National Advisory Council
For
Environmental Policy & Technology

November 6, 2003

Administrator Michael O. Leavitt
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Dear Administrator Leavitt:

On behalf of the National Advisory Council for Environmental Policy and Technology (NACEPT), I am pleased to welcome you as the new Administrator and to present to you the attached advice letter fulfilling the second part of our commitment to provide EPA with comments and recommendations in response to the Draft Report on the Environment (ROE). This advice letter was developed by the NACEPT Report on the Environment Working Group and endorsed by the full Council.

The NACEPT commends EPA for the extensive work that resulted in the Draft ROE. The document is a necessary and valuable first step in identifying the critical indicators of the health of the nation's environment. We strongly support the Agency's efforts to engage policymakers and the interested public in discussing the ROE's findings and identifying next steps. To that end, our comments focus on three overarching issues:

- The indicators themselves – their appropriateness, their accuracy, their completeness
- The public consultation process
- The next steps – issues for further study and inclusion in future reports

Although the comments include a number of recommendations, I would like to emphasize three issues. First, we strongly recommend that EPA issue a final report and a schedule for subsequent periodic updates. At a minimum the report should be issued on a schedule that will allow the findings to inform the preparation of EPA's Strategic Plan. Further, we believe that the nation needs and wants accurate and meaningful indicators for evaluating the health of the environment. As the current effort shows, however, such a project is too complex to trust to an ad hoc process. We believe that EPA should have lead responsibility for developing and publishing environmental indicators and should be provided with the staff and funding resources necessary to carry out this important task.

We commend the EPA for soliciting public input and feedback on the draft ROE. However, we noted that no forums are planned for the Mid-Atlantic or Northeast. We recommend that the Agency schedule a public forum or webcast in this region. Further, we encourage the EPA to consider expanding its use of technology, and particularly the Internet, to increase the opportunity for the public to respond to the draft ROE. The NACEPT stands ready to assist your Agency in its outreach efforts, and we expect that NACEPT members will attend the regional forums.

Finally, we note that EPA staff have been participating in an international effort to develop common environmental indicators and measurement methodologies. As we move from activity to outcome-based environmental protection programs, it will become increasingly important to understand how the actions taken by different agencies, and for differing environmental media, interrelate. Likewise, we will need to better understand how our programs in the U.S. affect worldwide environmental quality and vice versa. The NACEPT commends EPA staff's participation in that effort and supports fully any attempts to integrate the national-level indicators discussed in the draft ROE with parallel efforts to identify appropriate data at state and local, as well international levels.

Thank you again for the opportunity to comment on this seminal effort. EPA's issuance of the draft ROE could not be timelier, and the NACEPT looks forward to assisting in the preparation and review of subsequent reports.

Yours very truly,

Dorothy Bowers
Chair

Attachment

cc: Marianne Horinko
Kim Nelson
Paul Gilman

National Advisory Council
For
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Comments Regarding the U.S. Environmental Protection Agency's
2003 Draft Report on the Environment

Firstly, EPA is to be commended on the obvious levels of commitment and effort that went into the preparation of the draft Report on the Environment (ROE). Groundbreaking is always a particularly difficult venture, and the NACEPT Council urges that this ROE be the first in a continuing series of such reports, evolving as EPA's efforts to assess the environment continue to evolve.

An inadvertent testament to the influence that the ROE can play in informing the American public came when one Council member's 15 year-old son scanned through the document a few weeks ago. As someone who has been raised on high-powered digital media, even he commented on the clarity and force with which the ROE presents complex environmental information.

General Comments

The Council recognizes that evaluating environmental quality is a daunting task and that the indicators developed by EPA for the first draft ROE are the product of intensive professional investigation and, often, substantial peer review. The continuing efforts by EPA to improve the indicators are recognition that the task has not been completed and that much work remains; both to validate the indicators selected, as well as to explore other promising ones that have yet to be fully identified or considered. It may also be the case that the uncertainties associated with the selected environmental indicators cannot, in the present state of knowledge, be completely overcome. In such cases it is important to acknowledge the imperfect state of knowledge. That acknowledgement is, in fact, essential in order to avoid giving the impression of exactitude where it is absent.

Even as EPA works to refine the selected environmental indicators, and to collect the data necessary to support them, it is equally important to heed what the indicators are telling us about the health of the environment, to identify the most pressing environmental issues facing us, and to decisively address those environmental issues by committing the Agency's resources through its Strategic Plan. In the ROE, EPA should identify its strategy for moving forward, including (a) the timeline for issuing the current ROE in its final form, (b) the Agency's commitment to update and reissue the ROE at regular intervals, and (c) its plans for using the findings to inform the Agency's Strategic Plan.

EPA's effort to classify indicators into a hierarchy (Exhibit I-1, page viii) is helpful in mapping the relationships between indicators at various hierarchical levels. The Council encourages EPA to continue its focus on identifying highest-level indicators (Level 6: Changes in Human Health or Ecological Condition) in order to communicate the impacts of our nation's environmental programs and activities. At the same time, EPA must strive to see both the forest and the trees, to develop deep understanding and appreciation for all levels of environmental indicators.

The recurring and most common problem with the indicators that are used in the ROE is that they present and combine physical parameters without any measures of their relative significance. In some cases this is recognized; in other cases it is not. In general, it is not acceptable to combine individual physical or biological parameters without weighting their significance, for this implies that they all have the same significance, when that is clearly not so.

Although it is typically difficult to assess the significance of a physical parameter, it is also often not impossible, but requires careful study. Methods that might permit a start on such assessment are seldom identified in the ROE.

Some of the indicators identified in the ROE are not true environmental indicators, but represent a number of influences, some of which are not environmental. For example, changes in the number of citizens with access to community water supplies that meet health-based standards is more a function of population trends in those communities and political willpower to invest in expanding water infrastructure than a function of actual environmental conditions. In these cases, it can be quite misleading to single out the indicator as telling us something about the environment, when it reflects other, perhaps dominating influences as well.

In many instances, the ROE includes trend data for selected indicators, although timelines are not consistent across indicators. In some cases (notably air), the most recent data presented in the report was from 1996. EPA should strive to present trend data across the longest timeline for which data is available and should employ the most current data reported.

In some instances, the ROE includes strategic goals or objectives for the EPA Program Office responsible for the environmental indicator. The inclusion of strategic goals and objectives should be consistent throughout the ROE, and goals and objectives should be noted as such, where included. For example, the discussion regarding drinking water on page 2-13 includes the statement, "By-products of disinfection have also been associated with potential cancer, developmental, and reproductive risk, although the extent of risk posed is still uncertain. Limiting concentrations of disinfection by-products in drinking water, while ensuring that microbes are kept in check, will have a positive effect on public health."

Finally, while the ROE is clearly intended to be a report on the United States environment, the US does not exist in isolation from the rest of the world. A number of environmental issues, notably greenhouse gases, stratospheric ozone and deep ocean ecosystems, are global in nature. EPA should identify these issues as well as both their influence on the US environment and the impact the US has on these issues, and identify the challenges to effectively assessing and addressing them on the global stage.

Cleaner Air

Executive Summary

The ROE Executive Summary banner (page ii) summarizes future air challenges, "Notwithstanding this progress, challenges remain in attaining health based-standards for ozone and particulate matter, in improving visibility, and in understanding the nature and magnitude of issues posed by indoor air pollution." An additional challenge facing EPA is improving understanding of the impact of toxic and other hazardous pollutants on environmental quality and human health, including assessments of emerging pollutants not currently recognized as having adverse impacts.

The ROE Executive Summary (page ii) states, "Over the last 30 years, total emissions of six principal air pollutants have decreased by nearly 25 percent, resulting in lower concentrations of these pollutants in ambient air," (page ii, paragraph 1). EPA should identify the six principal pollutants in the Executive Summary. However, the chapter text (page 1-3) notes, "Average ambient concentrations of the six criteria pollutants have shown improvements over the past 20 years." The timeframe for the two discussions should be consistent.

The ROE Executive Summary (page ii) also states, "The National Toxics Inventory, which tracks 188 toxic pollutants, estimates that nationwide air toxics emissions decreased almost 25 percent from baseline levels (1990—1993) to 4.7 million tons annually in 1996." Both in the Executive Summary and in the text (page 1-3), EPA should include the baseline levels from which it determined the 25 percent decrease in air toxics emissions. Additionally, under EPA's Toxic Release Inventory requirements, all major sources must report their toxic air emissions annually, by July of each calendar year. Therefore, EPA should reassess this indicator with much more current data (2000 or 2001) than the 1996 data referenced in the report.

Outdoor Air Quality

The principal indicator for assessing and reporting daily air quality related to five of the six criteria pollutants (ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide) is the Air Quality Index (AQI). For each individual criteria pollutant, EPA reports an AQI value from 0 to 500, with an AQI value of 100 generally corresponding to the national ambient air quality standard for the pollutant. When reporting air quality, EPA uses the highest AQI value measured for an individual pollutant on a particular day as the reported AQI for that day. A more useful composite AQI indicator could be based on a weighted average of the individual pollutant AQI values.

$$I = W_{O3} * O_3 + W_{PM} * PM + W_{CO} * CO + W_{SO} * SO_2 + W_{NO} * NO_2,$$

where the W's are the weights established for each of the pollutants.

Determination of the correct weighting system is certainly difficult, but plausible alternatives exist or can be estimated. For example, the weights might be related to the

morbidity or mortality rates, or the economic costs of those rates, associated with each individual pollutant. Even such a weighting system would not be perfect since it does not take into consideration the potential synergistic contributions of criteria pollutants.

Prolonged (chronic) exposure to air pollution also has different effects than single-day (acute) exposure. EPA should explore how chronic exposure can be incorporated into the Agency's air quality indicators by weighting prolonged exposure into the AQI.

The health risks from exposure to air pollution are more severe for children, the elderly and other susceptible populations than they are for healthy adults. While EPA recognizes that these differences exist, their significance is not fully conveyed to the public through the AQI. EPA should explore how it can report air quality data for different risk populations in a way that those populations are better informed regarding the risks of air pollution exposure.

Exhibit 1-2 (page 1-4) depicts the number of people living in areas with air quality concentrations that sometimes exceed the National Ambient Air Quality Standards. The accompanying text notes, "More than 133 million people lived in areas where monitored air quality in 2001 was unhealthy *at times* because of high levels of at least one criteria pollutant." In addition to changes in actual pollutant emissions in monitored areas, population growth and migration patterns can contribute to this indicator. EPA should assess the trend in this indicator over the past 20 to 30 years, incorporating the other factors that contribute to the spatial distribution of populations in these non-attainment areas. Additionally, EPA needs to clarify what is meant by "at times," in this indicator. Does a single observation of a single criteria pollutant with an AQI exceeding 100 constitute an "at times" event? As discussed above, concurrent exposure to multiple criteria pollutants, and chronic exposures need to be incorporated into this indicator in a meaningful way.

Exhibit 1-3 (page 1-4) depicts the number and percentage of days with an Air Quality Index greater than 100, 1998—2001. The accompanying text notes, "Based on EPA's Air Quality Index data the percentage of days across the county on which air quality exceeded a health standard dropped from almost 10 percent in 1988 to 3 percent in 2001." Since the number of days with AQI greater than 100 ranges between 1,000 and 3,300 while the number of calendar days is 365, EPA needs to provide a clear explanation of how the number of reported AQI exceedance days was derived. Additionally, EPA needs to clearly explain how the percentage of days is calculated and its significance as an indicator. If the percentage of days is based on total observations at all monitoring stations, EPA should include data on trends in the number of monitoring stations over time, and the extent to which expansion of the monitoring network has impacted this indicator.

Finally, the AQI system addresses only the human health aspects of criteria pollutants. EPA should clearly identify the limitations of the AQI system to address other environmental impacts and commit itself to developing a corresponding assessment system for non-human impacts of air pollution.

Indoor Air Quality

EPA's selection of two indoor air quality indicators (U.S. homes above EPA's radon action levels, percentage of homes where young children are exposed to environmental tobacco smoke) correctly reflects the lack of knowledge regarding indoor air quality, and the risks to the U.S. population from exposure to unhealthy indoor air. While there may not be a substantial body of knowledge in this area, EPA should use the ROE as a vehicle to establish a suite of meaningful indoor air quality indicators, and to identify the data gaps that currently prevent assessment of such indicators.

With regard to EPA's two selected indoor air quality indicators, the Council believes that use of these indicators does not adequately assess national indoor air quality. Many other pollutants (e.g., molds, cleaning compounds, viruses, bacteria) can have significant impacts on indoor air quality. Other agencies, such as the Centers for Disease Control and local or state departments of health, have considerable data regarding health effects of many of these substances. EPA should work closely with such agencies to develop methodologies for correlating existing health data to levels of indoor air pollution and should strive to develop indicators that reflect the impact of these other pollutants on indoor air quality and human health.

Global Issues

The ROE defers discussion of global climate change and refers the reader to EPA's report "Our Changing Planet: The Fiscal Year 2003 U.S. Global Climate Research Program," and the Agency's "Draft Ten-Year Strategic Plan for the Climate Change Science Program." This deferral overlooks a singular opportunity to report information on what is surely one of the most contentious of all current environmental issues. While EPA may not be institutionally responsible for managing the activities that contribute to the emission of greenhouse gases, the Agency has had an active research program in this area in the past and has collected data pertaining to greenhouse gas emissions and climate change indicators. While there may be disagreement or dissention on many issues related to global climate change and the contribution of greenhouse gas emissions toward climate change, the possible consequences of such change warrant attention to the subject in a report on the environment. In keeping with the intent of the ROE to present environmental data independent of assessing the success of EPA's (or other agencies') programs and activities, the Agency certainly should include trend data on climate change indicators and greenhouse gas emissions in the ROE.

Purer Water

The organization of the water section of the ROE into four components (waters and watersheds, drinking water, recreation in and on the water, consumption of fish and shellfish) provides a clear presentation format, but should be expanded to include a fifth critical component—water consumption. This component should include a discussion of water use patterns, measures of water use efficiency and the impacts of water use patterns on the other four components.

Waters and Watersheds

The suite of Waters and Watershed Indicators (Page 2-3) holistically can provide a comprehensive assessment of watershed health. EPA needs to ensure that the last indicator (Toxic releases to waters of mercury, dioxin, lead, PCBs, and PBTs) is revisited regularly and expanded as necessary to address emerging pollutants that may not currently be recognized as toxics.

The call-out box, "Who Is Assessing Water and Watershed Conditions?" (page 2-5) is misleading in that it identifies only Federal water quality monitoring programs. This conflicts with the discussion on page 2-4, "A great deal is known, however, about the condition of regional, state, and local waters due to the tremendous monitoring efforts of state and local authorities and watershed groups and citizens."

The discussion regarding coastal waters (page 2-5) references the 2001 *National Coastal Condition Report's* use of seven indicators (eutrophication, dissolved oxygen, water clarity, sediments, benthic conditions, fish contamination, loss of coastal wetlands) but focuses only on three of these indicators (eutrophication, dissolved oxygen, water clarity). EPA should address why these three indicators were selected for discussion while the other four were not.

The first paragraph on page 2-11 states, "Although nitrogen and phosphorous are beneficial plant nutrients, human activities have increased their flow into waterbodies—in some cases to harmful levels." While it is true that human activities may cause nitrogen and phosphorous levels to reach harmful levels, the reverse implication, that non-human contributions do not result in the same impacts, is not true. Eutrophication can and does occur in the absence of human activity.

Drinking Water

The indicator for this component, "Population served by community water systems that meet all health-based standards," may be useful for demonstrating the extent to which community water supplies provide services, but it is not an indicator of environmental quality. Rather, it is a composite performance indicator for EPA's Drinking Water Program and individual community water supply systems. The critical factors that influence the size of the population served by community water supplies are (1) population trends and migration into and out of existing service areas, and (2) capital investment to extend community water supplies to populations not currently served by such systems. The critical factors affecting attainment of health-based standards are (1) capital investment in water treatment systems, and (2) system performance. The environmental quality of community system source waters plays a substantially less significant role where adequate water treatment technologies are in place.

The last paragraph on page 2-13 includes the statement, "By-products of disinfection have also been associated with potential cancer, developmental, and reproductive risk, although the extent of risk posed is still uncertain. Limiting concentrations of disinfection by-products in drinking water, while ensuring that microbes are kept in check, will have a positive effect on public health." This statement is not an objective environmental indicator or measure, but rather

a strategic goal of EPA's Drinking Water Program and should be noted as such, or deleted from the report.

Recreation In and On the Water

The indicator for this component, "Number of beach days that beaches are closed or under advisory," lacks references against which the significance of the indicator may be assessed.

Firstly, EPA points out in the text that the increase in the number of beaches impacted by advisories and closings is more likely linked to improved monitoring than to deteriorating environmental conditions. Secondly, the indicator does not distinguish the significance of beach closings or advisories on impacted populations. A closing or advisory at a large and/or densely populated beach affects more people than a closing or advisory at a remote, seldom-used beach. To compensate for this variation, the indicator should be normalized to population equivalents impacted.

A more useful indicator for assessing environmental impacts on water recreation that would compensate for both fluctuations in monitoring and reporting and for population density would be the percentage of population equivalent beach days impacted by closings or advisories. Another potential indicator for assessing impacts on water recreation would be the linear shoreline extension impacted by beach closings.

Finally, EPA should reword the text regarding assessing the sources of beach closings and advisories on page 2-16. The data presented in Exhibit 2-9 (page 2-16) indicate that 52 percent of beach closings and advisories during 2001 were attributed to unknown sources, yet the accompanying text asserts a single, identified source. The Council recommends the following revised text: "Where the sources are identified, the most frequently identified sources are storm water runoff that contains harmful contaminants such as bacteria from livestock or pet waste, inadequate sewage treatment, or poorly designed or operated septic systems."

Consumption of Fish and Shellfish

EPA has identified three indicators for the assessment of this component (percentage of river miles and lake acres under fish advisories, contaminants in fresh water fish, number of watersheds exceeding health-based national water quality criteria for mercury and PCBs in fish tissue).

While all three indicators are useful in assessing the spatial distribution of contaminants in the environment at levels that may impact fish and shellfish, they lack reference to the impact on the use of fish and shellfish populations as a food source. Contamination of high density fishing and shellfish harvesting regions will have far greater impact on food supply than contamination of urban rivers and streams, or artificial drainage and navigational waterways, where dense populations of edible fish are not otherwise sustainable or expected. EPA should explore how it might factor carrying capacities of the impaired waterbodies identified in factors 1

and 3 to derive a more robust indicator of the loss of consumable fish or shellfish production capacity.

In the fourth paragraph on page 2-18, which begins, "Some synthetic toxic substances..." reference is made to the cessation of PCB production in 1997. The production of PCBs in the United States was banned 20 years earlier, in 1977.

In the call-out box, "Chesapeake Bay Program Suite of Indicators," (page 2-22), Exhibit 2-14 depicts total nutrient loads delivered to the Chesapeake Bay in 1985 and 2000. In the graphics representing phosphorous and nitrogen loads, a "Phosphorous Goal" and a "Nitrogen Goal" appear as dashed lines at 15,000,000 lbs/yr and 230,000,000 lbs, respectively. However, there is no discussion in the accompanying text regarding the significance of these goals or how they were established. Again, EPA should be consistent with regard to the inclusion and identification of strategic goals and objectives in the ROE.

Better Protected Land

Executive Summary

Several of the conclusions regarding "Better Protected Land" in the Executive Summary should be better qualified based on the more detailed discussion in the chapter.

- "Industrial releases of toxic chemicals as reported to the Toxic Release Inventory have declined in recent years." EPA should focus specifically on land releases in this chapter.

- "Testing of foods for pesticide residues in 2000 found that no more than 1.4 percent of samples exceeded regulatory limits." EPA should also discuss the prevalence and quantities of non-regulated pesticides and other pollutants found in tested foods.

- "The nation is making progress in dealing with hazardous waste." EPA should clarify that this assessment, and the following one, are based on the limited data available at the Federal level, and that more data available at the state and local levels was not considered in these assessments.

- "The nation is making progress in cleaning up contaminated lands."

Introduction

In the introduction to the chapter (page 3-2), the ROE states, "Protecting land resources means ensuring that land meet *current* needs and support healthy communities and ecosystems....Other government agencies, notably the U.S. Department of the Interior and the U.S. Department of Agriculture at the federal level, manage land for natural resource and conservation purposes. Additionally, cities and counties adopt and implement land use laws and regulations, overseen in some cases by the states." The reader could infer from this discussion

that EPA sees itself as having no role in promoting sustainability and protection of the land for *future* generations. Is this the intent of the discussion?

Land Use

The land use indicators identified by EPA (page 3-3) evaluate the extent of developed land, urban and suburban lands, agricultural land, grassland and shrublands, and forest areas, and the changes in land use. An important land indicator not discussed in the ROE, particularly because of its ecological impact, is the amount of critical wetlands and riparian habitat. The loss of these critical lands to conversion to other uses, or to ocean encroachment, subsidence and erosion should also be included as a land use indicator.

The discussion of the ecological effects associated with land use (page 3-6, second paragraph) associates certain negative environmental impacts with a variety of land uses. While the cited associations are true, they may give the reader the impression that these impacts are associated exclusively with the linked uses. The discussion should more generally address the potential for terrestrial and aquatic habitat destruction as a result of land development, agriculture and forest uses of land.

The call-out box entitled "Measuring Impervious Surfaces" (page 3-7) discusses novel approaches toward estimating the extent of impervious land development using satellite imagery combined with other data sources. EPA should continue to encourage the development and use of these novel approaches as efficient means of assessing environmental conditions. Although the cited studies are insightful, EPA needs to acknowledge that watersheds are not uniform in size, shape, and other critical characteristics, nor can they be uniformly characterized by a single parameter (e.g., percent imperviousness). EPA will need to relate the significance of imperviousness to trends in other indicators that contribute to non-attainment of water quality objectives for the watershed being studied.

EPA should strive to better link the discussion on farmlands (page 3-5) to the discussion on pesticide and fertilizer use (page 3-9). Assuming that pesticide and fertilizer use is maximally efficient (no intended waste at application), increased net use of pesticides and fertilizers even as total cropland area decreases suggests more aggressive pest management and nutrient supplementation. Without additional information on actual land use practices, these two trends could be indicative of two widely divergent practices. Are these trends indicators of deteriorating farmland production capacity or of soil conservation practices such as "no till" farming? EPA should work with USDA to explore additional indicators that will assist in understanding the significance and causes of agricultural chemical use trends.

Finally, the environmental implications of land use/siting decisions are increasingly being recognized at the state and local levels. EPA should strive to work with other federal, state and local agencies to develop an indicator(s) that assesses both the aggregate and media-specific environmental and economic impacts of land use decisions, in effect, an eco-economic indicator of quality land management.

Chemicals in the Landscape

The ROE presents a plethora of data regarding the production, importation, management and transfer, and treatment and disposal of chemicals across the U.S., but the data will likely appear confusing, even contradictory to the reader who is unfamiliar with EPA programs and the classification schemes under these various programs. Data referenced in this chapter should be limited to data on land releases, rather than all releases generally.

The first paragraph in this section (page 3-8) asserts, "The Toxic Substances Control Act chemical inventory now identifies more than 76,000 chemicals currently or recently used in this country. Nearly 10,000 of those ... are produced or imported in quantities greater than 10,000 pounds per year; for about 3,100 chemicals, the quantities exceed 1 million pounds per year. Associated annual production and import volumes increased by 570 billion pounds (9.3 percent) to 6.7 trillion pounds between 1990 and 1998." The third paragraph in this section discusses releases reported by industries under the Emergency Planning and Community Right-to-Know Act and the Pollution Prevention Act for 650 toxic chemicals and compounds, declares, "In addition to the 7 billion pounds of toxic chemicals released in 2000, 31 billion pounds of toxic chemical were managed and transferred for treatment (50 percent), recycling (39 percent), and burning for energy recovery (11 percent). The total amount of toxic chemicals managed and transferred between 1998 and 2000 increased by almost 29 percent, a net increase of 8.4 billion pounds."

As impressive as the discussion in the preceding paragraph is regarding the release, management and transfer of toxic chemicals reported under the Toxic Release Inventory (TRI), a comparison with the statistics for chemicals regulated under the Toxic Substances Control Act (TSCA) leaves the reader with the impression that less than 1 percent of the full inventory of TSCA-regulated chemicals are tracked in the TRI (and only 20 percent of the TSCA large quantity chemicals), and that slightly more than ½ of 1 percent (38 billion pounds) of the toxic chemicals produced or imported annually in the U.S. (6.7 trillion pounds) are tracked through the TRI. EPA should include a discussion of these apparent discrepancies in the ROE.

EPA cites the Toxic Exposure Surveillance System (TESS) finding "that organophosphates are much more likely to cause post application symptoms than are other types of pesticides. In addition, the data show that in 2001, more than 100,000 people were sufficiently concerned about their actual exposure to pesticides to call their local poison control center." Because of the human health significance of organophosphate exposures identified in the TESS, EPA should include specific information on organophosphate use in addition to the general discussion on herbicide and insecticide use on page 3-9.

Waste and Contaminated Lands

Two major components to assessing waste and contaminated lands appear lacking in the ROE. Firstly, the selected indicators do not include state databases identifying quantities of wastes generated. While the ROE focuses on nationally available databases, state-tracked waste generation information is readily available from the states and should be included in the ROE. Secondly, the indicator of current National Priorities List (NPL) sites is not a true indicator of the

universe of potential candidate sites for the NPL. Underreporting of potential NPL sites is a consequence of political and policy decisions that do not diminish the environmental significance of these non-included sites.

EPA also estimates that there are approximately 3,700 sites not included in the NPL that may be subject to corrective action under the Resource Conservation and Recovery Act (RCRA). Again, information regarding these RCRA corrective action sites is readily available from states and should be included in the ROE in lieu of EPA estimates.

Finally, while improvements in air and water quality resulting from emissions reductions are often observable in short time frames due to the dynamic nature of those media, the critical factors influencing remediation of contaminated lands are time and money. While it may loom difficult to collect and evaluate information on the extent of the contaminated lands, and the effort needed to remediate them, EPA should explore the development and inclusion of two additional indicators, representing the time and cost to fully address all known remediation sites, in the ROE.

Human Health

Human health is discussed in various sections of the ROE, although the focal point for human health issues is contained primarily in Chapter 4. Therefore, to fully appreciate the nature of environmental impacts on human health, the reader must read virtually the entire report. This integrated approach does underscore, however, the fact that environmental conditions are directly related and integral to some human health conditions. For example, human health concerns are contained in (but not limited to these few examples):

- The *Cleaner Air* chapter – indoor air quality deals with radon, environmental tobacco smoke (see page 1-11) and particulate matter in outdoor air (see page 1-8)
- *Clean Water* chapter – deals with waterborne diseases associated with drinking water (page 2-14) and fish consumption advisories (page 2-18)
- *Chemicals in the Land* – especially the sensitive issue of the Superfund National Priorities List (page (3-8)

Because of this integrated approach to discussing human health throughout the draft report, there are some aspects of Chapter 4 that may leave the reader somewhat unsatisfied. As a consequence, Chapter 4 as a "stand alone" gives the reader the impression that it is searching for something new to say, but not always successfully delivering "new" news.

The introduction provides a useful and clear discussion as to why indicators for human health are particularly challenging. It is unfortunate that Exhibit 4-1 (page 4-3) in the Technical Support Document was NOT a part of the draft report, because it introduces the environmental public health risk paradigm in a way that makes clear the differences between bio-monitoring indicators and outcome indicators. This risk paradigm also provides a good way for the public to understand why 'cause and effect' mechanisms and pathways are very hard to pinpoint in the

instance of health conditions with suspected environmental antecedents, any why time frames for appearance of many effects may range from months to decades. Therefore, consideration should be given to including this exhibit in the final version of the ROE, or making certain that any oral or written presentation of the report includes this framework.

Insofar as the health conditions highlighted for future attention are concerned—cancer, cardiovascular disease, lung disease (including asthma) and gastrointestinal illnesses—these all seem good choices in that the attention is focused on the role of the environment in causing or contributing to these conditions, which all include genetic, environmental, and behavioral components. The suite of conditions for describing health risks to children also seems logical. However, a fuller explanation of infant mortality as an environmental issue was not presented until later in the ROE. Concerns about methyl mercury contamination as a consequence of maternal exposure during pregnancy provided a convincing argument for making such exposure a factor in infant mortality. This discussion would have been more useful if presented earlier in the chapter.

The case studies will need a brief preamble in order for the public to understand why these studies—lead, London 'fog' (sulfur dioxide and particulate matter) and typhoid—are informative to today's audience. On the face of it, because they do not reflect current national concerns, the significant of these public health 'successes' may be missed. And, with the possible exception of the yet ongoing debate concerning 'safe' lead levels, these are issues in which control processes are already in place.

The chapter falls short in discussing current environmental health concerns. Adding to the intricacies involved in translating an exposure to a dose and a subsequent health effect are many modern confounding factors—other co-existing chronic diseases, the contribution of work environments, the changing nature of work, the increase of women in the workforce as an environmental factor, etc. A second area of missed opportunity is a discussion of the complexity of racial and ethnic subpopulations. Comparisons between African-American populations and the general population are sprinkled throughout the chapter; however, other subpopulations complexities are relegated to the Technical Support Document. None of the discussions in the draft ROE hint at the complexity of the populations that are affected by environmental exposures. Focus here is only on women of childbearing age (read: potentially pregnant women), children (both sexes, all kinds), and Blacks as compared to the general population. In general, many public information efforts are geared toward dis-aggregation of data to provide greater subgroup analysis and thus a more accurate picture of differential risk. Consequently, this is an area that should be targeted for improvement and there will be many questions during the dissemination phase of the draft ROE about this relatively homogenized approach to population effects.

A third area for refinement concerns the demographics of age. Acknowledgement should have been made more directly to the differential risk that longevity may create, especially given the focus on chronic, mostly, middle-age adult diseases. Yet only brief reference is made to older persons as having a differential risk (page 4-12). After touting extensively the success in extending life expectancy over the past decades, a lack of a specific focus on older persons is unfortunate. Taken together with the population diversity issue, it is disappointing that age and

ethnicity are not discussed in a way that makes understandable the significant challenge and scope of environmental public health efforts in teasing out the relative environmental contribution to health outcomes.

Finally, a surprising omission is the role of newer monitoring technologies, and physiologic or genetic technologies (toxico-genomics) to the development of measures that will actually protect human health. Mortality and morbidity data are, by definition, data from registries that are obtained after a health condition is manifested. Biomarkers of disease also are indicators that some demonstrable physiological impact and/or health damage has occurred, but as a class are scarce. Therefore, the potential role for new and emerging technologies in monitoring the environment and/or monitoring human exposure to environmental insults could be included in this chapter.

Finally, two more direct comments:

- There is an error in the infant mortality chart. The Technical Support Document, Exhibit 4-2 (page 4-2) and the SAME table in the draft ROE, Appendix (page I-8) have infant mortality sorted into different categories. It is correct in the appendix (under children's environmental health issues) but incorrect in the body of the Technical Support Document.

- A second comment concerns organizational discordance for information on waterborne disease outbreaks. In the Technical Support Document it is placed in the human health chapter (page 4-26), but in the draft ROE, it is found in the water chapter (page 2-14). In any subsequent revision of the draft ROE, it may be best to include it in the water chapter entirely. Then the human health chapter could be expanded to discuss a few relevant contemporary issues, such as VOCs, POPs, or endocrine disruptors, topics that are now addressed in a real way only in the Technical Support Document.

Ecological Condition

Executive Summary

In many ways, this chapter on Ecological Conditions is one of the most powerful in the document. The strength of the message is in suggesting a much different approach to tracking environmental impacts of EPA programs and the actions of the citizens of the nation. The following statement in the introduction clearly states the case, "Most EPA programs focus on managing environmental stressors, such as minimizing chemicals in air and water or reducing toxic substances and hazardous waste. Measuring ecological conditions will help EPA systematically assess how its management of stressors affects overall ecosystem health."

To the extent that a case can be made that the nation (and the entire world) is composed of interconnected sets of ecosystems, focusing on overall ecosystem health is a viable and potentially very useful approach for assessing and managing the environmental conditions within which we live and work. The chapter does make the case emphatically, that much effort

involving both research and policy initiatives will be required in order to make this a truly workable approach.

The chapter cites recent key work in the area, including the findings of the EPA Science Advisory Board and the report from the Heinz Center, demonstrating that there is substantive scientific activity in this area. The chapter also indicates that there is a shortage of actual data that can be used to indicate the current state or changes in the ecological condition of the nation. For the most part, the existing data has been collected by other federal agencies or by state and local government organizations. This illustrates that progress toward defining and monitoring ecological conditions will require significant coordination among agencies and will require, as well, development of many new approaches to systematic data collection to define effectively the ecological condition of the nation.

There may be discussion and some questioning about the selection of data that was presented in this report as an initial attempt to assess the nation's ecological state. Certainly it is not complete, and because of that, the chapter fails to give more than a spotty picture of the condition of the ecosystems functioning in the United States. This observation should not be seen as a criticism of EPA's efforts, but rather as an affirmation of the major point made in the chapter. Only a fraction of the data necessary to make this report possible has ever been collected. In some local and regional situations ecological system data has been collected—for watersheds, for example. In addition, in some areas where concerns have been raised about endangered species, ecosystems have been characterized. However, these localized ecosystem databases may not share a common measurement methodology, nor have they been assembled to a degree of completeness so that a nation-wide picture can emerge. We as a nation have not yet made a concerted effort to examine the environment in this way and to use the results of the examination as a tool for policy formulation and for investment of resources for environmental improvement.

The chapter makes the case for shifting away from managing discrete environmental stressors and instead focusing on ecosystem health, and the following chapter provides some suggestions about how to use the approach to move forward.

Links Between Stressors and Ecological Outcome

This section explains the links between overall ecological conditions and the environmental stressors that have been discussed in the previous chapters dedicated to specific media. The linkage highlights the apparent advantages of developing understandings of the interactions of the stressors and the impacts on the overall environment. In addition, the section outlines some of the challenges of obtaining data of sufficient quality to make the indicators most useful. The quality issues around sampling are particularly important.

The individual sections about specific ecosystems in the United States, such as forests, farmlands, and freshwater, provide interesting information about trends and observations, but as indicated are, for the most part, not complete in terms of ecological assessment because of data gaps.

Challenges and Data Gaps

This section discusses some of the opportunities for advancement of this approach. It indicates that the data available for forest ecosystems are much more complete than for most other systems. In a real sense, this is true because the data has been useful for the management of forests as a productive resource. This fact can be extended to help make the case for similar data collection for other systems. By definition, all ecosystems are productive, and we as a nation depend upon that productivity. Only by good measurement of the health and vitality of these systems can we plan and work for the continuation and enhancement of their productivity. This approach has not only environmental implications, but economic implications as well. A sustainable balance between the two is what the nation, through the management of its environment, should strive to achieve.

This section discusses some ecological issues of recent concern to the EPA, including vertebrate deformities, algal blooms, and eutrophication. These are interesting issues and may indicate important ecological swings. However, they should be assessed and judged as part of an overall ecological understanding, so that no one issue takes primacy over understanding and improvement of the ecology as a whole.

Working Together for Environmental Results

This chapter addresses the need for a more comprehensive set of national environmental indicators. The chapter calls for developing a consensus around the most appropriate indicators and suggests a partnership between all of the public and private organizations involved in this task. These are good ideas and worthy of support. However, while consensus, coordination and partnership are good ideas, there remain two critical elements missing from the equation: *leadership* and *resources*. If the U.S. is to develop a comprehensive set of national environmental indicators, someone must have lead responsibility for doing so. The Council recommends that EPA be explicitly assigned that task. Moreover, a national system for developing environmental indicators, collecting environmental data, and analyzing that data will be expensive. It will require substantial resources to set up and maintain a national environmental observatory and to develop credible, understandable environmental indicators. Such a system is a prerequisite to cost-effective environmental management. Remember the old business mantra, "You cannot manage something if you cannot measure it." Without measures of success and indicators of environmentally related inputs, processes, outputs, and outcomes, we cannot know if our programs are resulting in progress or failure.

The chapter notes that, "Indicators can be powerful tools, but only if they clearly communicate environmental conditions to decision-makers and the public. Further, for an indicator or an index to be useful for decision-makers, thresholds or criteria distinguishing acceptable from unacceptable conditions are needed" (page 6-3). Our experience in developing and using environmental indicators is in its infancy. Given the inadequate resources devoted to collecting data to measure environmental conditions, a well-developed set of summary indicators could simply be a summary of inadequate information. It took a great deal of work to develop the Gross National or Domestic Product as a measure of economic growth. That indicator is based on a set of data of reasonably high reliability. Conversely, we are not nearly ready to

develop similar summary measures for the environment until we can do a much better job of collecting and analyzing environmental monitoring data.

The chapter also notes that, "Understanding and quantifying causality—that is, sorting out the role of other factors and their interactions—remains a significant scientific challenge" (page 6-3). It certainly is true that ecological relationships are complex. However, the goal of proving causal relationships is unrealistic and, as a standard, is not necessary to move forward. If causality can be demonstrated, then certainly we should act, but if we have a reasonable indication, supported by sound scientific analysis, that environmental damage is taking place, we should not wait for absolute proof before acting. Environmental damage can be irreversible; sometimes pilot tests of actions to reduce or reverse damage should be undertaken before the damage is fully proven. Moreover, in many instances such demonstration projects result in a clearer understanding of the complex interactions between a set of actions and their resulting impacts on an ecological system.

In any case, before we discuss the issue of causality we must have more comprehensive data on both causes and effects of environmental damage. Such data collection and analysis requires significant resources and assertive leadership. The chapter avoids what is ultimately the toughest question regarding the Environmental Indicators Initiative—who will pay for the collection and analysis of the data essential to its success, and who will do the work. Talk of partnerships and cooperation is helpful, but misses the fundamental point of resources and leadership.