Summary Minutes of the
U.S. Environmental Protection Agency (EPA)
Science Advisory Board (SAB)
Advisory Panel on EPA's Report on the Environment
Advisory Meeting
March 9-12, 2004 The Watergate Hotel, Washington, D.C.

Panel Members: See Panel Roster – Appendix A

Date and Time: Tuesday, March 9, 9:00 A.M. – 5:45 P.M.; Wednesday, March 10, 9:00 A.M. – 5:45 P.M.; Thursday, March 11, 9:00 – 5:45 P.M.; and Friday, March 12, 9:00 A.M. – 12:00 P.M.

Location: The Watergate Hotel
Virginia Ave., N.W.
Washington, D.C. 20037

Purpose: The purpose of this meeting was to provide advice on the development of EPA's Report on the Environment

Attendees: Chair: Dr. Virginia Dale

Panel Members:
Dr. Mark Bain
Dr. Phillip Bromberg
Dr. Timothy Buckley
Dr. Joseph Bunnell
Dr. Ann Marie Gephart
Dr. Joseph Helble
Dr. Arturo Keller
Dr. Charles Kolb
Dr. George Lambert
Dr. Norman LeBlanc
Dr. John McManus
Dr. Maria Morandi
Dr. Kathryn Saterson
Dr. Peter Scheff
Dr. Oswald Schmitz
Dr. Mark Schwartz
Dr. Alan Steinman
Dr. Stephen Trombulak
Dr. Cynthia Warrick

EPA SAB Staff:
Dr. Thomas Armitage, Designated Federal Officer
Dr. Vanessa Vu, SAB Staff Office Director

Dr. Anthony Maciorowski, SAB Associate Director for Science
Mr. Richared Albores, SAB Acting Deputy Director
Mr. Robert Flak, SAB Staff Office
Ms. Kathleen White, SAB Staff Office

Other EPA Staff:

Thomas Barnwell, U.S. EPA, ORD, NCER
Rona Birnbaum, U.S. EPA, OAR, OAP, CAMD
Rebecca Calderon, U.S. EPA, ORD, NHEERL
Margaret Conomos U.S. EPA, OEI, OIAA
Gail Froiman, U.S. EPA, OEI, OIAA
Joseph Greenblott, U.S. EPA, OCFO, OPAA
Brenda, Groskinsky, U.S. EPA, Region 7
Michael Hadrick, U.S. EPA, OAR, OPMO
Belinda Hawkins, U.S. EPA, OEI, OIAA
Michelle Hiller Purvis, U.S. EPA, OCIR
Chris Hoff, U.S. EPA, OCFO, OPAA
Marjorie Jones, U.S. EPA, OW
Monica Jones, U.S. EPA, OAR, OPMO
Roxolana Kushuba, U.S. EPA, OIG
Jane Leggett, U.S. EPA, OAR, OAP
Jay Messer, U.S. EPA, ORD, NERL
Scott Monroe, U.S. EPA, OAR, OAP,GPD
Peter Preuss, U.S. EPA, ORD, NCEA
Tamara Saltman, U.S. EPA, OAR, OAP, CAMD
Denice Shaw, U.S. EPA, ORD, NCEA
Charles, Spooner, U.S. EPA, OW, OWOW
Kevin Summers, U.S. EPA, ORD
Steve Young, U.S. EPA, OEI, OIAA, EAD
Suzie Young, U.S. EPA, OAR, OAP, CAMD

Others Participating:

Ed Kratsen, U.S. GAO
Gary Kuajanian, private citizen
Kevin Morley, American Water Works Association
Jim Rowe, private citizen

Meeting Summary

The discussion followed the issues and timing as presented in the meeting agenda (Appendix B)

Convene Meeting, Call Attendance

Dr. Thomas Armitage, Designated Federal Officer (DFO) for the Advisory Panel on EPA's Report on the Environment (ROE Panel), opened the meeting at 9:00. He stated that the Science Advisory Board (SAB) is a chartered federal advisory committee whose meetings are public by law. He reviewed Federal Advisory Committee Act (FACA) requirements, the panel's compliance with Federal ethics and conflict-or-interest laws, and the Panel formation process. Dr. Armitage stated that, as DFO, he would be present during panel business and deliberations. Records of panel discussions are maintained and summary minutes of the meeting will be prepared and certified by the panel Chair. Dr. Armitage then asked the panel members to identify themselves and their affiliations.

Dr. Vanessa Vu, Director of the EPA Science Advisory Board Staff Office, welcomed the meeting participants and thanked them for providing advice to EPA on the draft Report on the Environment.

Purpose of the Meeting

Dr. Virginia Dale, Panel Chair, also welcomed members of the panel and thanked them for their participation. Dr. Dale reviewed the charge questions to the panel and the agenda. She noted that during the next three and one half days, the panel would hear presentations from EPA on each individual chapter in the draft Report on the Environment. Dr. Dale stated that the panel would deliberate on the five charge questions included in the information packages provided to each panelist, and would break into workgroups to begin writing the advisory report to EPA. Dr. Dale also called attention to the two public comment sessions on the agenda.

EPA Presentations on the Draft Report on the Environment

EPA representatives from program offices presented information on the Draft Report on the Environment.

Presentation on the Approach and Framework of EPA's Draft Report on the Environment

EPA representatives from the Office of Research and development described the approach and framework of the Agency's draft Report on the Environment (ROE). EPA representatives stated that the draft ROE was developed in approximately 15 months by many people. It was noted that the document developed was a first draft that would not be updated. However, a new report would be developed in 2005.

EPA's remarks on the approach and framework of the draft ROE are summarized as follows. EPA's Office of Research and Development and Office of Environmental Information were given lead responsibility for developing the ROE. EPA Administrator Whitman decided to develop the ROE in order to establish a process for reporting whether environmental conditions were improving. Several purposes were served in

developing the ROE. Many outcomes can flow from this type of report including: assessing EPA progress, targeting scientific research, and identifying emerging issues. It was noted that EPA wanted to tie the report to environmental outcomes. In this regard the human health and ecological condition chapters are anchors for the report.

In developing the report, EPA discussed indicator hierarchy (ranging from administrative endpoints to indicators of ambient condition). EPA wanted to focus on the ambient condition end of the spectrum, particularly exposure and body burden. In developing the draft ROE, EPA also discussed questions that should be addressed in the report. The Agency wanted to ask questions about the environment and see what kinds of data were available to answer the questions. EPA decided to focus on issues of importance that are national in scope.

In addition to making sure that the report addressed the right questions, EPA wanted to ensure that the indicators used in the report had been peer reviewed. Many of the data sets described in the report were not collected by EPA, but the Agency went through an intense process to evaluate the indicators. Many indicators could not be used in the ROE because spatial or temporal coverage was incomplete. EPA formed a federal agency workgroup to assist in developing the ROE and also received many comments from the States.

EPA faced a number of challenges in developing the ROE. Pressure to complete the draft ROE within a short period of time was a significant factor in some decisions made. For example, EPA decided to use existing graphics when possible. No indicators were available to answer some of the important questions due to temporal or spatial coverage, or data reliability problems. EPA wanted to focus on environmental outcomes in the ROE, but the Agency found that in some cases not enough work has been completed to demonstrate linkages and causal factors.

EPA representatives concluded the presentation by noting that the Agency can use the Report on the Environment to manage for environmental outcomes and the ROE will be particularly useful for strategic planning in conjunction with EPA's state and federal partners.

Panel discussion of the Approach and Framework of the draft ROE

Dr. Dale thanked EPA representatives for their presentation and asked the panel to discuss the first charge question. This question focused on the approaches, processes or frameworks used in the ROE. Panel members asked EPA staff when the next report on the environment might be published. EPA program office representatives responded that the next version would be produced in late 2005. They also indicated that the Agency would like the report to be prepared so it can be used to develop the next EPA Strategic Plan. It was also noted that EPA wants more regional focus in the next ROE. Additional information to provide a regional perspective will be included in the report. EPA stated that there are problems associated with using information collected and reported by states

(e.g., the Clean Water Act Section 305(b) Report) to provide an indication of national condition. Data gaps exist in these data when viewed from a national perspective.

Panel members asked EPA to describe the greatest challenges the Agency faces in developing the ROE. EPA responded that one challenge is developing a report that will answer the most important questions and serve the Agency's needs. The ROE will provide information to the public to foster a better understanding of the state of the environment. The information in the report will be used by EPA to help manage the Agency and set priorities. The Agency hopes that the Technical Report will provide information that can be used for many purposes.

The panel noted that EPA relied upon other federal agencies and reports to develop the ROE. The panel asked how EPA's next assessment would differ from other reports that have been developed. EPA responded that the Heinz Foundation did a very good job developing its report on the environment. EPA's report is distinguished from other efforts because: 1) it is much broader in coverage (e.g., it includes both ecological and human health), and 2) it is trying to make linkages between air, water, and land condition indicators and broader indicators of ecological condition.

Panel members discussed some of the problems of scale associated with selecting meaningful national indicators. EPA ORD representatives stated that if EPA scientists had been able to design monitoring programs to provide the data that will be used in the report, different indicators would have been used. EPA representatives noted that some monitoring programs could be redesigned to provide better and more useful information. EPA representatives stated that that they welcomed comments from the panel that will help the Agency do a better job of monitoring.

The panel discussed the kinds of analysis that should be conducted to develop the ROE, noting that no new analysis was provided in the current draft of the report. EPA was asked whether new analysis would be conducted for future drafts. EPA representatives responded that, although data collected by state agencies could be analyzed, EPA decided not to some of this information (such as state water quality data in the STORET system) because of differences in the sampling designs, methods, and endpoints used by the states.

The panel discussed a number of improvements that might be considered in the next ROE to ensure that more useful data are provided. It was stated that EPA should take the lead role among federal agencies in collecting data. EPA representatives responded that EPA has been working with the Department of Health and Human Services and other agencies to work toward collecting better and more useful monitoring data that can be used in the next ROE. Several panel members noted that there currently does not appear to be a national agreement on what environmental outcomes are to be reported in the ROE and how they can be measured. EPA was asked how the Agency would facilitate decisions about outcomes. EPA representatives responded that there is an expectation that the next ROE will provide more information about outcomes.

Panel members also asked whether the ROE could move toward using health outcomes as indicators, and how the Office of Management and Budget might use the ROE. EPA representatives responded that there are gaps in the data linking outcomes, sources of pollutants, and indicators. It is therefore difficult to use health outcomes as indicators. It is also difficult to look at individual exposure. With regard to use of the report by OMB, EPA representatives responded that the Agency would like to use the ROE in the strategic planning process.

The panel discussed a number of elements that were thought to be missing from the current draft of the ROE. It was noted that linkage phenomena are not well described. For example, Chapter Four is a compilation of human health trends, but there has been no effort to relate these trends to environmental conditions. There is a need to compare gradients of pollution to health outcomes. Panel members thought that some conclusions could be drawn about pollutant exposure and causality. Panel members suggested that EPA could be more lenient about accepting probabilities of relationships, particularly in public health areas of the report. Panel members also noted that there is a need to state what is left out of the ROE. Panel members noted, for example, that the process by which greenhouse gasses affect the environment was omitted from the report, as was a discussion of environmental justice.

The Chair of the panel asked EPA representatives whether the next report would consist of two volumes, a Public Report and a Technical Report. EPA representatives responded that the next report might consist of two volumes. However, EPA also wants the next ROE to be a web-based product.

Panel members asked EPA representatives if they intend to focus on regional indicators in the next report, and how they intend to do this. EPA representatives responded that the Agency intends to scale the data to focus on regional conditions. EPA is trying to take a subset of national indicators and display them with regional information.

The Chair thanked EPA staff for responding to questions and called for the next EPA presentation on the air chapter of the ROE.

<u>Presentation on the Air Chapter of the Draft Report on the Environment</u>

EPA representatives from the Office of Air and Radiation provided an overview of the Air chapter of the draft ROE. The chapter provides air quality information obtained from a number of different sources. The chapter uses information on criteria pollutants to provide statistical information about days on which air quality was exceeded acceptable conditions, and the number of people who were likely to have been affected by reduced/poor air quality. Information about acid rain and acid deposition is provided as well as sources of NO_x. Air pollutant emissions are described on a national scale.

EPA representative described the following challenges that the Agency faced in developing this chapter. It was stated that some air pollution issues are global. It was difficult to address global issues in a national report. It was also difficult to identify

indicators of ecological health in the chapter. Another challenge faced by EPA is that and EPA generates none of the stratospheric ozone or indoor air data used in the ROE. Other challenges were also mentioned. Air monitoring occurs largely in urban areas, and indicators do not provide exposure data. Emissions are based on estimates prepared by states. Geographic coverage of lake and stream monitoring is incomplete. There is no national monitoring network for air toxics and monitoring is limited (only six contaminants are monitored nationally). There are also limited data on indoor exposure to air toxics. Some information is available on exposure to tobacco smoke. EPA expects that more indoor air quality data will become available in the future as data are collected on radon mitigation and tobacco smoke.

Panel Discussion of the Air Chapter

The Chair then asked the panel to discuss the air chapter and charge questions, 2, 3, 4, and 5. These charge questions focused on the indicators and conclusions in the chapter. Panel members identified and discussed a number of errors and omissions in the air chapter. One panel member noted that audiences must understand differences between primary air pollutants and secondary air pollutants (those synthesized in the atmosphere) and identified the following concerns. Only two of the six criteria pollutants discussed in the ROE have primary emission sources that dominate atmospheric concentrations. Others are synthesized in the atmosphere. Over half of the CO in the atmosphere comes from oxidation of volatile organic compounds. The discussion in the ROE addressing emission reductions does not make sense because half of the criteria pollutants are not emitted. The concept of secondary pollutants needs to be communicated early in the air chapter of the report. The discussion of stratospheric ozone in the air chapter is correct but the data are not complete. More recent data should be included.

Several panel members discussed the exhibits in the air chapter. Some panel members stated that they found Exhibit 1-3 to be confusing. They also noted that it is difficult to determine how baselines were established. It is hard to tell how much change is related to reduction versus how levels of pollutants are reported. EPA representatives indicated that pollutant levels were normalized for population. The panel discussed the issue of normalization for population and noted that normalization nationally or regionally does not have much meaning. Therefore, it is important to look at metropolitan areas. EPA representatives responded that spatial aggregation should be done in a more meaningful way.

Some panel members expressed disappointment with the indoor air section. The panelists noted that there are more indoor air problems than radon and tobacco smoke. The panelists stated that a discussion of EPA residential studies of air toxics is needed. Issues such as parking cars in attached garages should be discussed in the ROE. EPA representatives responded that it is difficult to find data to address these issues. EPA representatives noted that data are available on environmental tobacco smoke and radon, so including these data in the ROE and relating them to health effects is important.

The panel discussed the treatment of air pollution sources and fate in the draft ROE. Several panel members thought that the discussion of air pollution sources and fate in the draft ROE is inadequate. Panelists stated that particulate matter is a problem pollutant and that ulrafine particles are present in air and may have their own toxicology. Several panelists stated that the particulate matter discussion in the draft ROE is inadequate. One panel member stated that he was confused by "what is meant by indicators." He asked what indicators human health effects in the draft ROE were associated with outdoor pollutants, and noted that no air indicators were identified in the report for ecological effects or acid deposition. He noted that readers of the report are left with the impression that outdoor air quality has no effect upon human health or ecology. EPA staff responded that no indicators were identified that could be used to make these kinds of statements. Criteria documents are available for some toxics, but EPA did not want to use such individual studies. EPA representatives noted that some of the issues discussed should be addressed in the next ROE. One panel member stated that it is incorrect to use a definition of indicator that is too restrictive.

The panel continued to discuss a number of indicators missing from the air chapter of the draft ROE. One member noted that there are no indicators of transboundary air pollution. Panelists stated that audiences want to know what is happening in their communities, so it would be appropriate to reference regional and local information. Another panel member noted that asthma and respiratory disease are discussed in the draft ROE, but the diseases are not linked to air quality indicators. The panel member also noted that it is misleading to say that there are no indicators that can be used to characterize indoor air quality. Linkages such as exposure to benzene and incidence of leukemia should be examined. EPA staff responded that was difficult to identify good indicators for use in linking air quality to disease. Some studies are available, but it is difficult to find good indicators. For example, there is no mandatory reporting of asthma; therefore the available data are limited.

One panel member pointed out that, although the draft ROE is not, and should not be, a report on EPA activities, it would be helpful to include in the document a list of policy changes that have occurred. This information would enable readers to understand why certain trends can be observed. Another panel member noted that discussion of global mercury is absent from the draft ROE. The panelist stated that this should be addressed.

A panel member noted that the air chapter starts with a discussion of ambient air concentrations. The panelist stated that, although this is responsive to the public's interest in the issue, from a scientific perspective it would make sense to start with emissions. The panelist stated that criteria pollutants represent a small portion of exposure. The panelist also stated that the national air toxics assessment would provide useful information for the ROE in summarizing exposure. The panel member indicated that this information should be included in the draft ROE.

Another panel member asked EPA staff why international transport of dust was not addressed in the draft ROE. EPA staff responded that the Agency did not have the time or ability to look at international issues such as dust transport. Another panel member

stated that an approach to analyzing such information that could be considered is aggregating data on the basis of regional and global transport.

A panel member noted that it is hard to address air pollution problems without data on air toxics. The panelist stated that the national air toxics assessment data should be included in the ROE. The panelist noted that, although the 20 national air toxics assessment sites will not provide a national perspective, the data are important. The panelist further noted that, if EPA wants to inform the public about air quality, the Agency should provide data that indicate more than just national and regional trends. He stated that there are opportunities to provide information that is not included in the draft ROE.

Another panel member noted that occupational exposures to air toxics are not addressed in the draft ROE. EPA staff responded that this is not something that EPA is working on. EPA staff also noted that it is hard to address global problems, EPA has focused the ROE on the things for which EPA is responsible.

The panel Chair stated that the ROE should discuss the availability of data and indicate where new data will be available in the future. In this regard the report could provide more regional or local data.

Other panel members noted that EPA should consider using data from studies that have been conducted in areas where EPA does not have statutory authority. An example discussed by the panel was indoor air quality. A panelist commented that EPA plays an important role in indoor air quality, although it may be an indirect role. Another panel member stated that the ROE is a report on the environment in the U.S. so it is important to look at what is coming in and going out of the U.S. It is also very important to explain what has been left out of the ROE and why. Members of the panel commented that EPA has done a good job in the ROE of identifying gaps in the quality of existing data and indicators, but it is also important to discuss broader gaps. For example, what compounds are relevant to assessment of indoor air and why data on these compounds should be provided.

One panel member asked EPA staff whether the next ROE would narrowly focus on areas where EPA has responsibility. EPA staff responded that the Agency couldn't do a broad national report by itself. A very broad national report would have to be a multi-agency responsibility. EPA will focus on areas where the Agency has responsibility. One panel member noted that this might not be a good idea; it would be wrong for EPA to focus too narrowly in developing the next ROE.

Another panel member stated that if the ROE will not be an all-encompassing report, EPA should define what the Agency means by "environment." The panelist stated that EPA should indicate whether the report addresses those areas where the agency has statutory responsibility. Some panel members commented that the report should provide more information that is valid on a large scale, even if it is acquired from smaller studies. Panelists commented that a problem with the current draft of the draft ROE is that it has excluded data that did not meet the definition of the word, "indicator."

At the conclusion of the discussion of the air chapter, the panel recessed for lunch. The discussion of the water chapter resumed at 1:45 p.m.

Presentation on the Water Chapter of the draft Report on the Environment

Staff from EPA's Office of Water presented an overview of the water chapter emphasizing the following points. The framework of the chapter was developed using the State of the Great Lakes report as a model. The chapter incorporates water quality data available at the national level such as: information from the EPA's National Coastal Condition Report, information about drinking water, information about beaches and recreation waters (days that beaches were open), and information on waters with fish consumption advisories.

One of the challenges EPA faced in developing this report is that some of the best data are not available at the national level. However, EPA wants to obtain better water monitoring data, and efforts are underway in the Office of Water to obtain these data. States are moving toward using different monitoring protocols. It has been difficult to aggregate monitoring information gathered by different states. EPA has tried to track and report changes in wetland functions, and EPA's Drinking Water Program is working to include more data. Data gaps included in the water chapter were identified in a national dialogue sessions held during development of the draft ROE.

Panel Discussion of the Water Chapter

The Chair thanked EPA staff for the presentation on the water chapter and asked the panel to discuss the water chapter and charge questions 2, 3, 4, and 5.
Panel members discussed the water chapter of the ROE and asked EPA Office of Water staff a number of questions. One panel member stated that the rationale for including various indicators should be better explained and that EPA should look at the indicators in hierarchical fashion. The panelist noted that it is important to state the criteria for choosing indicators and that nothing in the document indicates what criteria were used to pick indicators. EPA Office of Water staff responded that national roundtable meetings were held to select the indicators.

A panel member noted that EPA should not use the same benchmark or criterion to evaluate the health of different ecosystems. Dissolved oxygen was discussed by the panel as an example. A panelist stated that the 5 mg/l threshold is not a valid benchmark in all systems. Similarly, water clarity can be quite different in different systems. Another panel member stated that the draft ROE should contain information on changes in indicators over time. The panelist stated that EPA should move from a static to a dynamic approach and also that it is important to correct "overstandardized" approaches. EPA staff responded, stating that much of the benchmark information included in the ROE came from the Agency's Coastal Condition Report. This information has been peer reviewed.

One panel member expressed surprise at EPA's statement in the overview presentation that there are few data available to assess the state of watersheds. He stated that information is available from the Clean Water Act section 303(d) list of waters. The panelist noted that this list provides a measure that can be used as an indicator of water quality. The panelist recommended that EPA identify all available information that could be used in the ROE and state in the report which data are not valid for use in a national assessment. EPA staff responded that the Agency is considering how to proceed with indicators work. Issues being considered include: how to assess the adequacy of data quality and how to aggregate data.

Another panel member noted that the Chesapeake Bay Program has established goals. These kinds of goals could be referenced in the ROE. EPA staff responded that performance goals must be differentiated from indicators.

Panel members noted that in developing the ROE EPA relied heavily on currently active government programs for data. USGS databases were used to develop the report. A panel member stated that there is much more information available to EPA for use in developing the ROE. The panel member identified a number of problems in the process used to select indicators for the draft ROE and cited several examples. The panelist noted that water clarity is inappropriate for use in naturally turbid systems such as some coastal waters. He questioned why this indicator was included in the ROE if it is not a useful indicator in some systems.

The panel discussed the use of descriptors like good, fair, and poor in the draft ROE to identify water quality. A number of panelists thought such descriptors should not be used and that EPA should instead look at trends.

The panel also discussed the appropriate scale of data for use in the ROE. Some panel members recommended that EPA look at data on a local scale and aggregate it to a national scale. EPA was commended for looking at indicators from a national perspective, but panel members stressed that it is important to include indicators that can highlight local conditions.

The panel also discussed indicators that are missing in the water chapter. Some panel members thought that important indicators such as the state of fish stocks should be included in the ROE. A panel member asked whether EPA knows how much drinking water data are collected but not reported to the Agency. EPA staff responded that various rules enable the Agency to collect drinking water information, and some data are underreported. However, some of the identified underreporting is simply late reporting of data. A panelist stated that it is misleading not to have an indicator in the ROE associated with drinking water related health effects. EPA staff responded that the Agency does not have a health effects tracking system. Panelists identified several other kinds of useful data that could be used to develop the ROE. These included: data generated by private industry and data describing power plant impacts such as fish killed in cooling systems. A panelist noted that there are no indicators in the report that can provide information on ecological effects related to energy industry activities. The panel

also discussed emerging pollutants and stressed the importance of including information about them in the ROE.

The panel then discussed the approaches to identifying questions and indicators that should be included in the ROE. Some panel members thought that EPA should conceptualize what an ecosystem is and identify a suite of questions and indicators that transcend environmental problems. This would require serious thinking to define the ecosystem. It was noted that in developing the ROE EPA should think from an ecosystem perspective. Panelists stated that in order to develop the next ROE, EPA should begin a dialogue to identify desired outcomes. Panelists noted that better conceptualization is needed "upfront" in the ROE. A panelist suggested that EPA should use the concept of essential ecosystem attributes to develop the questions and indicators included in the report. The panel asked EPA staff what processes they might use to handle this suggestion. EPA staff responded that they are trying to build competencies within EPA so this kind of work can be done internally. Within EPA there is a steering committee of senior managers, and the committee can work to incorporate these approaches into the next ROE. EPA stated that the Agency wants to get states more involved in developing the report.

The Chair thanked EPA staff for responding to questions and asked for the next EPA presentation on the land chapter of the ROE.

Presentation of the Land Chapter of the Report on the Environment

EPA staff provided an overview of the land chapter focusing on the following points. The land chapter includes information on land use, chemicals in the landscape, and waste and contaminated land. There are twelve questions in the chapter and twenty-one indicators. Five questions have no associated indicators. EPA staff presented a summary of the conclusions in the land chapter of the report. Information was presented on extent of cropland and forestland, the amount of toxic chemicals managed, nitrogen and phosphorus runoff, and pesticide residues in food. Information was also presented on the amount of municipal solid waste and hazardous waste and superfund sites in the U.S. EPA staff also presented information on challenges and gaps they faced in developing the land chapter of the ROE. These challenges included: limited ability to characterize and track land use over time, need for indicators to measure and track ecosystem services, lack of systematic survey to provide data on pesticide and fertilizer use, incomplete tracking of toxic chemicals by the Toxics Release Inventory, a limited number of indicators of ambient concentrations or exposures of pesticides or toxics to fish and wildlife, need for better indicators of human health and ecological effects of pesticides and toxic chemicals, and incomplete data on waste generation and management.

EPA staff concluded the presentation by identifying some issues that the Agency wants to address in developing future Reports to Congress. These issues included: obtaining better indicators of the relationships between land use and human health and ecological endpoints; using better indicators of habitat fragmentation; addressing concerns about TRI data quality and reliability; obtaining more pesticide data, particularly on urban use

of pesticides; and obtaining better data on water and contaminated land, particularly data available at the state and local level. EPA staff noted that in the future, land use and land cover indicators may be moved to other chapters, and EPA will do a better job of integrating "pressures" with indicators of ambient conditions, exposures, and effects indicators in other chapters of the ROE.

Panel Discussion of the Land Chapter

The Chair thanked EPA for the presentation on the land chapter and asked the panel to discuss the chapter and charge questions 2, 3, 4, and 5. Panelists discussed the need to use trend data in the ROE. It was noted that some trend data are included in the chapter, but benchmarks for trends are needed. A benchmark is needed to make judgments about the basis for action. The land chapter can set the stage for ecological analysis, so it is important to have benchmarks.

The panel provided the following comments. Panelists noted that the land chapter is incomplete and should be "fixed" before the next draft of the ROE. Generally, the questions posed in the chapter are good, but EPA should add more categories of indicators. If the report is limited to only indicators that meet the highest standards, it will not be possible to prioritize for the future. EPA should add more categories of data to the ROE including applicable data that may not be available for the entire U.S. but are available for one or two regions. Panelists noted that EPA should also identify needed data that are not even available regionally. Some of the questions posed in the land chapter cannot be answered. The questions should be phrased such that answers can be provided, or the data needed to answer the questions can be identified.

EPA staff responded to panel comments stating that the Agency wants consistency in the types of questions and indicators used in various chapters. EPA staff stated that in transitioning from the land chapter to the ecological condition chapter, questions and indicators were left in the land chapter in order to address them in detail.

The panel continued to discuss the development of appropriate questions and use of indicators. Some panelists stated that EPA should link questions asked in the ROE to goals. A panelist noted that the big issue of "national data gathering needs" is not completely addressed in the draft ROE. It was suggested that EPA consider developing a report on information that must be collected to make a better ROE. Another panelist stated that EPA should be careful using available data and definitions to characterize land use. People define land use differently. For example, forestland can be defined in different ways. Panel members indicated that the land chapter is less "question driven" than it could be. The use of various land use definitions to characterize the condition of land can lead to misleading statements. Instead of discussing conditions in terms of land use definitions, EPA should consider discussing differences in ecological condition in terms of function. EPA staff responded that it could be difficult to find the data needed for these types of analyses.

The panel then discussed the issue of environmental justice. A panelist noted that an environmental justice section should be included in the land chapter. The panelist commented that EPA should be able to quantify the number of Superfind sites, RCRA facilities, and other permitted facilities and develop a measure of their impact on environmental justice.

The panel also discussed the lack of connections between the land use chapter and the human health and ecological condition chapters. Some panelists suggested that the first chapter in the ROE should focus on ecosystem health and human health. The panelists suggested that EPA could lay out the overarching framework of the report in the first chapter, and subsequent chapters could then "break down" the discussion to focus on specific air, water, and land indicators, and a final chapter could provide the conclusions of the report. EPA staff responded, stating that consideration was given to such a structure when the report was developed.

The data gaps sections of the land use chapter and other chapters were discussed. The panel also identified missing indicators that should be included in the land chapter. Some panelists stated that there is inconsistency in the data gaps sections of the chapters in the ROE. A number of specific examples of problems were identified in the data gaps sections. The panel questioned why the ability to detect pesticides below health effects was identified in the draft ROE as a gap or limitation. A panelist asked why leaking underground storage tanks were not included as in indicator in the land chapter. EPA responded that there is some contextual discussion of this in the chapter, but the Agency questioned whether it should be used as an indicator.

Analyses presented in the ROE were discussed. The panel asked whether EPA had given thought to using common baseline years for indicator trends discussed in the report. EPA responded that it would be useful to do this, but in many cases the data are not available. The panel noted that in drawing conclusions about patterns and trends, EPA should carefully consider the years for which data are available. One panelist noted that analyses of greater statistical rigor are needed in the ROE. Another panelist stated that in some places the ROE appeared to be presenting a report of information on EPA's regulatory programs, and in other places it presented a "snapshot" of environmental conditions. Panelist stated that the ROE should not be a report on EPA programs and policy; it should focus on environmental status and trends. EPA staff responded that the Agency did not develop the ROE with the intent that it be a report on agency programs or policies.

Panelists discussed the possible use of the ROE for strategic planning and budgeting. EPA was asked whether the Agency plans to use current draft of the ROE for this purpose and also whether the next report will be more definitive. EPA staff responded that the next ROE would be built upon the current draft; EPA will pay close attention to the criticisms of the current draft. The current and future drafts of the ROE will provide useful information that could be used for a variety of planning purposes.

At the conclusion of the discussion of the land chapter at 5:00 p.m the Chair asked meeting attendees if there were public comments that should be considered as the panel continued to deliberate on the charge questions. There were no public comments.

The Chair then thanked the panel and EPA staff for the discussion of the first three chapters of the ROE and outlined plans for the next day of the meeting. The Chair noted that after a brief introductory plenary session on the next day of the meeting the panel would break out into concurrent air, water, and land writing group meetings to develop responses to the charge questions.

The Chair asked the panel if there were further questions. The panel had no further questions so the panel recessed for the day.

Reconvene meeting on March 10, 2004

The Chair of the panel reconvened the meeting at 9:00 on Wednesday, March 10 and discussed the agenda for the day. The Chair noted that panel members were assigned to air, water, or land writing groups. The chair identified rooms where each of the three breakout writing group sessions would be held during the morning and asked each group to convene in those rooms to draft responses to the charge questions. The chair asked each group to work on developing responses to all of the charge questions but to focus only on the chapter assigned to the group. The chair asked for questions from the panel.

One panelist asked whether the group would have an opportunity to discuss the indicator scale issue in more detail. The Chair responded that there was time on the agenda for panel discussion of indicator scale issues. The Chair asked panelists to keep a separate list of misunderstandings or typographical errors that could be included as an appendix in the panel's advisory report to EPA. The chair also asked the panel to identify key points that should be included in an executive summary of the advisory report to EPA or in a transmittal letter to the Agency.

The Chair asked the panel to reconvene in plenary session at 1:30 p.m. for presentations and deliberation on chapters 4 and 5 of the ROE.

Breakout Writing Groups on Chapters 1, 2, and 3 of the ROE

At 9:15, a.m. the panel broke into air, water, and land writing groups to develop responses to the charge questions.

Presentation of the Human Health Chapter of the ROE

At 1:15 p.m. the panel reconvened in plenary session and EPA staff presented an overview of the human health chapter of the ROE. The EPA presentation covered: the process followed to develop the chapter, the challenges faced, the questions and indicators included in the chapter, and the conclusions in the chapter. To develop the

chapter, EPA held an organizational meeting, formed a workgroup to develop an initial chapter outline, and held two additional workgroup meetings before the final draft was completed. Indicators of health in the chapter included: mortality, life expectancy, birth rate, specific causes of death, susceptible populations, and some emerging issues. Indicators of exposure included in the chapter included dosimetry (biomonitoring) information.

EPA faced a number of challenges in developing the chapter. One challenge was describing the linkages between association and causality. EPA used a number of case studies to illustrate linkages. In developing the chapter EPA staff also had discussions about how to use risk assessment and how to use mortality and morbidity data. EPA staff noted that the Agency wanted to "move beyond risk assessment" in developing the human health chapter of the ROE. A problem faced by EPA is that the Agency does not collect the health data. EPA also had discussions about what the Agency wanted people to do with the data in the ROE. EPA wanted people to understand the meaning of exposure levels, for example, what it means to have a certain level of lead in the air. EPA concluded that the best way to accomplish this would be to use case studies.

EPA staff stated that trends and indicators in the chapter are provided in a table. Exposure indicators were provided by the Centers for Disease Control's National Health and Nutrition Examination Survey (NHANES) report. Staff noted that EPA found it difficult to use the NHANES report to make local linkages. A number of conclusions are included in the chapter. EPA found that the health of the American public is good and improving. Infant mortality in the U.S. is lower than in some countries but higher than in others. EPA found that many studies have demonstrated an association between environmental exposure and certain diseases or health problems, but this is not the same as a cause and effect. EPA also found that people vary in their susceptibility to toxic environmental contaminants. Factors influencing susceptibility include genetics, age, lifestyle, and health.

EPA staff outlined the steps that will be followed in developing the next ROE. EPA is conducting research to provide more data needed to establish linkages. EPA is also partnering with other institutions and states to develop better information for the next ROE. A number of human health issues should be addressed. These issues include: the fact that indicators may or may not be linked to environmental exposure, the need for more information on the relationship between environmental health and general health, the need to translate the intricacies involved in exposure to dose and subsequent health effect, missed opportunities to discuss the complexity of racial and ethnic subpopulations (differential risk), and the role of new monitoring technologies and physiologic or genetic technologies in the development of measures to protect human health. EPA wants to improve the human health chapter by: developing a better explanation of linkages; developing case studies that illustrate goals; describing the benefits associated with Agency actions; provide information about sensitive subpopulations; and provide better integration with the air, water, and land chapters of the ROE.

Panel Discussion of the Human Health Chapter

The Chair thanked EPA staff for the chapter presentation and asked the panel to discuss the air chapter and charge questions 2, 3, 4, and 5. Panel members offered a number of comments on the chapter. One panel member noted that EPA should be aware that teenage pregnancy is strongly associated with infant mortality. The panel member also noted that in discussing new technology, EPA would have to address technologies that look at genes. A panelist stated that some new data are available to document the effects of exposure to lead on IQ and time to puberty. It was also noted that the incidence of autism is 2-3 times higher identified in the health chapter of the ROE. A panelist suggested that good data are available linking chlorpyrifos exposures and health effects.

The panel discussed the role of risk assessment in developing the chapter and asked how EPA intended to move past risk assessment. A panelist noted that a challenge in understanding cancer risk is looking at the effects of low-level exposure. The panelist asked EPA how this could be done without risk assessment. EPA staff responded that establishing linkages might not always require risk assessment. Linkages can be established by looking at whether health has changed.

One panelist noted that there was not a clear linkage between environmental agents and some of the health effects endpoints discussed in the chapter. The panel member stated that EPA should show exposure and correlate the range of exposure to health effects. In order to accomplish this, EPA should tell the exposure assessment groups within EPA that their data will have to be used in health effects studies. A panelist also noted that indicators in the chapter are defined in a way that makes it difficult to answer questions. For example, it is difficult to link indicators in the air chapter to effects discussed in the health chapter.

The panel discussed the issue of causality. A panelist noted that EPA should decide what level of causality is needed to take action. It is not always necessary to prove causality in order to take action, and this should be addressed in the ROE. EPA responded that the ROE has not addressed the issue of when EPA will take regulatory action. A question that has to be answered however is, “at what point do we have enough data to say we have a connection?”

Another panelist stated that the health chapter should be organized to present information that can indicate whether there are mechanistic data available to connect environmental conditions and health effects. The panelist stated that very little of this kind of information is presented in the ROE. The panel member also noted that the ROE does not provide a discussion of developmental effects of contaminants like mercury on children. It was stated that including developmental effects in the ROE would make the chapter more relevant. The panel also noted that an environmental chemical could exacerbate an effect even if it does not cause it. Panelists noted that this kind of discussion is not in the ROE. For example, the ROE could discuss certain effects of exposure to contaminants in breast mild and food. Endocrine disrupters could also be discussed as indicators. EPA staff responded that it was not the intent of the Agency to conduct a risk assessment in the health chapter. EPA’s intent was to identify what the

Agency could say about existing information. Staff stated that this is an attributable risk issue and that there are opportunities to use this chapter as a springboard to other issues.

The panel discussed the possible use of maps in the chapter. One panelist noted geospatial information is available for much of the data used by EPA. Maps could be used to show the incidence of disease. The panelist also noted that disease body burden does not mean health, and the health chapter of the ROE should provide a message about health, indicating where the population is in relation to a baseline.

A panelist stated that the utility of the health chapter is hypothesis generation, not testing. Hypothesis generation can raise questions that can identify research priorities. The panelist noted that it is good to see the emphasis in the health chapter on biomarkers. Biomarkers are likely to play a role in establishing linkages. Another member of the panel stated that there is much variability in biomarker data and this should be acknowledged in the ROE.

The panel discussed a number of indicators that are missing from the health chapter. Panelists noted that infectious disease is an emerging topic that should be more fully discussed in the chapter. A panelist noted that birth defect data are available for a few states. In New Jersery, for example, there is a wealth of information that could be used. A panel member asked EPA staff whether there was consideration given to discussing occupational health information or exposure associated with the 9/11 terrorist attacks. EPA staff responded that the agency would like to look at this kind of information in developing the next iteration of the ROE. Another panelist stated that he was surprised by the tone of the infectious disease discussion the health chapter. The chapter appeared to paint a “rosey” picture. The panelist asked whether there was a reason for omitting the issue of antibiotic resistance. EPA staff responded that this issue was discussed when the ROE was developed. EPA could not address this within the time constraints for developing the report.

Another panelist noted that EPA should identify important national indicators in the health chapter, and other chapters, irrespective of whether the data are available. Panelists also discussed the importance of providing a discussion of uncertainty and weight of evidence in the chapter. The panel discussed the need to combine national, regional, and site-specific information in the report and noted that developing a web-based product is one way to do this. EPA responded that the Agency wants to develop a web-based product for the next ROE.

The panel discussed the use of regional and site-specific data, and encouraged EPA to use this kind of information and to discuss how it could be scaled up to the national level. A panelist noted that it is not necessary to see results everywhere to accept an association. It is not necessary to prove everything to come up with a paradigm. Another panelist noted that it is necessary to draw boundaries around an effect to make it useful.

The Chair thanked EPA staff for responding to panel questions and stated that the next topic to be discussed would be the ecological condition chapter of the ROE.

Presentation of the Ecological Condition Chapter of the ROE

After a fifteen-minute break, the chair called upon EPA staff to present an overview of the ecological condition chapter of the ROE.

EPA staff described the content of the ecological condition chapter, noting that it presents the concept of ecological condition through an "EPA lens." In developing the chapter, EPA chose to use the concept of ecosystem categories as opposed to "pieces of real estate." The indicator framework of essential ecosystem attributes previously described by the Science Advisory Board was used in the chapter. A number of questions were asked in the chapter. These questions were, what is the ecological condition of: forests, farmlands, grasslands, and shrublands, urban and suburban areas, fresh waters, coasts and oceans, and the whole nation?

EPA staff indicated that, in developing the chapter there was some frustration with the lack of indicators available at the regional level. Staff summarized EPA findings concerning the questions posed in the chapter.

With regard to the ecological condition of forests, EPA found that: 1) The available data generally are not sufficient to track the progress of EPA's programs as they relate to forests, 2) One quarter of monitoring plots show more than a small amount of ozone damage to leaves, 3) Nitrate is low in most forest streams, but few streams are monitored in the Northeast where atmospheric deposition is high, 4) One fifth of forests show poor tree condition, but it may not be related to EPA programs, and 5) There are regional shifts in bird populations, but they may not be related to EPA programs.

With regard to the ecological condition of farmlands, EPA found that: 1) There are no nationally consistent indicators of the condition of farmlands as it relates to EPA programs, 2) Most indicators of chemical and physical attributes of farmlands are based on land use, rather than measurements of the pollutants themselves, 3) Nitrogen and phosphorus in farmland streams are higher than in urban streams, and most stream samples taken in the USGS National Water Quality Assessment (NAWQA) Program have at least one pesticide concentration that exceeded aquatic life guidelines.

With regard to the ecological condition of fresh waters, EPA found that: 1) There are few nationally consistent indicators of the ecological condition of fresh waters as it relates to EPA programs, 2) Water, sediment and fish tissue in half of the streams sampled in the NAWQA Program exceeded aquatic life guidelines, but the data cannot be extrapolated to streams not sampled, 3) Lakes and streams in three regions are becoming less acidic, and 4) Unbiased estimates of stream condition based on biotic condition are available only for the Mid-Atlantic.

With regard to the ecological condition of coasts and oceans, EPA found that: 1) There are several constant indicators of ecological condition of east and Gulf coast coastal waters that relate to EPA Programs, 2) About 1% of coastal wetlands have been lost since

the 1950's, 3) Chlorophyll a was above 15 ppm in one third of Mid-Atlantic estuaries, but national data were not available, 4) A number of conclusions were presented about dissolved oxygen, sediment contaminants, light penetration, benthic community condition, and fish deformities in Gulf Coast estuaries.

With regard to the ecological condition of the nation, EPA found that: 1) there is only one nationally consistent indicator of the condition of the entire nation that relates significantly to EPA programs, and 2) Nitrogen loads in four major rivers show a two-fold increase since the 1950's.

EPA staff presented the following key challenges faced in developing the ecological condition chapter. Major data gaps were found when EPA looked for the following types of nationally comparable indicators: process indicators, hydrology-geomorphology indicators, lake and stream biotic community indicators, and disturbance regime indicators. EPA found that some indicators in the FY 03 ROE may not be suitable for reporting on tends in outcomes of EPA programs because changes may not be evident in the appropriate scale of time. EPA staff also noted that it may be difficult to obtain future data from existing ecological monitoring programs because it can be hard to "keep them going." EPA staff concluded the presentation by identifying work that can improve the chapter. EPA staff stated that they would like to tie ecological outcome indicators to specific sources of pollutants, ambient concentration of pollutants, and exposure indicators contained in the first three chapters of the ROE. EPA staff would also like to focus on fewer indicators of big questions such as biodiversity, landscape change, nitrogen transport, primary productivity, and deformities. EPA staff would also like to rely more on narrative summaries of major reports on big issues.

Panel Discussion of the Ecological Condition Chapter

The Chair thanked EPA staff for the presentation and asked the panel to discuss the chapter and charge questions 2, 3, 4, and 5.

The panel discussed the measures in Exhibit 23 on page 5-39 of the ROE. It was noted that the measures in the exhibit are important but they don't have anything to do with sources of pollutants. One panelist asked whether the focus on ecological condition in the chapter was bounded by EPA's mission. EPA staff responded that Agency programs focus on load reduction, but other factors affect ecological condition. For example, land use and fishery management affect fish communities. In developing the ROE, EPA wanted to understand things that affect communities and not focus narrowly on EPA programs. Another panelist noted that the ROE should address big questions that people worry about. The report should not be limited to indicators affected by EPA programs.

The panel then discussed the indicators used in the chapter. One panelist stated that the chapter frequently and incorrectly states that no peer-reviewed indicators are available to answer questions posed in the document. The panelist noted that this statement really means that no published report is available for use. The panelist stated that there are much indicator data available for use, although the data have not all been included in

published reports. Panelists noted that mining these data would be useful. For example, analyses in the Heinz report were used in the ROE, but EPA would probably find that the Agency could do a better job of spatial analysis if it completed new analyses of data referenced in the Heinz Report. Panelists stated that EPA needs to move beyond the analyses and conclusions taken from published reports, and conduct its own analyses of data. EPA staff responded that if indicators were available in peer reviewed literature they would have been used. EPA found that often no indicator data were available at all. EPA staff noted that 75% of the data used in the chapter were gathered by other agencies.

A panelist noted that indicators of greater significance are needed in the chapter, and that the number of indicator in the chapter could be reduced. The panelist asked EPA staff if new analyses would be included in the next version of the ROE. EPA staff responded that the Agency is looking at including new graphics, but it is not certain how much new analysis will be included in the next report. The panel discussed the placement of certain indicators in individual chapters. Panelists noted that in some cases, indicators that should have been placed in the ecological condition chapter were instead placed in the water and land chapters. In other cases, indicators in the ecological condition chapter should have been placed in the water and land chapters.

The panel further discussed the need to include more analyses of data in the ROE, rather than using analyses published in other reports. One panelist stated that the ROE uses input from the Heinz Report to characterize species at risk and questioned why U.S. Fish and Wildlife Service endangered species data were not used in the ROE. EPA staff responded that it would be best to use both the Heinz data and data available from the U.S. Fish and Wildlife Service.

The panel then further discussed the number of indicators used in the ecological condition chapter and the types of indicators used in the chapter. One panelist stated that the ROE Technical Document provides information that can be added to the ROE Public Report. The panelist noted that it would be good to present annual data on indicators related to climate condition, such as wildfires. Panelists stated that, in future reports, climate change information should be presented within the technical document. One panelist stated that the sediment toxicity indicators used in the report were good, but that the ROE should contain more analysis of the toxicity information and other indicator data (such as dissolved oxygen and water clarity) that can vary naturally on a site-specific basis. EPA staff responded that the Agency's Coastal Condition report identifies a dissolved oxygen level of 5.0 mg/l as an indicator of good to fair conditions. Poor conditions are indicated by a dissolved oxygen level of 2.0 mg/l. EPA staff stated that this indicator is site-specific, but most people agree that dissolved oxygen levels at less than or equal to 2.0 mg/l indicate poor conditions.

The panel further discussed indicators used in the ecological condition chapter. Panelists stated that the ecological condition chapter contains much information, but it should be analyzed to answer big questions and tell a story about ecological condition. One panelist noted that the gaps and limitations section of the chapter is not consistent. Some indicator gaps are presented with too much information, and some have too little

information. It is important to distinguish between the limitations of the indicator and the limitations of the data. If the indicator is of limited use, this raises a question about why it is included in the ROE. Several panelists reiterated that that more syntheses should be included in the chapter.

Panel Discussion of the Organization of the draft ROE

The Chair thanked EPA staff for responding to panel questions on the ecological condition chapter and then asked the panel to discuss recommendations concerning the overall organization of the ROE.

Several panelists noted that the air and water chapters provided the kind of information needed for the report, but that the panel can offer many recommendations concerning the use of better indicators and analysis of data.

Panelists stated that more work is needed to reformulate and reorganize the land chapter. The panel discussed the need for an expanded introduction to the ROE and a vision chapter identifying the criteria used to select questions and indicators to be included in the report. The panel noted that more syntheses are needed in the human health and ecological condition chapters.

The panel also discussed the need to move various parts of the chapters to different sections of the ROE. The panel noted that Appendix B of the ROE should be expanded to discuss which indicators were chosen and which were not.

One panelist noted that the report lacks an overall framework. Many of the elements needed in the document are contained in various chapters of the report, but a framework for the report should be presented "up front." For example, an environmental health paradigm should be presented and the exposure paradigm should be expanded. Another panelist stated that it is important to get out the message that there have been environmental impairments, and these should be more clearly stated in the ROE. The panel discussed the need for an overarching theme for the ROE. It was suggested that an overarching theme might be presentation of a report card on how we are doing to keep the planet habitable.

The panel discussed the chapter titles. Some panelists thought that the chapter titles should be "tied to reality" and recommended using, for example, the title of "water" instead of "purer water," or "air" instead of "cleaner air."

The panel discussed the time frame for producing the next report on the environment. Panelists noted that the next report should come out in a meaningful time frame. The panel discussed the Chesapeake Bay Program's annual report card as an example that might be considered when developing the next ROE. The structure of the report was discussed, and a panelist stated that, once the structure of the ROE is fixed it would be easier to issue the report. Panelists noted that one option for issuing the next report might

be to produce a public report every year with references to a website where more detailed information could be found.

The Chair next asked for further comments or discussion. There were none, so the Chair asked the panel to reconvene at 9:00 a.m. on Thursday to discuss the key points that should be included in the advisory report, and then to break into writing groups to develop responses to the charge questions for the human health and ecological condition chapters. The panel then recessed for the day

Discussion of Key Points for the Advisory Report

The panel reconvened at 9:00 a.m. on Thursday, March 10. The Chair asked the panel to summarize and discuss the key points that should be included in the advisory report and stated that after the discussion the panel would break into two writing groups to develop responses to charge questions for the human health and ecological condition chapters.

The panel discussed a number of key points that were identified in the individual breakout writing group sessions. The discussion first focused on how EPA should identify indicators that could be further developed for future reports. The panel recommended that EPA should begin to collect data to answer questions that currently cannot be answered because indicators are not available. The panel then identified and discussed key points for the air, water, and land chapters. These key points were summarized by the Chair and provided to the DFO for inclusion in the advisory report.

Breakout Writing Groups for the human health and ecological condition chapters

The Chair asked the panel to separate into two writing groups to develop responses to charge questions. The Chair noted that panel members were assigned to either a human health or ecological condition writing group. The chair identified rooms where each of the two breakout writing group sessions would be held and asked each group to convene in those rooms to draft responses to the charge questions. The chair asked each group to write responses to all of the charge questions but to focus only on the chapter assigned to the group. The Chair asked the panel to reconvene in a plenary session at 2:00 p.m. to discuss the issue of indicator scale and the ROE *Public Report.*

Discussion of Indicator Scale and the ROE *Public Report*

At 2:00 p.m. the panel reconvened in plenary session to discuss the issue of scale, and responses to charge questions addressing indicator scale issues and the ROE *Public Report.* First the Chair asked whether there were any public comments on any of the issues discussed during the meeting. There were no public comments so the chair asked the panel to discuss responses to the charge questions. The Chair summarized these charge questions as follows:

1) The ROE focuses on indicators at the national scale. Regional indicators are highlighted in a few case studies. How useful are national indicators in presenting

information on the quality of the environment? How much consistency is necessary in indicator measurements and data quality across the country? Should more detailed regional data and indicators be accommodated in a national overview of the environment, and how could this regional data be accommodated?

2) The *Public Report* is intended to summarize the *Technical Document* for a broad, non-technical public audience. Does the *Public Report* accurately and adequately reflect the technical content, including the gaps and limitations, of the *Technical Document*?

The panel discussed the issue of indicator scale and identified the following key points to be included in the advisory report.

- Indicators in the ROE should not be limited to those for which data are available at the national level. The report appears to be more of a national inventory than a description of national environmental health examination. Much can be inferred from data available at local and regional scales. A nationally focused epidemiological approach masks important regional and local changes and impacts. By taking an exclusively national focus, potential issues may not be noticed until they become severe.

- Additional categories of indicators and data should be further developed in the next iterations of the ROE. Indicators that are relevant on a local or regional scale, such as groundwater withdrawal in key aquifers and contaminated sediment levels in the Great Lakes, should be used to evaluate goals and assess progress toward the improvement of environmental conditions and public health at the relevant scale.

- Approaches that could be used to evaluate local and regional data include: determining whether criteria are exceeded, evaluating data to determine whether regional goals have been met, and integrating regional goals to evaluate national progress. EPA should be judicious in choosing regions from which data are to be analyzed and presented. The use of EPA Regions as frames of reference is probably arbitrary. EPA has regional data available (e.g., Regional Vulnerability Assessment, ReVA), and these data should be reflected in the indicator exhibits of the ROE when they help to answer appropriate questions.

- Spatial distribution information in the form of maps describing indicator data should be included in the ROE when possible because these are very informative. Greater use of maps in the ROE would provide important information on spatial distributions that is largely lacking in the current draft. Exhibit 1-8 of the draft ROE, which provides spatial distributions of $PM_{2.5}$, is a good example of how maps can be used to identify regional differences.

- It is very important to use appropriate spatial or temporal averaging methods when describing indicator data. Data distributions should not be averaged across individual EPA Regions. EPA should instead consider using areas like ozone

urban core sites for grouping and scaling data. It is also important to use an appropriate time basis for reporting data. For example, annual averaging of SO_2 emissions is appropriate, but annual averaging of ozone data is not the best approach because of large seasonal variability and because averages are a poor measure of exceedence episodes.

The panel then discussed the charge question concerning the ROE *Public Report* and identified the following key points to be included in the advisory report.

- The executive summary needs revision; there is no information in the executive summary on human health and ecological conditions in the United States – this needs to be redressed.

- The *Public Report* should be shorter in length; where appropriate, the report should contain hyperlinks to the *Technical Document* or relevant URLs that provide supporting information. The supporting text does not have to be in the *Technical Document* itself.

- If possible, the graphics in the *Public Report* should not be drawn only from the *Technical Document*. Graphics in the *Public Report* should be simple and user-friendly. They could involve color-coding (assigning colors to relative state of health), reduction of text in graphics, and making graphics map-based. Examples of useful approaches recommended by the panel for EPA review include the State of the Great Lakes and Reefs at Risk reports.

- Where possible, information in the *Public Report* should be presented in a spatially distributed fashion. The use of national maps, with blow-ups of information within specific regions, would be very useful. There must be a balance between providing enough data to make graphics informative, but not overwhelming readers with too much data. If done well, the graphics in the *Public Report* can provide a quick overview of national status and also allow readers to see how their regions fit into the national condition.

- In places, the scientific terminology used in the *Public Report* reaches beyond the average grasp of the general public. The SAB recommends that EPA thoroughly review the *Public Report* to remove or define these terms.

The Chair then called for a break and reconvened the panel at 3:00 p.m. to discuss integrated responses to the key points and recommendations developed by all of the writing groups. Representatives from each writing groups presented the key points and specific recommendations developed by the group. The panel then discussed and revised each of the key points, and organized the key points and recommendations as responses to each of the charge questions.

At 5:45 p.m. the Chair stated that the panel would reconvene at 9:00 a.m. on Friday, March 12 to conclude the discussion of integrated responses to the charge questions and

review recommendations to be included in the advisory report. The meeting then recessed for the day.

Completion of Integrated Responses to the Charge Questions and Meeting Wrap-up

The panel reconvened at 9:00 a.m. on Friday March 12 and continued to discuss the development of integrated responses to the charge questions. After a break at 10:45 a.m. the Chair asked panel members to summarize the key points to be included in the responses to each of the charge questions. The key points were summarized and were provided to the DFO along with specific recommendations to be included in the draft advisory report.

The Chair then thanked the panel members for a very productive meeting and indicated that the draft advisory report would be completed and circulated to the panel for review. A follow-up conference call would be scheduled to discuss panel comments on the draft report before it is competed. The meeting was then adjourned at 12:00 p.m.

Respectfully Submitted:	Certified as True:
/***Signed***/	/***Signed***/
Thomas M. Armitage, Ph.D. Designated Federal Officer	Virginia Dale, Ph.D. Panel Chair

APPENDICES

Appendix A: Roster of SAB Advisory Panel on EPA's Report on the Environment

Appendix B: Meeting Agenda

Appendix A – Roster of the U.S. EPA Science Advisory Board Advisory Panel on EPA's Report on the Environment

---

CHAIR

Dr. Virginia Dale, Corporate Fellow, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN

MEMBERS

Dr. Mark Bain, Director, Center for the Environment, Cornell University, Ithaca, NY

Dr. Philip Bromberg, Bonner Professor of Medicine, Department of Medicine, School of Medicine, UNC Chapel Hill, Chapel Hill, NC

Dr. Timothy Buckley, Associate Professor, Environmental Health Sciences, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD

Dr. Joseph Bunnell, Public Health Research Biologist, United States Department of the Interior, United States Geological Survey, Reston, VA

Dr. Ann Marie Gebhart, Director, Drinking Water Program, Underwriters Laboratories, Northbrook, IL

Dr. Joseph Helble, Professor and Department Head, Department of Chemical Engineering, University of Connecticut, Storrs, CT

Dr. Arturo Keller, Associate Professor, Bren School of Environmental Science and Management, University of California, Santa Barbara, Santa Barbara, CA

Dr. Charles Kolb, President and CEO, Aerodyne Research, Inc., Billerica, MA

Dr. George Lambert, Associate Professor and Center Director, Center for Child and Reproductive Environmental Health, Environmental and Occupational Health Sciences Institute, Robert Wood Johnson Medical School/ University of Medicine and Dentistry of New Jersey, Piscataway, NJ

Dr. Norman LeBlanc, Chief of Technical Services, Hampton Roads Sanitation District, Virginia Beach, VA

Dr. John McManus, Professor and Director, NCORE, RSMAS, University of Miami, Miami, FL

Dr. Maria Morandi, Assistant Professor of Environmental Science & Occupational Health, Environmental Sciences, School of Public Health, University of Texas - Houston Health Science Center, Houston, TX

Dr. Kathyrn Saterson, Research Scientist/Executive Director, Center for Environmental Solutions, Division of Environmental Science and Policy, Nicholas School of the Environment and Earth Science, Duke University, Durham, NC

Dr. Peter Scheff, Professor, Environmental and Occupational Health Sciences, School of Public Health, University of Illinois at Chicago, Chicago, IL

Dr. Oswald Schmitz, Professor, Yale School of Forestry and Environmental Studies, Yale University, New Haven, CT

Dr. Mark Schwartz, Associate Professor, Department of Environmental Science and Policy, College of Agriculture, University of California, Davis, CA

Dr. Alan Steinman, Director, Annis Water Resources Institute, Grand Valley State University, Muskegon, MI

Dr. Stephen Trombulak, Professor of Biology and Environmental Studies, Biology and Environmental Studies, Middlebury College, Middlebury College, VT

Dr. Cynthia Warrick, Assistant Professor, Management and Policy Sciences, School of Public Health, University of Texas Health Science Center Houston, Houston, TX

SCIENCE ADVISORY BOARD STAFF

Dr. Thomas Armitage, Environmental Scientist, 1200 Pennsylvania Avenue, NW, Washington, DC, Phone: 202-564-4539, Fax: 202-501-0582, (armitage.thomas@epa.gov)

APPENDIX B – Meeting Agenda

SCIENCE ADVISORY BOARD
Advisory Panel on EPA's Report on the Environment
The Watergate Hotel – Riverview Room
2650 Virginia Ave N.W., Washington, DC 20037, 202-965-2300

March 9-12, 2004, Public

AGENDA

Tuesday, March 9, 2004

9:00 - 9:10 a.m.	**Meeting Convened by the Designated Federal Officer** Dr. Thomas Armitage
9:10 - 9:15 a.m.	**Welcome and Introductory Remarks** Dr. Vanessa Vu, Director, EPA Science Advisory Board Staff Office
9:15 - 9:25 a.m.	**Purpose of the Meeting and Review of Agenda** Dr. Virginia Dale, Chair
9:25 - 10:00 a.m.	**Approach and Framework of EPA's Draft Report on the Environment** Dr. Peter Preuss, Director EPA National Center for Environmental Assessment
10:00 - 11:00 a.m.	**Panel Discussion of General Approach, Processes, and Framework used to Develop the Report on the Environment** (charge question 1)
11:00 - 11:15 a.m.	BREAK
11:15 - 11:45 a.m.	**EPA Presentation on Cleaner Air (Chapter 1)** Mr. Michael Hadrick EPA Office of Air and Radiation
11:45 - 12:45 p.m.	**Panel Discussion of Cleaner Air (Chapter 1)** Panel will discuss charge questions 2, 3, 4, 5 and suggestions to enhance analysis and presentation.
12:45 - 1:45 p.m.	LUNCH

1:45 - 2:15 p.m.	**EPA Presentation on Purer Water (Chapter 2)** Ms. Marjorie Jones EPA Office of Water
2:15 - 3:15 p.m.	**Panel Discussion of Purer Water (Chapter 2)** Panel will discuss charge questions 2, 3, 4, 5 and suggestions to enhance analysis and presentation.
3:15 - 3:45 p.m.	**EPA Presentation on Better Protected Land (Chapter 3)** Dr. Thomas Barnwell EPA Office of Research and Development
3:45 - 4:00 p.m.	BREAK
4:00 - 5:00 p.m.	**Panel Discussion of Better Protected Land (Chapter 3)** Panel will discuss responses to charge questions 2, 3, 4, 5 and suggestions to enhance analysis and presentation.
5:00 - 5:30 p.m.	**Public Comments**
5:30 - 5:45 p.m.	**Expectations for the Next Day** Dr. Virginia Dale, Chair
5:45 p.m.	**RECESS FOR THE DAY**

Wednesday, March 10, 2004

9:00 - 9:10 a.m.	**Summary of Previous Day and Expectations for Today** Dr. Virginia Dale, Chair
9:10 - 10:00 a.m.	**Panel Discussion of Similarities in Responses Regarding Air, Water, and Land**
10:00 - 11:00 a.m.	**Concurrent Breakout Writing Group Meetings** (Panel writing groups will meet in breakout rooms to develop responses to the charge questions.) -- Cleaner Air -- Pure Water -- Better Protected Land
11:00 - 11:15 a.m.	BREAK
11:15 - 12:30 p.m.	**Breakout Writing Group Meetings (continued)** -- Cleaner Air

	-- Pure Water -- Better Protected Land
12:30 - 1:30 p.m.	LUNCH
1:30 - 2:00 p.m.	**EPA Presentation on Human Health (Chapter 4)** Dr. Rebecca Calderon EPA Office of Research and Development
2:00 - 3:00 p.m.	**Panel Discussion of Human Health (Chapter 4)** Panel will discuss charge questions 2, 3, 4, 5 and suggestions to enhance analysis and presentation.
3:00 - 3:15 p.m.	BREAK
3:15 - 3:45 p.m.	**EPA Presentation on Ecological Condition (Chapter 5)** Dr. Jay Messer EPA Office of Research and Development
3:45 - 4:45 p.m.	**Panel Discussion of Ecological Condition (Chapter 5)** Panel will discuss charge questions 2, 3, 4, 5 and suggestions to enhance analysis and presentation.
4:45 - 5:30 p.m.	**Panel Discussion of Similarities in Responses Regarding Human Health and Ecological Condition**
5:30 - 5:45 p.m.	**Expectations for Next Day** Dr. Virginia Dale, Chair
5:45 p.m.	**RECESS FOR THE DAY**

Thursday, March 11, 2004

9:00 - 9:15 a.m.	**Summary of Previous Day and Expectations for Today** Dr. Virginia Dale, Chair
9:15 - 10:45 a.m.	**Concurrent Breakout Writing Group Meetings** (Panel writing groups will meet in breakout rooms to develop responses to the charge questions.) -- Human Health -- Ecological Condition
10:45 - 11:00 a.m.	BREAK

11:00- 12:00 p.m.	**Concurrent Breakout Writing Group Meetings (continued)** -- Human Health -- Ecological Condition
12:00 – 1:00 pm	LUNCH
1:00 - 2:00 pm	**Panel Discussion on Use of National and Regional Scale Indicators** (charge question 4)
2:00 - 2:45 p.m.	**Panel Discussion of Accuracy and Adequacy of Public Report** (charge question 5)
2:45 - 3:00 p.m.	BREAK
3:00 -3:30 p.m.	**Public Comments**
3:30 - 5:30 p.m.	**Report Drafting Groups to Develop Integrated Responses to Five Charge Questions**
5:30 - 5:45 p.m.	**Expectations for Next Day** Dr. Virginia Dale, Chair
5:45 p.m.	**RECESS FOR DAY**

Friday, March 12, 2004

9:00 - 9:15 a.m.	**Expectations for the Day** Dr. Virginia Dale, Chair
9:15 - 9:45 a.m.	**Discussion of Response to Charge Question #1**
9:45 - 10:15 a.m.	**Discussion of Response to Charge Question #2**
10:15 - 10:45 p.m.	**Discussion of Response to Charge Question #3**
10:45 - 11:00 a.m.	BREAK
11:00 - 11:30 a.m.	**Discussion of Response to Charge Question #4**
11:30 - 12:00 p.m.	**Discussion of Response to Charge Question #5**
12:00 p.m.	**ADJOURN MEETING**