risk). The Board is concerned that there is no behavioral social science research on the EPA agenda and developing effective communications approaches and messages is dependent upon this research.

   Ms. Dietrich agreed that communications, in all its senses, is an important issue. It was important in flooding that resulted after the Gulf Coast hurricanes, it will be even bigger if there is a radiation release. EPA is not the sole authority in this area. The Agency is funding some work on message mapping in this area. In addition, the agency has a long history of communications, and learning to communicate, especially in the Superfund program where we learned that the public did not always hear what we intended to convey.

ii) Members asked if the Agency conducted exercises to better prepare for responses?

   Ms. Dietrich stated that EPA does conduct such exercises. She noted one in which it became clear that field and those from Headquarters needed to work on their procedures when responding together. The Agency conducts a major

exercise every 3 years. This year's exercise scenario focuses on an earthquake along the New Madrid fault and how we would respond to oil and hazardous materials releases that would result from such an event. This will be a multi-problem, multi-location and multi-incident scenario. It will test our Area Command structure. In terms of knowing what threats exist, information collected through the TRI, RCRA, and TSCA programs gives EPA a good idea of what threats exist in these areas. In preparing for such incidents, we also work with DOE and HHS. This exercise will involve just EPA and the US Coast Guard; however, the overall National Response Plans look much more broadly and identify 15 different response functions (ESFs) which can be mobilized to work together as the characteristics of various events show the need for broader response capacities. Our plans anticipate a response capacity for at least 5 simultaneous events. In all the scenarios that are a part of the National response picture, EPA focuses on oil and hazardous materials releases and water contamination from biologicals, chemicals, and radiation. EPA has substantial experience in dealing with these situations and our offices is working with ORD to develop new science to enhance our preparations for responding to water releases.

iii) The Board has discussed whether it would be better to think of data quality objectives in a phased fashion. That is, early in the response, the requirements could be less than later when we are moving from stabilizing the situation to where the longer term remediation is employed. Has EPA looked at this as a way of getting information out to the public at risk more rapidly than the current 6-day window? Ms. Tulis noted that EPA has much experience in dealing with such incidents in a phased manner. Ms. Dietrich noted that EPA has monitoring equipment for radiation, etc. and that it has much experience working with chemicals. We re now working on the biologicals where growth is needed. In all this, we work with ORD to identify research needs, set priorities, and our own staff stays current with how this effort is proceeding.

iv) Preparedness involves tools and resources in addition to processes that are exercised. What is EPA doing to map tools and resources and to identify gaps in what is needed for areas where it has lead responsibility, and has it looked for gaps between EPA responsibilities/capabilities relative to those assigned to other agencies? The Board has heard of a series of tools being developed by ORD in the Homeland Security area. What does the Agency do to get these tools out and to systematically evaluate whether they will improve responses?

Ms. Dietrich responded that EPA has been involved in many exercises involving many levels of response (local, state, national, as well as internal to EPA itself). Looking at the gaps is an area of shared interest with ORD. Ms. Tulis noted that a gap analysis was being conducted to determine gaps in capabilities and these are made a part of the Homeland Security work plans that identify program needs. We use this in planning our research needs and in determining how the research program can meet the needs.

v) The 6-day turnaround time for making monitoring results available seems to hamper our ability to communicate with and advise those citizens that are at risk during an environmental disaster. Can you help us understand this timing better?

Ms. Tulis noted that one of the constraints is the time that it takes to do the analysis itself. That often takes up from 48 to 72 hours. Ms. Dietrich noted that the Agency does have tools for fast turn-around in its mobile monitoring, however, these results are not released directly to the public because of a concern with providing "bad" data. We can get information to the public quickly if we detect an emergency situation. But that is different from what we put on our website for common usage. The information we develop is provided to those in the Command Post for their use.

vi) Do you give guidance to state/local groups on how they can use the data, e.g., to interpret the monitoring data in terms of risk? Ms. Tulis noted that EPA has a continuing dialogue with state and local groups on response preparation. There also exist several systems that can help provide this in terms that are relevant to risk (e.g., AEGLS, PALs).

vii) Does EPA ever get to the recovery phase when it conducts its exercises to prepare for disasters? Once one gets to this phase there would necessarily be major communications issues involved at this point in a response. Ms. Dietrich agreed that exercises do not get into this phase enough since most exercises focus on the first 3 days. We have considered a scenario involving as much as 90 days and the upcoming exercise will go out to two years.

viii) Has EPA worked with the private sector on its "gap" analysis to see if they have anything available (e.g., monitoring methods) that EPA could use? Does EPA have a priority for its work?

Ms. Tulis noted that EPA intends to work on chemicals, biologicals, and radiation and apply its best judgment on what needs come first. EPA has not worked systematically with the private sector on these issues because of the sensitivity of the information. EPA has worked with DHS and DOE on expanding its monitoring and analysis capability. OEM also has its National Decontamination Team stationed in Cincinnati (site of the Homeland Security Research Center) and our staff routinely interact with ORD on research needs and results.

ix) Has EPA simulated release of Nanoparticles in its scenario planning? Not yet, but we are looking into this.

x) Has EPA looked at behavioral research into things that people would want to know (those inside and outside of EPA) during a response?

Ms. Dietrich stated that behavioral research is not their area. EPA is a science agency.

xi) What can the SAB do to help EPA? We have many types of expertise that could be brought to bear on EPA needs in this area.

Ms. Dietrich stated that EPA would be open to SAB ideas in the risk communications and behavioral area. Ms. Tulis noted that additional advice on how communications about science topics can be accomplished with the public would be helpful. Some believe that all that is necessary to provide people with what they need is a number that clearly indicates if a situation is cleared. We know that one number does not do that. The real answer to whether a site is now "clean enough" involves multiple aspects.

xii) The SAB HSAC has looked at a consequence assessment tool. The tool helps to define a consequence, but does not do much on the back end (e. g., what should be done to handle a contaminated water system). Much is needed in the way of agent-specific analytical methods that provide results in real time on water quality changes. Terrorism was tested in other parts of the world before being brought to the U.S. There will be value in getting information from the public on things they might see, but the value of that information will be determined by whether the public is educated in how to recognize possible threats in the early stages. Is EPA including this type of proactive capability in its water security programs?

Ms. Dietrich stated that EPA is very proactive with utilities in terms of building awareness and capabilities in this area. There is much interaction going on in the water area; however, much of this is classified and can't be discussed in open forums. Detection approaches are a major item in these discussions. We anticipate a long term effort in this area.

Dr. Morgan thanked Ms. Dietrich and Ms. Tulis for their discussions. He considers their information to be very helpful. Dr. Morgan stated that the SAB would prepare a memorandum or an advisory providing the Board's thoughts on the issue. He stated that he would like to vet a draft of that report with Ms. Dietrich to ensure that we had not incorporated any large inaccuracies and to see if there are additional insights on issues we have missed that might be addressed, prior to completing the SAB's report. Ms. Dietrich stated that she would welcome this and the SAB's support.

e) <u>Convene Break-Out Groups</u>

The Board then discussed the types of breakout groups that would convene and continue the Board's discussions on this issue. The breakout groups were charged with discussing issues in this area and then drafting their thoughts on each of the areas.

Groups were identified and convened on the following general areas:

a) Range of Potential Environmental Disasters (scenarios that EPA should prepare for responding to) (Drs. <u>Theis</u>, Thomas, McFarland, Morgan, Zeise)

b) Geographically Specific Tools for Data Display and Analysis (screening tools for use helping to inform responders, and others, what is at risk from various scenarios) (Drs. Schnoor, Singer, Dickson, Walsh)
c) Communications and Public Consultation (what is EPA's role and how can it be enhanced) (Drs. Johnson, Parkin, Milford, Meyer, Segerson, Rejeski)
d) Technical Advice on Measurement and Risk (development of rapid advice on these inputs to decision making and communication) (Drs. Swackhamer, Bus, Roberts, Cory-Slechta, Rose, Lipoti, Henderson, Karol, Lambert, Kling)

Groups then convened in break out sessions and discussed each of the issues until 3:00 p.m.

f) Reconvene SAB to Identify Next Steps

NOTE: The following results from SAB report outs were discussed on both day one and day two of the meeting in plenary sessions to draw conclusions about the SAB's thoughts on environmental disaster response. However, they are discussed together here in the minutes (items i through iv) for continuity purposes.

i) TECHNICAL ADVICE ON MEASUREMENT AND RISK:

The Group decided to configure their discussions and advice as recommendations for improving EPA's rapid response for assessing exposure and risk during emergencies. Points that the group developed are in the following paragraphs.

Emergency responders and emergency management decision makers need rapid access to information on risks posed by exposure to chemical, radiological, and biological agents. This may include information on risks to first responders and workers involved in providing emergency shelter, food, and utility restoration, as well as the general public. Because disaster scenarios can provide an almost infinite variety of exposure scenarios and agents for which risk information is needed, tools to provide risk estimates must be versatile and flexible. Further, because disasters invoke decisions profoundly affecting public health that must be made quickly, information to support risk estimates must be obtained expediently. Components of the risk assessment will include identification of potentially toxic agents present and their concentrations, identification of exposure scenarios for which risk information is needed, and evaluation of risk-based criteria and/or toxicity information relevant to short-term exposure scenarios and the potential for longer-term (delayed) impacts. It is the opinion of the SAB that processes and resources currently available for such risk assessments are inadequate, and several recommendations are offered. A common theme in these recommendations is that the EPA develop highly flexible frameworks that will allow for maximizing their response to an emergency and yet allow for agility in tailoring their response to the exact site and nature of the emergency.

Use of Expert Panels

The SAB recommends that the Agency develop and utilize expert panels to provide advice to the Agency to improve the procedures for response to national emergencies. These panels can augment the Agency staff and the Homeland Security Subcommittee by providing experts who can review draft agency documents to provide comment or can pro-actively identify and address recognized gaps in the agency's capacity to respond. The panels also provide the Agency increased capacity to respond in a flexible manner. These panels should be of two types – proactive panels and panels that are responsive to a specific incident.

Examples of topics the panels could address include:

- Sampling plans
- Analytical laboratory procedures and appropriate quality assurance
- Monitoring plans, including what to monitor for, siting, thresholds for action,
- Ecosystems
- Human health risk assessment
- Communication
- Others as indicated by the needs and incident.

The proactive panel could be charged with the development of frameworks and tools that could be responsive in a generic fashion to almost any incident. An example of a tool which would be useful to the Agency would be a mechanism for crafting a message for the public, but also testing how that message would be received/ interpreted/ acted upon, and then iteratively developing a message which would elicit the desired public health behavior. Some standardized tools to evaluate the effectiveness of various messaging formulations could be developed. Follow up with the affected population may include measurement of medical parameters, both acute and chronic. Committees could also be constituted to evaluate lessons learned, appropriate decision points, and other post-mortem assessments.

Membership of the two types of panels would be comprised of expert volunteers willing to serve that have been pre-screened by the Agency. The Agency should develop an ongoing database of volunteer experts with details of their areas of expertise and geographic location. When an emergency incident occurs, the database can quickly be queried for the appropriate panel members. The Agency should strive to include experts from the affected area, so that cultural issues and community values can be considered in decision-making. The panel should include a mix of University, private sector, and state and local experts. An additional use of this database would be to identify individuals from other jurisdictions who have dealt with similar experiences, who could provide a peer to

peer match for quick advice to a specific problem encountered during the response. This database would be inherently different from the current database of experts that the SAB staff uses to populate review panels, with more information than is currently contained in the SAB database, and an expanded set of experts.

A third type of expert panel can be developed to advise the Agency on the recovery phase following an incident. Some members of such a panel might overlap with the acute response panel but would include additional expertise related to the problems of decontamination, long-term clean-up and monitoring.

Source Identification and Characterization

The SAB is concerned that there is no single entity with the ability for comprehensive hazard identification. EPA has collected information on the inventory of certain hazardous chemicals in quantities above certain thresholds that appear in regulatory lists (SARA Title III, CAA 112(r), etc.) but this is not an exhaustive inventory. For instance, these data do not include pharmaceuticals which include highly toxic cancer treatment medicines and other drugs which may be present in small quantities, and, if released into the environment, could be harmful to people and ecosystems. Separate inventories are available form other entities (e.g. the top 10 chemicals shipped by rail). Biological agents are not part of the inventory and they may be indigenous in low concentrations, but could have tremendous increases in numbers under certain conditions. This includes events such as flooding, discharges of untreated sewage, re-suspension of sediments, or the intentional release of a bioterrorist agent. There could be delays in appearance of the biological agent after the emergency which would include, for example, algal blooms and *Vibrio vulnificus* regrowth. Fecal pathogens including bacteria, parasites and viruses are not tracked in any organized database and have been most often identified as the etiological agents during flood-related disasters. Fecal indicators (fecal coliform bacteria and *E. coli)* have been used historically but are not appropriate for hazard identification and characterization during a disaster as these “indicators” provide no information on source, types of hazards, level of hazards or risk. It is recommended that the Category B and C microbial agents that could be associated with various types of disasters be cataloged.

To get a full picture of the source term for releases from a large scale incident would entail consulting multiple databases in multiple agencies.

Private sector databases may be useful also, but are not part of the EPA's tools at present. Some mechanism to access data on an as needed basis may be useful, but first, it is necessary to identify what kinds of data are available in the private sector.

Therefore, the SAB recommends that a compendium of pre-identified inventory databases be assembled. Cross-references and quality assurance checks between federal, state, local, and private sector databases would be useful as a second step

after identification of available information.

Exposure Assessment

Capacity. We encourage the ongoing development of a national database of laboratory expertise and capacity being done by EPA. We recommend that this database be expanded to include University laboratories and private sector laboratories (contract labs, consulting firms, industry labs), and laboratories in Canada and Mexico. We also recommend that this database include the specific expertise of the lab ("chemical organics" is not specific enough, the database should include details on the classes of contaminants such as PCBs, pesticides, VOCs, etc.), throughput of the laboratory (time to process a given number of samples), and the capacity of the lab (number of samples processed in a given amount of time).

To facilitate immediate access to the appropriate expertise, we recommend that EPA develop Memorandum of Understanding (MOUs) with a variety of labs (universities, private sector) so that arrangements for consultation do not need to be done in real time.

To facilitate these MOUs, we recommend establishing a legal framework specific to emergency operations that addresses liabilities, data access, chain of custody, and other quality assurance issues that may impede cooperation if not adequately dealt with in advance.

Monitoring Plans. We recommend that EPA create a framework with guidelines and access to resources to develop an appropriate monitoring plan as quickly as possible. Since specific pre-determined plans may be too restrictive or constrained, we recommend a flexible framework of elements to be considered that allows the details of the plan to be decided in the *context* of the emergency (population density considerations, geographical and geo-morphological considerations, nearness to water supplies, etc.). For example, the sampling strategy (what media, frequency, spatial coverage) should be informed by the hazard identification, context, and what data are needed for the toxicological assessment. The detection limits for measurement of chemicals should be set based on the toxicological assessment thresholds. Detection limits for biological agents of concern should be based on probability of infection models associated with outbreak levels (generally >5 to 10 /100) and endemic risks (<5/100). Background monitoring databases for indigenous hazards should be developed under non-event driven monitoring programs.

We recommend that a framework of goals and considerations be developed that also monitors human behavioral response to directives (boil water, evacuate) and information delivery (data communications, decision making process, etc). This framework should be developed as soon as possible and data collection tools should be included into the monitoring program.

The behavior response by people to the information they are provided in the affected area is often an overlooked component of both short term and long term monitoring. EPA should have plans in place to effectively communicate pertinent information to those that are affected and they should have a plan for monitoring to assess the success of their communication tools. As part of this strategy, EPA should have experts on their staff that can devise and implement these approaches. Further, experts in risk communication and research evaluating its effectiveness should be part of the recommended review panels as the most effective forms of communication when an event occurs is likely to be highly context dependent.

Appropriate behavioral monitoring will be case specific, but could include collecting data on the number of people following recommendations immediately after an event (e.g., how many used the recommended evacuation routes, how many boiled water before drinking it, etc.) and in the longer term (e.g., once people returned home, did they continue to undertake the recommended precautions). Data might be appropriately collected via surveys of affected individuals, face-to-face interviews, from traffic patterns, etc.

Understanding the effectiveness of specific communication strategies could be enormously valuable in refining and improving communication strategies for future incidents. Indeed, there is probably no better way to learn to better inform and protect the public in future events than to carefully analyze response to communication of information in an actual event.

Use of Data in Communications and Decision-making. We recommend a tiered approach to data collection to inform decision making. In general, we recommend a collection of screening data immediately (hours – days) to characterize the order of magnitude of threat. More detailed but preliminary data should be collected and communicated (days – weeks) followed by release and interpretation of final, quality-assured data. We strongly recommend that the decisions and data they are based on be communicated and released in real time so that as decisions evolve the rationale is completely transparent. This will emphasize that the uncertainty around the data and decisions is reduced over time. It is important to instill within the culture of such situations that decisions won't be perfect, will change as new data are collected and interpreted, but will be protective of human and ecological health rather than attempt to minimize false negatives.

Human Health and Ecological Risk Assessment

One approach for rapid assessment of risk is to compare environmental levels with pre-determined, risk-based criteria. For many disaster scenarios, exposures are anticipated to be short-term or intermittent. For chemicals in air, a number of criteria for short-term exposures exist, primarily in the form of occupational exposure limits (e.g., OSHA Permissible Exposure Limits and ACGIH TLVs (Threshold Limit Values) and STELs (Short-Term Exposure Limits) and values used for emergency planning (e.g., ERPGs (Emergency Response Planning

Guideline), AEGLs (Acute Exposure Guideline Levels), TEELs (Temporary Emergency Exposure Levels). The former are intended for protection of adult workers and are not well suited for application to broad populations that may contain sensitive individuals. Emergency planning air criteria are relevant for the general population, but are not yet available for all chemicals that might be of concern in disaster situations. Additionally, emergency planning numbers are generally oriented toward very brief exposures (e.g., 30 min), and may not be well suited for disaster exposure scenarios that are somewhat longer (e.g., days to months). Short-term exposure criteria for water are even more limited. The Agency has developed Health Advisory Levels (HALs) for 1- or 10-day exposures, but there are several limitations to these values for risk assessment in disaster scenarios: 1) the list of substances for which HALs are available is short (about 100) and unlikely to address all chemicals for which risk information is needed; 2) most HALs were developed 10 to 20 years ago and may not reflect current knowledge of adverse health effects of these chemicals; and 3) the exposure scenario upon which HALs are based (ingestion of 1 L of water per day by a child) may not reflect the scenario(s) of interest for a particular disaster situation. The Agency has no short-term exposure criteria for contaminated soil.

To address these limitations, the Agency is in the process of developing Provisional Advisory Levels (PALs) for inhalation and oral exposure over intervals relevant to disaster scenarios. PALs are intended to cover chemical, radiological, and biological agents of greatest interest in rapid assessment of risk for disaster response, and will be applicable to the assessment of both air and water. Subject to their approval by the SAB Homeland Security Advisory Committee, PALs should be valuable tools for rapid evaluation of risks in emergency response situations. A practical limitation to the PALs, however, is that it will take time to develop a set of values that can cover the immense variety of potential disaster scenarios. Further, the technical basis for the PALs (i.e., the implicit exposure assumptions) may not be sufficiently flexible to address all of the exposure scenarios of interest. Consequently, the Agency has a need for tools to rapidly develop risk estimates/risk-based criteria, as needed, for specific disaster situations.

Thus the SAB recommends that a framework be developed encompassing these tools, including the following:

1) Guidelines for selection of models and inputs for developing risk estimates and/or risk-based criteria.
2) An array of exposure models that cover most, if not all, conceivable scenarios of interest in emergency response.
3) Readily available data sources for risk model inputs that aren't site specific, including exposure assumptions and toxicity values appropriate for the exposure intervals of interest (principally, acute and subacute exposure).

The technical approach to risk calculation should be consistent with that used to develop PALs, but must offer flexibility to deal with a wide variety of exposure scenarios. The framework should be capable of addressing chemical, radiological, or microbiological agents in air, water, and soil/sediment.

Ecological impacts of national emergencies are also of concern to the Agency. Full evaluation of the ecological consequences of a national emergency, as well as of possible response measures, is likely to be complex and time consuming. In order to be able to provide information useful for decision making in a timely manner, the SAB recommends the development of a parallel framework for rapid ecological risk assessment, and that this framework also be incorporated into the overall Agency plan for dealing with national emergencies.

A quantitative microbial risk assessment framework should be developed for disasters and emergencies. Within this framework the role of the environment as a longer-term source of exposure will need to be examined. Sampling across media (eg. air to fomites, water to sediments), and sampling over time to address attenuation will be important. A critical need is a data base on microbe specific decay rates under various scenarios of time-temperature and other environmental conditions (eg. moisture, and sunlight). With the exception of anthrax, most biological agents of concern will die-off over time in the environment. Probability of infection models can be used quickly to develop ranges of risk based on possible exposure scenarios. The outcomes for sensitive populations need to be accounted for (for example, 80% of the AIDs patients died as a result of *Cyrptosporidium* infection within a year of the exposure event in Milwaukee). Chronic outcomes and longer term consequences should be addressed in the framework, so that these can be tracked, reported and communicated in the event of a real disaster. Community based outbreaks should be seen as a potential to examine the local preparedness of the community in regard to , use of a microbial risk framework, environmental contamination and clean up goals and risk communication strategies. Disinfection efficacy and targeted reductions should be risk-based. Currently zero thresholds are expected by the public and were used with the anthrax event. Thus the framework could develop a microbe based, outcome-consequence based approach to assessing and managing the risks that better addresses the publics concerns.

ii) COMMUNICATIONS REPORT OUT:

The group began its discussion by considering a range of issues, such as:

- What is the definition of "communication?" Not everyone interprets this term in the same way. In this discussion we mean more than conveying a specific message through channels to an audience; we also include two-way interactions within the agency, across agencies and with partners and the public. (We have avoided the use of "audience" because of its one-way

communication connotation.) Further, in this discussion risk communication was considered a subspecialty within a larger communication approach.

- What scales of communication (e.g., individual, organizational, societal) is EPA engaged in? What impacts do these scales have on the agency's approaches to communication?
- Under what conditions does the agency communicate? We considered the range of conditions from routine/pre-event/prevention, crisis/event and post-event modes.
- A comprehensive approach to communication does not seem to be in place. A life cycle or systems approach to communication and consultation with partners should be the basis for developing the agency's communication strategy.

The group's major points follow:

- What is the purpose of communication? This needs to be clearly defined.
- How can information be transmitted to elicit well-informed decisions and behaviors – by individuals, first responders, decision makers, and organizations?
- Communication is more than public relations or a specific technique; the form is should take is highly context dependent. Communication requires different forms at different points in the risk management paradigm. Research is needed to identify which forms are best under which conditions and with which kinds of receivers and partners.
- A strategic, comprehensive life cycle and/or systems approach to communication is essential. Communication and consultation need to occur throughout the risk management paradigm – from initiation through long-term monitoring (similar to "risk communication" depicted in the attached figure). These functions may involve different partners (e.g., state and local agencies, stakeholders) at different points (from the pre-event/preparedness stage to the post-event/continuous improvement phase) and different types of messages (level of certainty and protection, etc). Note that preparedness includes environmental scanning, prevention, training and other activities that help deter adverse events from occurring.
- Frequent and transparent interactions with partners (within the agency, across agencies, and with others), in advance of events, is an important part of building communication readiness. One element of readiness may include development and pre-testing of consistent messages for a variety of scenarios and receivers.
- A critical component of an effective communication strategy is anticipating how a variety of people would respond to communication initiatives (messages and interactive engagements), especially under stressful conditions.
- Another crucial component is empirical research; this would, in part, include pre-testing messages and methods with a range of receivers, as well as formative and follow-up evaluations of communication activities.
- During an event, zero tolerance for false positives often works against providing the public with timely and useful protective information. The

tradeoffs in risks (e.g., public health and environmental vs. organizational) are important considerations that should be clearly identified and articulated by decision makers. When uncertainty prevents a clear decision, warnings that include protective actions and clear guidance should be issued with a "stay tuned" alert for more certain information. However, pre-testing such messages would yield considerable insights about what will and will not work well in eliciting desirable behaviors.

- Risk communication research completed 15-20 years ago is not very relevant to today's issues and contexts, due to the changes in technology; demographics; and social, legal and other contexts. There is an increasingly pressing need for more recent and relevant research.
- Information diffusion networks need to be mapped and kept up to date. Discovering the ways in which information is currently and rapidly disseminated (e.g., reverse 911, e-mail, instant messaging, YouTube and other networks) is fundamental knowledge that would contribute to developing effective communication strategies.
- Scenarios should include representatives of the public and mass media, to ensure that exercises involve their perspectives and gauge the likelihood of behaviors that would have significant impacts in real events. Representatives of other partners appropriate to the scenario should also be involved both in drills as well as in debriefings after exercises.
- One of EPA's responsibilities should be to ensure that their information gets to the person or organization that is trusted by the intended receivers (in crisis conditions) or partners (in routine conditions). In various cases, another entity or person (e.g., local official or leader) will be seen as a more trusted source of information. In those circumstances, the EPA should focus on getting the best possible information to that party and helping him/her promptly interpret and use the information correctly.
- Knowledge of how people form their concepts of risk and related issues, as well as how people make decisions and what information influences their decisions, is a crucial foundation of effective communication strategies. The agency needs to have knowledge that is current and relevant to a variety of issues within its purview.
- Timely advice could be derived from an on-call panel of diverse subject area and local knowledge experts identified nationwide. Subject areas appropriate for such a panel would include: psychologists, anthropologists, decision analysts, information technology experts, etc.

iii) RANGE OF POTENTIAL ENVIRONMENTAL DISASTERS

Issues identified by this breakout group are included in the paragraphs below.

There are many potential catastrophic events that the Agency may be called upon for response, and for which prior analysis of needs and resources should be carried out. A partial listing of these occurrences includes:

Weather-related
- Wind (e.g. hurricane, tornado)
- Flood (e.g. Tsunami)
- Storm (e.g. winds, lightening)
- Drought
- Fire

Geo-related
- Earthquake
- Volcanic eruptions
- Flood plain events

Bio-related
- Disease (natural)
- Invasive species (natural)

Complex Network System Failures
- Disruption of network infrastructures (e.g. power, water, sewer, highways, rail, pipelines, etc.)
- Dam, levee, dike failures
- Nuclear events

Human Induced (unintentional/intentional)
- Water, air contamination
- Radiological
- Biological
- Chemical release
- Explosions
- Invasive species
- Fire

While recognizing that each event is unique to the specific location at which it occurs, it may be useful, as a point of departure, to approach this emergency catastrophe analysis by considering the role of other organizations in combination with EPA's role. Such analyses could help the Agency identify additional risk scenarios, jurisdictional issues, communication needs, and measurement and logistical requirements in advance.

According to the National Response Plan (NRP), EPA has primary responsibility, with the Coast Guard, for oil and hazardous materials, and secondary responsibility for most other Emergency Response Functions (ERF). Notwithstanding, the SAB suggests that the Agency shift its emphasis from post-emergency clean-up to a more comprehensive response mode that includes decision support during the early phases of the emergency, as well as continuing its post-emergency role. Such a shift implies that the Agency's response mode encompass low probability-high impact events.

Key taxonomic attributes of these events, and the ways in which they are

interrelated can assist in the analysis. For example, the manner in which communication to affected populations is carried out depends on the type of event that has occurred. Figure 1 summarizes one approach that recognizes the causation, temporal and spatial extent, and level of complexity of catastrophic events.

FIGURE 1 HERE ("decision-style" branching diagram) (See Attachment F)

Figure 2 presents the elements of a full anticipatory consequence analysis. The main features of the analysis are measurements, risk analysis and consequence analysis tools, measurement, communication, jurisdiction/coordination, and longer term remediation. Each of these must be carried through several phases: pre-event mitigation and avoidance, event duration (moments to weeks), "crisis" phase, management phase, and remediation and follow-up phase.

Figure 2 HERE (consequence event analysis)(see Attachment G)

It is critically important to incorporate uncertainty throughout the catastrophe analysis, since this will affect all features of event management. For example, if rapid turnaround of sample analysis is called for because of concern about minimizing human exposure immediately following an event, then the tradeoff of less stringent but more uncertain standards of acceptability may be warranted. These may result in a more precautionary response on the part of decision-makers. Similarly, as response progresses to remediation responsibilities, more stringent standards are desirable in order to assess the longer term risks.

iv) GEOGRAPHICALLY SPECIFIC TOOLS FOR DATA DISPLAY AND ANALYSIS

The Group presented its feedback in terms of disaster response models, tools and resources. Their feedback is incorporated within the following paragraphs.

Responding to disasters requires capabilities and information operative at a variety of scales (local, regional, and national). Local first-responders such as fire, emergency services or police can respond and often immediately address needs created by a small special disaster. However, as the spatial scale of the disaster increases additional resources, information and tools are needed to respond and address the consequences of the disaster.

EPA has developed a variety of spatial analysis tools incorporating GIS and fate and transport models applicable to assist emergency responders with information helpful in identifying vulnerable populations and environmental resources at the state, regional and national scales. These tools incorporate GIS data layers such as land use, infrastructure, location of chemical storage facilities, industrial plants, human census track data, and a myriad of other spatially explicit databases into decision support systems. EPA has also developed and uses, transport and fate models capable of estimating the dispersion of chemicals, particles, and radiation released by a disaster into the air and water.

These tools could be particularly valuable for disaster managers responding to incidents at the regional scale. This report recommends steps that EPA should consider to improve their spatial analysis and modeling capabilities during disasters, using tools developed for use by the agency and by other responders.

Models, Tools, and Resources. Maximum preparedness for short- and long-term emergency response actions requires development and maintenance of a variety of models, tools and other resources (resource systems). Consultations by EPA with SAB and HSAC have addressed specific elements of this overall system resource portfolio but have not provided the overall context for SAB and HSAC consideration of these reviews.

SAB recommends that EPA compile an inventory of existing models, tools and resources that are currently available for use in disaster response and present those results to SAB. These "assets" should be listed with those from other agencies considering EPA's specialized expertise, and they should be mapped against the variety of unintended or intended disasters and their applicability to each. EPA has special expertise in risk assessment of building disasters and building decontamination, water and wastewater infrastructure assessment, surface water and groundwater quality modeling, air quality modeling, emission locations and databases, municipal and industrial site locations, and ecological risk assessment. EPA tools may be especially useful in decision support for certain types of disaster response, and these applications should be identified *a priori*.

An example is the Water Sentinel Model that EPA has developed for assessing the vulnerability of water distribution systems to challenges by various contaminants. Water Sentinel, built around the EPANET water quality model for distribution systems, allows water utilities to simulate the purposeful (or accidental) input of chemical or microbial agents and predicts the impact of various scenarios on water consumers.

Identification of Gaps. Following completion of the review of the inventory, **SAB recommends a comprehensive assessment and report of the gaps in the available resource systems, and a listing of needs for further research and development.**

The SAB understands that EPA already participates in a wide variety of multi-agency drills and exercises on disaster response, and we commend EPA for the leadership shown in certain areas. SAB also recognizes that selected employees within EPA have been assigned to red or blue response teams, and they are already recognized for their capabilities in specialized areas of disaster response. These employees are expected to stop all other duties in the event of a disaster and devote themselves solely to the response for however long it takes. Such employees have laptop computers especially dedicated for disaster response, and

that drills in "bunker" locations have been successfully executed. However, it is our belief that one of the greatest remaining gaps is in the area of communications, and that the ability to locate and contact each person in the network during a disaster has not been given proper attention by the agency or by Homeland Security. **We recommend that a failsafe method for communication among key members of the disaster response team be designed and implemented.** Obviously, responders must be able also to communicate with critical models, databases, and decision support tools and to convey the results of their analysis to the responsible parties.

Prioritization of Needs. The list of gaps in the resource system inventory should be prioritized. This prioritization process should consider the environmental and human health consequences caused by missing tools or information, the impacts of related consequences (including spatial and temporal scales), and other relevant criteria. This analysis should enable optimization of allocation of EPA resources to fill these gaps over the short-, intermediate- and long-term. **SAB recommends that the listing of research needs (identified in the gap analysis) be prioritized and conveyed to the Agency and to SAB.**

Characteristics of Models, Tools and Resources. Effective use of resource systems requires functionality and reliability under a wide variety of circumstances and conditions, including disaster response situations. These characteristics should include:

Portability. To the extent possible, resource systems should be portable to allow transportation and usage in difficult field conditions. The systems should be designed to be field ready.

Redundancy. There should not be any single expert or expert-system that cannot be replaced in an emergency. Duplication of function is a necessity.

Interoperability. Models and databases must be compatible with those from other agencies such that if another person is called upon to utilize the resource, it is possible.

Vulnerability. These systems should be robust and have limited vulnerability. To the extent possible, resource systems should be able to operate when central power sources and direct internet access are not available, and they should not rely solely on standard communication lines to function.

Dissemination and Maintenance of Resource Systems. To achieve maximum effectiveness, resource systems must be disseminated to the full range of potential users including first responders and long term-managers at the local and state level, in addition to EPA central office and regional staff and other federal agencies. Resource systems should be maintained to keep their contents current and reliable. **The SAB recommends that EPA solicit feedback from users,**

particularly local and state personnel and regional EPA managers, regarding resource systems. Periodic updates of resource systems should consider comments and criticisms from users. The results of audits of response performance following actual events and trials should also be used in maintenance of resource systems.

Training and Planning Function of Resource Systems. SAB recognizes the substantial value of resource systems developed by EPA for use by local and state managers for training and planning functions, and SAB encourages EPA to maximize this function in the future. Uses of resource systems include emergency response scenario development, use within and during training exercises, and overall assessment of system response needs and capabilities.

Audits of Event Response Performance. **SAB recommends that EPA perform and encourage performance audits of event responses by its staff at the local and state level.** EPA should play a special role as compiler and synthesizer of performance results and characteristics, and as the disseminator of 'lessons learned' during major response events. These lessons should also be reflected in periodic improvements to EPA resource systems (continuous improvement).

Sensitivity of Resource Systems. In some cases, components of resource systems developed by EPA may be too sensitive to warrant general release to the public or to local and state entities. **SAB recommends that EPA carefully assess the content of its resource systems to evaluate the risks associated with their release.** Criteria recommended by SAB for this evaluation include the ability of system resources to be used to implement an attack, or to optimize consequences of an attack. Examples of resource systems that have components with considerable risk associated with release include the "consequence modeling" component of the Water Sentinel program and, to a lesser extent, the incident modeling in ECAT. Water Sentinel is a good example. If the model falls into the wrong hands, it could be used against utilities by attacking them at their most vulnerable distribution system locations.

Development of Resource Clearinghouse. **SAB strongly recommends EPA emphasize its role in development of centralized and streamlined virtual libraries of references, guidance materials and models, and other resources.** The SAB endorses efforts like that in ECAT to compile a wide breadth of information in a user-friendly form. This work should also include Internet enabled tools (with and without security) and coordination of spatial data bases (land use, land cover, census data, chemical plants). It is presumed that all counties in the US have an inventory of all chemical facilities, power plants, water and wastewater treatment facilities, hazardous waste generators, storage facilities, hospitals, research labs, universities, etc. located within their jurisdictional boundaries, in terms of types and amounts of potential contaminants and their coordinates. These inventories need to be updated annually.

g) Quality Review of the SAB Draft Report – *Advice to EPA on Advancing the Science and Application of Ecological Risk Assessment in Environmental Decision Making: A Report of the U.S. EPA Science Advisory Board (SAB)*

Members conducted a quality review of the draft report on Ecological Risk Assessment (see Attachment H) that was drafted by the Ecological Processes and Effects Committee. The Charge for SAB quality reviews is in Attachment I.

The report resulted from a study identified first by the SAB and affirmed by EPA. It involved a workshop on ecological risk assessment that became the source of the findings in the draft document. SAB Members submitted written comments on the draft report prior to the meeting (see Attachment J). Doctors Young, Dickson, Segerson and Morgan summarized parts of their written statements. Dr. Meyer stated tht she did not have any concerns relative to responding to the comments made by the SAB on the draft and that they could be accommodated in a final draft.

A motion was offered to approve the report and to allow its to be forwarded to the Administrator subject to one final quick check by Dr. Segerson who will serve as a vettor of the edits to be made. All members voted to approve the motion. No dissent was offered from this vote.

h) Quality Review of the SAB Draft Letter -- *Consultation on EPA's Risk and Technology Review Assessment Plan*

Members conducted a quality review of the draft letter highlighting various points made by Panel members during a consultation with EPA on its Risk and technology Review Assessment Plan (see Attachment K) that was drafted by the SAB Risk and Technology Review Consultative Panel. The Charge for SAB quality reviews is in Attachment I.

Dr. Rogene Henderson, Chair of the Panel, noted that the letter was written to capture several important points made during the consultation with EPA over its plan to assess residual risk among 51 source categories of hazardous air pollutant emissions. EPA is running out of time to finish these assessments. EPA started their reviews using a process that has now been changed to increase its efficiency and the Agency believes that the changes will allow their review task to be completed on time. The letter from the Panel highlights some of the important points that it made to EPA during the consultation. The Panel addressed nine charge questions during its consultation.

SAB Members submitted written comments on the draft report prior to the meeting (see Attachment L). Doctors McFarland, Morgan, Milford and Thomas discussed their comments. The actual charge to the Panel and the Panel's response, as documented in the letter, was identified as a significant issue in discussing the letter. Since the charge was not included in the transmission of the letter to the Board, and since it was not explicitly stated in the letter, Board members were not able to answer the traditional quality review question of whether the charge was adequately

responded to in the draft. That also contributed to lack of clarity on the Board's part about the actual process proposed by EPA for its residual risk evaluations, how that process differed from the earlier process, and whether the revised process would be adequate to permit high quality reviews by EPA.

Dr. Vu explained the nature of the changes to documenting SAB consultations to the Board and why this is now emerging as the preferred approach from SAB Panels. The traditional SAB approach was to notify the Administrator only that a consultation was conducted on a specific issue. Consultations are entry level interactions between EPA and the SAB on new issues that EPA is beginning work upon. They are not intended as consensus development forums and they are billed as low visibility interactions to vet ideas and not to review products at a late stage in their development. Traditionally, there has been an expectation that any issue brought to the SAB as an early consultation would be returned later for a mid-course review, and/or an end of pipe product peer review. This practice is changing and some programs do not return to the SAB for these later reviews. In the absence of written documentation on the important outcomes of a consultation, the actual advice from members participating in a consultation is open to interpretation. Therefore, Panels are increasingly choosing to include important points from the consultation in the letter to the Administrator documenting the consultation. These changes make quality reviews of the letters necessary. Because of this, the Board decided that there is a need to discuss the nature of consultations, the content of letters documenting the consultation, and the quality review of those letters at a later date to see if a change to SAB procedures might be needed.

In terms of this specific letter, there is a need to add information to make clearer what the changes are that are being agreed to by the Panel in its consultation. The Board agrees that its purpose in the quality review is to redo the Panel's work, however, the content of the documentation in the letter is important to the Board understanding what its approval is granting.

Dr. Henderson noted that she would revise the letter over night to add the needed detail for the Boards' understanding and bring it to the Board for a second look the following morning. Decision on approval of the letter was deferred until that time.

NOTE: The following paragraphs on the Risk and Technology letter were discussed on day two of the meeting; however, they are discussed here in the minutes for continuity purposes.

Dr. Henderson delivered a copy of the revised letter to the Board (see Attachment M – in the physical file only). The letter has additional information attached to provide a more complete package to inform the Board of the nature of the issue discussed and what the Panel was asked in the charge. Members noted their concerns about behavioral change in reporting institutions that now voluntarily provide information under the National Emissions Inventory. Reporting will no longer be voluntary and this may lead to behavioral change in respondents that will affect the data reported in uncertain ways. The concern should be forcefully noted.

A motion was offered, and seconded, to approve the revised letter based on the additional discussions from this session. A vote was taken and the motion was approved without dissent.

i) SAB Discussion of 30th Anniversary Meeting Plans

Dr. Vanessa Vu, Director, SAB Staff Office, updated Members on status of planning efforts for the 30th Anniversary meeting of the Science Advisory Board (Attachment N). Members had previously agreed that holding such a celebration would be appropriate because it would provide an opportunity to reflect on how external scientific advice had influenced EPA, and the quality of EPA science over the several decades of the Agency's existence.

Dr. Vu. stated that the EPA ORD Management had agreed that arranging the meeting to coincide with the 2008 EPA Science Forum (May 2008) would be useful and that it should be pursued. Plans are currently to schedule the meeting for 2 to 2 and one-half days. Dr. Vu noted that holding this event would require a significant commitment of Board as well as SAB Staff Office time.

Comments from Board Members indicated that:

i. There is value in such an event. The SAB and the Defense Science Board both share substantial reputations for their advice over the years. There is also a literature on advisory committees to draw on (both the documents and their authors as well). Considering how well the process has worked over these years would be good.
ii. Such a meeting would provide an opportunity to reflect on the state of the environment, science knowledge, at the beginning and now, as well as to consider the impact of SAB advice on the science, and science research directions, over the years.
iii. It would provide an opportunity to bring previous SAB Members, Chairs, and senior EPA officials together to engage in discussions of science advice and its impact.
iv. Having the correct people to participate will determine how successful the event would be in achieving its goal.
v. It is important to consider what will come out of the event and who will attend. (the audience will be those who usually attend the Science Forum, plus others directly interested in the advisory process; staff preparation of an "accomplishments" summary would precede the event).
vi. Such an event can also impact the quality of future scientific advice.
vii. It would provide an opportunity to reconsider the "look out panels" that were envisioned by the SAB *Beyond the Horizon* report.
viii. Several SAB Standing Committees did retrospectives in the past and these would be useful in the event.

ix. The SAB has a fairly unique role among Federal agencies and many envy EPA in having access to such a resource. Reflecting on that role and outcomes would be useful.

A continuation of the discussion on day 2 identified a number of focal points for sessions during the event. These included (suggesting members are noted in parentheses):

i. Carbon Dioxide Sequestration (Dr. Morgan)
ii. CO2 Sequestration combined with the Nitrogen Panel results along with CVPESS results (Dr. Milford)
iii. Environmentally-linked Disease Focus (Dr. Cory-Slechta)
iv. Metagenomics and Disease – the ecology of pathogens and evolution of regulatory frameworks for controlling environmentally-linked disease (Dr. Rose)
v. Neurodevelopmental Disease (children's health focus) (Dr. Lambert)
vi. Major Science Issues that will be faced over the next decade (i.e., future EPA Administrations) (Mr. Rejeski)
vii. The phenomena of states not waiting for EPA to lead on an issue, but rather stepping out front on their own to address environmental issues – Assistance of the Environmental Council of the States – ECOS – could be solicited for this (Dr. Lipoti)
viii. Climate change – alternatives and issues (Dr. Meyer)
ix. The SAB itself, the early years compared to now, with an eye toward the SAB of the future (Dr. Schnoor)
x. Economics and Behavioral Sciences – possibly built around market techniques (Dr. Kling)

Members agreed to move forward considering the following general focal points for the event:

i. **Ecological Challenges** (issues such as CVPESS, Nitrogen, Hypoxia, etc.) Drs. Meyer, dale and Dickson will lead the planning. The session is suggested to take about 2.5 hours.
ii. **Climate and Carbon Dioxide.** Drs. Morgan and Schnoor will lead the planning. The session is suggested to take form 2 to 3 hours
iii. **Market Based Methods for Environmental Management** (market based programs, voluntary programs, trade, permits). Drs. Kling and Segerson will lead the planning. The session is suggested to take about 2.5 hours.
iv. **Technological Challenges** (issues such as technology, toxico-genomics, susceptibility, computational toxicology). Drs. Bus, Lambert, and Henderson will lead the planning. The session is suggested for about 3 hours.

The event will be planned for two days duration and will use some concurrent sessions if needed. A **retrospective session/celebration** will be considered as will a **general plenary section to introduce** the event.

j) Discussion of EPA Office of Research and Development on Strategic Research Directions.

Dr. Kevin Teichman, Acting Deputy Assistant Administrator for Science, EPA Office of Research and Development, briefed the SAB on ORD's needs for SAB advice on the strategic directions for EPA's research program over the next 5 to 15 years. He proposed a new way to interact in an environment not constrained by the characteristics of an annual budget review (see Attachment O). An off-cycle review of these strategic directions would be more useful in influencing future budgets because they would influence the long-term planning that is used to frame each year's budget submission. The relationship among the activities and elements are shown in slide 5 in Dr. Teichman's presentation (Attachment O). The proposal was for an SAB meeting during September or October of 2007. Discussions at the meeting would be held among Board Members, National Program Directors, Lab and Center Directors, and possibly even the Board of Scientific Counselors (BOSC).

Dr. Teichman proposed that ORD would develop background materials to be made available on each major program component about one month before the SAB meeting. Board discussants could help ORD frame the written information so that the Board would get the information it most wants to inform the discussion. Cross cutting issues would also be discussed as appropriate.

Dr. Teichman suggested that: 1) the Board identify its discussants for each topic, 2) ORD develop "5-page" write-ups on each program area, 3) a draft agenda be developed for the meeting, and 4) a date be set for the meeting.

Members discussed a number of questions and made comments on the suggested approach. These included:

i. Would this be in place of a budget review? It would supplement such a review by giving members deeper knowledge of the strategic directions of the program. These would then be known to members so they could judge how each year's budgeted activity would contribute to accomplishing the ultimate end envisioned for each research program. This provides a good opportunity for the SAB to both be involved in planning and providing forceful comments on each budget.

ii. What type of background materials would be developed? This would be at least information on the contextual background for each program; the long term goals for each; a rationale for why the work was proposed; information on the type of outputs to be expected; and a suggestion of the outcomes to be gained as a result of each program's results. Some indication of emerging issues that are being seen would also be good, but it is not yet clear how to do this.

iii. The assumption of a flat budget over the years seems to be a problem. The ideal situation would be to focus the information and discussions on the actual research needs and not to be concerned with the budget levels during the strategic discussions. It is obvious that what work is accomplished in each research program is significantly influenced by the budget allocated to

conduct the work; however, discussions and reporting on specific program allocations fits more into the annual budget review and would be a diversion from discussions of the actual research needed and how that might be pursued. If productive, the strategic discussions will better inform the conclusions that are developed on each year's budget.

iv. How is review work of the BOSC focused? The general intent is that BOSC reviews actual research program plans and program activities as they are implemented. Questions to be answered by BOSC focus on whether the program is accomplishing what it said it would do, if the work is of high quality, and if it is useful to ORD clients. Many thought that it would be useful for BOSC members to be asked to participate in the strategic research review to be conducted by the SAB.

v. The SAB is still interested in looking at various cross-cutting view of the research program components, as it suggested in this year's budget review (examples of cross-cutting issues from this year's budget review included urban sprawl, sensitive subpopulations, climate change, etc.). This can be done for the four SAB challenge areas as well as for others that ORD would develop.

SAB Members agreed that it would be important to hold a meeting to discuss strategic directions for EPA Research. SAB Staff was directed to reschedule to meeting to an October or November time frame from that now proposed for September 19-20, 2007. Locating the meeting in Research Triangle Park, NC would be a good idea so as to allow interactions with laboratory personnel. That meeting will also work on the environmental disasters advice and be the venue for quality reviews as needed.

The Designated Federal Officer adjourned the meeting at noon.

Respectfully submitted by:

/ Signed /

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Thomas O. Miller
Designated Federal Officer
US EPA Science Advisory Board

Certified as true:

/ Signed /

_____

Dr. M. Granger Morgan
Chair
US EPA Science Advisory Board

Attachments

Attachment	Title
A	Agenda
B	Roster
C	FRN
D	Sign in sheets – physical file only
E	Morgan, May 1, 2007 Memo; June 19-20, 2007 SAB Meeting
F	Theis Figure 1
G	Theis Figure 2
H	Draft Ecological Risk Assessment Report
I	Quality Review Charge
J	Compilation of Member Comments on Draft Ecological Risk Report
K	Draft letter on Consultation on EPA's Risk and Technology Review Plan
L	Compilation of Member Comments on Draft RTR Letter
M	Revised RTR Letter with Attachments (physical file only)
N	SAB "30-Year's of Advising" (physical file only)
O	Dr. Teichman's Presentation