COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON

CHAIRMAN

6/26/89

to: Dave Bates

Here's the draft and memo requesting comments.

A. H.

To Bob Grady
Jamila Wingate
6/26

Document Originally
Attached to
Following Page

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
722 JACKSON PLACE, NW.
WASHINGTON, DC 20503

June 21, 1989

MEMORANDUM TO: HEADS OF FEDERAL AGENCIES

FROM: A. ALAN HILL
CHAIRMAN
COUNCIL ON ENVIRONMENTAL QUALITY

SUBJECT: DRAFT OF GUIDANCE TO FEDERAL AGENCIES REGARDING CONSIDERATION OF GLOBAL CLIMATE CHANGE IN PREPARATION OF ENVIRONMENTAL DOCUMENTS

Enclosed is a draft of guidance the Council proposes to issue to all federal agencies, directing consideration of global climate change when agencies prepare environmental impact assessment documents under the National Environmental Policy Act. The Council has given this topic very careful consideration and has held a number of public meetings, including one where the Council heard comments from representatives of federal agencies.

This draft is being sent to offer you the opportunity to review and comment on it. It would be appreciated if you would have your comments sent to Dinah Bear, General Counsel, Council on Environmental Quality, no later than July 31. If you or your staff have any questions, please contact Dinah Bear (#395-5754).

Enclosure

cc: NEPA Liaisons

D R A F T P1

MEMORANDUM

FOR: Heads of Federal Agencies

FROM: A. Alan Hill, Chairman

SUBJECT: Guidance Regarding Consideration of Global Climatic Change in Environmental Documents Prepared Pursuant to the National Environmental Policy Act

DATE:

Introduction

Beginning in 1987, the Council on Environmental Quality (CEQ) held a series of public meetings related to stratospheric ozone depletion and global warming.[1] CEQ heard not only from noted scientists on the probable causation of these phenomena, but also from experts on the possible human health, biological, terrestrial, and aquatic effects. In addition, the Council was briefed on the status of research being conducted by federal agencies into these questions. The Council concluded its series of meetings by inviting representatives of several federal agencies and members of the public to discuss global climatic change[2] in the context of the environmental impact assessment process under the National Environmental Policy Act (NEPA).

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[1] A list of the meetings held is attached as an appendix.

[2] In this guidance document, the phrase "global climatic change" is used as shorthand for the separate, but somewhat interrelated, phenomena of stratospheric ozone depletion and global warming.

While there are many unanswered questions with respect to stratospheric ozone depletion and global warming, the Council recognizes that the available scientific evidence regarding these phenomena furnishes sufficient cause for serious concern. Rather than wait until all scientific uncertainties are resolved, the Council has concluded that federal agencies should begin now to examine how their actions may contribute to, and could be affected by, global climatic change. This memorandum provides guidance on how such an examination of federal actions should be done in the context of environmental documents prepared pursuant to NEPA.

The phenomena of stratospheric ozone depletion and global warming, and their potential effects, are briefly described below. The Council then outlines how NEPA and the CEQ regulations compel consideration of these phenomena in NEPA documents, and how the NEPA process can be used to assess the impact of federal actions on global climatic change and the effects of such change on federal actions.

Stratospheric Ozone Depletion[3]

In 1974, scientists first hypothesized that manufactured chlorofluorocarbons (CFCs) could deplete the stratospheric ozone layer. Under this hypothesis, CFCs, emitted at the earth's surface in increasing quantities, slowly diffuse to and degrade in the stratosphere,[4] breaking into chlorine atoms which

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[3] Specific references for this section are: Albritton, Daniel L., National Oceanic and Atmospheric Administration, Stratospheric Ozone: The State of the Science and NOAA's Current and Future Research, July 1987, at iv-vi, 1-7; Molina, M., and F. S. Rowland, "Stratospheric Sink for Chlorofluoromethanes: Chlorine Atom-Catalysed Destruction of Ozone," Nature, Vol. 249, pp. 810-12 (1974); United States Environmental Protection Agency, Assessing the Risks of Trace Gases That Can Modify the Stratosphere, December 1987, Volume I (Executive Summary) at 2-4; and United States Environmental Protection Agency, Environmental Impact Statement on Montreal Protocol on Substances That Deplete the Ozone Layer, January 1988, at 1-1 to 1-2, 2-1, 3-2. See generally National Aeronautics and Space Administration, Present State of Knowledge of the Upper Atmosphere 1988: An Assessment Report, August 1988; United Nations Environment Programme and United States Environmental Protection Agency, Effects of Changes in Stratospheric Ozone and Global Climate Change, 1986, Volumes I (Overview) and II (Stratospheric Ozone); United States Environmental Protection Agency, Regulatory Impact Analysis: Protection of Stratospheric Ozone, 1987; and United States Environmental Protection Agency, Future Concentrations of Stratospheric Chlorine and Bromine, August 1988.

[4] The stratosphere is that region of the atmosphere 10 to 50 km (6 to 30 miles) above the surface of the earth. Most ozone is in the stratosphere, although smaller amounts are found in the lower atmosphere where it is composed of a residue from the stratosphere and is produced by air pollution.

ultimately chemically destroy ozone molecules. This chemical process results in a thinning of the stratospheric ozone layer.[5]

A thinner ozone layer would absorb less solar ultraviolet (UV) light and would allow increased UV radiation to reach the earth's surface. Excess amounts of UV radiation are associated with increased incidences of skin cancer, cataracts, and other biological effects such as reduced crop yields and disruption of some terrestrial and aquatic ecosystems. Increased UV radiation could also increase polymer (e.g., polyvinyl chloride) degradation and could increase ground level oxidants (smog).

Research conducted into the response of the stratosphere to ozone-altering compounds and long-term monitoring done to obtain direct evidence of the predicted effect on stratospheric ozone have substantially increased confidence in the ozone depletion

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[5] CFCs are not the only manufactured chemical compounds which can affect stratospheric ozone. Halons, which contain bromine, also have the potential to destroy ozone molecules. In fact, bromine atoms are considerably more effective in destroying ozone molecules than are chlorine atoms. Both CFCs and halons are halogenated compounds (i.e., a class of hydrocarbons in which one or more of the hydrogen atoms have been replaced by a halogen--a chlorine, bromine, or fluorine atom). The degree of hydrogen atom replacement and the particular halogens involved determine the relative effectiveness of a chemical compound to deplete stratospheric ozone.

CFCs are used in a wide variety of consumer and industrial goods, including air conditioning, refrigeration, foam products, and solvents. These gases are quite stable and can exist in the lower atmosphere for a century or more. Their unusual chemical stability allows them to reach the stratosphere intact; there solar ultraviolet radiation causes them to break apart, releasing chlorine. The production of halons, used for fire suppression, is currently relatively small, but, as noted above, they contain bromine which is even more effective than chlorine in ozone reduction.

hypothesis.[6] For example, there is emerging scientific consensus that the ozone "hole" over Antarctica is due to the reaction of CFCs in the unusually cold Antarctic stratosphere. Most atmospheric scientists do believe that if the present growth rates of CFCs and other ozone-depleting gases continue unabated indefinitely, then it is highly likely that substantial global ozone depletion will occur in the next century, particularly at the higher altitudes and latitudes.[7]

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[6] To date, very little monitoring has been done to determine whether increased amounts of UV radiation are in fact reaching the earth's surface.

[7] Recognizing that CFCs may damage stratospheric ozone, the United States signed the Montreal Protocol on Substances That Deplete the Ozone Layer in September, 1987. This protocol calls for signatory nations to freeze CFC production and consumption at 1986 levels in 1989, to reduce those levels by 20% in 1993, and to further reduce those levels by an additional 30% in 1998.

President Reagan, in transmitting the Montreal Protocol to the United States Senate for ratification, called it an "historic agreement" which was undertaken "to protect a vital global resource." The President also stated that ratification by the United States would be necessary for effective implementation of the Protocol and would "encourage similar action by other nations whose participation is also essential." Message to the Senate Transmitting the Protocol, 23 Weekly Comp. Pres. Doc. 1545 (December 21, 1987).

Global Warming[8]

While the phenomenon of stratospheric ozone depletion is a relatively recent discovery, global warming was predicted in 1896 by a Swedish chemist who postulated that the increasing atmospheric concentration of carbon dioxide and other gases from industrialization would trap more solar heat, thus raising the earth's temperature.[9] Scientific research conducted to date has demonstrated that atmospheric levels of carbon dioxide have increased 25% since pre-industrial times and continue to rise. The National Academy of Sciences has estimated that a doubling of carbon dioxide concentration, which could occur by the middle of the next century, would lead to global warming of 1.5 to 4.5 degrees celsius (3 to 8 degrees Fahrenheit).

Greenhouse gases include carbon dioxide, methane, and

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[8] Specific references for this section are: National Academy of Sciences, Carbon Dioxide and Climate: A Scientific Assessment, 1979, at 1-3; National Academy of Sciences, Carbon Dioxide and Climate: A Second Assessment, 1982, at 1-14; and National Academy of Sciences, Changing Climate: Report of the Carbon Dioxide Assessment Committee, 1983, at 1-4. See generally Council on Environmental Quality, Global Energy Futures and the Carbon Dioxide Problem, January 1981; United Nations Environment Programme and United States Environmental Protection Agency, Effects of Changes in Stratospheric Ozone and Global Climate Change, 1986, Volumes I (Overview), III (Climate Change), and IV (Sea Level Rise); and United States Environmental Protection Agency, Greenhouse Effect, Sea Level Rise and Coastal Wetlands, July 1988.

[9] "Global warming" should be distinguished from the "greenhouse effect." Carbon dioxide and other trace gases absorb heat radiation from the earth's surface, trap it, and prevent it from dissipating back into space. Without this "greenhouse effect," the earth's temperature would be substantially lower. As the concentration of greenhouse gases increases, however, scientists hypothesize that more of the earth's radiated heat will be trapped, leading to overall global warming.

nitrous oxide. These gases occur naturally, but are also produced industrially. For example, the burning of fossil fuels introduces a large amount of carbon dioxide into the atmosphere.[10] Ozone, a pollutant which is chemically produced in the lower atmosphere, and CFCs are still other greenhouse gases.[11]

A warming of the earth's temperature could cause changes in global climatology, such as possible shifts of desert and fertile regions, intensification of tropical storms, and a rise in sea level caused by expansion of sea water as it warms and by glacial melting. Although there are still considerable doubts with respect to the timing and extent of global warming, most scientists consider it highly likely that a global warming trend will eventually be caused by an increased concentration of greenhouse gases.[12]

The Role of the NEPA Process

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[10] Plants and trees consume carbon dioxide, but increasing deforestation lessens the amount of carbon dioxide consumed. Further, when downed trees are burned or allowed to rot, carbon dioxide and other greenhouse gases are released.

[11] Ironically, the presence of carbon dioxide in the stratosphere acts to lessen the rate of stratospheric ozone depletion. See, e.g., United States Environmental Protection Agency, Assessing the Risks of Trace Gases That Can Modify the Stratosphere, December 1987, Volume I (Executive Summary) at 5. Thus, increased levels of carbon dioxide may add to the problem of global warming in the lower atmosphere, but reduce the problem of ozone depletion in the stratosphere.

[12] Some scientists believe that an increase in surface temperature will increase cloud cover, lessening any warming, or even cooling, the earth's temperature by reflecting sunlight back into space. In addition, there is a continuing debate over the moderating influence of the oceans on global warming.

In enacting NEPA in 1969, Congress directed federal agencies to consider the effects[13] of their actions on the human environment. Among the many responsibilities set forth in the Act, NEPA requires federal agencies to "[i]nclude in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment, a detailed statement" which addresses the environmental impact of the proposed action. NEPA, Section 102(2)(C). The CEQ regulations implementing this provision of NEPA mandate that federal agencies address all reasonably foreseeable environmental impacts of their proposed programs, projects, and regulations. See 40 CFR §§ 1502.4, 1508.8, 1508.18, and 1508.25.

Whether stratospheric ozone depletion and global warming should be considered "reasonably foreseeable" impacts of emissions of CFCs, halons, and greenhouse gases are thus threshold issues: if these impacts are reasonably foreseeable, then federal agencies must address them in NEPA documents; if not, then they do not come within the scope of a NEPA analysis.

The available scientific evidence and the presentations made in CEQ's public meetings indicate that stratospheric ozone depletion and global warming are "reasonably foreseeable" impacts of emissions of CFCs, halons, and greenhouse gases, as that phrase is understood in the context of NEPA and the CEQ

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[13] In this memorandum, as in the CEQ regulations, "effect" is synonymous with "impact." See 40 CFR § 1508.8.

regulations.[14] As a result, stratospheric ozone depletion and global warming are effects which must be considered in NEPA documents in the future.

Specifically, federal agencies must determine whether and to what extent their actions affect emissions of stratospheric ozone depleting substances or greenhouse gases. Further, federal agencies must consider whether the actions they take, e.g., the planning and design of federal projects, may be affected by any changes in the environment which might be caused by global climatic change.

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[14] It should be noted that, in the scientific community, the stratospheric ozone depletion hypothesis enjoys a stronger degree of certainty than does the global warming hypothesis. With respect to ozone depletion, scientists have a good understanding of the chemical reactions which occur when CFCs degrade in the stratosphere, and empirical evidence that stratospheric ozone is thinning. On the other hand, scientists do not yet understand how the earth's response mechanisms might operate to modify or delay global warming. For example, although current climate models suggest that increased concentrations of greenhouse gases will lead to global warming, the trend of global surface temperature for the past 100 years, while not incompatible with predictions of global warming, shows evidence of other factors influencing annual variations of temperatures. For purposes of NEPA, however, both stratospheric ozone depletion and global warming should be viewed as reasonably foreseeable impacts of emissions of CFCs and greenhouse gases, respectively.

It should be kept in mind that global climatic change is just one of many issues to be analyzed in NEPA documents.[15] By providing this guidance, the Council is not suggesting that the global climatic change issue should be emphasized over other environmental effects, or that any emission, no matter how small, of a stratospheric ozone depleting substance or greenhouse gas will trigger the requirement to prepare an environmental impact statement (EIS).

Further, this guidance is not intended to discredit the adequacy of NEPA documents which have already been prepared without a discussion of global climatic change. Nor should this be read as requiring such a discussion in NEPA documents which are currently in the final stages of preparation. Rather, the Council recognizes that global climatic change is an emerging issue of great significance on which scientific consensus has been developed only recently, and that meaningful analysis of the issue has not been possible until this time.

In sum, very few federal agencies have focused on global

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[15] The Natural Resources Defense Council (NRDC) and others have strongly urged CEQ to amend its NEPA regulations to "require all federal agencies fully to analyze the causes of and impacts from climate disruption for all major federal actions significantly affecting the quality of the human environment." Letter to Chairman A. Alan Hill, Chairman, from David A. Wirth, Senior Attorney, NRDC, dated November 9, 1988 (NRDC Letter), at 1. As NRDC acknowledged, however, the scope of NEPA and the CEQ regulations is broad enough to include global climate change and its predicted effects. See NRDC Letter at 7-8. For example, section 1508.8 defines "effects" to include ecological, aesthetic, historic, cultural, economic, social, or health effects. Thus, a regulatory change is not necessary in order to require federal agencies to consider global climate change in their NEPA documents.

climatic change in their NEPA documents.[16] Stratospheric ozone depletion and global warming are serious concerns, however, and federal agencies should be aware of how their proposals may contribute to or be affected by climatic changes. Each agency must exercise its own independent judgment and discretion to determine the extent to which it should assess global climatic change in its NEPA documents.

Applying the NEPA Process

As noted above, there are two aspects of global climatic change which should be considered in NEPA documents: (1) the potential for federal actions to influence global climatic change (e.g., increased emissions of CFCs, halons, or greenhouse gases) and (2) the potential for global climatic change to affect federal actions (e.g., feasibility of coastal projects in light of projected sea level rise). As a first step, each federal agency should immediately review whether and to what extent its activities (both continuing and proposed) contribute, directly or indirectly, to the emission of CFCs or greenhouse gases and thus to global climatic change. Consideration should also be given as to whether and to what extent its activities will be affected by the consequences of stratospheric ozone depletion and global

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[16] One exception is the National Aeronautics and Space Administration which discussed possible impacts on stratospheric ozone in its environmental impact statement for the space shuttle program. See National Aeronautics and Space Administration, Final Environmental Impact Statement for the Space Shuttle Program, April 1978, at 80-91.

warming.

Federal Actions Influencing Global Climatic Change

Clearly, both projects and programs proposed by federal agencies, including permits issued by federal agencies, can cause increased emissions of CFCs and greenhouse gases. Analysis of the impacts of such emissions at the project level, however, would not provide meaningful information in most instances. Efforts would be better spent in assessing federal programs which may affect emissions of these gases. This type of approach recognizes that individual projects may increase CFC and greenhouse gas emissions by only marginal amounts, but that the cumulative effect of such emissions could be more dramatic.

It is long-range federal programs which have the greatest likelihood for influencing global climatic change. Thus, it is in programmatic NEPA documents where an analysis of global climatic change would be most useful. Proposals regarding long-range energy, transportation, and forest management programs in particular are prime candidates for programmatic environmental assessments (EA) or EISs which include an analysis of how the programs will contribute to (or reduce) emissions of greenhouse gases. Discussions of these issues in programmatic documents could then be incorporated by reference in (or "tiered" to) more site specific NEPA documents. See 40 CFR § 1508.28.

With respect to ongoing federal programs, federal agencies should review the extent to which such programs may contribute to stratospheric ozone depletion or global warming. Existing

programmatic EAs or EISs may need to be supplemented or new programmatic documents prepared to substantiate the results of this review.

Federal agencies are reminded that their actions may directly, and indirectly, influence emissions of CFCs and greenhouse gases, and that the CEQ regulations require analysis of both direct and indirect, as well as cumulative, effects in NEPA documents. See 40 CFR §§ 1508.8 and 1508.25.

Effects of Global Climatic Change on Federal Projects

While analyzing how federal actions might contribute to global climatic change will not be easy, examining the effects of stratospheric ozone depletion and global warming on proposed federal actions is an even more complex task. As discussed above, the hypotheses themselves are well supported, but the predicted effects are subject to substantial scientific uncertainty. For example, there currently is no consensus on the regional climatic changes that might occur with increased greenhouse gas concentrations. Thus, predicting what climate conditions might prevail at a particular place or time is troublesome at best.

Dealing with this type of uncertainty is discussed in 40 CFR § 1502.22. Under that regulation, if information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the costs of obtaining it are exorbitant or the means to obtain it are not known, the federal agency must include in its EIS a statement that such information is incomplete or

unavailable, a statement of the relevance of the incomplete or unavailable information to evaluating the reasonably foreseeable adverse impacts, a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable adverse impacts, and the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. The regulation also states that "reasonably foreseeable impacts" includes those which have catastrophic consequences, even if their probability is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on "pure conjecture," and is within the rule of reason.

Federal agencies must pay close attention to the research which is being conducted regarding climate change impacts. While such research will allow for better predictions in the future, regional predictions are not presently available. In the meantime, the absence of this information will often require federal agencies to comply with the dictates of Section 1502.22. Agencies will need to continually review the available scientific evidence on the effects of global climatic change and determine which effects have a reasonable scientific basis and which are "pure conjecture."

The validity of using the NEPA process to assess the impacts of global climatic change on federal projects is dependent upon the duration of the action. For short-term actions, climatic conditions should not be sufficiently different from the current

climatic situation as to require major modifications. Long-term actions, however, may need to be modified because of the anticipated effects of global climatic change. Agencies need to identify those projects and programs which are most sensitive to climate change effects such as higher temperatures, more severe storms, drier or wetter conditions, and sea level rise. Long-range decisions concerning agriculture, forestry, and coastal zone resources, as well as decisions regarding sites for proposed facilities, need to be supported by EAs or EISs which analyze, to the extent possible, the reasonably foreseeable impacts of global climatic change.[17]

For example, scientists have projected a 1.5 to 4.5 degree celsius (3 to 8 degree Fahrenheit) temperature rise if carbon dioxide and other gaseous emissions continue to rise at the current rate unabated. This translates into a predicted sea level rise of up to 8 inches by 2025 and up to 6 feet by 2100--a consequence with a severe impact on coastal resources. Thus, an agency proposing a long-term project in a coastal region should consider this potential impact in the NEPA document prepared for the project.

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[17] For example, the Forest Service is currently looking at the effects of global climate change on forest ecosystems. The results of this research will help the agency decide how it should alter the management of its forests to sustain forest health and productivity in light of climate changes. In addition, the Nuclear Regulatory Commission has recognized that higher temperatures could increase the demand for energy and that drought conditions could affect the availability of heat sinks for the nuclear power plants regulated by the agency.

Conclusion

Global climatic change is a serious environmental concern which, given the current state of scientific knowledge, must be viewed under NEPA as a reasonably foreseeable impact of continued emissions of CFCs and greenhouse gases. Thus, federal agencies must analyze the extent to which both their proposed and ongoing programs or other activities might influence such emissions, thereby contributing to (or reducing) the problems of stratospheric ozone depletion and global warming. Such analyses can best be done in the context of NEPA and should look at how federal actions may affect global climatic change and, to the extent possible given the current state of scientific knowledge, how federal actions may be affected by global climatic change.

APPENDIX

PUBLIC MEETINGS HELD BY THE COUNCIL ON ENVIRONMENTAL QUALITY REGARDING STRATOSPHERIC OZONE DEPLETION AND GLOBAL WARMING

April 7, 1987	**Dr. Jarvis Moyers**, Chief Atmospheric Scientist, National Science Foundation, on Climate Change Due to the Greenhouse Effect and Stratospheric Ozone Depletion
July 22, 1987	**Dr. S. Fred Singer**, Chief Scientist and Science Technology Advisor to the Secretary of the Department of Transportation; and **Dr. Irving Mintzer**, Director of the Program in Energy Climate and Industrial Resources, World Resources Institute, on Stratospheric Ozone Depletion and Climate Changes
July 24, 1987	**Dr. Daniel L. Albritton**, Director of the Aeronomy Laboratory of the National Oceanic and Atmospheric Administration's Environmental Research Laboratories, on Stratospheric Ozone Depletion and Climate Changes
October 6, 1987	**Dr. Margaret Kripke**, Chief of the Immunology Department at the University of Texas Cancer Center, on Human Health Effects of Stratospheric Ozone Depletion
October 22, 1987	**Dr. Alan Teramura**, Associate Professor, Department of Botany, University of Maryland, on Biological and Terrestrial Impacts of Stratospheric Ozone Depletion
February 16, 1988	**Dr. Robert Worrest**, Project Leader, Research Program on Global Climate Change, Environmental Protection Agency, on Aquatic Impacts of Stratospheric Ozone Depletion and Global Warming
March 29, 1988	**Dr. Alan D. Hecht**, Director of the National Climate Program Office, on the Five Year Plan Issued by the Program Office

September 9, 1988

Richard E. Sanderson, Director, Office of Federal Activities, Environmental Protection Agency;
David E. Ketcham, Director, Environmental Coordination Staff, United States Forest Service;
Ted Cress, Office of Deputy Under Secretary for Research and Advance Technology, Department of Defense;
Jerry Peterson, Chief, Floodplain Management Section and Coastal Resources Branch, Army Corps of Engineers;
Eileen Shea, Office of Global Programs, and **Ben Miermet**, Office of Coastal Resources Management, National Oceanic and Atmospheric Administration;
Carol Borgstrom, Director, Office of NEPA Project Assistance, Department of Energy;
Camille Mittelholtz, Environmental Program Analyst, Department of Transportation;
Thomas E. Murley, Director, Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission;
Bruce Blanchard. Director, Office of Environmental Project Review, Department of the Interior; and
David Wirth, Natural Resources Defense Council; on Global Climate Impacts and the NEPA Process