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Compilation of Exhibits

Political Interference with Science: Global Warming, Part II

March 19, 2007

Summary

Greenhouse gases are accumulating in Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise. Temperatures are, in fact, rising. The changes observed over the last several decades are likely mostly due to human activities, but we cannot rule out that some significant part of these changes is also a reflection of natural variability. Human-induced warming and associated sea level rises are expected to continue through the 21st century. Secondary effects are suggested by computer model simulations and basic physical reasoning. These include increases in rainfall rates and increased susceptibility of semi-arid regions to drought. The impacts of these changes will be critically dependent on the magnitude of the warming and the rate with which it occurs.

The mid-range model estimate of human induced global warming by the Intergovernmental Panel on Climate Change (IPCC) is based on the premise that the growth rate of climate forcing[1] agents such as carbon dioxide will accelerate. The predicted warming of 3°C (5.4°F) by the end of the 21st century is consistent with the assumptions about how clouds and atmospheric relative humidity will react to global warming. This estimate is also consistent with inferences about the sensitivity[2] of climate drawn from comparing the sizes of past temperature swings between ice ages and intervening warmer periods with the corresponding changes in the climate forcing. This predicted temperature increase is sensitive to assumptions concerning future concentrations of greenhouse gases and aerosols. Hence, national policy decisions made now and in the longer-term future will influence the extent of any damage suffered by vulnerable human populations and ecosystems later in this century. Because there is considerable uncertainty in current understanding of how the climate system varies naturally and reacts to emissions of greenhouse gases and aerosols, current estimates of the magnitude of future warming should be regarded as tentative and subject to future adjustments (either upward or downward).

Reducing the wide range of uncertainty inherent in current model predictions of global climate change will require major advances in understanding and modeling of both (1) the factors that determine atmospheric concentrations of greenhouse gases and aerosols, and (2) the so-called "feedbacks" that determine the sensitivity of the climate system to a prescribed increase in greenhouse gases. There also is a pressing need for a global observing system designed for monitoring climate.

The committee generally agrees with the assessment of human-caused climate change presented in the IPCC Working Group I (WGI) scientific report, but seeks here to articulate more clearly the level of confidence that can be ascribed to those assessments and the caveats that need to be attached to them. This articulation may be helpful to policy makers as they consider a variety of options for mitigation and/or adaptation. In the sections that follow, the committee provides brief responses to some of the key questions related to climate change science. More detailed responses to these questions are located in the main body of the text.

What is the range of natural variability in climate?

The range of natural climate variability is known to be quite large (in excess of several degrees Celsius) on local

[1] A climate forcing is defined as an imposed perturbation of Earth's energy balance. Climate forcing is typically measured in watts per square meter (W/m2).

[2] The sensitivity of the climate system to a prescribed forcing is commonly expressed in terms of the global mean temperature change that would be expected after a time sufficiently long for both the atmosphere and ocean to come to equilibrium with the change in climate forcing.

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A

→ and the Earth's natural climate variability and carbon cycle,

Global Issues

Ozone depletion has global consequences for human health and the environment. Ozone depletion takes place when pollution damages the thin layer of beneficial ozone in the stratosphere, about six to 30 miles above the Earth, which protects living beings from harmful ultraviolet (UV) radiation from the sun.

~~Climate change has global consequences for human health and the environment~~. The issue of global climate change involves changes in the radiative balance of the Earth— the balance between energy received from the sun and emitted from Earth – that may alter weather patterns and climates, at global and regional scales. Among other forces, variations in the sun's output and volcanic activity are ~~two~~ natural factors that affect the radiative balance. In addition, certain atmospheric gases, such as CO_2, methane, nitrous oxides (N_2O), water vapor, and other gases, trap some of the outgoing energy, retaining heat. Other substances, such as black carbon (soot), organic carbon, and sulfate aerosols, reflect incoming solar radiation, with a potential cooling effect, or absorb energy and affect climate on regional and global scales.

Ozone depletion in the stratosphere and climate change are separate environmental issues but are related in some ways. Specifically, some substances that deplete the stratospheric ozone layer also are potent and very long-lived greenhouse gases that absorb outgoing radiation and warm the atmosphere. Ozone itself is a greenhouse gas when it absorbs incoming solar radiation and its depletion in the stratosphere over the polar zones results in localized cooling at times. Combining these two counter-balancing effects of ozone depleting substances (ODS) results in a small net effect on the global mean ~~temperature~~ climate, but regional patterns may be altered.

What is happening to the Earth's ozone layer?

In recent decades, the Earth's stratospheric ozone layer has become substantially thinner. The thinning has occurred principally over Antarctica and is referred to as the "ozone hole." The ozone layer over the Northern Hemisphere's middle latitudes is about two percent below normal during summer and autumn and about four percent below normal in winter and spring.[1] Between 1979 and 1994, the ozone layer thinned 8 percent over Seattle, 10 percent over Los Angeles, and 2 percent over Miami.[2]

Scientists generally agree that a thinning of the stratospheric ozone layer causes an increase in the amount of UV radiation. While acknowledging high uncertainty in the data, scientists have calculated that UV radiation levels at more than 10 sites in both hemispheres have increased by six percent to 14 percent since the 1980s.[3] EPA, in partnership with the National Weather Service, publishes an index that predicts UV intensity levels for different cities on a scale of 0 to 10+, where 0 indicates a minimal risk of overexposure and 10+ means a very high risk.

What is causing changes to the ozone layer?

Stratospheric ozone depletion is associated with the use of chlorofluorocarbons (CFCs), halons used to extinguish fires, and other chemicals used as solvents. Air conditioners, refrigerators, insulating foams, and some industrial processes all emit those substances. Air currents carry molecules with chlorine and bromine from those pollutants into the stratosphere, where they react to destroy ozone molecules.

B

Yet the Northern Hemisphere as a whole experienced a slight cooling from 1946-1975, and the cooling during that period was quite marked over the eastern United States

The United States virtually ceased production of most ozone-depleting substances in January 1996, because of its participation in an international agreement, the Montreal Protocol on Substances that Deplete the Ozone Layer. Nonetheless, ozone-depleting substances are still being released into the environment, as reported in the Toxics Release Inventory. Along with other developed countries, the U.S. makes substitutes for the strong ozone depleting CFCs. These substitutes are themselves less ozone-depleting than the substances they replace. Also, because the Montreal Protocol controls production but not use, emissions continue from materials made before January 1996. Even though scientists believe that recovery is under way, full restoration of the stratospheric ozone layer will take decades because of the continued use of products manufactured before the ban.

What are the human health and ecological effects of stratospheric ozone depletion?

Thinning of the stratospheric ozone layer allows more of the sun's UV radiation to reach Earth, where it contributes to increased incidences of human skin cancers, the most common of all cancers. Cataracts and suppression of the human immune system may also result from increased exposure to UV radiation. In addition, productivity of some marine phytoplankton, essential to the ocean's food chain, may be unduly stressed by high levels of UV radiation.[4]

Is the Earth's climate ground-level changing? The Earth's climate has dramatically changed throughout history and will continue to change due to natural variability.

The global mean surface temperature of the Earth has increased by about 1° Fahrenheit (° F) since the late 19th century (Exhibit 1-7).[5] The years between 1990 and 2001 include the eight warmest since systematic measurement of temperatures by instruments began about 120 years ago.[6] Scientists have been able to extend the understanding of climate change far beyond that period by examining "proxy" data. Proxy data include natural archives of climate information such as tree rings, ice cores, corals, and sediments. In addition, historical documents such as ships' and farmers' logs, travelers' diaries, and newspaper accounts can provide insights into past weather and climate conditions. Proxy temperature reconstructions are more uncertain than direct instrumental measurements, but they suggest that the recent warming is may be unusual ~~and that the 1990s are likely to have been the warmest decade in the past 1,000 years for the Northern Hemisphere (Exhibit 1-8).~~[7] Regarding the long-term proxy analyses, the ~~NRC~~ National Research Council, stated, "The data become relatively sparse prior to 1600, and are subject to uncertainties related to spatial completeness and interpretation making the results somewhat equivocal, e.g., less than 90% confidence."[8, 9]

Despite the measured ~~Although~~ warming at the earth's surface ~~has been quite pronounced~~ during the past few decades, satellite measurements beginning in 1979 indicate relatively little warming of air temperatures in the troposphere (the atmospheric layer extending from the earth's surface up to about 8 km). (Exhibit 1-X) The finding that surface and troposphere temperature trends have been as different as observed over intervals as long as a decade or two is difficult to reconcile with the current understanding of the processes that control the vertical distribution of temperature in the atmosphere. However, the disparity between surface and upper ~~air~~ atmosphere trends in no way invalidates the conclusion that surface temperature has been rising, ~~The troposphere actually may have warmed much less rapidly than the surface from 1979 to the late 1990s, due both to natural causes (e.g., the sequence of volcanic eruptions that occurred within this particular 20-year period) and human activities (e.g., the cooling in the upper troposphere resulting from ozone depletion in the stratosphere).~~ while the upper atmosphere temperature has not.

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Exhibit 1-7: Annual anomalies of combined land-surface air and sea-surface temperatures (°C), 1861-2001, relative to 1961-1990.

~~*Exhibit 1-8: Reconstructions of average surface temperature of the Northern Hemisphere for the past 1,000 years, including 95 percent confidence range in the data*~~

Exhibit 1-X: MSU Lower Tropospheric Temperature Anomalies

But global averages mask great regional variations: some parts of the world are changing more, some less. Many areas of the U.S. have warmed by more than 1°F, whereas the Southeast has cooled somewhat during the past century.[9] In some regions, particularly the Northeast, the Southwest, and the upper Midwest, the warming has been greater.[10] The increase in some places, such as the northern Great Plains, has reached as much as 3 °F.[11] During the 20th century, average U.S. temperatures dropped below freezing two fewer days per year than they did in the 19th century.[12] And observations indicate that total annual precipitation is increasing around the country. For the conterminous United States, the increase in precipitation during the 20th century is estimated to be five percent to 10 percent.[13] Recent analyses suggest that heavier precipitation and more days of rain account for much of the precipitation increase.[14] Although the United States has a well-developed climate monitoring system, the nation will need to combine the data into meaningful and comprehensive indicators of climate change.

What are the contributors to climate change?

The U.S. National Research Council (NRC) concluded that "The changes observed over the last decade are likely mostly due to human activities, but we cannot rule out that some significant part of these changes is also the reflection of natural variability." The NRC also stated: "A causal linkage between the buildup of greenhouse gases in the atmosphere and the observed climate change during the 20th century cannot be unequivocally established. However, the magnitude of the observed warming is large in comparison to natural variability as simulated in climate models and is suggestive of such a linkage." ~~The~~ Some activities emit greenhouse gases and other substances that directly or indirectly may affect the balance of incoming and outgoing radiation, thereby potentially affecting climate on regional and global scales. ~~NRC concluded that "Greenhouse gases are accumulating in the atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise."~~[15] The best-understood greenhouse gases are water vapor, carbon dioxide, methane, nitrous oxide, and certain fluorinated compounds. Several additional emissions indirectly affect the Earth's radiative balance, though, including CO, NO_x, and nonmethane VOCs, and substances that deplete the stratospheric ozone layer. Aerosols, which are extremely small particles or liquid droplets, such as those produced by emissions of SO_2 or elemental carbon, can also strongly affect the absorption of radiation in the atmosphere.

Carbon dioxide accounted for 84 percent of the nation's anthropogenic greenhouse gas emissions in 2000.[16] It results primarily from the combustion of fossil fuels used to heat and cool homes and offices, produce electricity and power motor vehicles, and from a few industrial processes.[17] Forestry and other land use activities in the U.S. remove more carbon from the atmosphere than they emit, resulting in net carbon storage, called "sequestration." Methane released by landfills, coal mines, oil and gas systems, and agricultural activities accounted for nine percent of the total U.S. greenhouse gas emissions in 2000.[18] Nitrous oxide is emitted during agricultural and industrial activities, and during combustion of solid waste and fossil fuels. In 2000, it accounted for six percent of the national greenhouse gas emissions.[19]

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Anthropogenic

Emissions of greenhouse gases are linked to economic activity and population (Exhibit 1-9). Commensurate with the economic expansion of the 1990s, greenhouse gas emissions in the U.S. ~~have~~ increased at an average annual rate of 1.3 percent between 1990 and 2000.[20] However, U.S. greenhouse gases emitted per dollar of gross domestic product—or greenhouse gas intensity—decreased significantly during this period.[21]

Exhibit 1-9: U.S. greenhouse gas emissions, emissions per capita, and emissions per dollar of gross domestic product, 1990-2000

Over the past 150 years, CO_2 concentrations have increased by 31 percent, methane by about 150 percent, and N_2O by 16 percent (Exhibit 1-10).[22] Based on analysis of ice core data, today's CO_2 concentration is the greatest in 420,000 years—and likely in 20 million years.[23] From 1990 to 1999, CO2, methane, and N2O concentrations increased by 1.5 parts per million per year, 7.0 parts per billion per year, and 0.8 parts per billion per year respectively.

Exhibit 1-10: Climate change indicators for carbon dioxide, methane, and nitrous oxide

Limitations of Air Indicators

Many sources of data support indicators that help to answer questions about the trends in outdoor and indoor air quality, stratospheric ozone, and climate change. But there are limitations in using the indicators to fully answer the questions.

Outdoor Air

In general, there are some very good measures of outdoor air quality. Although the national air monitoring network for the six criteria air pollutants is extensive, there are far more monitors in urban areas than in rural areas. That helps to characterize population exposures, because population tends to be concentrated in developed areas, but it may make it more difficult to assess effects associated with the transport of air pollutants and ecological effects. Recently, EPA and states have begun evaluating and planning a nationwide monitoring network for air toxics. Emissions quantities for both the criteria pollutants and air toxics are based on engineering estimates derived from more limited actual data. There is a need for measures to compare actual and predicted human health and ecological effects related to exposure to air pollutants.

Indoor Air

Although environmental indicators have been developed for some aspects of indoor air, significant gaps exist in knowledge about the conditions inside the nation's buildings. For schools and residences, a large amount of information on indoor air quality is available, but it comprises primarily case studies and small, at best, regional studies. More comprehensive data from national exposure studies for schools and residential indoor environments, including multiple-family residences, would be helpful in understanding the condition of indoor air environments. Ideally, such studies would collect exposure data on air toxics and particulate matter in those indoor environments, as well as data for molds and other biological contaminants found in indoor air.

Global Issues

The uncertainties associated with climate change underscore the need to measure over time emissions of greenhouse gases and other relevant factors, resulting atmospheric concentrations ~~and associated changes in climate, and related changes in human health, well-being, and ecological condition~~. More refined measures are needed of emissions by different human and natural processes. Monitoring data will also help identify changes in emissions and land cover, and removals of carbon from the atmosphere by natural or engineered processes. Although there are partial monitoring and observation networks for some greenhouse gas concentrations and climate indicators, they should be better and have a larger scope.

Better knowledge will require many kinds of research. To be useful, climate measurements require long, consistent time series with wide geographic coverage—not only from land and sea, but also from remote-sensing satellites. Better understanding of the biogeochemical processes—cycling of chemicals between the living and nonliving parts of an ecosystem—that determine greenhouse gas concentrations is also needed. Continued improvement in complex computer models of climate systems will also ~~illuminate~~ what is happening to the Earth's climate. Using observed data to improve ~~models will help scientists~~ understand and predict the sensitivity of the climate system, its effects on human health, well-being, and ecological condition, and possible adaptive responses to manage any effects.

[1] Scientific Assessment Panel of the Montreal Protocol on Substances that Deplete the Ozone Layer. *Scientific Assessment of Ozone Depletion: 2002, Executive Summary*, Report No. 47. Geneva, Switzerland: World Meteorological Organization, Global Ozone Research and Monitoring Project, 2003.
[2] National Aeronautics and Space Administration. Total Ozone Mapping Spectrometer (TOMS), flown on Nimbus-7 satellite. January 24, 2003: http://www.epa.gov/ozone/science/glob_dep.html
[3] Ibid.
[4] DeMora, S., S. Demers, and M. Vernet. *The Effects of UV Radiation in the Marine Environment*, Cambridge, UK: Cambridge University Press, 2000.
[5] Intergovernmental Panel on Climate Change. *Climate Change 2001: The Scientific Basis. A Contribution of Working Group I to the Third Assessment Report of the IPCC*, Cambridge, UK and New York, NY: Cambridge University Press, 2001.
[6] Waple AM, JH Lawrimore, MS Halpert, et al. Climate Assessment for 2001. American Meteorological Society, 2002. Can be found at http://lwf.ncdc.noaa.gov/oa/climate/research/2001/ann/annsum.pdf
[7] ~~Mann, M.E., R.S. Bradley, and M.K. Hughes. Northern hemisphere temperatures during the past millennium: inferences, uncertainties, and limitations. *Geophysical Research Letters* 26 (6): 759-762 (1999).~~
[8] Climate Change Science: An Analysis of Some Key Questions. 2001. National Research Council. National Academy Press, Washington DC.
[9] Karl, TR, Knight RW, Easterling DR, Quayle RG. 1996. Indices of climate change for the United States. *Bulletin of the American Meteorological Society*, 77(2): 279-292.
[10] Ibid.
[11] Ibid.
[12] Easterling DR. 2002. Recent changes in frost days and the frost-free season in the United States. *Bulletin of the American Meteorological Society*, Sept: 1327-32.
[13] Karl TR, Knight RW. 1998. Secular trends of precipitation amount, frequency, and intensity in the *United States. Bulletin of the American Meteorological Society*, 79(2): 231-241.
[14] Ibid.
[15] ~~Climate Change Science: An Analysis of Some Key Questions. 2001. National Research Council. National Academy Press, Washington DC.~~
[16] IPCC. *Climate Change 2001: The Scientific Basis*, 2001. op. cit
[17] U.S. Environmental Protection Agency. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000*, EPA 430-R-02-003. Washington, DC: U.S. Environmental Protection Agency, Office of Atmospheric Programs, April 2002.
[18] Ibid.
[19] Ibid.
[20] Ibid.

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[21] Ibid.
[22] IPCC. *Climate Change 2001: The Scientific Basis*, 2001. op. cit.
[23] IPCC. *Climate Change 2001: Synthesis Report*, 2001. op. cit.

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(focusing on ecosystem greenhouse gas and energy exchanges) to better parameterize, calibrate, and evaluate models of land-ocean-atmosphere chemistry feedbacks. Primary linkages are to the Carbon Cycle and Water Cycle research elements to share data and experimental sites and facilities.

- Spatially explicit ecosystem models capable of representing complex interactions between diverse ecosystems and their physical and chemical environments.
- Models that link remote sensing of land surface albedo to changes in the spatial distribution of ecosystems and exchanges of mass, energy, and momentum for implementation in general circulation models. It is anticipated that these models will be developed in collaboration with the Water Cycle and Carbon Cycle research elements. A primary linkage is to the Land-Use/Land-Cover Change research element to provide model-based projections of future land cover.
- Social science research to explore human factors in ecosystem-climate linkages and feedbacks. The Human Contributions research element must supply information on the magnitude and significance of the primary human drivers of global change.

MILESTONES, PRODUCTS, AND PAYOFFS

- Reports presenting a synthesis of current knowledge of observed and potential (modeled) feedbacks between ecosystems and climatic change to aid understanding of such feedbacks and identify knowledge gaps for research planning [2-4 years]; Arctic Climate Impact Assessment [2 years].
- Definition of the initial requirements for ecosystem observations to quantify feedbacks to climate and atmospheric chemistry, to enhance existing observing systems, and to guide development of new observing capabilities [2-4 years]. This will provide key input to the Observing and Monitoring component of the program.
- Quantification of important feedbacks from ecological systems to climate and atmospheric composition to improve the accuracy of climate projections [beyond 4 years]. This product will be needed by the Climate Variability and Change research element to ensure inclusion of appropriate ecological components in future climate models.

Question 8.2: What are the potential consequences of global change for ecological systems?

STATE OF KNOWLEDGE

Many research programs that support long-term observations (e.g., forest productivity, ultraviolet-B (UV-B) radiation received by ecosystems, greenhouse gas concentrations and fluxes, atmospheric nitrogen deposition, nutrient loading, fisheries, and the spread of invasive species) have unambiguously established that large-scale ecological changes are occurring, and there is considerable evidence that some of those changes are the result of ecological responses to recent global change. For example, recent warming has been linked to longer growing seasons (i.e., period of leaf display) in temperate and boreal terrestrial ecosystems, grass species decline, changes in aquatic biodiversity, and coral bleaching (IPCC, 2001b; and see Figures 8-3 and 8-4). Climatic oscillations (e.g., El Niño-Southern Oscillation, North Atlantic Oscillation, and Pacific Decadal Oscillation) are known to impact plankton and fisheries, such as sardine, anchovies, and

6/16/03
BH + PC

CEQ Review and Comment of Science Plan for the Climate Change Science Program

Chapter 1. Introduction

p.1, line 13-14: delete "Development of the strategy has been guided by the societal outcome that the CCSP seeks to bring about, as well as by a defined program mission." [Explanation: what is that "societal outcome"? Should CCSP be invested in certain "outcomes" or appear to be so invested?]

p.1, line 20: insert "improved" between the words "reports," and "assessments"; insert "and" between the words "assessments" and "comparative"

p.1, line 29: insert "the" between the words "on" and "prioritization"; insert "essential" between the words "and" and "sequencing"

p.2, line 24: delete "or"; insert ", the natural carbon cycle, and potentially from" between the words "radiation" and "human-induced"

p.3, line 4: delete "human-induced"

p.3, line 15: insert ", often" between the words "variability" and "based"

p.3, line 16: delete "and quantitative", replace with "or still-evolving"

p.3, line 21-23: delete "Changes in radiative forcing may be due to either natural sources (e.g., volcanic emissions) or human induced causes (e.g., energy, industrial, or agricultural emissions of greenhouse gases and aerosols, or changes in land use and land cover)." [Question: Isn't this also true of the assumptions made by the models that generate "predictions" in definition above?]

p.3, line 42: insert "including a clear understanding of the limits of certain information,"

p.3, line 43: delete "set"; insert ", inform" between the words "to" and "society's"

p.4, line 11: delete "to achieve outcomes"

p.4, line 12: delete "attain."; insert "." after the word "could"

p.4, line 42: insert "likely" between the words "and" and "alter"

p.4, line 43: insert "potential" between the words "important" and "climatic" on next line

p.4, line 44: delete "some", replace with "most"

p.5, line 3: delete "key"

p.5, line 4: delete "management of carbon in the environment.", replace with "decision making."

p.5, line 11: delete "to changes in natural and human influence"

p.5, line 30: delete "damages", replace with "any negative impacts"

p.5, line 45: insert "and clearly disclosing" between the words "respecting" and "the"

p.6, line 38-40: delete "active involvement of US-based scientists in the work of the Intergovernmental Panel on Climate Change (IPCC) and other assessment activities;" [Explanation: let's be judged by our products rather than our "active involvements"]

p.7, line 24: insert "potentially" between the words "it" and "is"

p.7, line 30: delete "sustained and"; delete "predictive" replace with "improved"

p.7, line 31: delete "other"; delete "needs.", insert "."

p.7, line 37: insert ", as is the logical and efficient sequencing of research and assessment," between the words "essential" and "and"

p.8, line 32: delete "address", replace with "continually improve our understanding of"

p.8, line 43: insert "credible" between the words "of" and "decision"

D

p.9, line 7: insert ", and will fully disclose when uncertainties expand unexpectedly as the result of different research initiatives" between the word "initiatives" and the "."
p.9, line 21: delete "even"
p.9, line 23: delete "disputes", replace with "debates"
p.9, line 30: delete "trustworthiness", replace with "credibility"
p.10, line 22: at end of line insert ", which among other things, entails the logical sequencing of research." after the word "way"
p.10, line 39: delete "provide oversight", replace with "also participate"
p.11, line 34: delete "key", replace with "fundamental"
p.12, line 1: insert "management review (including the logical sequencing of overall research)" between the words "direction," and "and"

Chapter 2. Integrating Climate and Global Change Research

p.15, line 25: delete "(both natural and human-induced)"
p.15, line 30: insert "very complex" between the words "these" and "issues"
p.16, line 17: delete "and improved carbon management"
p.16, line 32-33: delete "or other 'surprises'" [Explanation: too spooky]
p.17, line 17: delete "increase", replace with "likely increased"
p.19, line 13: delete "climate sensitive"
p.19, line 26: insert "likely" between the words "and" and "alter"
p.20, line 11: delete "and improved carbon management.", replace with "."
p.20, line 20: delete "Future", replace with "The potential of"
p.20, line 30: insert "continue it outstanding" between the words "to" and "work"
p.21, line 26: delete "and improved carbon management"
p.21, line 31: delete "and management"
p.21, line 38: delete "human actions,"; insert "and potentially human activities," between the words "system," and "with"
p.21, line 40: delete "management sustainability", replace with "sequestration"
p.21, line 42: delete "management", replace with "sequestration"
p.22, line 10: insert "future" between the words "migration);" and "energy"; delete "consumption", replace with "technologies"
p.22, line 16: insert "potential" between the words "and" and "human"
p.22, line 24: insert "basic climate research of the natural carbon and water cycles, an improved understanding of the role of aerosols and black carbon in climate," between the words "assimilation," and "and"
p.22, line 33: insert "seek to" between the words "also" and "reduce"
p.22, line 43: delete "would", replace with "may"
p.22, line 44: insert "relatively" between the words "change" and "rapidly"
p.22, line 44-45: delete "in response to internal processes or rapidly changing external forcing.", replace with "." [Explanation: Wasn't it all "internal" processes in the historical record? What was the source of any "external" forcing?]
p.23, line 13: insert "are and" between the words "there" and "may"; insert "continue to" between the words "may" and "be"; insert "severe" after the word "be" at end of line
p.24, line 20-21: delete "or other 'surprises'"
p.25, line 9: insert "potential" between the words "and" and "human-induced"

p.25, line 16: delete "damages", replace with "negative impacts" [Explanation: "damages" is a legal term of art or could be read as such]
p.25, line 41: insert "still limited" at end of line after the word "our"
p.25, line 42: insert ", and the potential role of human activities in influencing concentrations (as distinct from natural climate variability)" between the words "levels" and "and"
p.25, line 43: insert "such" between the words "comparing" and "impacts"
p.26, CCSP-Topics to be covered, second entry: delete "climate-sensitive", replace with "natural"
p.26, CCSP-Topics to be covered, fourth entry: delete "climate-sensitive"
p.26, line 8: delete ", such as improved regional climate models,"
p.26, line 12-14: delete "Reports on the potential consequences of global and climatic changes on selected arctic, alpine, wetland, riverine, and estuarine and marine ecosystems; selected forest and rangeland ecosystems; selected desert ecosystems; and the Great Lakes"
p.26, line 26-27: delete "abrupt global changes or"
p.27, line 13: insert "cooling" between the words "warming," and "and"
p.27, line 20: insert "potential" between the words "of" and "effects"; insert "precipitation" between the words "warming," and "and"
p.27, line 38: insert "and" between the words "data;" and "experiments"
p.27, line 39-41: delete "; and advisory committee assessments of the potential vulnerabilities and opportunities arising from climate change in different regions and sectors of the United States.", replace with "." [Explanation: legal considerations preclude mentioning the National Assessment]
p.27, line 43: insert "The negative commentary asserted that certain assessment efforts were exaggerated, contrived, or otherwise unsubstantiated." at the end of the line after the word "negative."
p.28, line 4: insert "and fully disclosing" between the words "respecting" and "the"
p.28, line 8: insert "improved" at end of the line after the word "develop"
p.30, line 9: delete "Strategic"
p.30, line 27: insert "potential" between the words "the" and "effects"
p.30, line 31: insert "dramatic" between the words "of" and "variability"
p.30, line 34-35: delete "that result from natural processes as well as from human activities.", replace with "."
p.31, line 26: delete "for", replace with "of"
p.31, line 28-30: delete "Relatively small human perturbations can have major impacts, however, and our knowledge of these and their implications for environmental change is insufficient to manage carbon effectively."
p.32, line 18: insert "potential" between the words "welfare;" and "human"
p.35, line 34: delete "from", replace with "on"
p.35, line 35: delete "flow", replace with "depend"
p.36, line 36: insert "and identify" between the words "address" and "key"
p.38, line 32: delete "an assessment that focuses", replace with "assessments that focus"
p.38, line 33: delete "The assessment", replace with "They"
p.38, line 35: delete "to be addressed", replace with "that are currently being considered"
p.39, line 11: delete the "," between the words "with" and "economic"
p.39, line 13: insert "long-term global" between the words "by" and "climate"
p.39, line 15: delete "need to", replace with "challenge of"

p.39, line 16: delete "develop", replace with "developing"
p.39, line 26: insert "fully disclosing" at end of line after the word "by"
p.39, line 27: delete "reporting on"
p.40, CCSP Goal 4, second entry: delete "climate-sensitive"
p.40, CCSP Goal 4, fourth entry: delete "climate-sensitive"
p.40, CCSP Goal 5, first entry: delete "and regions"

Chapter 3. Atmospheric Composition

p.48, Question 3.1, delete "human-caused and naturally occurring"
p.48, Question 3.2, delete "the growing suite of"
p.48, Question 3.3, replace with the following: "What are the effects of changes in emissions of air pollutants and greenhouse gases on regional air quality and global atmospheric composition?" (Move focus on ecosystems to question 3.5)
p.48, Question 3.4, delete "time scale and other"
p.48, Question 3.5, replace with the following: "What are the integrated effects of changes in atmospheric composition on human health and ecosystem structure and function?"
p.48, line 4-5, delete and replace with the following: "Issues of atmospheric composition are central to improving our understanding of the Earth system, for a variety of reasons: "
p.48, line 9, delete "will" and replace with "have the potential to"
p.48, line 12, insert "may" after "that"
p.48, line 12, delete "well being" and replace with "function"
p.48, line 14-15, delete ", such as the growth rate of carbon dioxide (CO_2) concentrations in the atmosphere"
p.48, line 16, delete "Similarly" and replace with "For example"
p.49, line 4, delete ", not just the emitters"
p.49, line 13, delete "managed or unmanaged"
p.49, line 16, delete "climate" and replace with "Earth"
p.49, line 17, delete "the climate system and" and insert "changes in the Earth's energy balance and changes in"
p.49, line 21, delete "as it relates to climate, ozone depletion, ultraviolet radiation, and pollutant exposure"
p.49, line 24, delete "well-being" and replace with "health"
p.49, line 25, delete "health" and replace with "function"
p.50, line 6-7, delete sentence.
p.50, line 8, delete "However,"
p.52, line 14, delete "climate-response" and replace with "climate"
p.52, line 17, delete "Strongly"
p.52, Box 3-1, needs to be rewritten to highlight specific activities planned for FY04.
p.53, line 10, delete "warming/cooling" and replace with "radiative"
p.53, delete lines 12-20 (payoff is improved understanding, not enabling of actions)
p.53, line 22, delete "benchmark" and replace with "estimate"
p.54, line 10, delete "atmospheric gases that absorb infrared radiation" and replace with "chemically active greenhouse gases"
p.54, line 13, delete "global climate change" and replace with "the Earth system"
p.54, line 18, insert "natural and" after "The"
p.56, delete lines 6-11 (payoff is improved understanding, not enabling of actions)

p.56, line 30, delete "policy-relevant"
p.56, lines 32-34, move this bullet to Question 3.5
p.56, line 37, delete "of the macronutrients"
p.56, line 38-39, delete "the radiative forcing of climate change" and replace with "radiative forcing"
p.56, line 38, change "abundances" to "concentrations"
p.57, line 1-2, delete "the abundances of greenhouse gases and global nutrient cycles" and replace with "global atmospheric composition"
p.57, lines 22-23, move to Question 3.5
p.57, line 26, delete "the first" and replace with "a detailed" (there already have been many)
p.57, line 28, delete "modeling"
p.57, line 37-41, delete bullet (not clear – should be rewritten and moved to Question 3.5)
p.59, line 11, change "composition" to "concentrations"
p.59, line 16, insert "stratospheric" before "ozone"
p.59, line 32, delete "ozone and climate friendliness" and replace with "impacts"
p.60, lines 15-19, delete bullet and replace with "Contribute new findings to the 2006 update of the international scientific assessment of stratospheric ozone depletion [2-4 years]."
p.60, line 26, insert "potential" before "consequences"
p.61, line 1, delete "regional"
p.61, line 1, delete "the hemispheric"
p.61, line 4, delete "now" (redundant)
p.61, line 21-22, delete sentence
p.61, line 25, delete "local, regional, and global scales" and replace with "global scale"
p.61, line 32-34, delete bullet [Explanation: too much assessment-focused, not basic science]
p.61, line 37-39, delete bullet
p.61, line 43, delete "and ecosystem exposure"
p.62, lines 1-7, move to first bullet in following form: "Strengthen processes within the national and international scientific community to provide for integrated evaluation of impacts from air pollution and changes in climate and weather patterns on ecosystems and human health [2-4 years]."

Chapter 4. Climate Variability and Change.

p.68, Question 4.2: delete "and what are the limits of their predictability"
p.68, line 5, delete ". The" and replace with ", with"
p.68, line 5, delete "are" and replace with "that can be, at times,"
p.68, line 25, start new paragraph before "All climate models…" and add the following sentence at the end (p.69, line 3): "However, given the considerable uncertainty in our current understanding of how the climate system varies naturally and reacts to emissions of greenhouse gases and aerosols, current estimates of projected changes in global mean temperatures should be regarded as tentative and subject to future adjustments (in either direction) (NRC, 2001a)."
p.70, line 3-4, delete sentence
p.70, line 11, delete "have led to" and replace with "has created the possibility of"
p.70, line 11, delete "up to a few seasons" and replace with "several months"
p.70, line 12, delete "unprecedented" and replace with "improved"
p.70, line 13, delete "this major natural climate phenomenon" and replace with "impacts from ENSO"

p.70, line 22, insert "may" after "change"
p.70, line 23-26, delete sentences. The linkage between climate forcing and ENSO behavior is not well established and such a strong link between the two cannot be scientifically drawn.
p.70, line 34, insert "potential" before "human-induced"
p.70, line 45-46, delete "in supporting" and replace with "for societal"
p.71, line 2-5, delete sentence (redundant with p.71, line 17-19)
p.71, line 13, delete "decision-relevant"
p.71, line 17, delete "climate scientists, other natural scientists (e.g. biologists), social scientists," and replace with "the climate research community"
p.71, line 22, insert "research into" before "climate variability and change" and delete "research"
p.71, line 26-30, delete as unnecessary and confusing
p.71, line 41, delete "required by" and replace with "to" (cannot always get answers you require)
p.72, line 1-2, delete "indicate that both the magnitude and spatial extent of 20th century Arctic warming may be unprecedented over the past 400 years" and replace with "may help address whether recent warming trends in the Arctic are due to natural variability"
p.72, line 12, insert "improved" before "information"
p.73, line 3-5, delete sentence [explanation: unnecessary musing]
p.73, line 12-14, delete bullet [explanation: is not as high priority as others listed]
p.73, line 16-18, delete "and provide bounds for..." through end of sentence.
p.74, line 12-13, delete "and more advanced models will address the reliability and uncertainties of these frameworks" and replace with "will improve the reliability and reduce the uncertainty associated with model predictions, "
p.74, line 26, delete "2003-"
p.74, line 30, through p.75, line 29, shorten each bullet to first sentence only to be consistent with other chapters
p.75, line 27, delete "Policy-relevant" and replace with "Contribute"
p.75, line 30-34, delete [explanation: no new information added by this text]
p.75, Box 4-1, needs to be shortened and specific FY04 initiatives made more obvious
p.76, line 42-43, delete sentence
p.77, line 20, add new sentence at end: "However, improved modeling techniques alone will not be sufficient to enable more skillful climate forecasts. A comprehensive global observation network and improved fundamental understanding of basic feedback processes (e.g. clouds, aerosols) will first be required to enable advances in modeling of climate variability and change."
p.77, line 35, delete "exploited" and replace with "used"
p.78, line 1, insert "may" before "affect"
p.78, line 6-8, delete sentence.
p.78, line 17-19, delete sentence (no such thing as "seasonal-to-interannual" climate)
p.78, line 30, delete "foster progress in utilizing prediction capabilities" and replace with "encourage the use of such products and information"
p.78, line 35 through p.79, line 45, shorten each bullet to first sentence only to be consistent with other chapters
p.79, line 43, delete "Policy-relevant" and replace with "Contribute"
p.80, line 1-11, delete [explanation: no new information added by this text]
p.80, line 31, insert "or understood" after "explained"
p.81, line 1, delete "How soon" and replace with "When"

p.81, line 5-8, delete bullet [redundant with Question 4.3.1]
p.81, line 12-16, delete Figure 4-5 – this is not an "abrupt" change given that glaciers are constantly growing or retreating based on seasonal-interannual & decadal precipitation balance
p.82, line 13-15, delete [explanation: no new information added by this text]
p.82, Box 4-2, needs to be shortened and focused on specific FY04 initiatives
p.82, line 21, delete "warnings" and replace with "indication"
p.83, line 27, delete Question 4.4.5 – contained in others (4.4.4 and 4.4.7)
p.84, line 8, delete "regional"
p.84, line 35, delete "regional"
p.84, line 40, delete "4.4" and replace with "4.4.4"
p.85, line 9-10, delete (too speculative, included in following bullet)
p.85, line 11, delete "Policy-relevant" and replace with "Contribute"
p.85, line 15-20, delete [explanation: no new information added by this text]
p.85, line 26, delete "policymakers" [redundant]
p.86, line 3, delete "no regrets strategies" and replace with "strategies to reduce vulnerability to natural climate variability"
p.86, line 14, delete "and policymakers" [redundant]
p.86, line 21, delete "across the nation and around the globe"
p.86, line 28, delete "The physical science underpinnings for this research are" and replace with "A key challenge in this area is to develop"
p.86, line 29, delete "link" and replace with "determine impacts of global"
p.86, line 29, delete "from global down to" and replace with "at"
p.86, line 30, delete "physical" and replace with "required basic"
p.87, line 9-14, delete [explanation: confusing paragraph, little additional value]
p.87, line 25, delete "climate and social"
p.87, line 30, delete "knowledge" and replace with "information"
p.87, line 33, delete "regional" and replace with "information for"
p.87, line 34, delete "regional and policy"
p.87, line 41, delete "and development of reports on the potential implications should climate change in the future" [explanation: too speculative given primitive state of science]
p.87, line 42-43, delete bullet [explanation: redundant with p.87, line 25-31]
p.88, line 3, delete "Policy-relevant" and replace with "Contribute"
p.88, line 6-12, delete [explanation: no new information added by this text]
p.88, line 31, delete "changes that impact" and replace with "variability that impacts"
p.88, line 32, delete "changes" and replace with "variability"
p.88, line 34-35, delete "inherent features such as"
p.88, line 35-36, delete "potentially important for abrupt changes, and must be correctly modeled to project future climate changes" and replace with "an important component of the Earth system"
p.88, line 37, delete "climate"
p.88, line 38, delete "climate"
p.88, line 44, change "infrastructure" to "elements"

Chapter 5. Water Cycle

p.94, line 18, delete "total"
p.95, line 44, changed "reasonably accurate" to "credible"

p.95, line 45-46, delete "The ability to produce credible predictions" and replace with "This activity"
p.96, line 15, change "the large scale" to "global"
p.99, line 17, insert "potential" before "climate change"
p.100, line 2, change "will" to "may"
p.100, line 3, change "will" to "may"
p.103, line 13, delete "change"
p.103, line 14, delete "climate change projections" and replace with "model projections of climate change"
p.104, line 21, delete "such as improved regional climate models"
p.106, line 26, insert "the potential, if any, for" after "examine"
p.106, line 27, insert "in the United States" after "threats"
p.107, line 5, change "predictive capacity" to "available scientific information"
p.108, line 24-25, delete [explanation: the state of science does not support this as a robust scientific learning tool; at best it only serves to further a climate constituency]
p.108, line 28, insert "If successful, " before "(t)hese advances"

Chapter 6. Land Use and Land Cover Change

p.115, line 4-5, delete sentence [explanation: unnecessary]
p.115, line 19-21, delete sentence [explanation: unnecessary]
p.116, line 2, insert "variability and" before "change"
p.116, line 27-28, delete "and to make the science useful for decisionmaking will require"
p.116, line 28, insert "is required" before "that includes"
p.118, line 31, delete "a" and delete "research strategy"
p.120, line 28, insert "natural and" before "human"
p.121, line 1, insert "natural and" before "human"
p.121, line 38, delete "change characteristics" and replace with "land use and land cover change"
p.122, line 25, insert "climatic," before "socioeconomic"
p.122, line 35, delete "climate" and replace with "ecological"
p.125, line 24, insert "variability and" after "climate"
p.125, line 26-27, delete "sometimes have a more intense reaction" and replace with "may respond unexpectedly"
p.125, line 37, insert "or benefits" after "costs"
p.127, line 15-17, move sentence to end of paragraph [explanation: better fit]
p.128, line 9, delete "The issues of land-cover and land-use change for"
p.128, line 12-13, delete "that is relevant for U.S. global policy in the climate change arena" and replace with "with respect to land use and land cover change"

Chapter 7. Carbon Cycle

p.132, Question 7.6, delete "being considered by society"
p.132, line 8, insert "believed to be" after "now"
p.132, line 11, insert the following sentence after "land use change accounts for the rest.": "However, the gross amount of CO_2 exchanged annually between the ocean and atmosphere, and between the land and atmosphere, is many times larger than the total net anthropogenic CO_2 input (IPCC, 2001a)."
p.133, line 22, change "controlling" to "affecting"

p.133, line 24, insert "extinguishing coal mine fires throughout the world" before "or changing"
p.133, line 28, insert "projected" before "rise"
p.133, line 32, delete "such manipulations" and replace with "changes in net anthropogenic CO_2 emissions"
p.134, line 16, delete "carbon cycling" and replace with "the carbon cycle"
p.135, line 39, change "the" to "that"
p.135, line 42, change "caused" to "-induced"
p.136, Box 7-1, specific FY04 research initiatives need to be made more clear (e.g. bullets)
p.137, line 3-4, delete bullet [explanation: is climate policy, not science]
p.143, line 8, delete "of a wide range of policy scenarios"
p.143, line 18, delete "mitigation of the continued buildup of atmospheric carbon" and replace with "carbon management"
p.143, line 24, change "Earth system carbon" to "global"
p.144, line 22, delete "the"
p.145, line 24-25, delete "in worldwide carbon accounting" [explanation: redundant with rest of sentence]
p.145, line 27-28, delete "and inform scenario development for decision support" [explanation: this is assumed in "applied climate models", same sentence]
p.147, line 13, delete "increasing CO_2 ,warming" and replace with "changes in atmospheric composition, temperature or precipitation patterns"
p.148, line 1-2, delete last sentence [redundant]
p.149, line 38, delete "emissions intensity" and replace with "sequestration"
p.150, line 9, delete "mitigation" and replace with "carbon sequestration"
p.150, line 14-16, delete bullet [explanation: no idea what this involves or means]
p.150, line 19-20, delete sentence [explanation: too broad – "emissions reductions actions"]
p.150, line 23-24, delete all after "net" and replace with "carbon sequestration"

Chapter 8. Ecosystems.

p.158, Question 8.1, delete "global change (especially climate)" and replace with "climate variability and change"
p.158, Question 8.2, change "global change" to "climate variability and change"
p.158, Question 8.3, change "projected global changes" to "known climate variability and projected climate change"
p.158, line 10, change "global change" to "climate variability and change"
p.159, line 2, change "global changes" to "climate variability and change"
p.159, line 5, change "Global change is altering" to "Climate variability and change may alter"
p.159, line 8-9, change "global change" to "climate variability and change"
p.159, line 9, delete "of global change"
p.159, line 12, change "environmental changes and variability" to "climate variability and change"
p.159, line 37, change "environmental changes" to "climate variability and change"
p.160, lines 3-4, delete sentence [explanation: unnecessary musing]
p.160, line 8, change "global and climatic changes" to "climate variability and change"
p.160, line 10, change "global change" to "climate variability and change"
p.160, line 11, delete "of global change"
p.160, line 30, change "global change" to "climate variability and change"

p.160, line 31, change "global change" to "climate variability and change"
p.160, line 33, delete "climate" and replace with "other components of the Earth system"
p.160, line 33-35, delete sentence. [adds no extra value or information]
p.161, line 29, delete "climatic change" and replace with "climate variability and change"
p.161, line 32, delete "regional climatic changes" and replace with "climate change"
p.161, line 34, delete "use of fossil fuels or"
p.161, line 41-42, delete sentence [is redundant and poorly worded compared to next sentence]
p.162, line 9, delete "general circulation" and replace with "climate"
p.162, line 19, delete "climatic change" and replace with "other components of the Earth system"
p.162, line 23, change "chemistry" to "composition"
p.162, line 40, delete "recent global change" and replace with "climate variability and change"
p.162, line 40, insert "indicated as potentially" before "linked"
p.162, line 43, delete "Climatic oscillations" and replace with "Natural modes of climate variability"
p.163, line 2, delete "warming" and replace with "increased surface temperature"
p.163, line 3-4, delete "climatic change and increased weather variability would" and replace with "climate variability and change may"
p.164, line 18-19, delete bullet and replace with "How might changes in atmospheric composition, precipitation and temperature affect yield of major U.S. crops?"
p.164, line 20, change "CO_2 concentration" to "composition"
p.164, line 24, delete "do changes in climate, climatic variability, or weather variability intensify or mitigate" and replace with "does climate variability and change modify"
p.164, line 25, insert "environmental" after "other"
p.164, line 33, delete "move poleward and to higher elevations in response to regional warming" and replace with "be able to adapt to climate variability and change"
p.164, line 35, delete "increasing atmospheric CO_2 concentration, warming" and replace with "climate variability and change"
p.165, line 2, change "global change" to "climate variability and change"
p.165, line 4, change "global change" to "climate variability and change"
p.165, line 6, change "climatic variability" to "the state of the Earth system"
p.165, line 17, change "climatic change" to "climate variability and change"
p.165, line 19, change "warming" to "temperature changes"
p.165, line 21, delete "the rate of change of" and replace with "future"
p.165, line 21-22, delete "and atmospheric CO_2 concentration"
p.165, line 31, delete "global and climatic changes" and replace with "potential climate variability and change"
p.165, line 43, change "global change" to "climate variability and change"
p.166, line 11, delete "global and climatic changes" and replace with "climate variability and change"
p.166, line 14-15, delete "to alert decisionmakers to the most likely consequences to these ecosystems" [can we say these are "most likely" given our limited knowledge?]
p.166, line 19, change "warming" to "temperature change"
p.166, line 21, change "global change" to "climate variability and change"
p.166, line 27-29, delete bullet [duplicates first bullet]
p.166, line 38, insert "changes in" before "UV-B"

p.166, line 45-46, delete "manipulations focused on effects of interactions among global change variables" and replace with "results"
p.167, line 2, change "global changes" to "climate variability and change"
p.167, line 32, delete "global" and replace with "environmental"
p.167, line 37, delete "global" and replace with "environmental"
p.167, line 40, delete "global" and replace with "climate variability and"
p.167, line 43, delete "global changes" and replace with "climate variability and change"
p.168, line 3, delete "global and climatic changes" and replace with "climate variability and change"
p.168, line 10-15, delete paragraph. [bears no relation to the research questions listed above]
p.168, line 23, add the following sentence back at the end:
"Substantial improvements in modeling capabilities are also needed to develop and deploy effective options to maintain and enhance the supply of critical goods and services and to evaluate alternative management options under changing environmental conditions."
p.168, line 31, delete "severe" and replace with "significant (positive or negative)"
p.168, line 33, delete bullet [how to use science to manipulate decisions?]
p.168, line 41, insert "ecosystem" before "management"
p.168, line 44, delete "global and climatic change" and replace with "climate variability and change"
p.169, line 8, delete "global changes"
p.169, line 16-17, delete bullet [duplicative of previous bullet – not specific to ecosystems]
p.169, line 32-33, delete "climatic and global changes" and replace with "the Earth system"
p.169, line 35-36, delete "the many scientific elements of this plan" and replace with "monitor a wide range of variables important for characterizing the state of ecosystems"
p.169, line 43, why is this figure here? Is there something unique about the international partnerships required to gather the data? If so, mention it. If not, move elsewhere.

Chapter 9. Human Contributions and Responses to Environmental Change

p.177, box Question 9.4: delete "What are the", replace with "Are there"; delete "the cumulative", replace with "any"; delete "from these effects?", replace with "?"
p.177, line 6-9: delete "Social, economic, and cultural systems are changing in a world that is more populated, urban, and interconnected than ever. Such large-scale changes increase the resilience of some groups while increasing the vulnerability of others." [Explanation: unnecessary musing]
p.178, box Question 9.1: delete "the primary"
p.178, line 37: delete "consumption", replace with "technology and living standards"
p.178, line 39: delete "and the National Assessment (NAST, 2000,"
p.179, line 1: delete "2001)"
p.179, line 3-6: delete "For example, the National Assessment pointed to population changes (including an aging population in the United States with rapid growth of human settlements, especially in the South, West, and coastal areas) that have profoundly impacted consumption patterns and other drivers of global environmental change."
p.179, line 8: delete "the direct", replace with "potential"
p.179, line 9: delete "But", replace with "And"
p.179, line 10: insert "advances in technology" between the words "densities," and "the"
p.179, line 13: insert ""quality of life" elements" at end of line after the word "significant"

p.179, line 14: delete "consumption"
p.179, line 32: delete "How do", replace with "Do"
p.179, line 35: insert "and if so, how" between the word "systems" and the "?"
p.179, line 41: delete "consumption", replace with "living standards"
p.180, line 14: delete "prioritize the development of", replace with "develop"
p.180, line 19: delete "How does", replace with "Does the"
p.180, line 20: insert "and if so, how" between the word "change" and the "?"
p.180, line 24: insert "potentially" between the words "that" and "influence"
p.180, line 31: insert "more" between the words "of" and "coherent"
p.180, line 34: insert "better" between the words "to" and "analyze"
p.180, line 43: delete "emissions targets"
p.181, line 1: insert "incentives" between the words "programs," and "taxes"
p.181, line: 9: insert "and potential human" between the words "drivers" and "of"
p.181, line 16: insert ", residential heating and cooling" between the word "transportation" and the "("
p.181, line 18: delete "mitigate climate change", replace with "reduce greenhouse gas intensity"
p.181, line 24: insert "potential" between the words "the" and "human"
p.182, line 11: insert "the potential of" between the words "to" and "sea"
p.182, line 23: delete "and consumption patterns", replace with ", improved living standards, and technology advances"
p.182, line 38-40: delete "How and to what extent might institutions (e.g., markets, laws, property rights, formal organization) be adjusted in response to global change, and what would be the probable socio-economic benefits and costs associated with making such adjustments?" [Explanation: Isn't this question rather sweeping, open-ended, 1960s-"How can we change the 'establishment', man?" Isn't this set of issues the province of the legislature, not the USGCRP? Do you really expect "silver bullet" answers here? Through what competence and authority does the USGCRP render judgments on needed changes in "laws," "markets" and "property rights"?]
p.183, line 1: insert ", both positive and negative," between the words "of" and "changes"
p.183, line 13: insert "society" at end of line after the words "ability of"
p.183, line 14: delete "hazard and resource management institutions"; insert "to both negative impacts and positive opportunities" between the word "respond" and the ";"
p.183, line 17: insert "technology gains" between the words "institutions," and "and"
p.183, line 35: insert "(both positive and negative)" between the word "impacts" and the ","
p.184, line 2: delete "climate-sensitive"
p.184, line 5: delete "anticipated", replace with "potential"
p.184, line 9: insert "and" between the words "characterization" and "understanding"; delete ", and modeling"
p.184, line 10: delete "at local, regional, and national levels"
p.184, line 16: delete "plan to", replace with "could"; insert "the potential of" between the words "to" and "sea"
p.184, line 22: insert "potential" between the words "to" and "sea"
p.185, line 14: delete "disaster reduction", replace with "opportunities"
p.185, line 15: delete "risky phenomena", replace with "uncertainty"
p.185, line 18: insert "and uncertainties" between the words "risks" and "associated"
p.185, line 19: delete "those risks", replace with "them"

p.185, line 23-33: delete "Advances have been made… and participatory approaches." [Explanation: This is opinionated musing, totally gratuitous and not essential to preparation of a strategic plan—and it is redundant of other sections in this chapter.]

p.186, line 13: delete "better", replace with "appropriate"

p.186, line 11-16: [Note: Lines 11-16 sound like a foundation for totalitarian propaganda? Isn't it really asking "how can we change people's minds to think like we do?" Doesn't it give anyone else the creeps? e.g., "to make better decisions"… Is there a problem with the decisions made to date, like the Senate's 95-0 vote against Kyoto? The premise here is that science isn't being heard and we need to research "why"- But maybe it *is* being heard and current policies *are*, in fact, calibrated to our limited current state of knowledge.]

p.186, line 23: delete "improve", replace with "improve"

p.187, box Question 9.4: delete "What are the", replace with "Are"; delete "the cumulative", replace with "any"; delete "from these effects"

p.187, line 8: insert "if our public health infrastructure is not able to compensate or respond" between the word "health" and the "."

p.187, line 10: delete "EHP,"

p.187, line 11: delete "2001"

p.187, line 21: insert "potential" between the words "the" and "impact"

p.187, line 27-33: delete "Figure 9-2: Anticipated pathways…see Annex C."; delete "Annex C Version: Figure 9-2: Anticipated causal pathways…*Climate Research*, 6, 113-125]" [Explanation: delete Figure 9-2, it is selective and old.]

p.187, line 36: insert ", if any," between the words "What" and "are"

p.188, line 3: insert "potential" between the words "assessing" and "climate-related"

p.188, line 18: insert "potential" between the words "the" and "impact"

p.188, line 25-26: delete "Research on interactions among climate variability and change, air quality, and respiratory disorders." [Explanation: redundant of third bullet above, which is better stated]

p.188, line 31: delete "regional control and treatment of", replace with "capacity of our public health infrastructure to address"

p.188, line 33: insert "potential" between the words "for" and "public"

p.189, line 5: delete "Tools", replace with "Additional tools"

p.189, line 7: insert "potential" between the words "the" and "health"

p.189, line 12: insert "potential" between the words "the" and "consequences"; insert ", if any," between the words "consequences" and "of"

p.189, line 36: delete "coping"

p.190, line 5: insert "potential" between the words "the" and "impacts"

p.190, line 7: delete "advances in these areas, as well as in"

p.190, line 8: delete "modeling"; delete ","; delete "other areas.", replace with "our understanding of basic scientific question."

Chapter 11. Decision Support Resources Development

p.210, line 12-14: delete "The largest assessment program previously undertaken by USGCRP was the National Assessment initiated in 1998 that produced overview reports in late 2000 and a series of specialty reports in the period 2001-2003."

p.211, line 21: delete "limited"
p.214, line 21: delete "The assessments", replace with "They"
p.214, line 23: delete "to be addressed", replace with "that are currently being considered"
p.214, line 24: delete "of", replace with "concerning"
p.214, line 46: insert "potential" between the words "to" and "sea"
p.215, line 1: delete "climate-sensitive"
p.215, line 18: insert "potential" between the words "the" and "climatological"
p.215, line 30: delete ""climate services" to optimize the"; delete "severely"
p.216, line 7-8: delete ", and thus enhancing the resilience of different groups in society,"
p.216, line 20: delete "damage", replace with "negative impacts"
p.216, line 30: delete ", data products, and forecasts.", replace with "."
p.217, line 1: insert "observation-based" between the words "of" and "regional/sub-regional"
p.217, line 29: delete "regional climate,"
p.217, line 36-37: delete "Improved public-health decision support for major climate modulated infectious disease threats in United States, including mosquito-born viral disease, Hantavirus, and Valley Fever (2-4 years)" [Explanation: This is a table with 6 other illustrative examples. This example is not necessary. CEQ opposes this example.]
p.218, line 11: delete "Two case studies", replace with "A case study"
p.218, line 12: delete "Boxes 11-4 and", replace with "Box"
p.218-219, line 16-46 and 1-28: delete entire Box ll-4 [Explanation: one box/example on this is enough (in a 320 page report) and the example in Box 11-5 is much better]
p.219, line 32: delete "in spite of", replace with "and"
p.219, line 33-34: delete "Given current fuel loadings, limited resources, and increasing costs for suppressing wildland fires"; make the "e" at the beginning of "effective" capital "E"
p.221, line 4: delete "of the regional"
p.221, line 25: delete "to aid in", replace with "guide appropriate"
p.221, line 39: insert "and the pursuit of historic and current observational data" between the word "fields" and the "."
p.222, line 10: insert "likely" after the word "about" at end of line
p.222, line 34: insert "the potential" between the words "of" and "effects"
p.222, line 35: insert "potential" between the words "comparing" and "impacts"
p.222, line 38: insert "potential" between the words "and" and "human"
p.224, line 28: insert "potentially" between the words "a" and "wider"
p.224, line 39-40: delete "Possible climate and ecosystem responses to long-term GHG stabilization at various specified levels." [Explanation: there are enough bulleted examples here]
p.225, line 16: insert "potential" between the words "the" and "consequences"
p.225, line 32: insert "fusion energy" between the words "systems" and "and"
p.225, line 44: insert "Potential" between the words "including" and "Environmental"
p.226, line 17: delete "would", replace with "may"
p.226, line 18: insert "but only" between the "," and the word "if"
p.226, line 26: insert "potential" between the words "the" and "impacts"
p.226, line 29: insert "potential" between the words "the" and "environmental"
p.226, line 35: insert "potential" between the words "of" and "environmental"

Chapter 12. Observing and Monitoring.

p. 230, insert in opening paragraph the following quote from the National Academy of Science's June 2001 report *Climate Change Science: An Analysis of Some Key Questions:* "A major limitation of model forecasts for use around the world is the paucity of data available to evaluate the ability of coupled models to simulate important aspects of past climate. In addition, the observing system available today is a composite of observations that neither provide the information nor the continuity in the data needed to support measurements of climate variables. Therefore, above all, it is essential to ensure the existence of a long-term observing system that provides a more definitive observational foundation to evaluate decadal- to century-scale variability and change. This observation system must include observations of key state variables such as temperature, precipitation, humidity, pressure, clouds, sea ice and snow cover, sea level, sea-surface temperature, carbon fluxes and soil moisture."

p.230, line 23: delete "prediction or"
p.236, delete lines 29 – 37 (Objective 1.10)
p.244, line 2 – 4: Delete sentence "Some climate data records will have sufficient accuracy or stability to resolve regional climate change....." [Explanation: that is not true]
p. 255, Appendix 12.2, last bullet: insert "potential" before "sea level rise" in both places where the tem is used.

Chapter 13. Data Management and Information

p.267, line 24: delete "fame", replace with "frame"
p.267, line 27: [??? Something missing here at end of the line]
p.267, line 35: delete "regional"
p.267, line 43: delete "regions,"
p.267, line 44: delete "," after the word "sectors"
p.268, line 5-6: delete "and predictions"
p.270, line 39: insert "potential" between the words "of" and "effects"; delete "increasing CO_2,"
p.270, line 44: insert "potential" between the words "to" and "sea"
p.271, line 8: insert "both positive and negative," between the words "sectors," and "and evaluations"

Chapter 14. Communications

No comments or corrections.

Chapter 15. International Research and Cooperation

p.287, line 36: delete "has the", replace with "assumes"
p.288, line 13: delete "is the impact", replace with "are the potential impacts"; insert "both positive and negative," after the word "of" at the end of the line
p.288, line 21: delete "are"; delete "needto", replace with "need to"
p.294, line 26-29: delete "Climate modeling capabilities have improved dramatically in recent years and can be expected to continue to do so. As a result, scientists are now able to model Earth system processes and the coupling of those processes on a regional and global scale with increasing precision and reliability."
p.294, line 29: delete "such"
p.297, line 44: insert "advanced" between the words "of" and "energy"
p.297, line 45: delete "promote sustainable development"

p.300, box entitled Global Environmental Change and Food Systems (GECAFAS): delete "predicted unequal", replace with "potential"

Chapter 16. Program Management and Review

p.305, line 15: delete "provide oversight.", replace with "also participate."
p.312, line 25: insert "potential" between the words "of" and "climate"
p.313, line 2: delete "famine.", replace with "impacts of global change."
p.313, line 6: delete "human health" [Explanation: human health would fall under socioeconomic]
p.313, line 7: delete "," between the words "ecosystems" and "and socioeconomic"

WH 6
EPA Draft Report on the Environment

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY

Allen - these changes must be made. Thanks Phil

QR: please make a copy for me. Thx Phil

Phil - Rob is reviewing
Al -

E

Summary Issues Surrounding Presentation of Climate Change EPA's Draft Report on the Environment

Background

EPA's Draft Report on the Environment contains a Global Issues section in the Cleaner Air chapter addressing questions about stratospheric ozone depletion and climate change. Under development for over a year with input from other federal agencies and some states, the report will intentionally be published as a *draft* to solicit feedback from stakeholders and the public on how to improve and use indicators to measure progress in protecting human health and the environment.

Over the last three months, CEQ and OMB together have made extensive, detailed edits to the climate change text. OEI, ORD, and OAR staff have reviewed and attempted to negotiate language through iterative review drafts, noting concern that some of the edits provided by CEQ and OMB have the potential to undermine the objectivity and credibility of the report and the Agency. On April, 24, 2003 OMB transmitted "cleared" language for the Global Issues section (Attachment A), noting that no "further changes may be made."

Action Requested: Review editorial issues and decide whether to publish the text as cleared, remove section, or pursue further negotiations.

Note: illustrative edits are color-coded to Attachment A.

Summary of Issues Related to Edits

Removal of the Discussion of the Impacts of Climate Change

- Early on the questions, "What human health effects are associated with climate change?" and "What ecological effects are associated with climate change?" and associated discussions were removed from the report. Removal of the questions and discussions makes this section conspicuously different from the others.

  Deleted from 3-1, line 6: "Climate change has global consequences for human health and the environment."
  The sections addressing impacts on human health and ecological effects are deleted. p. 3-4
  Sentences have been deleted that called for recognized further research on effects to support future indicators (p. 3-5, lines 1-2; 11-13).

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Text No Longer Accurately Represents Scientific Consensus on Climate Change

A few examples are:

- Conclusions of the NRC (2001) are discarded, that multiple studies indicate recent warming is unusual (p.3-3 (endnote); previous text deleted in last round). The 1000 year temperature record is deleted **(Exhibit 1-8 from p. 3-3)** Emphasis is given to a recent, limited analysis supports the Administration's message. **(See p. 3-3, lines 1-2)**

- Natural variability is used to mask scientific consensus that most of the recent temperature increase is likely due to human activities. **(See p. 3-3, lines 28-35.)**

- Uncertainty is inserted (with "potentially" or "may") where there is essentially none. For example, the introductory paragraph on climate change **(See p. 3-1)** says that changes in the radiative balance of the atmosphere "may" affect weather and climate. EPA had provided numerous scientific citations, and even Congressional testimony by Patrick J. Michaels, to show that this relationship is not disputed. **(Similar insertions in p. 3-2 line 37; p.3-5 line 14).**

- Repeated references now may leave an impression that cooling is as much an issue as warming. (See p. 3-1, line 18; p. 3-2, line 28)

Text Overworked and Misunderstood

- Numerous technical details, incongruous with the rest of the ROE, make the section confusing and seem more uncertain, rather than presenting balanced conclusions about what scientists do and do not know. **(See p. 3-3, lines 3-9).**

Objectivity of the Process

- Over the course of the last four months, the significant changes and added interpretations supplied by CEQ/OMB have led to a climate change discussion that is far from objective and balanced. Given that previous drafts of the section were vetted with federal agencies and some state representatives, the significant changes to the text are likely to come to light. That being said, one could argue that EPA ensures objectivity through review and comment of *draft reports* by external parties and the public.

Options

OPTION 1: Accept CEQ and OMB edits.

Pro: Report becomes another venue for public discussion of needed research and information to better understand a contentious and complex issue; easiest in terms of EPA-White House relations; ends a multi-month negotiating process that has regressed substantially with the last round of comments; does not expend more EPA resources on the product.

Con: EPA will take responsibility and severe criticism from the science and environmental communities for poorly representing the science. It also undercuts key science assessments, such as by the National Research Council and Intergovernmental Panel on Climate Change. This will undermine the ROE and the EPA for an extended period. This option also provides specific text to attack and the potential to extend the period of criticism. Early review drafts were circulated to other agencies, States and Regions, and can be expected to surface for comparisons. EPA will have to decide who will respond and how to questions once report is published.

OPTION 2: Remove climate change section from the ROE.

Pro: This provides little content for attacks on EPA's science. It may be the only way to meet both White House and EPA needs. It does not expend more EPA resources on the product. EPA can explain the omission by pointing to the scientific disagreements and explaining that it is inappropriate for EPA to create its own version of the science.

Con: EPA will take criticism for omitting climate change. This weakens EPA's role on this issue. The White House may not easily accept this option. Lose opportunity for public feedback and debate; no foundation for further improvement of climate change indicators for future ROEs.

OPTION 3: Do not accept "no further changes" and try to reach compromise

Pro: This is the only approach that could produce a credible climate change section in the ROE.

Con: It may antagonize the White House more than the other two options. It is likely not feasible to negotiate agreeable text. It will expend more resources on the section and will delay the release of the ROE further.

CEQ 84 PC

NATIONAL SCIENCE AND TECHNOLOGY COUNCIL
CONCURRENCE SHEET

RETURN BY Monday, July 21, 2003

Please check the applicable option, sign in space provided, and return by fax to addressee below.

NSTC Report Title: ***The US Climate Change Science Program Vision for the Program and Highlights of the Scientific Strategic Plan,*** and ***Strategic Plan for the Climate Change Science Program.***

✓ A. I approve of the attached report.

____B. I approve of the attached report and recommend minor editing [attach editorial comments].

____C. I request that the attached comments on the report be considered prior to its being finalized.

____D. This report does not directly apply to this agency, but I do not object to its being cleared.

Philip A Cooney
Signature

Name: Philip A. Cooney Title: Chief of Staff

CEQ — Department/Agency
7/19/03 — Date
202 456 6224 — Telephone

Return by FAX to: **202-408-9674**
Carla Sullivan, NSTC Committee on Environment and Natural Resources, Executive Secretary 202-482-5921, Carla.Sullivan@noaa.gov.

001484

G

Strategic Issue – Climate Change

Issues Raised in Budget Review:

- What near and medium term risk does the climate issue pose to the oil and gas industry?
- What are other groups (NMA, EEI, Autos) doing through the GCC and on their own? Why is API playing a central role in business's efforts on climate policy?
- What is the appropriate level of effort for API's climate program for 2000?

What near and medium term risk does the climate issue pose to the oil and gas industry?

- Climate is at the center of industry's business interests. Policies limiting carbon emissions reduce petroleum product use. That is why it is API's highest priority issue and defined as "strategic." Near term risks are not from treaty ratification, which is not likely, but from a broad, well-funded campaign to galvanize public and opinion leader opinion that the threat is greater than justified by the current state of science and by efforts to use appropriations, executive orders and government reports to advance Administration objectives. This is calculated to create a political climate to disadvantage fossil fuels indirectly in the near term and in the long term through more direct means to control consumption.

- The Clinton/Gore Administration and other OECD governments promote the Kyoto Protocol, in part by funding studies to "document" catastrophes aimed at scaring the public into supporting dramatic action. This effort is clearly an aim of the *U.S. National Assessment on the Consequences of Climate Variability and Change* (with significant EPA involvement) and the IPCC *Third Assessment Report.* These reports are unlikely to be characterized objectively.

- The fate of the Kyoto Protocol is unlikely to be determined soon. However, international negotiations have a strong undercurrent: what policies can be adopted and how given that enough countries will not ratify the Protocol. Much of what is being done domestically by proponents is to change public opinion so that more direct action can be taken quickly if political circumstances change. Credit for early action proposals and the Administration's Climate Change Action Plan and related budget proposals are examples.

- No other policy issue facing the oil and gas industry has a continuous agenda of national and international conferences and negotiations that routinely draw hundreds to thousands of participants. Being an effective part of the debate requires continuing effort and is expensive; the benefits may, however, provide positive spillover impacts to other important industry issues. The largest environmental organizations have made climate change their top priority in the 106th Congress. These groups routinely stage climate events to coincide with the latest weather events or their release of reports and studies – the latest, *The Twenty Kingpins of Carbon*, was released in July by NRDC and the Union of Concerned Scientists. The Pew Center has substantial funding and is developing a series of studies to support aggressive action.

What are other groups (NMA, EEI, Autos) doing on climate change through the GCC and on their own? Why is API playing such a central role in business's efforts on climate policy?

- Almost 40% of carbon emissions from fossil fuels come from coal, and mining interests as well as electric utilities have been quite active in the climate policy effort, supporting groups such as CEED, the Greening Earth Society and the Climate Coalition, in addition to the GCC. The balance of emissions, more than 60%, come from oil and gas use. Unlike coal,

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where the bulk of that industry's output is used by a single industry (electric utilities), petroleum users are diverse. No other groups (except NMA and the utilities) see this as a core issue; others are willing to at least partially be 'free riders.'

- Some other industries also have periodically attempted to do what looks good at the expense of doing what is right. The "autos", some utilities and equipment manufacturers are examples.

- Most other associations do not have the expertise or member support to carry out leadership activities. Of 10 current GCC committee chairs or co-chairs, three are from API and one from an API member company. The electric utility industry also accounts for 40% of GCC chairs, but only one is from EEI. The "autos" provide only one co-chair, as does the mining industry.

- Recognizing climate change as our strategic issue, key Congressional leaders look to API for leadership and broad-based advocacy to maintain support for the principles of Senate Resolution 98.

What is the appropriate level of effort for API's climate program for 2000?

- API's 1998 climate program was about $6 million, the original 1999 program slightly over $4 million and the proposed 2000 program is $3.8 million.

- Initially API's 1999 climate budget had over 15 FTEs and $1.7 million in authorized carry-over funds for external expenditures. API currently has 8.6 FTEs and $1.5 million in external expenditures.

- The issues facing the climate team are both complex, broad and labor intensive with significant new scientific studies, impact studies, policy studies, policy proposals, legislative proposals, conferences, debates and international negotiations occurring on a continuous basis.

Current Staffing

- The 8.6 FTE in staff resources have the following responsibilities:
  - RASA (0.7 FTE) – Track and evaluate scientific studies, including IPCC material. Review of science component of climate materials. Participate in GCC Science and Technology Committee and related groups. Provide liaison with Federal agencies.
  - Policy Analysis and Statistics (1.7 FTE) – Develop the economic component of advocacy material. Critique Administration and other analyses. Rapid development of communications response material and review economics material in communications. Provide expertise for emissions methodology efforts, emissions trading proposals and development of voluntary actions workshop.
  - Communications (2.0 FTE) – Co-chair GCC-Communications Committee. Develop major communications and advocacy materials, including Internet web-site, voluntary actions papers and brochures, and rapid response to media reports on climate.
  - Federal Government Relations (0.3 FTE) – Interact with the Hill on climate issues, including legislative proposals and education of staff and members. Appropriations, "Early Action Credits" and the Murkowski-Byrd-Hagel bills have been a focus.
  - Strategic Issue Staff (3.9 FTE) – Work with the API Steering Group on keeping the situation analysis, strategy, objectives and programs current. Direct the Climate Team efforts and work with constituency groups. Evaluate legislative proposals,

develop communication strategies, speeches and manage content. Chair the GCC Economics Committee and represent API at climate meetings.

Expanded Staffing

- For 2000, an additional 2 FTEs were proposed: 1.0 FTE to the Climate Team staff, 0.5 to RASA and 0.5 to Federal Relations. The added climate staff ($380,000) would correct the imbalance between workload and resources to ensure faster turnaround and response and improve contacts with other constituencies. RASA resources would improve the limited ability to respond to new science claims, which are numerous. The Federal Relations resources would more extensively present the industry's case to Capitol Hill, including a longer-term educational strategy that is currently not possible.

2000 Budget Strategic Components

- With a total program of $3.8 million, the Climate Steering Committee envisioned $2 million in external expenditures. The climate program has four major strategies. These strategies are specified below for a $1.5 million expenditure level, per the challenge of the Program and Budget Work Group. In most cases, **potential** grant recipients, consultants and allies have been identified. Plans for the proposed $0.5 million are discussed later below.
  - **Strategy 1 – Approach and Tenor of the Debate ($215,000)**
    Emphasize industry's positive role and actions. Establish that responsible action is not synonymous with the Kyoto Protocol. Major elements:
    - Develop/deliver positive industry messages; media outreach ($70,000) [Wirthlin]
    - Industry voluntary programs ($40,000) [Identification and advocacy of industry voluntary efforts, plus published workshop report]
    - Industry GHG emissions and reporting methodology ($50,000) [technical analysis for consistent estimation, plus industry aggregation and communications, if appropriate]
    - Communications material, including contract speeches, position statements (printing and distribution) ($55,000)

  - **Strategy 2 – Outreach to Constituencies, Allies, State and Federal ($670,000)**
    Work with these groups on Capitol Hill, and coordinate actions. Major elements include:
    - Maintain relationship with organized labor ($75,000) [consultants - Cunningham; Flynn]
    - Work with and support national/state groups ($75,000) [Seniors Coalition, People for the USA, National Conference of Mayors, Atlas Economic Research Foundation]
    - Strengthen coalitions; grants to constituency and communications oriented foundations and think tanks that address climate issues ($280,000) [Reason Pubic Policy Institute, Independence Institute, CEED, Heartland Institute, Frontiers of Freedom, National Center for Policy Analysis, CEI, AEI, Heritage]
    - GCC membership ($25,000) and communications program ($100,000)
    - State climate action initiatives and policy resolutions ($50,000) [Fund State Council efforts]

  - **Strategy 3 – Building the Case ($485,000)**
    Promote industry's positive contribution to a long-term approach as an alternative to near-term targets and timetables. Major elements include:
    - Climate science and science uncertainty research to highlight changing climate science ($100,000) [National Environmental Policy Institute, CATO Institute]
    - Health research to address "vector-borne" disease claims ($100,000) [Carnegie-Mellon]

- Expert review of regional impact claims in U.S. National Assessment and IPCC deliberations on "dangerous" concentration levels ($100,000)
- Policy oriented think tanks and consultant programs to address economic studies and policy impacts ($160,000) [ACCF, Center for the Study of American Business, Annapolis Center, WEFA, CRA]
- GCC Special Projects ($25,000)

- **Strategy 4 – Domestic and International Policymakers ($130,000)**
  Participate in domestic and international forums on climate and climate policy as well as domestic and international climate negotiations. Major elements include:
  - FCCC/COP-6 preparation & meetings ($30,000) [Reinstein Report and consulting]
  - IPCC report review and response ($25,000)
  - National security and sovereignty issues ($65,000) [COMPASS, Heritage or academic]

Expanded Program

- For 2000, an additional $500,000 in external expenditures was proposed to expand the reach of API's program. Under Strategy 1, $50,000 would have been used for message testing and $75,000 for Earth Day 2000 communications efforts to respond to the Earth Day theme of reducing fossil fuel use. $80,000 was slated for Strategy 2 to provide additional outreach to other associations and state coalitions and $175,000 for Strategy 3 to address extreme weather claims, EPA-funded State GHG limitation plans and economic studies "demonstrating" large scale/low cost emission reductions. In Strategy 4, $120,000 would be used to document the infeasibility of other nations' meeting their Kyoto targets.

from different research elements to establish baseline characterizations of man acting in and reacting to his environment. The complex interactions of multiple environmental stressors on human activities must be examined. It is widely acknowledged that human dimensions research has special challenges associated with the cross-disciplinary nature of its topics and with the mix of qualitative and quantitative data and analyses employed in its pursuit.

Across the range of human dimensions research there is a particularly strong need for the integration of social, economic, and health data with environmental data. Such integration requires data from physical, biological, social, and health disciplines on compatible temporal and spatial scales, to support the synthesis of data for research and to support decisionmaking. There is an especially critical need for geo-referenced data.

A broad research agenda for human contributions and responses has been identified in a series of national and international reports, including the assessment reports of the Intergovernmental Panel on Climate Change (IPCC, 2001a, b, c, d), a series of focused reports and monographs from the National Research Council (NRC, 1999a, e, 2001c, e) ~~and the overview and foundation documents produced as part of the National Assessment of the Potential Consequences of Climate Variability and Change (NAST, 2000, 2001).~~ The NRC report *Climate Change Science: An Analysis of Some Key Questions* concluded that: "In order to address the consequences of climate change and better serve the Nation's decisionmakers, the research enterprise dealing with environmental change and environment-society interactions must be enhanced." Such an enterprise should include, "...support of interdisciplinary research that couples physical, chemical, biological, and human systems" (NRC, 2001a). This chapter draws from these reports and from priority areas identified by the research community through federal research programs.

Red Flag: do not cite National Assessment

Two overarching questions for research on the human contributions and responses to global change are:

- How do humans and human societies drive changes in the global environment?
- How do humans prepare for and respond to global environmental change?

These questions frame the human dimensions research outlined in the four key questions that follow.

Question 9.1: What are the magnitudes, interrelationships, and significance of the primary human drivers of change in atmospheric composition and its potential impact on the climate system, changes in land use and land cover, and other changes in the global environment?

STATE OF KNOWLEDGE

Human drivers of global environmental change include consumption of energy and natural resources, technological and economic choices, culture, and institutions. The effects of these

Office Of Science And Technology Policy Director Rosina Bierbaum's Letter On The Status Of The National Assessment Of Climate Change

News Release
by CEI Staff
September 6, 2001

September 6, 2001

Christopher C. Horner
Competitive Enterprise Institute
1001 Connecticut Avenue, NW
Suite 1250
Washington, DC 20036

Dear Mr. Horner:

The purpose of this letter is to explain the status of the national assessment of climate change sponsored by the U.S. Global Change Research Program and to explain how the Administration is developing its policies on global climate change.

The national assessment, titled Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change, consists of an overview document of about 150 pages and a foundation document of about 600 pages. These documents were the product of the National Assessment Synthesis Team, an advisory committee chartered under the Federal Advisory Committee Act. As such, they are not policy positions or official statements of the U.S. government. Rather, they were produced by the scientific community and offered to the government for its consideration.

The formulation of a comprehensive policy addressing global climate change is an important priority for this Administration. Towards this end, the President has constituted a Cabinet-level working group to study this issue and assist in the development of such comprehensive policy. Among other things, this working group is conducting an extensive review of climate change science and technology, has commissioned and received a report from the U.S. National Academy of Sciences on climate change science questions and uncertainties, and is carefully examining how best to address the challenge of climate change. The efforts of this working group will form the basis of government decision-making on the important issue of global climate change.

Sincerely,

Rosina Bierbaum
Acting Director
Office of Science and Technology Policy

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

COMPETITIVE ENTERPRISE INSTITUTE, *et al.*	)	
Plaintiffs,	)	
v.	)	C.A. No. 00-02383 (RU)
GEORGE W. BUSH, in his Capacity as Chairman of the National Science and Technology Council, *et al.*	)	
Defendants.	)	

MEMORANDUM IN SUPPORT OF JOINT STIPULATION TO DISMISS PLAINTIFFS' COMPLAINT WITHOUT PREJUDICE

In light of very recent events and pursuant to FRCP 41(a) the Parties jointly stipulate to dismiss Plaintiffs' Complaint without prejudice.

Events precipitating this Stipulation include Plaintiffs receiving a correspondence from the White House Office of Science and Technology Policy dated September 6, 2001. This correspondence asserts to Plaintiffs' satisfaction that the document at issue in this matter, the National Assessment on Climate Change, does not and will not serve as or as the basis for any policies, positions or rules of the Federal Government of the United States, but that it constituted a submission by a non-governmental body and would be considered by policymakers as such.

Further contributing to this Stipulation, on September 6, 2001, Plaintiffs obtained the August 31, 2001 submission by Defendant George W. Bush, through the United States Department of State, to the United Nations' Intergovernmental Panel on Climate

K

Change ("IPCC"). This document, "Comments" from the "Final Government Review" of the "IPCC Third Assessment Report, Synthesis Report," satisfied Plaintiffs that the National Assessment indeed does not serve as the position of the Federal Government of the United States as to the science of the theory of climate change or global warming, or the basis for any such position or any policy, at present and given all facts known to Plaintiffs.

As such Plaintiffs agree to withdraw their Complaint pursuant to the attached Joint Stipulation to Dismiss Plaintiffs' Complaint Without Prejudice.

Respectfully submitted,

Christopher C. Horner
D.C. Bar No. 440107
1001 Connecticut Avenue, N.W.
Suite 1250
Washington, D.C. 20036
(202) 331-1010
Attorney for Plaintiffs

Gail Walker
VA Bar No. 23590
United States Department of Justice
Civil Division
901 E Street, N.W.
Room 1086
Washington, D.C. 20530
Attorney for Defendants

Dated: September 11, 2000.

RECORD TYPE: FEDERAL (NOTES MAIL)

CREATOR:Samuel A. Thernstrom (CN=Samuel A. Thernstrom/OU=CEQ/O=EOP [CEQ])

CREATION DATE/TIME:15-JUL-2002 09:40:58.00

SUBJECT:: Re: Revised Whitman Time magazine climate change piece

TO:Gibson.Tom@epamail.epa.gov (Gibson.Tom@epamail.epa.gov [UNKNOWN])
READ:UNKNOWN

CC:Phil Cooney (CN=Phil Cooney/OU=CEQ/O=EOP@EOP [CEQ])
READ:UNKNOWN

CC:Scott McClellan (CN=Scott McClellan/OU=WHO/O=EOP@EOP [WHO])
READ:UNKNOWN

CC:James Connaughton (CN=James Connaughton/OU=CEQ/O=EOP@EOP [CEQ])
READ:UNKNOWN

TEXT:
Tom: This figure is taken directly from the president's 2-14 speech, and Jim Connaughton's Senate testimony last week., Using merely an abstract dollar figure may not be as compelling. In any case, if a dollar figure was used, it would have to be billions, not millions. We can discuss this point later if need be.

Gibson.Tom@epamail.epa.gov
07/15/2002 09:32:02 AM
Record Type: Record

To: Samuel A. Thernstrom/CEQ/EOP
cc:
Subject: Re: Revised Whitman Time magazine climate change piece

SAm---I can't use the five million out of work figure for Kyoto. It is based on an EIA report that assumed that no trading would be allowed to implement the KP. It also is the high end of numbers that were expressed as a range. I suggest going back to "would have cost hundreds of millions of dollars" as in the draft.

Samuel_A.
_Thernstrom@ceq.eop.g To: Tom
Gibson/DC/USEPA/US@EPA, watsonhl@state.gov,
ov
Conrad.C.Lautenbacher@noaa.gov, James.R.Mahoney@noaa.gov,
Robert.Card@hq.doe.gov,

LYNN_SCARLETT@IOS.DOI.GOV, David.Tenny@usda.gov, Tim.Adams@do.treas.gov
07/15/02 09:18 AM cc:
James_Connaughton@ceq.eop.gov, Phil_Cooney@ceq.eop.gov, Stuart_W.

_Bowen@who.eop.gov,
Daniel_J._Bartlett@who.eop.gov, James_R._Wilkinson@who.eop.gov,

Scott_McClellan@who.eop.gov, Joel_D._Kaplan@who.eop.gov
Subject: Revised
Whitman Time magazine climate change piece

Attached for everyone's review is a revised version of Governor Whitman's Time magazine piece on climate change, which incorporates the broad range of comments submitted through WH staffing and interagency review. Since this changed substantially during this process, I am recirculating this on an FYI basis to all of you. If anyone has any final comments, please send them to me and Tom Gibson no later than 1:30 today if possible, since this must be submitted to Time today.

(See attached file: CTW Time GCC revised.doc)

Draft Whitman Time Magazine piece on climate change

Among the many public policy issues the world faces today, few are as complex as global climate change. Countless scientific, technological, and economic issues affect our understanding of, and response to, climate change. Tremendous uncertainties exist in each of these fields, and new information is constantly added to the equation

? new climate observations, new scientific studies, new technological developments, and new partnerships and programs to control greenhouse gas emissions.

One fact, however, is indisputable: America has never had a stronger, smarter, and more practical climate change program than it does today under President Bush's leadership. Never before has a President and his Cabinet devoted as much attention to climate change policy, or provided such significant resources to our climate change science, technology, and mitigation programs. And never before has America engaged in so many bilateral climate change partnerships with both the developed and developing world.

Last February, the President unveiled a comprehensive climate change policy with three key goals: Resolving key uncertainties in climate change science, developing and deploying new technologies, and strengthening domestic and international efforts to prevent greenhouse gas emissions. In each of

international
cooperation on climate change programs. In the past year, we've developed
bilateral agreements with China, India, Japan, Australia, Canada, the European
Union, and a consortium of Central American nations, creating international
cooperation on scientific research and programs to prevent greenhouse gas
emissions.

Supporting these efforts, the President's budget provides $178 million for the
Global Environment Facility ? which funds projects to bring clean energy and
other environmental technologies to the developing world ? and $205 million for
USAID climate change programs, including $50 million for tropical forest
conservation. USAID is also spending $25 million over the next two years on new
climate observation systems in developing countries.

In the face of this unprecedented effort, partisan critics still lament the
President's refusal to support the Kyoto Protocol ? forgetting that the Senate
voted 95-0 against its principles in 1997. It's worth remembering why: The Kyoto
Protocol would have put up to 5 million Americans out of work, for the sake of
meeting unrealistic and arbitrary targets that would have a negligible effect on
global emissions. In fact, the Protocol requires little or no real reductions
from most of our trade competitors in the developed world ? who will simply buy
credits for phantom emissions "reductions" caused largely by the collapse of the
communist economies ? and requires nothing whatsoever of the developing
countries that already emit a majority of the world's greenhouse gases.

Collectively, America has never been more engaged in meeting the long-term
challenge of climate change with smart policies that guide both concrete actions
today and a long-term vision for progress in the years ahead.

####

793 words
(See attached file: CTW Time GCC revised.doc)

- CTW Time GCC revised.doc

========== ATTACHMENT 1 ==========

RECORD TYPE: FEDERAL (NOTES MAIL)

CREATOR:Gibson.Tom@epamail.epa.gov (Gibson.Tom@epamail.epa.gov [UNKNOWN])

CREATION DATE/TIME:15-JUL-2002 12:36:12.00

SUBJECT:: Re: Revised Whitman Time magazine climate change piece

TO:Samuel A. Thernstrom (CN=Samuel A. Thernstrom/OU=CEQ/O=EOP@EOP [CEQ])
READ:UNKNOWN

CC:Mulvaney.Susan@epamail.epa.gov (Mulvaney.Susan@epamail.epa.gov [UNKNOWN])
READ:UNKNOWN

CC:Martyak.Joe@epamail.epa.gov (Martyak.Joe@epamail.epa.gov [UNKNOWN])
READ:UNKNOWN

CC:Phil Cooney (CN=Phil Cooney/OU=CEQ/O=EOP@EOP [CEQ])
READ:UNKNOWN

CC:Mcginnis.Eileen@epamail.epa.gov (Mcginnis.Eileen@epamail.epa.gov [UNKNOWN])
READ:UNKNOWN

CC:Scott McClellan (CN=Scott McClellan/OU=WHO/O=EOP@EOP [WHO])
READ:UNKNOWN

CC:James Connaughton (CN=James Connaughton/OU=CEQ/O=EOP@EOP [CEQ])
READ:UNKNOWN

TEXT:
Here are Governor Whitman's edits---

seventh para, last sentence---strike "in the long run." and replace with "if we are truly to make a difference."

eleventh para, second sentence---strike from "put up to 5 million . . ." through "arbitrary targets that would have a . . " and replace with "cost American jobs while having". New sentence reads "It's worth remembering why: The Kyoto protocol would have cost American jobs while having a negligible effect on global emissions."

Tom G

Samuel_A. _Thernstrom@ceq.eop.gov 07/15/02 09:40 AM

To: Tom Gibson/DC/USEPA/US@EPA

cc: James_Connaughton@ceq.eop.gov, Phil_Cooney@ceq.eop.gov, Scott_McClellan@who.eop.gov

Subject: Re: Revised Whitman Time magazine climate change piece

RECORD TYPE: FEDERAL (NOTES MAIL)

CREATOR:Samuel A. Thernstrom (CN=Samuel A. Thernstrom/OU=CEQ/O=EOP [CEQ])

CREATION DATE/TIME:15-JUL-2002 15:11:01.00

SUBJECT:: Time Magazine -- latest

TO:Phil Cooney (CN=Phil Cooney/OU=CEQ/O=EOP@EOP [CEQ])
READ:UNKNOWN

TEXT:
Draft Whitman Time Magazine piece on climate change

Among the many public policy issues facing the world today, few are as complex as global climate change. Countless scientific, technological, and economic issues affect our understanding of, and response to, climate change. Tremendous uncertainties exist in each of these fields, and new information is constantly added to the analysis □) new climate observations, new scientific studies, new technological developments, and new partnerships and programs to control greenhouse gas emissions.

One fact, however, is indisputable: Under President Bush□,s leadership, this Administration has crafted the strongest, smartest, and most practical climate change program America has ever had. No previous Administration has devoted as much attention to climate change policy, or provided such significant resources to our climate change science, technology, and mitigation programs. And America has never before engaged in so many bilateral climate change partnerships with both the developed and the developing world.

Last February, the President unveiled a comprehensive climate change policy with three key goals: resolving key uncertainties in climate change science, developing and deploying new technologies, and strengthening domestic and international efforts to prevent greenhouse gas emissions. In each of these areas, the President has provided the leadership and resources needed to produce new results.

Collectively, the Administration□,s initiatives have set America on a path to slow the projected growth of greenhouse gas emissions, while developing the scientific and technological knowledge and economic strength necessary to enable us ultimately to stabilize or reduce emissions, if science justifies such action.

For the first time, our strategy establishes a specific and realistic goal: to reduce America□,s greenhouse gas emissions relative to the size of our economy by eighteen percent over the next ten years. Accomplishing this goal will require a significant and sustained effort. Although American businesses continue to improve their energy efficiency and productivity, the President□,s goal is to accelerate that trend by another 30 percent □) the equivalent of taking 70 million cars off the road, or avoiding roughly 500 million metric tons of greenhouse gases.

In fact, meeting the President□,s goal will require emissions reductions comparable to what the Kyoto Protocol parties hope to attain □) but without the devastating economic consequences of the Kyoto approach.

The President□,s plan provides significant new resources for climate change science and technology. His 2003 budget provides $4.5 billion for climate-related programs, a $700 million □) or 17 percent □) increase in funding. This includes $1.7 billion for basic research on climate change and $1.2 billion for research on advanced energy generation and carbon

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sequestration technologies. The President□,s funding for climate change programs is unmatched in the world, and it ensures America□,s leadership in efforts to develop important technologies such as a pollution-free fuel cell-powered car. Real progress on developing cost-effective breakthrough technologies is an essential part of the President□,s policy.

The President□,s policy also provides new resources and opportunities to prevent greenhouse gas emissions right now. The budget provides $4.6 billion over the next five years in tax credits for individuals and businesses that invest in renewable energy and energy efficiency projects. And the President has asked the Department of Energy to develop, for the first time, transferable credits for individuals or businesses that reduce their greenhouse gas emissions.

The President has also reinvigorated America□,s efforts to expand international cooperation on climate change programs. In the past year, the Administration has developed bilateral initiatives with China, India, Japan, Australia, Canada, the European Union, and a consortium of Central American nations, creating international cooperation on scientific research and programs to prevent greenhouse gas emissions.

Supporting these efforts, the President□,s budget provides $178 million for the Global Environment Facility □) which funds projects to bring clean energy and other environmental technologies to the developing world □) and $205 million for USAID climate change programs, including $50 million for tropical forest conservation. USAID is also spending $25 million over the next two years on new climate observation systems in developing countries.

Despite this unprecedented effort, partisan critics still lament the President□,s refusal to support the Kyoto Protocol □) forgetting that the Senate voted 95-0 against its principles in 1997. It□,s worth remembering why: The Kyoto Protocol would have put up to 5 million Americans out of work, for the sake of meeting unrealistic targets that would have a negligible effect on global emissions. The developing world □) which creates the majority of the world□,s greenhouse gas emissions □) has no obligations at all under the Kyoto Protocol. And even the industrialized world isn□,t expected to make real reductions in their emissions □) rather, they will simply buy credits for phantom emissions □&reductions□8 caused largely by the collapse of the Eastern European economies.

America has never been more engaged in meeting the long-term challenge of climate change with smart policies that guide both concrete actions today and a long-term vision for progress in the years ahead.

####

792 words

EMAIL >

> > From: "Deutsch, George (HQ-NB000)" <george.deutsch-1@nasa.gov>
> > Date: Mon, 17 Oct 2005 16:29:43 -0500
> > To: "Wild, Flint (HQ-HA000)[Oklahoma State Univ]"
> > <flint.wild@nasa.gov>
> > Cc: "Hupp, Erica (HQ-NB000)" <erica.hupp-1@nasa.gov>, "Deutsch,
> > George (HQ-NB000)" <george.deutsch-1@nasa.gov>
> > Conversation: <COB 10/19> - For Review/Approval: Einstein portal
> submission:
> > Subject: RE: <COB 10/19> - For Review/Approval: Einstein portal
> submission:
> >
> > Okay, Flint. We've got a slight problem here.
> >
> > I like these pieces, they're interesting, but they refer to the
> "big bang" as
> > if it were law. As you know, the theory that the universe was
> > created by a "big bang" is just that -- a theory. It is not proven fact; it is opinion.

0

> > Yes, the scientific community by and large may share this opinion,
> > but that doesn't make it correct.
> >
> > Two things. First of all, we have been given direction from our
> Deputy AA that
> > we are never to refer to the big bang as anything but a theory,
> because that's
> > what it is. This is also AP style as written in the latest
> > Associated Press Stylebook 2005. The "big bang theory" is listed
> > beside the
> oscillating theory
> > and the steady-state theory, and the common denominator here is the
> > word "theory."
> >
> > Secondly, it is not NASA's place, nor should it be, to make a
> declaration such
> > as this about the existence of the universe that discounts
> intelligent design
> > by a creator -- the other half of the argument that is notably
> absent from any
> > of these three portal submissions. And I know the particular
> context of these
> > pieces doesn't lend itself to getting into this particular
> debate, and that's
> > fine with me. But we, as NASA, must be dilligent here, because this
> > is more than a science issue, it is a religious issue. And I would
> > hate
> to think that
> > young people would only be getting one half of this debate from
> > NASA. That would mean we had failed to properly educate the very
> > people who rely on us for factual information the most.
> >
> > Sorry to get on a soap box here; I don't mean to. I know the
> "point" in these
> > entries is not the big bang, but instead Einstein's
> contributions, etc. That
> > having been said, I think the way that the big bang is presented
> > totally overshadows the rest of the information, not to mention that
> > it essentially declares the big bang theory a NASA-recognized fact, which it is not.
> >
> > Please edit these stories to reflect that the big bang is but one

> > theory on how the universe began. That is the only change I really want.
> Every time we
> > see "big bang," we should also see the word "theory" somewhere
> > nearby. You don't have to list any other theories or get into it at
> > great
> length, but we
> > really need to see that one clarification. Thanks.
> >
> > George

CEQ 12 PC

CLIMATE CHANGE SCIENCE PROGRAM OFFICE and
US GLOBAL CHANGE RESEARCH PROGRAM
1717 Pennsylvania Ave, NW
Suite 250, Washington, DC 20006
Phone: 202-223-6262 Fax: 202-223-3064

TO: PHIL COONEY

FAX NUMBER: 202-456-2710

FROM: JIM MAHONEY AND RICHARD MOSS

SUBJECT: RESPONSE TO CEQ COMMENTS ON OUR CHANGING PLANET

DATE: 4 NOVEMBER 2002

****
This fax has 9 page(s)
****

URGENT!

000799

Climate Change Science Program Office and US Global Change Research Program
1717 Pennsylvania NW, Suite 250, Washington DC 20006
Tel. 202-223-6262; Fax: 202-223-3064; E-mail: office@usgcrp.gov; Web: http://www.usgcrp.gov

P

DATE: November 4, 2002

TO: Phil Cooney

FROM: Jim Mahoney
Richard Moss

RE: Response to CEQ Review Comments on FY 2003 "Our Changing Planet"

Thank you for your time and effort in commenting so extensively on the draft FY03 "Our Changing Planet." We have accepted and included in the final text about 80 percent of the approximately 110 revisions proposed by CEQ to "Our Changing Planet" (the October 15 Final review Draft). These revisions have been incorporated verbatim except for a few minor instances of editing for syntax and stylistic consistency. However, we have concerns about some of the proposed revisions, as discussed below. In some cases we have proposed alternative wording.

Your proposed revisions to the Final Review Draft are indicated by underlining and strikethroughs.

1 Page 1, lines 35-36:
Reducing the scientific uncertainty in global climate models could ... in the long run, provide more meaningful information ~~essential to projecting~~ on the potential impacts of climate change on ecosystems.

no.

Response: Not just "in the long run." Research is already providing meaningful information on potential impacts of climate change on ecosystems. We propose the following text: "Reducing the scientific uncertainty in global climate models could ... provide more meaningful information on the potential impacts of climate change on ecosystems."

2 Page 2, lines 14-17:
The complexity of the Earth system and the interconnections among its components make it a complex scientific challenge to document change, begin to understand ~~diagnose~~ its causes, and develop useful projections of how natural variability and human actions will affect the global environment in the future.

Response: Researchers have already begun to understand its causes. We could say "understand its causes."

3 Page 2, lines 31-33:
In this new phase of the climate science programs, information that might allow comparisons of ~~compares~~ the potential consequences of different responses to global changes, including climate change, will be pursued ~~developed in a form useful to national debate and decisionmaking. This~~

~~information will facilitate the search for the most effective and efficient approaches to adapt to and mitigate the effects of both natural and human-induced climate change.~~

Response: Information is already being developed that compares potential consequences of different response strategies, e.g., in Integrated Assessment models. Also, we believe it is more correct to say that information will be "developed," rather than "pursued." We propose the following: "In this new phase of the climate science programs, information that ~~compares~~ allows comparison of the potential consequences of different responses to global changes, including climate change, will be developed."

(4) Page 4, lines 11-23:
The [NRC] report identified areas where additional research is crucial. These included the magnitude and nature of future human-caused "forcings" such as emissions of greenhouse gases; the carbon cycle; "feedbacks" caused by water vapor, clouds, ice, and other factors that determine the response of the climate system; regional and local climate change consequent to an overall global level of change; the nature and causes of natural variability; and the direct and indirect effects of the changing distribution of aerosols (including black carbon). In addition, the report also called for accelerated research on the interactions of environmental change and human societies, ~~including interdisciplinary research on coupled human-environment systems; integration of knowledge, including its uncertainty, into decision-support systems; and regional or sectoral research into the response of human and natural systems to multiple stresses.~~ Finally, the report noted that an effective strategy for advancing the goal of understanding climate change will require enhanced global observing systems; large-scale modeling; and more effective management of resources to ensure innovation, effectiveness, and efficiency.

CEQ comment about proposed deletion: Why elaborate on this and not other basic issues?

Response: This paragraph tracks closely the NRC 2001 report's summary of "specific areas of science that need to be studied further" – see page 5 of the NRC report. The proposed deletion would produce a less accurate and less balanced summary of the key research issues as identified by the NRC.

(5) Page 4, lines 32-33:
Because … stable, long-term measurement records are absolutely essential to interpret Earth system variability and trend data, there is a critical near-term need for a well-designed, comprehensive climate and ecosystem monitoring system.

Response: The proposed adjectives seem unnecessary.

(6) Page 5, lines 9-56 (section on Decision-Support Resources):
You propose deletion of lines 17-56. An associated comment raises the question of whether we can deliver, given basic research and observational needs. Also, you suggest that including this material would pre-judge outcomes of FY 2004 budget discussions.

Response: Our Changing Planet often includes longer-term objectives in the introductory section. The text specifically points out the long-term nature of these items. Also, we need to have some balance in the length of the sections on science, observations, and decision support; the proposed revision would reduce the decision-support section to two sentences.

Suggested alternative text for this section: A final priority for the USGCRP and CCRI will be the development of comparative information to assist national policymakers, resource managers and other decisionmakers, and the general public in further developing strategies for responding to climate change while maintaining sound economic and energy security conditions in the United States and throughout the world. Significant progress in developing and applying science-based decision-support resources is a key goal of the CCRI. Specific objectives include improving our capacity to use climate and other models to evaluate the potential implications of different strategies and technologies (including those identified by the National Climate Change Technology Initiative), and accelerating the transition of scientific knowledge to applications in resource management, disaster preparedness, planning, and assessment. Careful application of data from observations and monitoring programs will be coupled with emerging skills to project climate on seasonal time scales. An even more challenging goal is extending applications to take advantage of decadal and longer-term projections of climate as these improve. These efforts will develop pilot activities that demonstrate both the strengths and limitations of current knowledge. They will include careful descriptions of scientific uncertainties that are meaningful to those using the information. ok

Page 6, lines 23-29:

- ~~Global climate models, ocean circulation models, and other computer models that integrate our scientific information about climate change and ecosystem impacts, and that project future conditions expected to result from various response strategies.~~
- ~~Scientific evaluation of technology initiatives that translate the effects of proposed mitigation technologies into scientific parameters suitable for scenario analyses.~~
- ~~Economic and energy supply analyses related to various suggested scenarios that allow projections of the outcomes expected to result from the scenarios.~~

CEQ says "No need to promise these in this report before '04 CCRI budgeting strategy is resolved." Also: "Possible/realistic/meaningful at this point, given basic research and observation needs?"

Response: The three bullet items add important information and context about the types of analyses to be carried out and are not specific to the FY 2004 timeframe. The research community is already doing these types of analyses.

If the above language on decision support is accepted (i.e., page 5, lines 9-56), we could delete these three bullets but modify the first bullet that follows them to include some of the relevant points as follows: "Comparisons of the potential implications of a range of selected technology and other scenarios, using computer models that integrate scientific information about climate change and potential ecosystem and economic impacts, to facilitate the search for the most effective and efficient adaptation and mitigation options."

email

as the President described it in his June 2001 speech: "... to strengthen research at universities and national labs, to enhance partnerships in applied research, to develop improved technology for measuring and monitoring gross and net greenhouse gas emissions, and to fund demonstration projects for cutting edge technologies such as bioreactors and fuel cells"

(7) Page11, lines 28-30:
Draft text reads: The main thrust of the NCCTI is to examine, from the perspective of both near- and long-term climate change goals, the current Federal portfolio of R&D and strengthen its coordination and focus on achieving these goals.

CEQ comment: Quote from POTUS 6/11/01 charge would be helpful here.

Response: Can you indicate what you see as an appropriate quote to be included in this passage?

(8) Page 16, lines 48-49:
...regional and sectoral assessments that are scientifically justified and accurately reflect the significant limits of our current state of knowledge ~~of vulnerability and resilience~~;...

Response: We propose the following text: "...science-based regional and sectoral assessments that accurately reflect the limits of current understanding;..." ok.

(9) Page 23, lines 35-38:
Prediction of at least some aspects of coming El Niño events and related regional anomalies has been demonstrated and proven useful to both economic and community leaders. While the accuracy of predictive capabilities still needs vast improvement...

Response: The paragraph is worded appropriately for the higher skill levels that have been developed for predicting El Niño-related phenomena than for long-term climate change. We could say "substantial improvement" if this were important. ok.

Page 45, lines 37-43:
The three overarching questions for USGCRP ecosystem research are: ....

2. How ~~can~~ ~~and whether~~ projections of the state of ecosystems and ecosystem services, which are dependent on explicit scenarios for climate, land use, and economic activity, can be measurably improved to begin to provide decision-relevant information? ok.

Response: This text was prepared and vetted by the CCSP/USGCRP interagency working group on Ecosystems research and describes their joint research program. The science program managers in the Ecosystems working group believe that the original text more faithfully represents the state of development/application and next tasks for this area of modeling.

(10) Page 45, lines 48-51:
The USGCRP agencies have identified five major goals for ecosystem research in global change over the next 10 years:

1. ~~Characterize and quantify~~ Improve the understanding of the most important potential linkages among the structure and functioning of ecosystems, biogeochemical cycles, climate, and ecosystem management. ok

Response: The original text captures more precisely the nature of the research challenge for this area. In addition, why say "potential" linkages? -- There are real linkages among ecosystems, biogeochemical cycles, climate, and ecosystem management.

ok.

Page 47, lines 9-14:

11. **More Wildfires Likely in Warmer, More Variable Climate:** Fire suppression in the Rocky Mountains has resulted in forests that have greater potential to create catastrophic fires and wildfires. Absent reform of our forest management policies, and discounting the intentional human component involved in recent fires, ~~Such~~ wildfires are projected as more likely to occur more frequently under scenarios of future warmer and/or more variable climates. Recent tree-ring studies show that the acreage of forest burned increased when one or two years of above average precipitation were followed by springs and summers of below average precipitation.

delete

delete entirely or talk

Response: The proposed text would interject a policy issue into a straightforward description of research. We would propose including your addition of "projected as more..."

Page 55, lines 17-37:

- ~~**Regional Assessments of Global Change Consequences:** Ongoing regional assessments are examining the consequences of and responses to global change in natural and human systems. In the Great Lakes Region, for example, a series of workshops has been held to determine how assessment findings can inform decisionmaking. An assessment of potential climate change in the Rocky Mountain National Park and its gateway community, Estes Park, found that climate-related changes in the natural systems of the Park are likely to change visitation to the Park while driving changes in the town's economy. Another assessment has led to improved wildland forest fire prediction by developing a methodology that links seasonal climate forecasts, the Palmer Drought Index, and forest vegetation densities in the western United States.~~

- ~~**Integrated Assessment of Response Strategies:** An Integrated Assessment model was developed that, through linked models of urban and global chemistry with economic analysis of all relevant emissions, could analyze the relationship between policies to control greenhouse gases and measures directed to the reduction of urban air pollution. Another Integrated Assessment model introduced a possible hydrogen market into its economic analyses, as well as carbon capture and disposal technology options that span a wide range of options, from powerplant capture to recovery in hydrogen refineries. These modules yielded new insights. For example, the contribution of many sectors to atmospheric CO_2 stabilization depends heavily on the development of cost-competitive technologies capable of delivering services at competitive prices without releasing carbon to the atmosphere.~~

No.

You propose deletion of FY 2003 research highlights bullet items on Regional Assessments and Integrated Assessment, and "question whether these pursuits are really 'Highlights' worth mentioning in this report."

We propose the following alternative text:

- **Regional Assessments of Global Change Consequences:** Ongoing regional assessments are examining the consequences of and responses to global change in natural and human systems. ~~For example, one assessment has led to improved wildland forest fire prediction by developing a methodology that links seasonal climate forecasts, the Palmer Drought Index, and forest vegetation densities in the western United States.~~

- **Integrated Assessment of Response Strategies:** An Integrated Assessment model was developed that, through linked models of urban and global chemistry with economic analysis of all relevant emissions, could analyze the relationship between policies to control greenhouse gases and measures directed to the reduction of urban air pollution. Other types of Integrated Assessment models are also under development. Related research is being carried out through international activities focused on the Asian brown cloud phenomenon.

No delete

Page 57, lines 25-27:

- EPA is initiating the next phase of health sector assessments to ~~understand~~ evaluate the potential consequences of global change for human health in the United States, especially for particular demographic and geographic subpopulations that are potentially at increased risk.

CEQ comment: Why? See p. 55, first bullet....

delete

Response: This is a program plan that is in FY 2003 budget. The page 55 bullet on Consequences of Global Change for Human Health specifically notes that "certain demographic and geographic populations would be at increased risk." The EPA activity would address this.

Page 57, lines 29-36:

~~**Regional Assessment of Vulnerability and Resilience:**~~

- ~~EPA is initiating the next phase of assessments in the Great Lakes, the Gulf Coast, and the Mid- to Upper Atlantic Regions. The emphasis is on understanding the information needs of decisionmakers as they respond to findings about the impacts of climate variability and change in their region.~~
- ~~NOAA will enhance and refine its decisionmaking based, regional research in the United States and will expand its cross-regional research efforts to address such issues as transboundary resource management.~~

Response: CEQ makes no comment on this proposed deletion. These are FY 2003 agency program plans that were in the President's budget request for this FY.

Pages 65-66, 71, and 78:

CEQ's proposed revisions would change text in Appendix A, which is provided by agencies and describes their FY 2003 budgets and program plans that are already in progress or in the works. In our judgment, all text in Appendix A should remain as drafted sand approved by the individual agencies. Substantive changes in how the agencies have described their own programs would require consultation with agencies prior to making any such changes. This

would essentially make it impossible to produce this document in time to distribute it at the CCSP strategic planning workshop to be held December 3-5. Certain of the proposed changes are particularly problematical:

Page 66, lines 50-52:
NOAA, Human Dimensions of Global Change, includes ~~the~~ out following:

- Advancing efforts to foster the development and long-term application of reliable, scientific forecast information in climate-sensitive regions and sectors such as agriculture, water resources, energy, marketing, human health, and transportation infrastructure.

Response: This program item refers basically to applications of ENSO forecasts, an ongoing activity that is already underway but is being advanced. The reference to "long term" application is misleading -- the item is not about long-term climate change projections.

Page 71, lines 1-3, 31-36:
DOE:
BER will also support research to develop and employ information technologies that can quickly and efficiently work with large and distributed data sets of both observations and model predictions to produce quantitative information that may in the long-term prove suitable for the meaningful study of regional climate changes.

....

Ecological Processes: DOE will continue to support large-scale, long-term experimental field manipulations of environmental factors in important North American terrestrial ecosystems. The goal is to understand, and be able to predict, effects of environmental changes ~~—especially multiple changes associated with energy production, such as the rising concentrations of CO_2 and ozone in the atmosphere, climate warming, changes in precipitation, and enhanced atmospheric nitrogen deposition—~~ on the structure and functioning of terrestrial ecosystems.

no

....

In FY 2003, research will emphasize improving integrated assessment models to include other greenhouse gases, as well as carbon dioxide~~,~~ and carbon sequestration, ~~and international trading of greenhouse gas emission permits~~.

no

Response: DOE has developed its program activity and goals through a careful peer-review process involving its Labs and the external research community. Research focused on multiple factors is extremely important since ecosystems in the real world are subject to many interacting forces.

78/29-36, 42-46
EPA:
~~FY 2003 Program Highlights.~~ EPA will continue to make significant contributions to the ongoing assessment activities of the USGCRP. ~~EPA will continue to sponsor regional assessments in the Mid-Atlantic, Great Lakes, and Gulf Coast regions. EPA will also continue to sponsor Human Health assessments. (The assessments will be funded through cooperative agreements with universities located within the region or sector of interest.)~~ The EPA-sponsored assessments will continue to be conducted through public-private partnerships that actively engage researchers from the academic community, decisionmakers, resource managers, and other affected stakeholders in the assessment process.

Response: The proposed deletion would gut the lead paragraph of the agency's self-description of its program. It was already contained in the FY 2003 request and thus needs to be represented here for descriptive accuracy.

Subject: Re: [Fwd: [Fwd: [Fwd: Re: I'm the national environmentalreporter]]]
From: "Jana Goldman" <Jana.Goldman@noaa.gov>
Date: Mon, 13 Jun 2005 11:09:33 -0400
To: Kent Laborde <Kent.Laborde@noaa.gov>

thanx --
my concerns are the same as yours --that she may try to take him into other places, but I know Ram is very good about this. Also, this reporter has not gotten things right before, so I am a little uneasy.

Kent Laborde wrote:

> Here's what we sent. It may be contrary to what your initial reaction was, but if we have CEQ approval to go ahead, then that would be good. If not, then we can refer them to CEQ.
>
> -------- Original Message --------
> **Subject:** [Fwd: [Fwd: Re: I'm the national environmental reporter]]
> **Date:** Mon, 13 Jun 2005 11:06:12 -0400
> **From:** Kent Laborde <Kent.Laborde@noaa.gov>
> **To:** St. Martin, Michele M. <Michele M. St.Martin@ceq.eop.gov>, Jordan St.John <Jordan.St.John@noaa.gov>
>
> Michele,
> I've attached an emial trail from and one of our scientists at the computer modeling lab in Princeton, NJ. Basically, she's looking for a comment on the politicization of climate science. Ramaswamy has appropriately responded that his area of expertise is on science alone and that's what he is most knowledgeable about.
>
> There are a few dangers here. One is that she may fish for the answers she's looking for. The other is that if we do not allow this interview to go forward or if we recommend that a higher official respond, that can be in and of itself considered politicization and would raise red flags with the
>
> I've discussed it here with Jordan St. John and we feel that it would be the best course of action to allow him to conduct the interview since he already knows his boundaries. We would like to get an answer today so that we do not appear to be stalling.
> Kent
> 202-482-5757
>
> -------- Original Message --------
> **Subject:** [Fwd: Re: I'm the national environmental reporter]
> **Date:** Mon, 13 Jun 2005 10:08:24 -0400
> **From:** Jana Goldman <Jana.Goldman@noaa.gov>
> **To:** Kent Laborde <Kent.Laborde@noaa.gov>
>
> -------- Original Message --------
> Subject: Re: I'm the national environmental reporter
> Date: Sat, 11 Jun 2005 14:18:24 -0400 (EDT)
> From: "V. Ramaswamy" <V.Ramaswamy@noaa.gov>
> To: >

Q

Subject: Re: GFDI
From: "Jana Goldman" <Jana.Goldman@noaa.gov>
Date: Mon, 13 Jun 2005 13:05:14 -0400
To: Kent Laborde <Kent.Laborde@noaa.gov>

thanx for this --
jana

Kent Laborde wrote:

> CEQ and OSTP have given the green light for the interview with Ram. They had me call to find out more specifics. She will be asking the following:
> *what research are you doing with climate change
> *what research has been encouraged or discouraged by the administration
> *what interaction has he had with the administration
> *does he have free reign to conduct the research her wants to do
>
> I told that he feels comfortable to comment only on science and does not want to loose his scientific objectivity by addressing policy/potitical questions. She said since he is not a policy maker, she wouldn't ask policy questions.
>
> Michele wants me to monitor the call and report back to her when it's done. I will set up the interview for later today or early tomorrow, depending on her and Ram's schedules.
>
> Points for these questions: It's all covered in the strategic plan, which guides all federally funded scientific research on climate change. The SP coordinates the efforts to maximize the benefits and outcomes of the research -- eliminates redundancies and fills in gaps in research.
>
> While research is "guided" in this way by the administration, the individual scientists have a great deal of input into the specifics of the reseach they conduct and they had a voice in directing the research goals set out in the SP.
>
> Finally, no scientist has completely free regin. In this case, the research is focused on providing decision support tools and eliminating uncertainties in climate science. Whether in academia or corporate settings, science is conducted in a coordinated and constructive manner.

--
Jana Goldman
Public Affairs Officer
NOAA Research

1315 East West Highway
SSMC3 #11460
Silver Spring, MD 20910

301/713-2483
301/713-4020 fax

Jana.Goldman@noaa.gov

R

CEQ
224 AC

Claudia M. Abendroth 04/24/2003 04:36:36

Record Type: Record

To: flynn.mike@epa.gov

cc: Alan Hecht/CEQ/EOP@EOP, Phil Cooney/CEQ/EOP@EOP, Kevin F. Neyland/OMB/EOP@EOP, Christine A. McDonald/OMB/EOP@EOP

Subject: RoE - Global comments

mike,
i am sending you comments from EOP review. please note that the comments reflect careful EOP review and clearance, and that no further changes may be made. in addition, please make sure that the text for the global section of the Executive Summary is consistent with these comments.

RoE global022403.doc

claudia

002145

S

Global Issues

Ozone depletion has global consequences for human health and the environment. Ozone depletion takes place when pollution damages the thin layer of beneficial ozone in the stratosphere, about six to 30 miles above the Earth, which protects living beings from harmful ultraviolet (UV) radiation from the sun.

The issue of global climate change involves changes in the radiative balance of the Earth— the balance between energy received from the sun and emitted from Earth – that may alter weather patterns and climates, at global and regional scales. Among other forces, variations in the sun's output and volcanic activity, and the Earth's natural climate variability and carbon cycle, are natural factors that affect the radiative balance. In addition, certain atmospheric gases, such as CO_2, methane, nitrous oxides (N_2O), water vapor, and other gases, trap some of the outgoing energy, retaining heat. Other substances, such as black carbon (soot), organic carbon, and sulfate aerosols, reflect incoming solar radiation and thus have a cooling effect, or absorb energy and can affect climate on regional and global scales.

Deleted: Climate change has global consequences for human health and the environment.

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Ozone depletion in the stratosphere and climate change are separate environmental issues but are related in some ways. Specifically, some substances that deplete the stratospheric ozone layer also are potent and very long-lived greenhouse gases that absorb outgoing radiation and warm the atmosphere. Ozone itself is a greenhouse gas when it absorbs incoming solar radiation and its depletion in the stratosphere over the polar zones results in localized cooling at times.

Deleted: Combining these two counter-balancing effects of ozone depleting substances (ODS) results in a small net effect on the global mean

Deleted: temperature

Deleted: climate, but regional patterns may be altered.

Inserted: climate

What is happening to the Earth's ozone layer?

In recent decades, the Earth's stratospheric ozone layer has become substantially thinner. The thinning has occurred principally over Antarctica and is referred to as the "ozone hole." The ozone layer over the Northern Hemisphere's middle latitudes is about two percent below normal during summer and autumn and about four percent below normal in winter and spring.[1] Between 1979 and 1994, the ozone layer thinned 8 percent over Seattle, 10 percent over Los Angeles, and 2 percent over Miami.[2]

Scientists generally agree that a thinning of the stratospheric ozone layer causes an increase in the amount of UV radiation. While acknowledging high uncertainty in the data, scientists have calculated that UV radiation levels at more than 10 sites in both hemispheres have increased by six percent to 14 percent since the 1980s.[3] EPA, in partnership with the National Weather Service, publishes an index that predicts UV intensity levels for different cities on a scale of 0 to 10+, where 0 indicates a minimal risk of overexposure and 10+ means a very high risk.

What is causing changes to the ozone layer?

Stratospheric ozone depletion is associated with the use of chlorofluorocarbons (CFCs), halons used to extinguish fires, and other chemicals used as solvents. Air conditioners, refrigerators, insulating foams, and some industrial processes all emit those substances. Air currents carry molecules with chlorine and bromine from those pollutants into the stratosphere, where they react to destroy ozone molecules.

The United States virtually ceased production of most ozone-depleting substances in January 1996, because of its participation in an international agreement, the Montreal Protocol on Substances that

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Deplete the Ozone Layer. Nonetheless, ozone-depleting substances are still being released into the environment, as reported in the Toxics Release Inventory. Along with other developed countries, the U.S. makes substitutes for the strong ozone depleting CFCs. These substitutes are themselves less ozone-depleting than the substances they replace. Also, because the Montreal Protocol controls production but not use, emissions continue from materials made before January 1996. Even though scientists believe that recovery is under way, full restoration of the stratospheric ozone layer will take decades because of the continued use of products manufactured before the ban.

What are the human health and ecological effects of stratospheric ozone depletion?

Thinning of the stratospheric ozone layer allows more of the sun's UV radiation to reach Earth, where it contributes to increased incidences of human skin cancers, the most common of all cancers. Cataracts and suppression of the human immune system may also result from increased exposure to UV radiation. In addition, productivity of some marine phytoplankton, essential to the ocean's food chain, may be unduly stressed by high levels of UV radiation.[4]

Is the Earth's climate changing?

The Earth's climate has changed dramatically throughout history and will continue to change due to natural variability. The global mean surface temperature of the Earth has increased by about 1° Fahrenheit (° F) since the late 19th century (Exhibit 1-7).[5] The years between 1990 and 2001 include the eight warmest since systematic measurement of ground-level temperatures by instruments began about 120 years ago[6], a time when the earth's climate began recovering from the Little Ice Age (from about 1400 to as late as 1900 in some regions. Yet the National Research Council (NRC) also recently observed that the Northern Hemisphere as a whole experienced a slight cooling from 1946 – 1975, and the cooling during that period was quite marked over the eastern United States. [add footnote here: Climate Change Science: An Analysis of Some Key Questions, 2001. National Research Council, National Academy Press, Washington DC, p.16]. Scientists have been able to extend the understanding of climate change beyond this century by examining "proxy" data. Proxy data include natural archives of climate information such as tree rings, ice cores, corals, and sediments. In addition, historical documents such as ships' and farmers' logs, travelers' diaries, and newspaper accounts can provide insights into past weather and climate conditions. Proxy temperature reconstructions are more uncertain than direct instrumental measurements, but they suggest that the recent warming may be unusual.[7] Regarding the long-term proxy analyses, the NRC stated, "The data become relatively sparse prior to 1600, and are subject to uncertainties related to spatial completeness and interpretation making the results somewhat equivocal, e.g., less than 90% confidence."[8] [see additional citation in footnote to recent Soon/Baliunas paper].

Despite the measured warming at the earth's surface during the past few decades, satellite measurements beginning in 1979 indicate relatively little warming of air temperatures in the troposphere (the atmospheric layer extending from the earth's surface up to about 8 km). (Exhibit 1-X) The finding that surface and troposphere temperature trends have been as different as observed over intervals as long as a decade or two is difficult to reconcile with the current understanding of the processes that control the vertical distribution of temperature in the atmosphere. However, the disparity between surface and upper atmosphere trends in no way invalidates either of the data sets.

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Deleted: and that the 1990s are likely to have been the warmest decade in the past 1,000 years for the Northern Hemisphere (Exhibit 1-8).

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Deleted: has been quite pronounced

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Deleted: the conclusion that surface temperature has been rising

Deleted: The troposphere actually may have warmed much less rapidly than the surface from 1979 to the late 1990s, due both to natural causes (e.g., the sequence of volcanic eruptions that occurred within this particular 20-year period) and human activities (e.g., the cooling in the upper troposphere resulting from ozone depletion in the stratosphere).

Exhibit 1-7: Annual anomalies of combined land-surface air and sea-surface temperatures (°C), 1861-2001, relative to 1961-1990.

Exhibit 1-X: MSU Lower Tropospheric Temperature Anomalies

Deleted: *Exhibit 1-8: Reconstructions of average surface temperature of the Northern Hemisphere for the past 1,000 years, including 95 percent confidence range in the data*

But global averages mask great regional variations: some parts of the world are changing more, some less. Many areas of the U.S. have warmed by more than 1°F, whereas the Southeast has cooled somewhat during the past century.[9] In some regions, particularly the Northeast, the Southwest, and the upper Midwest, the warming has been greater.[10] The increase in some places, such as the northern Great Plains, has reached as much as 3 °F.[11] During the 20th century, average U.S. temperatures dropped below freezing two fewer days per year than they did in the 19th century.[12] And observations indicate that total annual precipitation is increasing around the country. For the conterminous United States, the increase in precipitation during the 20th century is estimated to be five percent to 10 percent.[13] Recent analyses suggest that heavier precipitation and more days of rain account for much of the precipitation increase.[14] Although the United States has a well-developed climate monitoring system, the nation will need to combine the data into meaningful and comprehensive indicators of climate change.

What are the contributors to climate change?

The U.S. National Research Council (NRC) concluded that "Because of the large and still uncertain level of natural variability inherent in the climate record and the uncertainties in the time histories of the various forcing agents (and particularly aerosols), a casual linkage between the buildup of greenhouse gases in the atmosphere and the observed climate changes during the 20th century cannot be unequivocally established. The fact that the magnitude of the observed warming is large in comparison to natural variability as simulated in climate models is suggestive of such a linkage, but it does not constitute proof of one because the model simulations could be deficient in natural variability on the decadal to century time scales"The best-understood greenhouse gases are water vapor, carbon dioxide, methane, nitrous oxide, and certain fluorinated compounds. Several additional emissions indirectly affect the Earth's radiative balance, though, including CO, NO_x, and nonmethane VOCs, and substances that deplete the stratospheric ozone layer. Aerosols, which are extremely small particles or liquid droplets, such as those produced by emissions of SO_2 or elemental carbon, can also strongly affect the absorption of radiation in the atmosphere.

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Deleted: "The changes observed over the last decade are likely mostly due to human activities, but we cannot rule out that some significant part of these changes is also the reflection of natural variability." The NRC also stated: "A causal linkage between the buildup of greenhouse gases in the atmosphere and the observed climate change during the 20th century cannot be unequivocally established. However, the magnitude of the observed warming is large in comparison to natural variability as simulated in climate models and is suggestive of such a linkage."

Deleted: The NRC concluded that "Greenhouse gases are accumulating in the atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise."[15] T

Carbon dioxide accounted for 84 percent of the nation's anthropogenic greenhouse gas emissions in 2000.[16] It results primarily from the combustion of fossil fuels used to heat and cool homes and offices, produce electricity and power motor vehicles, and from a few industrial processes.[17] Forestry and other land use activities in the U.S. remove more carbon from the atmosphere than they emit, resulting in net carbon storage, called "sequestration." Methane released by landfills, coal mines, oil and gas systems, and agricultural activities accounted for nine percent of the total U.S. greenhouse gas emissions in 2000.[18] Nitrous oxide is emitted during agricultural and industrial activities, and during combustion of solid waste and fossil fuels. In 2000, it accounted for six percent of the national greenhouse gas emissions.[19]

Anthropogenic emissions of greenhouse gases are linked to economic activity and population (Exhibit 1-9). Commensurate with the economic expansion of the 1990s, greenhouse gas emissions in the U.S.

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increased at an average annual rate of 1.3 percent between 1990 and 2000.[20] However, U.S. greenhouse gases emitted per dollar of gross domestic product—or greenhouse gas intensity—decreased significantly during this period.[21]

Exhibit 1-9: U.S. greenhouse gas emissions, emissions per capita, and emissions per dollar of gross domestic product, 1990-2000

Over the past 150 years, CO_2 concentrations have increased by 31 percent, methane by about 150 percent, and N_2O by 16 percent (Exhibit 1-10).[22] Based on analysis of ice core data, today's CO_2 concentration is the greatest in 420,000 years—and likely in 20 million years.[23] However, based on proxy data, temperatures appear to have been warmer as recently as the Medieval Warm Period, from 800 to 1300 C.E.[1] From 1990 to 1999, CO2, methane, and N2O concentrations increased by 1.5 parts per million per year, 7.0 parts per billion per year, and 0.8 parts per billion per year respectively.

Exhibit 1-10: Climate change indicators for carbon dioxide, methane, and nitrous oxide

Limitations of Air Indicators

Many sources of data support indicators that help to answer questions about the trends in outdoor and indoor air quality, stratospheric ozone, and climate change. But there are limitations in using the indicators to fully answer the questions.

Global Issues

The uncertainties associated with climate change underscore the need to measure over time emissions of greenhouse gases and other relevant factors, and resulting atmospheric concentrations. Further research needs to be undertaken to distinguish natural variability from a potential human influence on climate. More refined measures are needed of emissions by different human and natural processes. Monitoring data will also help identify changes in emissions and land cover, and removals of carbon from the atmosphere by natural or engineered processes. Although there are partial monitoring and observation networks for some greenhouse gas concentrations and climate indicators, they should be better and have a larger scope.

Better knowledge will require many kinds of research. To be useful, climate measurements require long, consistent time series with wide geographic coverage—not only from land and sea, but also from remote-sensing satellites. Better understanding of the biogeochemical processes—cycling of chemicals between the living and nonliving parts of an ecosystem—that determine greenhouse gas concentrations is also needed. Continued improvement in complex computer models of climate systems will also assist in understanding what is happening to the Earth's climate. Using observed data to improve models will help scientists understand and one day potentially predict the sensitivity of the climate system, its potential positive and negative effects on human well-being, and ecological condition, and possible adaptive responses to manage any effects.

[1] Soon, W and Baliunas, S, Harvard-Smithsonian Center for Astrophysics 2003. Proxy climate and environmental changes of the past 1000 years.

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Comment: Outdoor and Indoor Air sections appear out-of-place, so we have deleted.

Deleted: Outdoor Air¶
In general, there are some very good measures of outdoor air quality. Although the national air monitoring network for the six criteria air pollutants is extensive, there are far more monitors in urban areas than in rural areas. That helps to characterize population exposures, because population tends to be concentrated in developed areas, but it may make it more difficult to assess effects associated with the transport of air pollutants and ecological effects. Recently, EPA and states have begun evaluating and planning a nationwide monitoring network for air toxics. Emissions quantities for both the criteria pollutants and air toxics are based on engineering estimates derived from more limited actual data. There is a need for measures to compare actual and predicted human health and ecological effects related to exposure to air pollutants. ¶
Indoor Air¶
Although environmental indicators have been developed for some aspects of indoor air, significant gaps exist in knowledge about the conditions inside the nation's buildings. For schools and residences, a large amount of information on indoor air quality is available, but it comprises primarily case studies and small, at best, regional studies. More comprehensive data from national exposure studies for schools and residential indoor environments, including multiple-family residences, would be helpful in understanding the condition of indoor air environments. Ideally, such studies would collect exposure data on air toxics and particulate matter in those indoor environments, as well as data for molds and other biological contaminants found in indoor air. ¶

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[1] Scientific Assessment Panel of the Montreal Protocol on Substances that Deplete the Ozone Layer. *Scientific Assessment of Ozone Depletion: 2002, Executive Summary*, Report No. 47. Geneva, Switzerland: World Meteorological Organization, Global Ozone Research and Monitoring Project, 2003.
[2] National Aeronautics and Space Administration. Total Ozone Mapping Spectrometer (TOMS), flown on Nimbus-7 satellite. January 24, 2003: http://www.epa.gov/ozone/science/glob_dep.html
[3] Ibid.
[4] DeMora, S., S. Demers, and M. Vernet. *The Effects of UV Radiation in the Marine Environment*, Cambridge, UK: Cambridge University Press, 2000.
[5] Intergovernmental Panel on Climate Change. *Climate Change 2001: The Scientific Basis. A Contribution of Working Group I to the Third Assessment Report of the IPCC*, Cambridge, UK and New York, NY: Cambridge University Press, 2001.
[6] Waple AM, JH Lawrimore, MS Halpert, et al. Climate Assessment for 2001. American Meteorological Society, 2002. Can be found at http://lwf.ncdc.noaa.gov/oa/climate/research/2001/ann/annsum.pdf

[8] Climate Change Science: An Analysis of Some Key Questions. 2001. National Research Council. National Academy Press, Washington DC. See also: Soon, W and Baliunas, S, Harvard-Smithsonian Center for Astrophysics 2003. Proxy climate and environmental changes of the past 1000 years.

Deleted: [7] Mann, M.E., R.S. Bradley, and M.K. Hughes. Northern hemisphere temperatures during the past millennium: inferences, uncertainties, and limitations. *Geophysical Research Letters* 26 (6): 759-762 (1999).

[9] Karl, TR, Knight RW, Easterling DR, Quayle RG. 1996. Indices of climate change for the United States. *Bulletin of the American Meteorological Society*, 77(2): 279-292.
[10] Ibid.
[11] Ibid.
[12] Easterling DR. 2002. Recent changes in frost days and the frost-free season in the United States. *Bulletin of the American Meteorological Society*, Sept: 1327-32.
[13] Karl TR, Knight RW. 1998. Secular trends of precipitation amount, frequency, and intensity in the *United States. Bulletin of the American Meteorological Society*, 79(2): 231-241.
[14] Ibid.
[15] IPCC. *Climate Change 2001: The Scientific Basis*, 2001. op. cit
[17] U.S. Environmental Protection Agency. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000*, EPA 430-R-02-003. Washington, DC: U.S. Environmental Protection Agency, Office of Atmospheric Programs, April 2002.
[18] Ibid.
[19] Ibid.
[20] Ibid.
[21] Ibid.
[22] IPCC. *Climate Change 2001: The Scientific Basis*, 2001. op. cit.
[23] IPCC. *Climate Change 2001: Synthesis Report*, 2001. op. cit.

Joe Walker

To: Global Climate Science Team
Cc: Michelle Ross; Susan Moya
Subject: Draft Global Climate Science Communications Plan

As promised, attached is the draft Global Climate Science Communications Plan that we developed during our workshop last Friday. Thanks especially to those of you who participated in the workshop, and in particular to . Adams for his very helpful thoughts following up our meeting, and Alan Caudill for turning around the notes fro workshop so quickly.

Please review the plan and get back to me with your comments as soon as possible.

As those of you who were at the workshop know, we have scheduled a follow-up team meeting to review the pl person on Friday, April 17, from 1 to 3 p.m. at the API headquarters. After that, we hope to have a "plan cham help us move it forward to potential funding sources, perhaps starting with the global climate "Coordinating Co That will be an item for discussion on April 17.

Again, thanks for your hard work on this project. Please e-mail, call or fax me with your comments. Thanks.

Regards,
Joe Walker

T

April 3, 1998

Global Climate Science Communications

Action Plan

Situation Analysis

In December 1997, the Clinton Administration agreed in Kyoto, Japan, to a treaty to reduce greenhouse gas emissions to prevent what it purports to be changes in the global climate caused by the continuing release of such emissions. The so-called greenhouse gases have many sources. For example, water vapor is a greenhouse gas. But the Clinton Administration's action, if eventually approved by the U.S. Senate, will mainly affect emissions from fossil fuel (gasoline, coal, natural gas, etc.) combustion.

As the climate change debate has evolved, those who oppose action have argued mainly that signing such a treaty will place the U.S. at a competitive disadvantage with most other nations, and will be extremely expensive to implement. Much of the cost will be borne by American consumers who will pay higher prices for most energy and transportation.

The climate change theory being advanced by the treaty supporters is based primarily on forecasting models with a very high degree of uncertainty. In fact, it not known for sure whether (a) climate change actually is occurring, or (b) if it is, whether humans really have any influence on it.

Despite these weaknesses in scientific understanding, those who oppose the treaty have done little to build a case against precipitous action on climate change based on the scientific uncertainty. As a result, the Clinton Administration and environmental groups essentially have had the field to themselves. They have conducted an effective public relations program to convince the American public that the climate is changing, we humans are at fault, and we must do something about it before calamity strikes.

The environmental groups know they have been successful. Commenting after the Kyoto negotiations about recent media coverage of climate change, Tom Wathen, executive vice president of the National Environmental Trust, wrote:

"...As important as the extent of the coverage was the tone and tenor of it. In a change from just six months ago, most media stories no longer presented global warming as just a theory over which reasonable scientists could differ. Most stories described predictions of global warming as the position of the overwhelming number of mainstream scientists. That the environmental community had, to a great extent, settled the scientific issue with the U.S. media is the other great success that began perhaps several months earlier but became apparent during Kyoto."

Because the science underpinning the global climate change theory has not been challenged effectively in the media or through other vehicles reaching the American public, there is widespread ignorance, which works in favor of the Kyoto treaty and against the best interests of the United States. Indeed, the public has been highly receptive to the Clinton Administration's plans. There has been little, if any, public resistance or pressure applied to Congress to reject the treaty, except by those "inside the Beltway" with vested interests.

Moreover, from the political viewpoint, it is difficult for the United States to oppose the treaty solely on economic grounds, valid as the economic issues are. It makes it too easy for others to portray the United States as putting preservation of its own lifestyle above the greater concerns of mankind. This argument, in turn, forces our negotiators to make concessions that have not been well thought through, and in the end may do far more harm than good. This is the process that unfolded at Kyoto, and is very likely to be repeated in Buenos Aires in November 1998.

The advocates of global warming have been successful on the basis of skillfully misrepresenting the science and the extent of agreement on the science, while industry and its partners ceded the science and fought on the economic issues. Yet if we can show that science does not support the Kyoto treaty — which most true climate scientists believe to be the case — this puts the United States in a stronger moral position and frees its negotiators from the need to make concessions as a defense against perceived selfish economic concerns.

Upon this tableau, the Global Climate Science Communications Team (GCSCT) developed an action plan to inform the American public that science does not support the precipitous actions Kyoto would dictate, thereby providing a climate for the right policy decisions to be made. The team considered results from a new public opinion survey in developing the plan.

Charlton Research's survey of 1,100 "informed Americans" suggests that while Americans currently perceive climate change to be a great threat, public opinion is open to change on climate science. When informed that "some scientists believe there is not enough evidence to suggest that [what is called global climate change] is a long-term change due to human behavior and activities," 58 percent of those surveyed said they were more likely to oppose the Kyoto treaty. Moreover, half the respondents harbored doubts about climate science.

GCSCT members who contributed to the development of the plan are A. John Adams, John Adams Associates; Candace Crandall, Science and Environmental Policy Project; David Rothbard, Committee For A Constructive Tomorrow; Jeffrey Salmon, The Marshall Institute; Lee Garrigan, Environmental Issues Council; Lynn Bouchey and Myron Ebell, Frontiers of Freedom; Peter Cleary, Americans for Tax Reform; Randy Randol, Exxon Corp.; Robert Gehri, The Southern Company; Sharon Kneiss, Chevron Corp; Steve Milloy, The Advancement of Sound Science Coalition; and Joseph Walker, American Petroleum Institute.

The action plan is detailed on the following pages.

Global Climate Science Communications

Action Plan

Project Goal

A majority of the American public, including industry leadership, recognizes that significant uncertainties exist in climate science, and therefore raises questions among those (e.g. Congress) who chart the future U.S. course on global climate change.

Progress will be measured toward the goal. A measurement of the public's perspective on climate science will be taken before the plan is launched, and the same measurement will be taken at one or more as-yet-to-be-determined intervals as the plan is implemented.

Victory Will Be Achieved When

- Average citizens "understand" (recognize) uncertainties in climate science; recognition of uncertainties becomes part of the "conventional wisdom"
- Media "understands" (recognizes) uncertainties in climate science
- Media coverage reflects balance on climate science and recognition of the validity of viewpoints that challenge the current "conventional wisdom"
- Industry senior leadership understands uncertainties in climate science, making them stronger ambassadors to those who shape climate policy
- Those promoting the Kyoto treaty on the basis of extant science appear to be out of touch with reality.

Current Reality

Unless "climate change" becomes a non-issue, meaning that the Kyoto proposal is defeated and there are no further initiatives to thwart the threat of climate change, there may be no moment when we can declare victory for our efforts. It will be necessary to establish measurements for the science effort to track progress toward achieving the goal and strategic success.

Strategies and Tactics

I. **National Media Relations Program: Develop and implement a national media relations program to inform the media about uncertainties in climate science; to generate national, regional and local media coverage on the scientific uncertainties, and thereby educate and inform the public, stimulating them to raise questions with policy makers.**

Tactics: These tactics will be undertaken between now and the next climate meeting in Buenos Aires, Argentina, in November 1998, and will be continued thereafter, as appropriate. Activities will be launched as soon as the plan is approved, funding obtained, and the necessary resources (e.g., public relations counsel) arranged and deployed. In all cases, tactical implementation will be fully integrated with other elements of this action plan, most especially Strategy II (National Climate Science Data Center).

- Identify, recruit and train a team of five independent scientists to participate in media outreach. These will be individuals who do not have a long history of visibility and/or participation in the climate change debate. Rather, this team will consist of new faces who will add their voices to those recognized scientists who already are vocal.

- Develop a global climate science information kit for media including peer-reviewed papers that undercut the "conventional wisdom" on climate science. This kit also will include understandable communications, including simple fact sheets that present scientific uncertainties in language that the media and public can understand.

- Conduct briefings by media-trained scientists for science writers in the top 20 media markets, using the information kits. Distribute the information kits to daily newspapers nationwide with offer of scientists to brief reporters at each paper. Develop, disseminate radio news releases featuring scientists nationwide, and offer scientists to appear on radio talk shows across the country.

- Produce, distribute a steady stream of climate science information via facsimile and e-mail to science writers around the country.

- Produce, distribute via syndicate and directly to newspapers nationwide a steady stream of op-ed columns and letters to the editor authored by scientists.

- Convince one of the major news national TV journalists (e.g., John Stossel) to produce a report examining the scientific underpinnings of the Kyoto treaty.

- Organize, promote and conduct through grassroots organizations a series of campus/community workshops/debates on climate science in 10 most important states during the period mid-August through October, 1998.

- Consider advertising the scientific uncertainties in select markets to support national, regional and local (e.g., workshops/debates), as appropriate.

National Media Program Budget — $600,000 plus paid advertising

II. Global Climate Science Information Source: Develop and implement a program to inject credible science and scientific accountability into the global climate debate, thereby raising questions about and undercutting the "prevailing scientific wisdom." The strategy will have the added benefit of providing a platform for credible, constructive criticism of the opposition's position on the science.

Tactics: As with the National Media Relations Program, these activities will be undertaken between now and the next climate meeting in Buenos Aires, Argentina, in November 1998, and will continue thereafter. Initiatives will be launched as soon as the plan is approved, funding obtained, and the necessary resources arranged and deployed.

- Establish a Global Climate Science Data Center. The GCSDC will be established in Washington as a non-profit educational foundation with an advisory board of respected climate scientists. It will be staffed initially with professionals on loan from various companies and associations with a major interest in the climate issue. These executives will bring with them knowledge and experience in the following areas:
  - Overall history of climate research and the IPCC process;
  - Congressional relations and knowledge of where individual Senators stand on the climate issue;
  - Knowledge of key climate scientists and where they stand;
  - Ability to identify and recruit as many as 20 respected climate scientists to serve on the science advisory board;
  - Knowledge and expertise in media relations and with established relationships with science and energy writers, columnists and editorial writers;
  - Expertise in grassroots organization; and
  - Campaign organization and administration.

  The GCSDC will be led by a dynamic senior executive with a major personal commitment to the goals of the campaign and easy access to business leaders at the CEO level. The Center will be run on a day-to-day basis by an executive director with responsibility for ensuring targets are met. The Center will be funded at a level that will permit it to succeed, including funding for research contracts that may be deemed appropriate to fill gaps in climate science (e.g., a complete scientific critique of the IPCC research and its conclusions).

- The GCSDC will become a one-stop resource on climate science for members of Congress, the media, industry and all others concerned. It will be in constant contact with the best climate scientists and ensure that their findings and views receive appropriate attention. It will provide them with the logistical and moral support they have been lacking. In short, it will be a sound scientific alternative to the IPCC. Its functions will include:
  - Providing as an easily accessible database (including a website) of all mainstream climate science information.
  - Identifying and establishing cooperative relationships with all major scientists whose research in this field supports our position.
  - Establishing cooperative relationships with other mainstream scientific organizations (e.g., meteorologists, geophysicists) to bring their perspectives to bear on the debate, as appropriate.
  - Developing opportunities to maximize the impact of scientific views consistent with ours with Congress, the media and other key audiences.
  - Monitoring and serving as and early warning system for scientific developments with the potential to impact on the climate science debate, pro and con.
  - Responding to claims from the scientific alarmists and media.
  - Providing grants for advocacy on climate science, as deemed appropriate.

Global Climate Science Data Center Budget — $5,000,000 (spread over two years minimum)

III. National Direct Outreach and Education: Develop and implement a direct outreach program to inform and educate members of Congress, state officials, industry leadership, and school teachers/students about uncertainties in climate science. This strategy will enable Congress, state officials and industry leaders will be able to raise such serious questions about the Kyoto treaty's scientific underpinnings that American policy-makers not only will refuse to endorse it, they will seek to prevent progress toward implementation at the Buenos Aires meeting in November or through other ways. Informing teachers/students about uncertainties in climate science will begin to erect a barrier against further efforts to impose Kyoto-like measures in the future.

Tactics: Informing and educating members of Congress, state officials and industry leaders will be undertaken as soon as the plan is approved, funding is obtained, and the necessary resources are arrayed and will continue through Buenos Aires and for the foreseeable future. The teachers/students outreach program will be developed and launched in early 1999. In all cases, tactical implementation will be fully integrated with other elements of this action plan.

- Develop and conduct through the Global Climate Science Data Center science briefings for Congress, governors, state legislators, and industry leaders by August 1998.

- Develop information kits on climate science targeted specifically at the needs of government officials and industry leaders, to be used in conjunction with and separately from the in-person briefings to further disseminate information on

See attached
USA Today article

- Organize under the GCSDC a "Science Education Task Group" that will serve as the point of outreach to the National Science Teachers Association (NSTA) and other influential science education organizations. Work with NSTA to develop school materials that present a credible, balanced picture of climate science for use in classrooms nationwide.

- Distribute educational materials directly to schools and through grassroots organizations of climate science partners (companies, organizations that participate in this effort).

National Direct Outreach Program Budget — $300,000

IV. Funding/Fund Allocation: Develop and implement program to obtain funding, and to allocate funds to ensure that the program it is carried out effectively.

Tactics: This strategy will be implemented as soon as we have the go-ahead to proceed.

- Potential funding sources were identified as American Petroleum Institute (API) and its members; Business Round Table (BRT) and its members, Edison Electric Institute (EEI) and its members; Independent Petroleum Association of America (IPAA) and its members; and the National Mining Association (NMA) and its members.

More inter-relatedness

- Potential fund allocators were identified as the American Legislative Exchange Council (ALEC), Committee For A Constructive Tomorrow (CFACT), Competitive Enterprise Institute, Frontiers of Freedom and The Marshall Institute.

Total Funds Required to Implement Program through November 1998 — $2,000,000 (A significant portion of funding for the GCSDC will be deferred until 1999 and beyond)

Measurements

Various metrics will be used to track progress. These measurements will have to be determined in fleshing out the action plan and may include:

- Baseline public/government official opinion surveys and periodic follow-up surveys on the percentage of Americans and government officials who recognize significant uncertainties in climate science.

- Tracking the percent of media articles that raise questions about climate science.

- Number of Members of Congress exposed to our materials on climate science.

- Number of communications on climate science received by Members of Congress from their constituents.

- [redacted]

- Number of science writers briefed and who report upon climate science uncertainties.

- Total audience exposed to newspaper, radio, television coverage of science uncertainties.