United States Environmental Protection Agency

EPA's Response to the Petitions to Reconsider the Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act

Volume 2: Issues Raised by Petitioners on EPA's Use of IPCC

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Office of Atmospheric Programs
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ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
AIRS	Atmospheric Infrared Sounder
AMS	American Meteorological Society
AOGCM	Atmosphere-Ocean General Circulation Models
AR4	IPCC Fourth Assessment Report
BOM	Australian Bureau of Meteorology
CH_4	methane
cm	centimeter
CCSP	U.S. Climate Change Science Program
CDIAC	Carbon Dioxide Information Analysis Center
CMIP	Coupled Model Intercomparison Project
CO_2	carbon dioxide
CRU	Climatic Research Unit
EPA	U.S. Environmental Protection Agency
FOIA	Freedom of Information Act
GHCN	Global Historical Climatology Network
GHG	greenhouse gases
GISS	Goddard Institute for Space Studies (NASA)
GSL	Global Snow Laboratory (Rutgers University)
IAC	InterAcademy Council
IEA	Institute of Economic Analysis
IISD	International Institute for Sustainable Development
IJC	International Journal of Climatology
IPCC	Intergovernmental Panel on Climate Change
IQA	Information Quality Act
LIA	Little Ice Age
MET	United Kingdom Meteorological Office
MWP	Medieval Warm Period
NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research
NCDC	National Climatic Data Center
NIWA	National Institute of Water & Atmospheric Research
NMS	National Meteorological Station
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
NSIDC	U.S. National and Snow and Ice Data Center
ORNL	Oak Ridge National Laboratory
PBL	Netherlands Environmental Assessment Agency
RMS	Risk Management Solutions
RTC	Response to Comments
RTP	Response to Petitions
SAB	Scientific Advisory Board
SALR	saturated adiabatic lapse rate
TSD	Technical Support Document

UAH	University of Alabama–Huntsville
UCAR	University Corporation for Atmospheric Research
UHI	urban heat island
UK	United Kingdom
USGCRP	U.S. Global Change Research Program
USHCN	United States Historical Climatology Network
W/m^2	watts per meter squared
WMO	World Meteorological Organization
WWR	World Weather Reports

2.0 Issues Raised by Petitioners on EPA's Use of IPCC

2.1 Claims That IPCC Errors Undermine IPCC Findings and Technical Support for Endangerment

2.1.1 Overview

Several petitioners (Peabody Energy, the State of Texas, the Coalition for Responsible Regulation, the Competitive Enterprise Institute, the Ohio Coal Association, and the Southeastern Legal Foundation) contend that alleged errors and/or unsupported findings in IPCC reports demonstrate that the science on which the Administrator relied for the Endangerment Finding is uncertain and/or not credible. We have examined each specific instance of error, alleged error, and/or alleged unsupported statement in the voluminous IPCC report and we find that the evidence cited by petitioners does not support this conclusion.

In reviewing the information provided by petitioners, EPA has determined that most—if not all—of the alleged errors and/or unsupported statements highlighted by petitioners are not relevant, not truly erroneous or unsupported, and/or inconsequential to the Administrator's Finding. In many cases, the petitioners' interpretation of both the alleged error (or alleged unsupported statement) and its implications is not supported by the evidence provided. Clearly, the charge that there are or might be errors or unsupported statements in the IPCC's Fourth Assessment Report (AR4) is serious, and we agree with petitioners that such claims merit thorough review. EPA has done such a review; we find that the documented errors in the AR4 are not significant, and do not call into question the fundamental and broad evidence on which the Endangerment Finding rests. Moreover, the occurrence of the few documented errors in a study the size of the IPCC report is not unexpected and does not call into question the credibility of the entire report and all of its findings.

The Netherlands Environmental Assessment Agency (PBL) conducted its own independent assessment of the regional chapters (9 through 16) in Working Group II's contribution to the AR4, where many of the errors, alleged errors, and/or alleged unsupported statements have been identified. The report *Assessing an IPCC Assessment* (PBL, 2010a) finds "no significant errors" in summary conclusions, though it notes that "provenance of summary statements needs to become more transparent in future reports."

PBL (2010a) also states that "examples of negative impacts dominate at summary level," indicating that the IPCC selected a "risk-oriented" approach in communicating to policymakers. The report states:

> The PBL subscribes to the importance of an approach that highlights what may go wrong under unmitigated climate change, but Working Group II Report lacked a clear explanation of the choice of approach and its consequences. Alternatively, it could be argued that policymakers should be presented with a complete picture in the Summary for Policymakers, not just with negative examples (without suggesting that potential positive effects cancel out potential effects).

While we cited the IPCC Working Group II Summary for Policymakers in the Endangerment Technical Support Document (TSD), we relied most heavily on information from the full chapters in the Working Group II report, specifically Chapter 14 on North America, as well as other assessment literature such as the U.S. Global Change Research Program (USGCRP) assessment *Global Climate Change Impacts in the United States* (Karl et al., 2009). The Administrator considered both the positive and negative effects of climate change, as the Endangerment Finding states (Section I.A.):

> The Administrator is using her judgment, based on existing science, to weigh the threat for each of the identifiable risks, to weigh the potential benefits where relevant, and ultimately to assess whether these risks and effects, when viewed in total, endanger public health or welfare.

In addition, the Administrator found endangerment based on impacts in the United States alone, with international impacts providing some supporting information, as the Endangerment Finding states (Section III.D):

> EPA is not considering international effects to determine whether the health and welfare of the public in a foreign country is endangered. Instead, EPA's consideration of international effects for purposes of determining endangerment is limited to how those international effects impact the health and welfare of the U.S. population.
>
> The Administrator looked first at impacts in the United States itself, and determined that these impacts are reasonably anticipated to endanger the public health and the welfare of the U.S. population. That remains the Administrator's position, and by itself supports her determination of endangerment.

Despite its few criticisms of the IPCC, PBL (2010a) concludes:

> Our findings do not contradict the main conclusions of the IPCC on impacts, adaptation and vulnerability related to climate change. There is ample observation evidence of natural systems being influenced by climate change on regional levels. The negative impacts under unmitigated climate change pose substantial risks to most parts of the world, with risks increasing at higher global average temperatures.

This conclusion is very consistent with the conclusion the Administrator reached in the Endangerment Finding, after weighing the balance of evidence.

This section responds to the major arguments of the petitioners on the significance of alleged errors and/or unsupported statements in the IPCC reports, and assesses the implications of these errors and/or unsupported statements for the credibility and reliability of the major findings and conclusions of the IPCC and other assessment literature.

2.1.2 Accuracy of Statement on Percent of the Netherlands Below Sea Level

Comment (2-1):
Peabody Energy and the State of Texas contend that the IPCC erroneously stated (in Working Group II's contribution to the AR4) that 55% of the Netherlands is below sea level, whereas the actual number is much lower according to Dutch materials (26%).

Response (2-1):
The statistic quoted in the IPCC AR4 is inaccurate. When this error was identified, PBL (2010b) published a correction:

> In the 2007 IPCC report by the Working Group 2 (Climate change 2007: Impacts, Adaptation and Vulnerability) a mistake has entered the text that was supplied by the Netherlands Environmental Assessment Agency, regarding the risks of flooding for the Netherlands. In the chapter on Europe, on page 547, it says that 55 per cent of the Netherlands is below sea level ('The Netherlands is an example of a country highly susceptible to both sea level rise and river flooding because 55% of its territory is below sea level'). This should have read that 55 per cent of the Netherlands is at risk of flooding; 26 per cent of the country is below sea level, and 29 per cent is susceptible to river flooding. Examples of the latter are the near floodings, in the mid-1990s, of areas along the rivers Meuse and Waal – areas that are well above sea level.

The IPCC agrees that this statistic is incorrect in the AR4, and also notes that the same mistake was made by other reputable groups (Reuters, 2010). For example, the IPCC—in a written statement provided to Reuters—indicated that a report from the Dutch Ministry of Transport had stated "'about 60%' of the country is below sea level," and referred to a European Commission study saying "about half" (Reuters, 2010). As noted by the IPCC statement, the error was not made by authors of the AR4, but originated with PBL, which supplied the text. To correct the mistake, the IPCC published an official erratum (IPCC, 2010d):

> 2) Page 547. Section 12.2.3. Line 20: Delete "below sea level" and replace with "at risk flooding".

The IPCC was further quoted as saying (Reuters, 2010): "The sea level statistic was used for background information only, and the updated information remains consistent with the overall conclusions."

In its independent report *Assessing an IPCC Assessment* (PBL, 2010a), PBL, which was responsible for the error, states:

> We acknowledge that this error was not the fault of the IPCC (Coordinating) Lead Authors or Co-Chairs. The error was made by a Contributing Author from the PBL, and the (Coordinating) Lead Authors [of the IPCC] are not to blame for relying on Dutch information provided by a Dutch agency.

EPA concludes that this error is minor and inconsequential to the Administrator's Endangerment Finding. EPA does not refer to or rely on this statistic in the Endangerment Finding or supporting documents, and this information does not pertain to endangerment of public health and welfare in the United States in any meaningful way. It does not call into question the integrity of the IPCC, and it has no impact on the scientific support for EPA's Endangerment Finding. Furthermore, as the error pertains to a statistic outside the United States, it is not relevant to the Endangerment Finding. As noted in Subsection 2.1.1, the Endangerment Finding states (Section III.D): "The Administrator looked first at impacts in the United States itself, and determined that these impacts are reasonably anticipated to endanger the public health and the welfare of the U.S. population. That remains the Administrator's position, and by itself supports her determination of endangerment."

2.1.3 Validity of Himalayan Glacier Projection

Comment (2-2):
Several petitioners (the Coalition for Responsible Regulation, the Competitive Enterprise Institute, the Ohio Coal Association, Peabody Energy, the Southeastern Legal Foundation, and the State of Texas) state that the IPCC erred in including a projection that glaciers in the Himalayas would disappear by 2035, and they claim EPA relied on this projection in the Endangerment Finding. Petitioners argue that this error undermines the credibility of the IPCC reports. The Ohio Coal Association writes: "The Agency no longer has a basis for unquestioned confidence that the IPCC reports present a fair, unbiased, and accurate assessment of climate science." Peabody states the error: "…undercuts EPA's conclusion that the IPCC review process was 'rigorous' and shows how reliance on the IPCC led to errors in EPA's Endangerment Finding."

Response (2-2):
The IPCC has issued a correction pertaining to this projection for the melting of Himalayan glaciers (IPCC, 2010f):

> The Synthesis Report, the concluding document of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (page 49) stated: "Climate change is expected to exacerbate current stresses on water resources from population growth and economic and land-use change, including urbanization. On a regional scale, mountain snow pack, glaciers and small ice caps play a crucial role in freshwater availability. Widespread mass losses from glaciers and reductions in snow cover over recent decades are projected to accelerate throughout the 21st century, reducing water availability, hydropower potential, and changing seasonality of flows in regions supplied by meltwater from major mountain ranges (e.g. Hindu-Kush, Himalaya, Andes), where more than one-sixth of the world population currently lives."
>
> This conclusion is robust, appropriate, and entirely consistent with the underlying science and the broader IPCC assessment. It has, however, recently come to our attention that a paragraph in the 938-page Working Group II contribution to the underlying assessment refers to poorly substantiated estimates of rate of recession and date for the disappearance of Himalayan glaciers. In drafting the paragraph in question, the clear and well-

> established standards of evidence, required by the IPCC procedures, were not applied properly.
>
> The Chair, Vice-Chairs, and Co-chairs of the IPCC regret the poor application of well-established IPCC procedures in this instance. This episode demonstrates that the quality of the assessment depends on absolute adherence to the IPCC standards, including thorough review of "the quality and validity of each source before incorporating results from the source into an IPCC Report". We reaffirm our strong commitment to ensuring this level of performance.

First, as described in Response 2-3 below, this error concerns a single study, out of many that support the IPCC's conclusions regarding glacier recession. Second, EPA does not refer to this projection in the Endangerment Finding or supporting material. We acknowledge that the TSD mentions Himalayan glaciers; Table 16.1 of Section 16(b) ("Overview of International Impacts"), highlighting "examples" of international impacts, states (U.S. EPA, 2009):

> Glacier melt in the Himalayas is projected to increase flooding and rock avalanches from destabilized slopes and to affect water resources within the next two to three decades. This will be followed by decreased river flows as the glaciers recede.

This statement is entirely consistent with the IPCC's statement in its Synthesis Report (on page 49) (IPCC, 2007b), cited above, which the IPCC notes is "robust, appropriate, and entirely consistent with the underlying science and the broader IPCC assessment." EPA did not refer to a rate of recession or a timeframe in which the Himalayan glaciers would be gone.

This error represents one lapse in the deliberate preparation and review of a multi-volume assessment containing thousands of pages of findings and conclusions. Despite petitioners' claims to the contrary, the timing of glacier recession in the Himalayas has no impact on the scientific support for EPA's Endangerment Finding. As noted in Section 2.1.1, the Endangerment Finding states (Section III.D):

> The Administrator looked first at impacts in the United States itself, and determined that these impacts are reasonably anticipated to endanger the public health and the welfare of the U.S. population. That remains the Administrator's position, and by itself supports her determination of endangerment.

After careful review, the facts do not substantiate the petitioners' assertion that this error undercuts EPA's conclusion that the IPCC review process was 'rigorous' or that reliance on the IPCC, among other assessments, led to errors in EPA's Endangerment Finding.

Comment (2-3):
The Southeastern Legal Foundation questions the IPCC claim that the conclusions regarding Himalayan glaciers presented in the AR4 Synthesis Report are "robust, appropriate, and entirely consistent with the underlying science and the broader IPCC assessment" despite the erroneous projection. The Southeastern Legal Foundation states: "The IPCC has now grudgingly retracted

the claim of imminent Himalayan glacier melt, though it claims the overall conclusions regarding glacial melt are robust. How their conclusions can be fake but accurate is not evident."

Response (2-3):
Southeastern Legal Foundation is referring to the following conclusions in the IPCC's 2007 Synthesis Report (IPCC, 2007b, page 49):

> Climate change is expected to exacerbate current stresses on water resources from population growth and economic and land-use change, including urbanization. On a regional scale, mountain snow pack, glaciers and small ice caps play a crucial role in freshwater availability. Widespread mass losses from glaciers and reductions in snow cover over recent decades are projected to accelerate throughout the 21st century, reducing water availability, hydropower potential, and changing seasonality of flows in regions supplied by meltwater from major mountain ranges (e.g. Hindu-Kush, Himalaya, Andes), where more than one-sixth of the world population currently lives.

EPA has reviewed the complete discussion of this issue in the AR4, in the Synthesis Report, and in the contributions of Working Groups I (IPCC, 2007e) and II (IPCC, 2007g). The IPCC cites numerous studies that document Himalaya and other Asian glacier trends, projections, and impacts. For example, it references the following findings from a range of studies supporting its conclusion:

- Glaciers in the Asian high mountains have generally shrunk at varying rates (from Su and Shi, 2002; Ren et al., 2004; Solomina et al., 2004; Dyurgerov and Meier, 2005)—in IPCC Working Group I Chapter 4 (Lemke et al., 2007).

- The entire Hindu-Kush-Himalaya ice mass has decreased in the last two decades. Water supply in areas fed by glacial meltwater from the Hindu Kush and Himalayas, on which hundreds of millions of people in China and India depend, will be negatively affected (Barnett et al., 2005)—in IPCC Working Group II Chapter 3 (Kundzewicz et al., 2007).

- The Himalayan glacier Gangotri receded at an average rate of 7.3 meters every year from 1842 to 1935; from 1985 to 2001, it receded at a rate of 23 meters per year (Hasnain, 2002)—in IPCC Working Group II Chapter 10 (Cruz et al., 2007).

- Reductions in the mass of a sample of Northern Hemisphere glaciers (including several in Asia) of up to 60% are projected by 2050 (Schneeburger et al., 2003)—in IPCC Working Group II Chapter 3 (Kundzewicz et al., 2007).

- Rapid melting of glaciers can lead to flooding of rivers and the formation of glacial melt-water lakes, which may pose a serious risk of outburst floods (Coudrain et al., 2005)—in IPCC Working Group II Chapter 3 (Kundzewicz et al., 2007).

Thus, EPA finds that the single faulty projection highlighted by petitioners does not compromise the IPCC's overall assessment of observed glacier loss, projected glacier loss, and the impacts of glacier loss on water resources in the Himalayas. Numerous studies document a general decline in Himalayan glacier mass, project substantial future declines, and discuss the impacts of these

changes on water resources and society, which is consistent with the conclusions drawn by the IPCC. The petitioner's claim implies that the IPCC conclusion in the Synthesis Report depends upon a single study, without which we are uncertain as to the fate and timing of Himalayan glacier melt. The full discussion of this issue by the IPCC clearly demonstrates that the petitioners' argument is flawed and that the IPCC's conclusions are well-supported by the scientific literature.

2.1.4 Characterization of Climate Change and Disaster Losses

Comment (2-4):
Some petitioners raise concerns with certain aspects of the IPCC's treatment of climate change and natural disasters. The Southeastern Legal Foundation asserts that the IPCC mischaracterized the findings of a non-peer-reviewed study (Muir-Wood et al., 2006) on climate change and disaster losses. It states that the IPCC reported that global warming was causing an increase in losses from weather disasters of 2% per year, even after controlling for economic growth, citing the Muir-Wood study even though that study had actually found no trend. Along with the Southeastern Legal Foundation, the Competitive Enterprise Institute refers to an article in the *Sunday Times* (Leake, 2010b) indicating that the IPCC wrongly linked climate change to natural disasters. Southeastern Legal Foundation finds:

> The EPA Endangerment Finding relies heavily on the assertion that AGW [anthropogenic global warming] will cause extreme weather events to become more frequent and more severe and thus constitute a danger to human health and welfare—an essential element of the Finding. To support this assertion the Finding in turn relies heavily on the IPCC's reports on weather disasters.

Response (2-4):
To support the Endangerment Finding, EPA cited the potential impacts of climate change on the number and/or severity of certain extreme weather events, for which the Southeastern Legal Foundation levels no specific criticism. The TSD did not discuss the link between climate change and the historical trends in the economic magnitude of disaster losses. In responding to public comments on the issue (e.g., see Responses 7-5 and 7-38 in the Response to Comments [RTC] document), EPA acknowledged that many factors influence the economic losses caused by disasters which make it difficult to use historical data on trends in economic disaster loss to determine the impact of climate change on the losses from weather events in the past. Further, the Endangerment Finding is clear that the Administrator's decision was based on the physical and environmental impacts associated with climate change, and how they can affect the characteristics of weather events, not the link between climate change and disaster losses. As the Endangerment Finding states (Section I.A):

> The evidence concerning how human induced climate change may alter extreme weather events also clearly supports a finding of endangerment, given the serious adverse impacts that can result from such events and the increase in risk, even if small, of the occurrence and intensity of events such as hurricanes and floods.

With respect to the Muir-Wood study, we neither cited nor relied upon it in our discussion of extreme events. In fact, our only specific reference to this study in the record for the Endangerment Finding is in Response 1-15 in the RTC documents, which addressed criticism of the IPCC's use of gray literature. The technical aspects of this study were not discussed because EPA did not focus on the relationship between climate change and the economic magnitude of disaster losses as underlying support for the Endangerment Finding. We note that the TSD did include a figure (TSD Figure 14.1) showing information on several factors, including one portion (panel e) on observed U.S. hurricane economic damages compared to a measure of Atlantic hurricane intensity. This figure was taken from the chapter on North America from Working Group II's contribution to the AR4 (Field et al., 2007, Figure 14.1); the TSD provides no commentary on the hurricane economic damages portion (panel e).

The controversy surrounding the relationship between climate change and economic losses from disasters did arise in public comments (e.g., see comments 7-5 and 7-38 in the RTC document), to which EPA provided measured, balanced responses consistent with the assessment literature. In comment 7-38, for example, the commenter argued that increasing raw damage totals associated with tropical storm (or hurricane) damage in coastal communities are not the result of climate change, but rather are caused by changes in coastal population, the wealth of the population, inflation, and poor sediment management practices. EPA responded:

> EPA agrees that the interaction of a series of drivers adversely impacts coastal areas and can contribute to tropical storm damage totals. These drivers include changes in coastal population, wealth of the population, inflation, and sediment management practices.

EPA's response then focused on the physical impacts of climate change that suggest increased risk to the public from severe weather events, pointing to the following findings from the assessment literature:

- Superimposed on accelerated sea level rise, the present storm and wave climatology and storm surge frequency distributions suggest more severe coastal flooding and erosion hazards (Nicholls et al., 2007).
- Higher sea level provides an elevated base for storm surges to build upon and diminishes the rate at which low-lying areas drain, thereby increasing the risk of flooding from rainstorms (CCSP, 2009a).
- Apart from nonclimatic events such as tsunamis, extreme sea levels occur mainly in the form of storm surges generated by tropical or extra-tropical cyclones. There is evidence for an increase in extreme high sea level since 1975 based upon an analysis of 99th percentiles of hourly sea level at 141 stations over the globe (Bindoff et al., 2007).

We also noted: "USGCRP concludes that future increases in losses will be attributable to climate change with high confidence as climate change increases the frequency and intensity of many types of extreme weather (Karl et al., 2009)." EPA agrees with this conclusion regarding losses in the future—if climate change causes an increase in the frequency or intensity of certain severe weather events, then it follows that climate change could lead to increased losses compared with what would occur without the increase in those severe weather events. However,

EPA did not focus on historical trends in the magnitude of economic disaster losses to evaluate the likelihood that climate change would lead to an increase in the number or frequency of such weather events. For that reason, the charge that the IPCC mischaracterized reports on the implications of such historical trends does not materially affect the basis for EPA's Endangerment Finding.

For its part, the IPCC responded to the allegation that it mischaracterized the Muir-Wood study on climate change and disaster losses with an official statement (IPCC, 2010e). The IPCC stated, among other things, that the *Sunday Times* article cited by Southeastern Legal Foundation and the Competitive Enterprise Institute:

> Incorrectly assumes that a brief section on trends in economic losses from climate-related disasters is everything the IPCC Fourth Assessment Report (2007) has to say about changes in extremes and disasters. In fact, the Fourth Assessment Report reaches many important conclusions, at many locations in the report, about the role of climate change in extreme events. The assessment addresses both observations of past changes and projections of future changes in sectors ranging from heat waves and precipitation to wildfires. Each of these is a careful assessment of the available evidence, with a thorough consideration of the confidence with which each conclusion can be drawn.

To summarize, petitioners do not properly characterize the information on which EPA relied in making the Endangerment Finding. Petitioners also mischaracterize the statements of the IPCC. The IPCC reasonably characterized the links between climate change and the projected increase in frequency and severity of severe weather events. The IPCC discussed the various types of evidence supporting this view, which include but are clearly not limited to consideration of the evidence for and against the ability to identify a climate change impact from the trend in economic magnitude of disaster losses, and the IPCC caveated its discussion of this issue. To support the Endangerment Finding, EPA cited the physical and environmental factors indicating that climate change would lead to an increase in frequency and severity of certain severe weather events. Only in response to public comments did EPA discuss what can be determined from analyses of past trends in disaster losses. Accordingly, EPA did not rely on a linkage between climate change and the economic magnitude of disaster losses to support the Endangerment Finding, and petitioners' arguments do not undermine the reasoning supporting EPA's Endangerment Finding.

Our response to a petitioner's specific claims regarding the Muir-Wood study is provided in Response 2-5, below.

Comment (2-5):
Southeastern Legal Foundation writes:

> The IPCC reported that global warming was causing an increase in losses from weather disasters of 2% per year, even after controlling for economic growth, citing a non-peer reviewed study by Robert Muir-Wood. Yet the IPCC mischaracterized the study, which actually found no trend and expressly eschewed the proposition for which it was cited.

> Muir-Wood *et al.* expressly caveated that the exceptionally strong hurricane seasons in 2004 and 2005 accounted for almost all of the 2% increase from 1970-2005.

Response (2-5):
First, while the version of the Muir-Wood et al. (2006) paper cited in the IPCC was not yet peer-reviewed, a subsequent version of this work was peer-reviewed and accepted for publication just weeks after the cutoff for inclusion in the IPCC, according to a statement by Risk Management Solutions (RMS), where Robert Muir-Wood is employed as a chief research officer. In a frequently asked questions document posted on its website (RMS, 2010), RMS states:

> The research was conducted during the first half of 2006 and the full paper summarizing the results was peer reviewed and accepted for publication in November 2006. This was a few weeks outside of the cut-off date for the IPCC 4th Assessment Report in October, which is why an earlier summary version of the paper—written for a scientific workshop held in May 2006 and published in the conference proceedings in October 2006—was referenced (the IPCC can only cite published material). Despite not being able to reference it, the IPCC was aware of the full report and that it had been accepted for publication before the 4th Assessment Report was finalized.
>
> While the paper was completed and accepted for publication in November 2006, delays in publication meant that it did not officially appear as a book chapter until 2008.

Second, the same frequently asked questions document (RMS, 2010) indicates that the IPCC did not mischaracterize the results of the paper:

> RMS believes the IPCC fairly referenced its paper, with suitable caveats around the results, highlighting the factors influencing the relationship that had been discovered between time and increased catastrophe costs. We believe it was appropriate to include the RMS paper in the report because, at that time, it was the only paper addressing global multi-peril catastrophe losses over time that had been normalized for changes in the values and exposure at risk.

Thus, we find the study to be valid. As discussed in Response 1-15 of the RTC document, the use of non-peer-reviewed literature is allowed under IPCC procedures. In this case, the paper was clearly a reasonable reference and was ultimately peer-reviewed. We further find the petitioner's discussion of the caveats in the Muir-Wood paper to be potentially misleading. The petitioner claims that "the IPCC mischaracterized the study" and states in the next sentence that "Muir-Wood *et al.* expressly caveated that the exceptionally strong hurricane seasons in 2004 and 2005 accounted for almost all of the 2% increase from 1970-2005." This could give the impression that the IPCC does not provide such caveats. An examination of the discussion in Working Group II's contribution to the IPCC AR4, however, reveals that it also caveats the 2% increase, stating (Rosenzweig et al., 2007): "The significance of the upward trend is influenced by the losses in the USA and the Caribbean in 2004 and 2005 and is arguably biased by the relative wealth of the USA, particularly relative to India."

Comment (2-6):
Background: Southeastern Legal Foundation cites the following IPCC expert reviewer comment (IPCC, 2006c), which was submitted while the Working Group II report was in preparation and pertains to the IPCC's characterization of climate change and disaster losses and the Muir-Wood et al. (2006) study:

> I think this is inappropriate. It leads the reader into interpreting recent events in a particular way without providing supporting information. This suggestion, that the losses in 2004 and 2005 draw Pielke's results into question, needs to be supported with a reference or a solid in-chapter assessment. What does Pielke think about this? (Francis Zwiers, Canadian Centre for Climate Modelling and Analysis)

According to Roger Pielke Jr. (Pielke, 2010a), a professor of environmental studies at the University of Colorado, the expert reviewer, Zwiers, is referring to this passage in the AR4 (Rosenzweig et al., 2007):

> A previous normalisation of losses, undertaken for U.S. hurricanes by Pielke and Landsea (1998) and U.S. floods (Pielke et al., 2002) included normalising the economic losses for changes in wealth and population so as to express losses in constant dollars. These previous national U.S. assessments, as well as those for normalised Cuban hurricane losses (Pielke et al., 2003), did not show any significant upward trend in losses over time, but this was before the remarkable hurricane losses of 2004 and 2005.

The IPCC writing team responded to the Zwiers comment with the following: "I believe Pielke agrees that adding 2004 and 2005 has the potential to change his earlier conclusions – at least about the absence of a trend in US Cat losses" (IPCC, 2006c).

Comment: The Southeastern Legal Foundation claims that "The IPCC knew from the comments of reviewers that their use of the [Muir-Wood] study was wrong before the report was published." Citing a blog post from Roger Pielke Jr., Southeastern Legal Foundation suggests the IPCC fabricated its response to the expert reviewer, Zwiers:

> The IPCC reviewer had asked "What does Pielke think about this?" The answer given was a fabrication, according to Pielke, Jr. As he commented on his blog, "[N]ot only did the IPCC AR4 WGII egregiously misrepresent the science of disasters and climate change, but when questions were raised about that section by at least one expert reviewer, it simply made up a misleading and false response about my views."

Response (2-6):
It is unfortunate that Dr. Pielke found that his views were misrepresented by the IPCC. EPA cannot speculate how or why this happened. Dr. Pielke had the opportunity to comment on the IPCC's draft treatment of these issues as a reviewer, but did not. (He is officially listed as an IPCC Working Group II expert reviewer for the United States in Appendix III of the IPCC AR4 Working Group II report (IPCC, 2007f).

The representative for the IPCC's author team wrote "I believe Pielke agrees," which suggests a possible honest misunderstanding of Dr. Pielke's views. This incident certainly does not support the petitioner's contention that the IPCC "knew" that its use of the Muir-Wood study was wrong. In fact, as discussed in the previous response (2-5), it is not at all clear that the study was wrong or was used inappropriately by the IPCC in any way.

At the time the Muir-Wood et al. study was completed in 2006, it was the only global analysis we are aware of that included 2004 and 2005 data. While it is true that Pielke Jr.'s remarks from the Seventh Annual Roger Revelle Commemorative Lecture contained an analysis of normalized Atlantic hurricane damages through 2005 and were published in *Oceanography* (Pielke, 2006), those remarks were not assessed by the IPCC, likely because they were presented as a lecture rather than a scientific study. Much of the scientific content of Dr. Pielke's talk was subsequently peer-reviewed and published in 2008 (Pielke et al., 2008), but this was well after the IPCC deadline for inclusion in the AR4. Furthermore, whereas Dr. Pielke's 2006 analysis in *Oceanography* limited its focus to Atlantic hurricanes, the Muir-Wood analysis was multi-hazard and global.

Thus, while the IPCC may have made mistaken assumptions about Dr. Pielke's views, its reliance on the Muir-Wood et al. (2006) study was reasonable, as that study contained the latest and most relevant published global analysis.

Comment (2-7):
The Southeastern Legal Foundation states that EPA's Response 1-15 (in Volume 1 of the RTC document, concerning the use of non-peer-reviewed literature) did not respond to the substance of the comment concerning the IPCC's and Climate Change Science Program's (CCSP's) misrepresentation of the literature and the central underlying point that there was no legitimate evidence that manmade climate change was causing an increase in weather disasters.

The Southeastern Legal Foundation notes: "This comment showed that both the IPCC and especially the CCSP had fraudulently asserted that AGW was causing increased frequency and severity of extreme weather events." It provides the following excerpt from the comment (3303):

> In 2007 the IPCC released its Fourth Assessment Report and it relied on the single non-peer reviewed Muir-Wood (2006) [9] study cherrypicked from the Hohenkammer workshop as the single study to highlight in its review of this topic. [12] The same critique of the Stern report's reliance on this Muir-Wood study above applies to the IPCC's reliance on it as well. Further, the IPCC included a graph [13] attempting to show how closely temperature anomalies match up with disaster losses, using a scaling of the axes to suggest a relationship where none has been shown in the peer-reviewed literature. Again it relies on Muir-Wood *(2005)*. Coincidentally, Robert Muir-Wood, of Risk Management Solutions, Inc., was an author of the chapter of the IPCC report that selectively highlighted his own non-peer reviewed work.
>
> The US Climate Change Science Program systematically and repeatedly misrepresented the science of disasters and climate change. First, the CCSP US extremes report [14] miscited several of Roger Peilke's papers in support of claims that they did not make and

> relied on Mills 2005 as the definitive source on this topic. [16] The disasters and climate change section of this CCSP report is also a fact checker's nightmare. Second the CCSP draft Synthesis report and final Synthesis report [15] relied on non-peer reviewed work by Evan Mills and ignored relevant peer reviewed research showing different results (in fact all peer reviewed research points in the same direction on this subject). Coincidentally, Evan Mills was an author of the CCSP Synthesis Report that highlights his own non-peer reviewed work. Mills also apparently consults for companies with an interest in climate policies, and yet this was not disclosed by the CCSP.

It then cites EPA's response (RTC 1-15):

> The commenter describes two pieces of literature that were referenced by IPCC but not published in peer reviewed journals: 1) a natural catastrophes report by Munich Re (2000) that was cited in IPCC Third Assessment Report (IPCC, 2001), and 2) a paper on trends in weather-related catastrophes by Muir-Wood et al. (2006). The identification of only two examples out of the thousands of references cited in the IPCC (2000) and (2007) reports provides more support for the rigor of the IPCC process. Further, these specific studies were neither the central nor sole evidence used in forming the broader conclusions of the IPCC; such broader conclusions are based on multiple lines of evidence and peer-reviewed literature.

On the basis of EPA's response, the Southeastern Legal Foundation concludes:

> It is a very peculiar logic that treats proof of what appears to be scientific fraud as demonstrating "the rigor of the IPCC's process." No response whatsoever is made to the substance of the comment concerning the CCSP's misrepresentation of the literature and the central underlying point that there was no legitimate evidence that manmade climate change was causing an increase in weather disasters. The question naturally arises as to why the EPA avoided these points. One of the lead authors of the CCSP report so vigorously attacked in Comment 3303 is Thomas Wilbanks, of the DOE Oak Ridge National Laboratory. The same Thomas Wilbanks was a Federal expert reviewer for the TSD. TSD p. 2. Thus, the EPA ignored and avoided the substance of a comment that pointed out that a report of which one of its expert reviewers was a lead author had "systematically and repeatedly misrepresented the science of disasters and climate change."

Response (2-7):

First, EPA's RTC document, Volume 1, covers EPA's "General Approach to the Science and Other Technical Issues," not the substantive issues pertaining to climate change and disaster losses. Those issues are discussed in RTC Volume 7, "Water Resources, Coastal Areas, and Ecosystems and Wildlife." Specifically, RTC 7-38 address substantive issues pertaining to climate change and disaster losses raised by commenters (as does RTC 7-5) as discussed in Response 2-4 above. Accordingly, EPA's commentary on the Muir-Wood literature in Volume 1 focuses on process issues, and the scientific issues are addressed in Volume 7.

Furthermore, as we indicate in Response 2-5 above, a subsequent version of Muir-Wood et al. (2006) was, in fact, peer-reviewed and accepted for publication just weeks after the IPCC cutoff according to RMS. Irrespective of the peer review issue, we reiterate our conclusion from RTC 1-15: "…these specific studies were neither the central nor sole evidence used in forming the broader conclusions of the IPCC; such broader conclusions are based on multiple lines of evidence and peer-reviewed literature." The magnitude of observed disaster losses from extreme events in general, and the Muir-Wood study in particular, were not central to EPA's Endangerment Finding.

We discuss allegations that the IPCC misrepresented the literature on observed climate change and disaster losses in Response 2-5. With respect to the "graph [13, IPCC Supplementary Material Figure SM1.1, Working Group II AR4, 2007] attempting to show how closely temperature anomalies match up with disaster losses" referred to in the cited comment (3303) above, we note that said graph was not cited or relied upon in the Endangerment Finding and, furthermore, that it did not appear in the main IPCC Working Group II report but in supplementary material. We acknowledge this graph is controversial. RMS, for example, stated the following in its frequently asked questions document pertaining to climate change and disaster losses (RMS, 2010):

> A graph showing averaged global temperature and averaged catastrophe loss since 1970 was included in supplementary material rather than the IPCC report itself and was not itself published. RMS believes that the graph could be misinterpreted and should not have been included in these materials.

Despite this statement, the inclusion of one controversial graph in supplementary material does not compromise the IPCC's credibility or legitimacy.

The charges that CCSP (and hence USGCRP) miscited and misrepresented Roger Pielke Jr.'s work, over-relied on the work of Evan Mills, and ignored some other studies on the issue of climate change and disaster loss are difficult to assess as they were made in blog posts (of Roger Pielke Jr. (Pielke, 2010b)), represent the perspective of one individual (Roger Pielke Jr.), and have not been published in any official capacity (e.g., in the peer-reviewed literature). However, they do not materially affect the basis for EPA's Endangerment Finding. Dr. Pielke himself stated: "…I am of the view that the Obama Administration is perfectly justified in advancing the [Endangerment] finding" (Pielke, 2010b). As we state in Response 2-4, EPA did not focus on historical trends in the magnitude of economic disaster losses to evaluate the likelihood that climate change would lead to an increase in the number or frequency of extreme weather events. Furthermore, in RTC 7-5 we cite the CCSP (2008) statement acknowledging that the relative contribution of climate change and socioeconomic vulnerability (to weather and climate extremes) to observed increases in disaster costs are "subject to debate."

Finally, the fact that Robert Muir-Wood and Evan Mills were selected as authors for chapters in the IPCC and CCSP, respectively, and may have cited their own work does not delegitimize these assessments or their findings. Rather, it is only appropriate that leading experts on these topics—familiar with the range of literature—would be asked to assist in these assessments. Petitioners provide no evidence to support the allegation that Evan Mills' work was

compromised or biased; speculating that he "apparently" does consulting for companies "with an interest in climate policies" is innuendo, not proof.

Lastly, the fact that Thomas Wilbanks was an expert reviewer for EPA's TSD (U.S. EPA, 2009) and was lead author of a report that the petitioner alleges "systematically and repeatedly misrepresented the science of disasters and climate change" is irrelevant. As we state in Response 2-4, EPA did not discuss observed climate change and disaster losses in the TSD. Thus, though we discuss some of CCSP's conclusions in RTC 7-5 and 7-38 that focus on the challenges in linking observed climate change and disaster losses, CCSP's treatment of this issue was not and is not materially relevant to the Endangerment Finding. Furthermore, the petitioner does not present evidence Wilbanks played any role in the presentation of material on this issue. Thus, the charge that EPA "ignored and avoided" the substance of the comment on disasters and climate change because of Wilbanks is unsupported and false. EPA relied on a team of federal experts to ensure that EPA was correctly synthesizing the existing assessment literature in the TSD. As RTC 1-10 states:

> ….the purpose of the federal expert review was to ensure that the TSD accurately summarized the conclusions and associated uncertainties from the assessment reports. The federal experts were ideal candidates because they have contributed significantly to the body of climate change literature and played active roles in IPCC and CCSP—therefore making them experts on various aspects of climate science and very familiar with the underlying literature and state of the science. Furthermore, the federal climate change experts represent a range of technical specialties that span the range of topics covered in the TSD and covered by the range of topics that the Administrator needed to consider. In addition, the federal experts were not involved with developing the TSD or Findings in any way other than their review roles.

Petitioners are making a very serious accusation—that "what appears to be scientific fraud" occurred—without providing supporting scientific evidence. Instead, they mischaracterize EPA's actions in claiming that disaster losses are central to the Endangerment Finding when they clearly are not. They mischaracterize EPA's treatment of comments on the proposed Endangerment Finding by implying that we did not address the issues surrounding disaster losses, when the issue is clearly addressed in the appropriate volume of the RTC. And they impugn the integrity of several scientists, on the basis of speculation not evidence, seemingly for no other reason than that they disagree with the conclusions of the assessment literature.

2.1.5 Validity of Alps, Andes, and African Mountain Snow Impacts

Comment (2-8):
Several petitioners (the Competitive Enterprise Institute, the Ohio Coal Association, Peabody Energy, the State of Texas, and the Southeastern Legal Foundation) argue that claims of glacier melt in the Andes, the Alps, and parts of Africa arise from anecdotal comments in a magazine article and a master thesis. They challenge the IPCC's use of this non-peer-reviewed literature, suggesting the findings may be suspect. The Southeastern Legal Foundation states: "The EPA should reconsider its reliance on the IPCC's reporting now that the IPCC's conclusion has been shown to be so poorly supported."

Response (2-8):
The citations referred to by petitioners regarding the reduction of mountain ice in the Andes, Alps, and Africa are actually references to "loss of ice climbs," not assessments of mountain glacier retreat. Loss of ice climbs is an example of the observed effects of warming on the ice-covered areas of the Earth. In this context, these citations are appropriate and within the IPCC's guidelines on the use of so-called gray literature. They provide additional evidence consistent with the well-supported peer-review conclusions that snowpack is declining in many places and that glaciers are melting worldwide. Note that we respond to petitioners' broader claims regarding the IPCC's use of gray literature in Subsection 2.2.4.4.

Furthermore, as the finding in question pertains to indicators outside the United States, the petitioners' claims are not relevant to the Endangerment Finding. As noted in Subsection 2.1.1, the Endangerment Finding states (Section III.D): "The Administrator looked first at impacts in the United States itself, and determined that these impacts are reasonably anticipated to endanger the public health and the welfare of the U.S. population. That remains the Administrator's position, and by itself supports her determination of endangerment."

EPA did not rely on these specific references or refer to "loss of ice climbs" as an indicator of climate change. Our primary focus was on the implications of climate change for the United States, and we relied on peer-reviewed literature to assess these impacts. We did not refer to this specific issue in either the TSD or the Endangerment Finding, and we did not include any discussion on "loss of ice climbs." The TSD does include discussion of mountain glacier retreat, based on peer-reviewed literature, which the petitioners do not critique.

2.1.6 Validity of Amazon Rainforest Dieback Projection

Comment (2-9):
Several petitioners (the Competitive Enterprise Institute, the Ohio Coal Association, Peabody Energy, the State of Texas, the Southeastern Legal Foundation) challenge the IPCC's statement that "[U]p to 40% of the Amazonian forests could react drastically to even a slight reduction in precipitation," alleging that it arises from gray literature and cannot be substantiated. The Southeastern Legal Foundation states that the source for the IPCC's statement, Nepstad et al. (1999) from the journal *Nature*, "does not support the IPCC's assertion". Peabody states that "the Nature article does not contain the 40% figure" and "the provenance of the IPCC's striking '40%' figure is uncertain." The Competitive Enterprise Institute finds that "the IPCC claim that the findings in AR4 are based on peer reviewed science is false."

Response (2-9):
First, we note that this issue is not discussed anywhere in the TSD or Endangerment Finding, and is thus of little relevance to the Finding. Second, while we agree that the IPCC cited gray literature in this case—i.e., Rowell and Moore (2000), a report of the World Wildlife Federation—we note that the underlying studies supporting the Rowell and Moore report are, in fact, peer-reviewed.

In response to the publicity surrounding this purportedly unsubstantiated finding in the IPCC AR4, Daniel Nepstad—a senior scientist at Woods Hole Research Center and author of the study (Nepstad et al., 1999) that contained the finding referred to by Rowell and Moore—issued a statement on this matter. In the statement, he noted that the citations listed in the Rowell and Moore report were incomplete but that the AR4's statement on Amazon forest susceptibility to rainfall reduction was correct. Here is the relevant excerpt from his statement (Nepstad, 2010):

> The IPCC statement on the Amazon is correct, but the citations listed in the Rowell and Moore report were incomplete. (The authors of this report interviewed several researchers, including the author of this note, and had originally cited the IPAM website where the statement was made that 30 to 40% of the forests of the Amazon were susceptible to small changes in rainfall). Our 1999 article (Nepstad et al. 1999) estimated that 630,000 km2 of forests were severely drought stressed in 1998, as Rowell and Moore correctly state, but this forest area is only 15% of the total area of forest in the Brazilian Amazon. In another article published in Nature, in 1994, we used less conservative assumptions to estimate that approximately half of the forests of the Amazon depleted large portions of their available soil moisture during seasonal or episodic drought (Nepstad et al. 1994). After the Rowell and Moore report was released in 2000, and prior to the publication of the IPCC AR4, new evidence of the full extent of severe drought in the Amazon was available. In 2004, we estimated that half of the forest area of the Amazon Basin had either fallen below, or was very close to, the critical level of soil moisture below which trees begin to die in 1998. This estimate incorporated new rainfall data and results from an experimental reduction of rainfall in an Amazon forest that we had conducted with funding from the US National Science Foundation (Nepstad et al. 2004). Field evidence of the soil moisture critical threshold is presented in Nepstad et al. 2007.

Specifically, we note that the Nepstad et al. (2004) study states: "Increases in ET [evapo-transpiration] of only 15% or similar reductions in rainfall can lead to severe soil moisture deficits over roughly half of the Amazon." This statement certainly is consistent with the statement "Up to 40% of the Amazonian forests could react drastically to even a slight reduction in precipitation" in the IPCC AR4.

Nepstad's 2010 statement in response to this controversy reached the following conclusion (Nepstad, 2010):

> In sum, the IPCC statement on the Amazon was correct. The report that is cited in support of the IPCC statement (Rowell and Moore 2000) omitted some citations in support of the 40% value statement.

Similarly, in its report *Assessing an IPCC Assessment*, PBL (2010a) identified a problem with the IPCC's referencing of this finding, but not the finding itself. It states:

> More adequate peer-reviewed, scientific journal literature would have been available to support this statement, such as Cox et al. (2000; 2004) (C6). This minor comment has no consequences for the IPCC conclusions in the various Summaries for Policymakers.

Finally, the United Kingdom's *Sunday Times* newspaper, which reported the alleged problem with the IPCC's representation of this issue on January 31, 2010 (Sunday Times, 2010), has subsequently reversed itself, arriving at the same conclusion as Nepstad. Consequently, it removed the article from its website and printed a correction on June 20, 2010 (Sunday Times, 2010), which stated in part:

> The article "UN climate panel shamed by bogus rainforest claim" (News, Jan 31) stated that the 2007 Intergovernmental Panel on Climate Change (IPCC) report had included an "unsubstantiated claim" that up to 40% of the Amazon rainforest could be sensitive to future changes in rainfall. The IPCC had referenced the claim to a report prepared for the World Wildlife Fund (WWF) by Andrew Rowell and Peter Moore, whom the article described as "green campaigners" with "little scientific expertise." The article also stated that the authors' research had been based on a scientific paper that dealt with the impact of human activity rather than climate change.
>
> In fact, the IPCC's Amazon statement is supported by peer-reviewed scientific evidence. In the case of the WWF report, the figure had, in error, not been referenced, but was based on research by the respected Amazon Environmental Research Institute (IPAM) which did relate to the impact of climate change. We also understand and accept that Mr Rowell is an experienced environmental journalist and that Dr Moore is an expert in forest management, and apologise for any suggestion to the contrary.

To summarize, contrary to the assertions of the petitioners, though the IPCC may have not adequately referenced the Amazon finding, the basis for its statement originated from and is supported by peer-reviewed literature. Furthermore, as this finding is specific to the Amazon region, petitioners' claims are not relevant to the Endangerment Finding. As noted in Subsection 2.1.1, the Endangerment Finding states (Section III.D): "The Administrator looked first at impacts in the United States itself, and determined that these impacts are reasonably anticipated to endanger the public health and the welfare of the U.S. population. That remains the Administrator's position, and by itself supports her determination of endangerment."

For further discussion on petitioners' broader claims regarding the IPCC's use of gray literature, please refer to Subsection 2.2.4.4.

2.1.7 Validity of African Rain-Fed Agriculture Projection

The comments and responses in this section refer to the following statement pertaining to crop yields in Africa from Chapter 9 of Working Group II's contribution to the IPCC AR4 (Boko et al., 2007):

> In other countries [of Africa] additional risks that could be exacerbated by climate change include greater erosion, deficiencies in yields from rain-fed agriculture of up to 50% during the 2000-2020 period, and reductions in the crop growth period (Agoumi, 2003).

A version of this statement appeared in the IPCC's AR4 Synthesis Report (IPCC, 2007b):

> By 2020, in some countries, yields from rain-fed agriculture could be reduced by up to 50%. Agricultural production, including access to food, in many African countries is projected to be severely compromised. This would further adversely affect food security and exacerbate malnutrition.

A similar statement also appeared in the IPCC's AR4 Working Group II Summary for Policymakers (IPCC, 2007c):

> Agricultural production, including access to food, in many African countries and regions is projected to be severely compromised by climate variability and change. The area suitable for agriculture, the length of growing seasons and yield potential, particularly along the margins of semi-arid and arid areas, are expected to decrease. This would further adversely affect food security and exacerbate malnutrition in the continent. In some countries, yields from rain-fed agriculture could be reduced by up to 50% by 2020.

The same statement (from IPCC, 2007c) was incorporated into EPA's TSD (U.S. EPA, 2009) within Table 16.1: "Examples of Key Regional Impacts as Identified by IPCC."

Comment (2-10):
The Competitive Enterprise Institute, the Ohio Coal Association, Peabody Energy, and the Southeastern Legal Foundation take issue with a statement in Section 16(b) of the TSD that: "In some countries, yields from rain-fed agriculture could be reduced by up to 50% by 2020." They claim the statement originated from gray literature in the IPCC AR4 and is therefore illegitimate. Southeastern Legal Foundation concludes: "The African Crop Yields claim stands as another example of the IPCC making a claim of imminent disaster that inappropriately relied on non-peer-reviewed literature…"

Response (2-10):
The IPCC statement cites a report by Dr. Ali Agoumi, a climate expert from Morocco (Agoumi, 2003) that was published by the International Institute for Sustainable Development (IISD) and funded by the government of Canada, the U.S. Agency for International Development, and other public and private institutions. Based on EPA's review of the report, it appears that the 50% number was not obtained from the peer-reviewed literature but rather from "vulnerability studies on three North African countries (Algeria, Morocco and Tunisia) with respect to climatic changes." These vulnerability studies were prepared under the U.N. Environment Programme Global Environment Fund and included in the National Communications of these three countries to the U.N. Framework Convention on Climate Change (Ministry of Territory Development and Environment, 2001, Kingdom of Morocco, 2001 and Republic of Tunisia, 2001).

In response to publicity regarding this purportedly unsubstantiated statement in the IPCC report, Dr. Coleen Vogel, a contributing lead author of the IPCC chapter on Africa impacts, described the context in which Dr. Agoumi's research was used. She explained that Agoumi's report received rigorous scrutiny by her fellow authors and was thoroughly discussed during development of the chapter (Kretzmann, 2010). She explained that the decision to include this (gray literature) study was based on the paucity of peer-reviewed material relating to some parts

of the world, particularly Africa, and the desire of the authors of the report to provide balanced information. The process described by Dr. Vogel is consistent with the IPCC's guidance on the use of gray literature, as previously described in Volume 1 of the RTC document and further discussed in Subsection 2.2.4.4 of this Response to Petitions (RTP) document.

Finally, we note that this statement relates to impacts outside the United States, and it did not materially impact the determination of endangerment of public health and welfare in the United States. As noted in Subsection 2.1.1, the Endangerment Finding states (Section III.D): "The Administrator looked first at impacts in the United States itself, and determined that these impacts are reasonably anticipated to endanger the public health and the welfare of the U.S. population. That remains the Administrator's position, and by itself supports her determination of endangerment."

Comment (2-11):
Referring to an analysis published by Ben Pile, co-editor of the blog climateresistance.org (on the blog of Roger Pielke, Jr.) (Pile, 2010), the Southeastern Legal Foundation states that the primary reference supporting the IPCC's statement on African crop yields "Vulnerability of North African Countries to Climatic Changes" (Agoumi, 2003) was from IISD, an advocacy group.

Regarding the IISD reference, Peabody Energy states:

> Thus, the EPA based its findings on the IPCC WGII report, which based its findings on a report [the IISD report] published by an organization with a declared political interest in climate change that based its findings from an assessment of other non-peer reviewed national studies. This is not the way EPA science should be carried out.

Response (2-11):
The implication that the credibility of IPCC's statement on African crop yields is diminished because the IPCC's source (Agoumi, 2003) for the statement was published by an advocacy organization or an organization with a "declared political interest in climate change" is unsupported. The organization in question is IISD, which describes itself as follows:

> The International Institute for Sustainable Development contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change, measurement and indicators, and natural resource management. By using Internet communications, we report on international negotiations and broker knowledge gained through collaborative projects with global partners, resulting in more rigorous research, capacity building in developing countries and better dialogue between North and South.
>
> IISD's vision is better living for all—sustainably; its mission is to champion innovation, enabling societies to live sustainably. IISD receives operating grant support from the Government of Canada, provided through the Canadian International Development Agency (CIDA) and Environment Canada, and from the Province of Manitoba. The institute receives project funding from the Government of Canada, the Province of

Manitoba, other national governments, United Nations agencies, foundations and the private sector. IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States.

We find no reason to question the credibility and legitimacy of information produced by this organization on the basis of either its mission or funding sources. Moreover, neither the Southeastern Legal Foundation nor Peabody Energy provide any support for the implication that work by an organization such as IISD is automatically suspect or flawed.

Finally, Peabody Energy's statement that EPA's findings are based on this material is incorrect. As noted in Subsection 2.1.1, the Endangerment Finding states (Section III.D): "The Administrator looked first at impacts in the United States itself, and determined that these impacts are reasonably anticipated to endanger the public health and the welfare of the U.S. population. That remains the Administrator's position, and by itself supports her determination of endangerment."

We discuss the legitimacy of the science and underlying references for the African crop yields statement in Response 2-12.

Comment (2-12):
The Southeastern Legal Foundation alleges that EPA uncritically adopted the IPCC's "faulty conclusion" with respect to crop yields. It refers to a blog by writer/commentator Richard North (North, 2010) to conclude the Agoumi (2003) reference cited by the IPCC on the issue of rain-fed agricultural yields in Africa relies on studies that "do not support the proposition for which they are cited."

Relying on Richard North's blog, the Southeastern Legal Foundation summarizes the vulnerability studies cited by Agoumi (2003) from the National Communications of Morocco, Tunisia, and Algeria. The Southeastern Legal Foundation notes that the Morocco National Communication "lends some support [to the Agoumi reference], saying that by 2020 during drought conditions cereal yields would decline up to 50%" but that "the data apply to cereal yields only, not crops in general as is implied by the IPCC." The Southeastern Legal Foundation further states that "Algeria's report said their yields would double, and be trimmed only slightly by 'climate change'" and "Tunisia's submission concluded the picture was mixed, but they could have an increase in rain and agricultural production."

Response (2-12):
The IPCC's statement on rain-fed agriculture in Northern Africa is not "faulty" and the Southeastern Legal Foundation presents no evidence that it was included uncritically in EPA's TSD. Furthermore, the Southeastern Legal Foundation's portrayal of findings on climate and crop yields from the National Communications of Morocco, Tunisia, and Algeria derived from Richard North's blog is not complete. When all of the information in these National Communications is considered, we find there is broad support for Agoumi's (2003) statements on North African rain-fed agriculture, which are:

- "Some of the key statistics regarding water, soil, urban areas and coastal zones are outlined below. . . . Decreasing rain-based agricultural yields with grain yields reduced by up to 50 percent in periods of drought."

- "Studies on the future of vital agriculture in the region have shown the following risks, which are linked to climate change: . . . deficient yields from rain-based agriculture of up to 50 percent during the 2000–2020 period."

PBL, in its report *Assessing an IPCC Assessment* (PBL, 2010a), makes the following important point with respect to IPCC's statement on rain-fed agriculture in Africa:

> This statement is not directly a statement on climate change, but on climate variability: in individual years, droughts can cause up to 50% in yield reductions. The implicit message here is that when droughts would become more frequent due to climate change, more years with up to 50% in yield reductions would occur. The statement could easily mislead readers into thinking that average annual yields could be reduced by up to 50% due to climate change. In the Summary for Policymakers of the Working Group II Report, the paragraph that contains this statement starts with a sentence introducing the notion of climate variability, which puts the statement more into context.

It is possible that petitioners misinterpreted the IPCC's statement as suggesting that the IPCC's projection was on the basis of climate change alone, given the Southeastern Legal Foundation's assertion, for example, that IPCC was projecting "imminent disaster." While we agree with PBL that the IPCC's statement could easily mislead readers without the proper context, we note that, before quoting the IPCC's projection on rain-fed agriculture, EPA's TSD includes the statement "Agricultural production, including access to food, in many African countries and regions is projected to be severely compromised by **climate variability** [emphasis added] and change." Therefore, EPA provided the proper context for the IPCC's conclusion.

With respect to the basis for the conclusion itself, the following excerpts from the three countries' National Communication reports on the issues of climate variability and change, precipitation, and crop yields provide broad support for the Agoumi (2003) statements along with accompanying discussion:

- The National Communication of Morocco states (Kingdom of Morocco, 2001):

  > The development of climate scenarios for Morocco according to IPCC methodology reveals the following results: . . .
  >
  > - A trend towards a decrease in average annual rainfall volume by about 4% in 2020 compared to 2000 levels. . . .
  > - An increase in the frequency and intensity of droughts in the south and the east of the country.

> The first quantitative estimate of possible CC [climate change] impacts on water resources in 2020 points to the fact that there would be an average and general decrease in water resources (in the order of 10 to 15 %...).
>
> The study of CC [climate change] impacts on agriculture (dominated by cereal cultivation) in 2020 unfolds the following results: A decrease in cereal yields by 50% in dry years and 10% in normal years.

As the Southeastern Legal Foundation admits, the numbers from Morocco's National Communication lend support to the statement in Agoumi (2003) that "studies on the future of vital agriculture in the region have shown the following risks, which are linked to climate change: . . . deficient yields from rain-based agriculture of up to 50 per cent during the 2000–2020 period."

Richard North's contention (North, 2010, as referred to by the Southeastern Legal Foundation) that "the data apply to cereal yields only, not crops in general as is implied by the IPCC" is arguable considering that Morocco's National Communication indicates that agriculture is "dominated by cereal cultivation." Thus, it is not unreasonable to use cereal cultivation as a proxy for all of agriculture in this cereal-crop-dominated region.

- The National Communication of Algeria (Ministry of Territory Development and Environment, 2001) states:[1]

> Because of global warming, we must brace ourselves for chronic climate instability and greater frequency of droughts and floods. Droughts damage soils and floods destroy ground cover and contribute to the erosion of soils. With longer spans of time between dry and wet spells comes an even greater impact due to erosion. The southern regions of the country will be most directly impacted by increased temperatures and will be subject to the numerous consequences of accelerated desertification. The increased risk of drought presents the greatest challenge as a result of climate change. The Intergovernmental Panel on Climate Change (IPCC) expect that the desert regions will extend northward in the Maghreb.

The above text provides a clear qualitative description of the risks climate change pose to agriculture in Algeria. In addition, this information from the National Communication of Algeria provides quantitative output from a model known as CROPWAT, which estimates changes in crop yields using climate change projections obtained from two general circulation models. The National Communication of Algeria reports:

> … one can consider an average reduction in the output cereal of about 5.5 to 6.8%, corresponding mainly to instances of climate change [in 2020](Ministry of Territory Development and Environment, 2001)

[1] The excerpt that follows was professionally translated from French.

When considering these quantitative cereal yield changes, it is very important to note that these percentages refer to changes in cereal yields resulting primarily from climate change alone and not *climate variability and change* combined. The climate and hence precipitation variability in northern Africa can be quite large. For example, in the report *Assessing an IPCC Assessment* (PBL, 2010a), PBL states "…the [IPCC] authors made plausible that, due to current climate variability, the yields in Algeria, Morocco and Tunisia have been varying annually, including yield reductions of nearly 70% in individual years, in the period between 2000 and 2006."

In other words, if these yield reductions resulting from greenhouse gas–induced climate change were superimposed on the yield reductions that might occur during a particularly dry period arising from the region's characteristic precipitation variability, they would be higher and comparable with the results from the Morocco National Communication.

Finally, the Southeastern Legal Foundation's reference to the Algeria National Communication's projections for net increases in cereal projections in 2020 (relative to prior decades) is irrelevant and misleading. These increases are related not to climate variability and change but to changing agricultural practices and technology. Algeria's National Communication makes clear that the effect of climate change on cereal yields is projected to be negative.

- The National Communication of Tunisia states (Republic of Tunisia, 2001):

  > …Tunisia is in a hydrous stress situation close to a shortage, sharpened by a high anthropic pressure. So minor they be, the Climate Changes can so, result in harmful consequences on water resources, on ecosystems depending of water, and on the different economic activities that need large quantities of water such as agriculture and tourism.
  >
  > By modifying the evaporation and precipitation rate, the global warming will probably affect the hydrous climate balance and therefore the Tunisian water resources. In this way, if the intensification of the evaporation can lead to a possible important increase of the rain falls, it might not be sufficient to offset the decrease of the sweet water resources. Moreover, due to the global warming, the rain situation can be characterized by a bigger frequency of rains resulting from torrential storms and downpours, disappearing generally in streaming waters rather than be absorbed by the soils.

  This information in the Tunesian National Communication does not provide any quantitative estimates of climate variability and/or change on rain-fed agriculture, but the clear qualitative implication is that climate changes—both drought and heavy precipitation events—will stress agriculture in Tunisia. We, therefore, find that the Southeastern Legal Foundation's statement that "Tunisia's submission concluded the picture was mixed, but they could have an increase in rain and agricultural production" is an overly optimistic interpretation of clearly expressed negative impacts.

Overall, these three National Communications (Morocco, Algeria, and Tunisia) provide qualitative support for the fact the climate change will likely stress rain-fed agriculture in northern Africa, consistent with the portrayal of Agoumi (2003) and the IPCC. The National Communication of Morocco presents quantitative information consistent with what is reported by Agoumi (2003) and the IPCC (and hence the TSD), while the National Communication of Algeria provides quantitative information that is consistent with these sources when factoring in precipitation variability in addition to climate change. The National Communication of Tunisia does not provide quantitative information.

Our view of the literature behind Agoumi (2003) provides considerable evidence that the scientific basis for the IPCC's conclusion is legitimate. The PBL assessment of the IPCC notes that "…additional explanations could have provided further foundations for the statement, had they been included in [IPCC's Working Group II] Chapter 9." We concur, but the Southeastern Legal Foundation conclusion that "…there is no support for the IPCC's dramatic pronouncement on African crop yields" is significantly overstated.

Comment (2-13):
The Southeastern Legal Foundation provides the following reaction to the African rain-fed agriculture projection, which appeared in the *Sunday Times* (Leake, 2010a) and comes from former IPCC chair Robert Watson: "Any such projection [pertaining to African crop yields] should be based on peer-reviewed literature from computer modeling of how agricultural yields would respond to climate change. I can see no such data supporting the IPCC report."

Response (2-13):
Watson may not have appreciated that peer-reviewed modeling studies of climate change impacts on agriculture in parts of Africa are limited. As the IPCC's AR4 WGI report states (Christensen et al., 2007): "Several climate change projections based on RCM (regional climate model) simulations are available for southern Africa, but are much scarcer for other regions." Accordingly, as we discuss in Subsection 2.2.4.4 of this RTP document, the IPCC references gray literature in these circumstances. We also note in Response 2-10 that these studies are not central to the TSD or the Endangerment Finding. Finally, though we discuss some additional modeling studies pertinent to Africa in RTP 2-15, those modeling studies (Parry et al., 2005 and Hulme et al., 2001) were conducted at the global and continental scales and contain limited results pertinent to northern Africa specifically.

Comment (2-14):
The Southeastern Legal Foundation states that EPA ignored contrary peer-reviewed literature and submits literature that the Sahel is greening (from *National Geographic* and several studies) in contrast to "IPCC horror stories" (projecting reductions in rain-fed agriculture).

Response (2-14):
EPA is aware of the literature cited by the petitioner that suggests greening in parts of the Sahara and Sahel (e.g., Seaquisti, et al., 2009; Anyamba, and Tucker, 2005; Hutchinson et al., 2005; Olsson et al., 2005). The issue raised by petitioners is not new and was raised and responded to through the public comment process (see Response 2-73 in Volume 2 of the RTC document). Thus, these objections do not meet the test in Clean Air Act (CAA) Section 307(d)(7)(B) that it be impracticable to raise the objection during the public comment period or the reasons for the

objection arose between June 24, 2009, and February 16, 2010. Nonetheless, we have reviewed these arguments and respond once again.

The fact that precipitation has increased recently in this region, as we note in our TSD in Section 4(d), does not mean that a combination of climate variability and change could not substantially reduce rain-fed agriculture in the future. The climate in this region is highly variable and while it has been relatively wet over the past decade or so, severe drought impacted the region for several decades from the 1960s to the 1990s and dry patterns could return to the region. As one of the studies (Nicholson, 2005) cited by the petitioner states: "The fluctuations between 'wet' and 'dry' in the Sahel/Soudan zones are extreme even on decadal and multi-decadal time scales." Therefore, if the current wet period reverses to a dry period, the impacts of rain-fed agriculture on the region could be profound, especially when considering the potential enhancement of the drying from human-induced warming (i.e., climate change).

Finally, we note that the literature presented relates to impacts outside the United States, and it did not materially impact the determination of endangerment of public health and welfare in the United States. As noted in Subsection 2.1.1, the Endangerment Finding states (Section III.D): "The Administrator looked first at impacts in the United States itself, and determined that these impacts are reasonably anticipated to endanger the public health and the welfare of the U.S. population. That remains the Administrator's position, and by itself supports her determination of endangerment."

Comment (2-15):
The Southeastern Legal Foundation suggests that the IPCC ignored literature that drew different conclusions on the issue of rain-fed agriculture projections in Africa, specifically referring to two studies: Parry et al., 2005 and Hulme et al., 2001. The Southeastern Legal Foundation states: "Both Parry's own paper and Hulme's paper were known to and available to Professor Parry [co-chair of IPCC Working Group II] in composing the WGII Report and the Synthesis Report. Yet, Parry's WGII report ignored his own paper and that of Hulme, which did not predict disaster, and instead relied on one that did, the Agoumi paper, even though it did so incorrectly and improperly and was not peer-reviewed." The Southeastern Legal Foundation further notes that Hulme et al. (2001) were careful to note uncertainties in understanding African climate change, and implies that the IPCC was not as careful.

Response (2-15):
We have reviewed these papers (Parry et al., 2005, and Hulme et al., 2001) and find that, while not directly comparable with Agoumi (2003), they do not contradict that source. We also find, contrary to the Southeastern Legal Foundation's assertion, that both of these studies were in fact cited by the IPCC, although not always in the same section or context as Agoumi (2003).

The Parry et al. (2005) study reports the results of a series of research projects that aimed to evaluate the implications of climate change for food production and risk of hunger. The analysis in this study is performed at global and continental scales rather than the regional scale. This is likely why it is not discussed in Chapter 5 of Working Group II's contribution to the AR4 (Easterling et al., 2007), where Agoumi (2003) is cited in a section focusing on regional impacts in Africa (specifically on Morocco, Algeria, and Tunisia). The Parry et al. (2005) study is cited

multiple times in Chapter 5 of Working Group II's contribution ("Food, Fiber, and Forest Products," Easterling et al., 2007), which provides a global perspective. Therefore, Parry did not "ignore his own paper" as stated by the Southeastern Legal Foundation.

One of the primary conclusions of Parry et al. is that "the region of greatest risk [of losses in food production, and hunger due to climate change] is Africa." Parry et al. (2005) provide specific cereal yield projections for the 2020s and 2080s resulting from different GHG emission scenarios. They state for the globe: "By the 2020s, small changes in cereal yield are evident in all scenarios, but these fluctuations are within historical variations." For the 2080s, Parry et al. (2005) provide projections specific to Africa – but not northern Africa specifically, stating that climate change could reduce cereal yields by up to 30%. Importantly, the changes in cereal yield projected for the 2020s and 2080s are driven by GHG-induced climate change and likely do not fully capture interannual precipitation variability which can result in large yield reductions during dry periods, as the IPCC (Christensen et al., 2007) states: "…there is less confidence in the ability of the AOGCMs (atmosphere-ocean general circulation models) to generate interannual variability in the SSTs (sea surface temperatures) of the type known to affect African rainfall, as evidenced by the fact that very few AOGCMs produce droughts comparable in magnitude to the Sahel droughts of the 1970s and 1980s." Given the different scopes of the two analyses, it is misleading to state that the Parry et al. projections are inconsistent with the Agoumi (2003) yield projections.

The Hulme et al. (2001) study, which reviews observed (1900–2000) and possible future (2000–2100) continent-wide changes in temperature and rainfall over Africa, is also not ignored by the IPCC, contrary to the assertion of the petitioner. In fact, it is cited twice in IPCC's Working Group II Chapter 9 on Africa (Boko et al., 2007):

- Hulme et al. (2001) is cited in a statement about the complexity of African climatology: "Other factors that complicate African climatology include dust aerosol concentrations and sea-surface temperature anomalies, which are particularly important in the Sahel region (Hulme et al., 2001; Prospero and Lamb, 2003) and southern Africa (Reason, 2002), deforestation in the equatorial region (Semazzi and Song, 2001; Bounoua et al., 2002)…"

- Hulme et al. (2001) is also cited in a statement pertaining to uncertainties in precipitation projections in the western Sahel (Boko et al., 2007): "For the western Sahel (10 to 18°N, 17.5°W to 20°E), there are still discrepancies between the models: some projecting a significant drying (e.g., Hulme et al., 2001; Jenkins et al., 2005) and others simulating a progressive wetting with an expansion of vegetation into the Sahara (Brovkin, 2002; Maynard et al., 2002; Claussen et al., 2003; Wang et al., 2004; Haarsma et al., 2005; Kamga et al., 2005; Hoerling et al., 2006)."

These examples demonstrate that the IPCC both cited Hulme et al. (2001) and transparently discussed the complexity of Africa's climate and the uncertainty in African climate projections. This treatment is appropriate and reasonable, contrary to the petitioner's implication.

Even in light of the complexities and uncertainties, Hulme et al. (2001) state that a "warming climate will nevertheless place additional stresses on water resources [in Africa], whether or not future rainfall is significantly altered" and they project reduced precipitation over Tunisia. Hulme et al. (2001) do not, however, provide projections for changes in cereal yields (from changes in rain-fed agriculture), so their results cannot be compared directly with Agoumi (2003) or its supporting documents (discussed in Response 2-12).

Overall, the IPCC does not ignore either the Parry et al. (2005) or Hulme et al. (2001) studies. The findings of these studies, while not directly comparable with Agoumi (2003), are broadly consistent. Hulme et al. (2001) project increased drying over northern Africa while Parry et al. (2005) project an increased risk of reduced cereal yields over all of Africa. The petitioner's claim that IPCC was not careful or acted inappropriately in this regard is not confirmed by careful review of the material.

2.1.8 Summary

The small number of real or alleged errors in the IPCC report is not materially relevant for EPA's Endangerment Finding. Neither of the two errors that are verifiable (the percentage of the Netherlands below sea level and the projections for Himalayan glaciers) is relevant to the United States and neither is contained within EPA's endangerment record. Although it is unfortunate when any error occurs, two errors in a nearly 3,000-page study are not evidence of a complete breakdown of the IPCC's review process, contrary to petitioners' suggestions.

The remaining alleged errors or unsupported statements have not been shown to be erroneous and can be traced to findings in the gray literature from which they were derived. As discussed further in Subsection 2.2.4.4 in this volume and previously in Volume 1 of the RTC, the IPCC provides guidance on how and when to use gray literature, and petitioners do not demonstrate that the guidance was not followed. There is no de facto assumption that all gray literature is incorrect or suspect, and an examination of the instances raised by petitioners demonstrates that the specific allegations of petitioners are unfounded. Furthermore, the statements at issue drawn from the gray literature have no material relevance to conclusions supporting EPA's Findings, as explained in RTP Subsection 2.1.1.

In conclusion, the evidence cited by petitioners does not undermine the overall credibility and reliability of the scientific conclusions relied upon and underlying EPA's Endangerment Finding.

2.2 Claims That the IPCC Has a Policy Agenda and Is Not Objective and Impartial

2.2.1 Overview

Several petitioners argue that the e-mails from the University of East Anglia's Climatic Research Unit (CRU), and other information that has arisen since publication of the Endangerment Finding, show that a select group of influential authors who wrote, contributed to, or reviewed parts of IPCC assessment reports (or the studies on which the assessment reports were based) were not objective and impartial while developing the reports. Several petitioners also argue that the CRU e-mails confirm that the IPCC and some of its authors and reviewers have a policy agenda and are tailoring the science to suit that agenda. The petitioners allege that the e-mails show that the peer-review and report development processes employed by the IPCC are "fundamentally corrupt," lack scientific integrity, are policy prescriptive, and do not yield "true" consensus conclusions regarding the state of the science. The petitioners request that EPA reconsider its reliance on the IPCC assessment reports that were used as the basis for the Endangerment Finding.

As discussed in detail below, after reviewing the petitioners' arguments, EPA finds that the evidence and arguments provided by petitioners do not support their conclusion that the peer-review and assessment report processes employed by the IPCC were "fundamentally corrupt" and policy prescriptive. Further, the petitioners' arguments, which for the most part rely on selective use of the CRU e-mails, misinterpretations of the e-mails, and quotations from press articles, do not show that either the IPCC peer-review and report development processes were inadequately designed or that they were not implemented properly. We note that several of the petitioners' arguments are not new; many of these comments were submitted and responded to in the process of developing the Findings.

2.2.2 Background

Several petitioners criticize the IPCC's report development and peer-review procedures. We respond specifically to each allegation in the sections that follow. EPA received similar comments during notice and comment on the Endangerment Findings. In Volume 1 of the RTC document, we responded in detail to these comments, describing the IPCC's report development and peer-review procedures. However, to provide context for evaluating the merit of these more recent allegations, in this background section we revisit the structure and procedures employed by the IPCC in developing their reports.

In response to the allegations raised against it, the IPCC released the following statement in December 2009 describing their report development process from beginning to end (IPCC, 2010a).

> The assessment process begins with a Scoping Meeting attended by scientific experts whose task it is to outline the report. The IPCC Bureau selects the experts attending the Scoping Meeting after an open call for nominations to Governments and IPCC observer organizations. The Bureau consists of experts elected by an IPCC Plenary composed of all WMO and UNEP member nations. The outline is then approved by Working Group

Sessions and endorsed by the Plenary. A call for nominations of authors for the report is sent out to Governments and observer organizations. The individual Working Group Bureaus select the authors for respective contributions to the Assessment Report, ensuring that the composition of the author teams reflects a range of views, scientific expertise and geographical diversity. Over the ensuing 3-4 years, writing teams collaborate on drafting chapters – including four Lead Author meetings, plus chapter meetings as necessary. The author teams prepare two externally reviewed drafts and then a final version of their respective chapters. All chapters undergo a rigorous writing and open review process to ensure consideration of all relevant scientific information from established journals with robust peer review processes or from other sources which have undergone robust and independent peer review. Additional procedures are provided for information found in sources that have not been published or peer-reviewed. In these cases, authors and chapter teams should critically assess and review the quality and validity of each source before incorporating results.

The First Order Draft is subject to a formal Expert Review, where any expert is encouraged to comment on all aspects of the draft, including, but not limited to, issues of interpretation, missed literature, and presentation. Author teams must make a written response, explaining how they responded to each comment in developing the next draft. A Second Order Draft is compiled based on the comments received during the Expert Review. This draft undergoes a second combined formal Expert and Government Review. Author teams have to react to the second round of review comments as well and prepare the final draft, taking into account all the comments received. The entire review process is overseen by a team of 2-3 independent Review Editors for each chapter, whose role is limited to overseeing the reviews, ensuring the thoroughness of the responses. All the AR4 review comments and responses by the author teams are available online (IPCC, 2006a).

In parallel, the Summary for Policymakers and the Technical Summary are prepared by authors selected from chapter writing teams. The Summary for Policymakers and the Technical Summary undergo a formal Expert and Government Review and are revised based on the review comments. Again, 2-3 Review Editors oversee the review process for the Technical Summary. The Summary for Policymakers is then distributed to the Governments for final comment. The Summary for Policymakers undergoes a line-by-line approval process by Governments during a multi-day meeting. The Governments must reach consensus before text is approved. After the Working Group Session approves the Summary for Policymakers, the IPCC Plenary then accepts the entire underlying Report (including the individual chapters and Technical Summary).

To ensure objectivity, transparency, and information quality, the IPCC's report development procedures (IPCC, 1999) clearly describe the roles and responsibilities of coordinating lead authors, lead authors, contributing authors, expert reviewers, and review editors in report development. It states:

1. LEAD AUTHORS
Function:
To be responsible for the production of designated sections addressing items of the work program on the basis of the best scientific, technical and socio-economic information available.
Comment:
Lead Authors will typically work as small groups which have responsibility for ensuring that the various components of their sections are brought together on time, are of uniformly high quality and conform to any overall standards of style set for the document as a whole.

The task of Lead Authors is a demanding one and in recognition of this the names of Lead Authors will appear prominently in the final Report. During the final stages of Report preparation, when the workload is often particularly heavy and when Lead Authors are heavily dependent upon each other to read and edit material, and to agree to changes promptly, it is essential that the work should be accorded the highest priority.

The essence of the Lead Authors' task is synthesis of material drawn from available literature as defined in Section 4.2.3. Lead Authors, in conjunction with Review Editors, are also required to take account of expert and government review comments when revising text. Lead Authors may not necessarily write original text themselves, but they must have the proven ability to develop text that is scientifically, technically and socio-economically sound and that faithfully represents, to the extent that this is possible, contributions by a wide variety of experts. The ability to work to deadlines is also a necessary practical requirement. Lead Authors are required to record in the Report views which cannot be reconciled with a consensus view but which are nonetheless scientifically or technically valid.

Lead Authors may convene meetings with Contributing Authors, as appropriate, in the preparations of their sections or to discuss expert or government review comments and to suggest any workshops or expert meetings in their relevant areas to the Working Group/Task Force Bureau Co-Chairs. The names of all Lead Authors will be acknowledged in the Reports.

2. COORDINATING LEAD AUTHORS
Function:
To take overall responsibility for coordinating major sections of a Report
Comment:
Coordinating Lead Authors will be Lead Authors with the added responsibility of ensuring that major sections of the Report are completed to a high standard, are collated and delivered to the Working Group/Task Force Bureau Co-Chairs in a timely manner and conform to any overall standards of style set for the document.

Coordinating Lead Authors will play a leading role in ensuring that any crosscutting scientific or technical issues which may involve several sections of a Report are addressed in a complete and coherent manner and reflect the latest information available.

The skills and resources required of Coordinating Lead Authors are those required of Lead Authors with the additional organizational skills needed to coordinate a section of a Report. The names of all Coordinating Lead Authors will be acknowledged in the Reports.

3. CONTRIBUTING AUTHORS
Function:
To prepare technical information in the form of text, graphs or data for assimilation by the Lead Authors into the draft section.
Comment:
Input from a wide range of contributors is a key element in the success of IPCC assessments, and the names of all contributors will be acknowledged in the Reports. Contributions are sometimes solicited by Lead Authors but unprompted contributions are encouraged.

Contributions should be supported as far as possible with references from the peer reviewed and internationally available literature, and with copies of any unpublished material cited; clear indications of how to access the latter should be included in the contributions. For material available in electronic format only, the location where such material may be accessed should be cited. Contributed material may be edited, merged and if necessary, amended, in the course of developing the overall draft text.

4. EXPERT REVIEWERS
Function:
To comment on the accuracy and completeness of the scientific/technical/socio-economic content and the overall scientific/technical/socio-economic balance of the drafts.
Comment:
Expert reviewers will comment on the text according to their own knowledge and experience. They may be nominated by Governments, national and international organizations, Working Group/Task Force Bureau, Lead Authors and Contributing Authors.

5. REVIEW EDITORS
Function:
Review Editors will assist the Working Group/Task Force Bureau in identifying reviewers for the expert review process, ensure that all substantive expert and government review comments are afforded appropriate consideration, advise lead authors on how to handle contentious/controversial issues and ensure genuine controversies are reflected adequately in the text of the Report.
Comment:
There will be one or two Review Editors per chapter (including their executive summaries) and per technical summary. In order to carry out these tasks, Review Editors will need to have a broad understanding of the wider scientific and technical issues being addressed. The workload will be particularly heavy during the final stages of the Report preparation. This includes attending those meetings where writing teams are considering

> the results of the two review rounds. Review Editors are not actively engaged in drafting Reports and cannot serve as reviewers of those chapters of which they are Authors. Review Editors can be members of a Working Group/Task Force Bureau or outside experts agreed by the Working Group/Task Force Bureau. Although responsibility for the final text remains with the Lead Authors, Review Editors will need to ensure that where significant differences of opinion on scientific issues remain, such differences are described in an annex to the Report. Review Editors must submit a written report to the Working Group Sessions or the Panel and where appropriate, will be requested to attend Sessions of the Working Group and of the IPCC to communicate their findings from the review process and to assist in finalizing the Summary for Policymakers, Overview Chapters of Methodology Reports and Synthesis Reports. The names of all Review Editors will be acknowledged in the Reports.

In implementing these procedures across the three working groups of the IPCC's AR4, 1,250 scientists (450 lead authors and more than 800 contributing authors) from 130 countries served as authors and more than 2,500 experts provided over 90,000 review comments. Many petitioners specifically critique the practices employed by IPCC Working Group I, for which there were 152 lead authors and 26 review editors from 32 countries, in which 6,000 peer-reviewed publications were cited, for which 625 experts from 42 countries provided over 30,000 review comments, and for which the Summary for Policymakers was approved line by line by 113 countries. Furthermore, the petitioners specifically critique the practices employed by Chapter 6 (Jansen et al., 2007) authors and reviewers of Working Group I, which had two coordinating authors and 14 lead authors from 12 countries, 33 contributing authors from nine countries, and two review editors who oversaw the handling of more than 2,900 comments from the rounds of expert and governmental review. The petitioners also critique the practices employed by Chapter 9 (Hegerl et al., 2007) authors and reviewers of Working Group I, which had two coordinating authors and seven lead authors from nine countries, 44 contributing authors from 12 countries, and three review editors who oversaw the handling of about 2,600 comments from the rounds of expert and governmental review.

The IPCC processes have been developed for the express purpose of ensuring integrity and avoiding any possibility of bias in the conclusions drawn from the scientific literature. The level of detail and clarity of the requirements—especially concerning report review, the specific responsibilities of review editors to assess the quality of author responses to comment, and the transparency of the record of comments and responses—provide the foundation for ensuring that the reports are credible and sound.

The IPCC's peer-review and report development processes are very important components of the overall integrity, quality, transparency, and objectivity of its reports. As stated in the TSD (U.S. EPA, 2009) for the Endangerment Finding, EPA relied on the assessment literature because:

> they 1) are very recent and represent the current state of knowledge on GHG emissions, climate change science, vulnerabilities, and potential impacts; 2) have assessed numerous individual, peer-reviewed studies in order to draw general conclusions about the state of science; 3) have been reviewed and formally accepted, commissioned, or in some cases

authored by U.S. government agencies and individual government scientists; and 4) they reflect and convey the consensus conclusions of expert authors.

Finally, we note the following recent IPCC statement regarding their report development process:

> The IPCC procedures, which are regularly reviewed and amended by the IPCC members, have served the international community effectively for over 20 years. The conclusions of the IPCC assessment reports, and especially the Fourth Assessment Report, are as solid as careful science can make them. They reflect the current state of knowledge about one of the most complex and important of all topics -- climate change science (IPCC, 2010b).

2.2.3 Responses to Arguably New Objections Raised by the Petitioners

The petitioners submit four arguably "new" objections along with excerpts from the CRU e-mails related to: 1) authorship and reviewer roles among IPCC personnel; 2) an e-mail allegedly showing that IPCC authors were aware that citing their own papers could be seen as using the IPCC process to advance their own views rather than to present a neutral overview of the science; 3) allegations that the IPCC is a biased organization, including claims that IPCC lead authors encouraged other authors to focus on policy-prescriptive science; and 4) allegations that IPCC authors forced consensus and altered the contents of the assessment reports to eliminate any suggestion of non-consensus. We respond to each of these allegations in the subsections below.

2.2.3.1 Allegations of Inappropriate Authorship and Reviewer Roles Among IPCC Personnel

Comment (2-16):
Peabody Energy argues that the CRU e-mails show inappropriate authorship roles in the development of Chapter 6 ("Paleoclimate") of Working Group I's contribution to AR4 (Jansen et al., 2007). The petitioner alleges that Michael Mann (Penn State) and Thomas Crowley (University of Edinburgh) contributed significantly to the development of the chapter, but were not listed as contributing authors. In addition, the petitioner alleges that Mann and Crowley were inappropriately given the opportunity to comment on drafts of the chapter outside the formal review process, thereby compromising their objectivity as reviewers and introducing bias to the chapter development process.

Response (2-16):
EPA has reviewed the petitioners' submissions and finds that the evidence and arguments they provide do not support the conclusions they draw. The content of the e-mails does not show that Michael Mann or Thomas Crowley contributed substantially to the writing or key development decisions of Chapter 6 (Jansen et al., 2007), or that they introduced any bias. Chapter 6 assesses paleoclimatic data and knowledge of how the climate system changes over inter-annual to millennial time scales and how well these variations can be simulated with climate models.

- On December 23, 2004, Michael Mann wrote to Keith Briffa (Chapter 6 lead author) and stated, "Thanks again for your phone call, and the (informal) opportunity to help out where I can. I'm perfectly happy in that role (as an informal contributor and a formal reviewer, for example), if you and Peck, for example, are both comfortable with that." [2] He also sent some website links regarding arguments that some have made against his work. In a follow-up e-mail that same day[3], Mann again writes to Briffa, stating "I went ahead and tried to make some constructive comments on what you sent…Let me say I think it's shaping up very nicely--looks like it should be a significant improvement on the '01 report. You've handled the various controversies and points of dispute delicately and adeptly…I made a dozen or so minor comments--please make use of them as you see fit…Thanks again for including me in and giving me an opportunity to comment." [4]

  These e-mails show that Mann served as an informal contributor on a preliminary draft of Chapter 6 (Jansen et. al, 2007), and the IPCC's response to comments document for Chapter 6 confirm that Mann was also a formal reviewer (IPCC, 2006a). The petitioners allege that Mann could not have objectively reviewed the chapter if he also provided information for its development, but these e-mails do not show that Mann "significantly contributed" to the development of this chapter. In fact, the evidence provided by the petitioner indicates that Mann participated at most in a limited way as an informal contributor, providing a small amount of information, such as Web links, to the authors. This level of involvement would not warrant being listed as a contributing author, as Mann was involved neither with assessing the underlying literature nor with writing text for the chapter. The IPCC does not require informal contributors of this nature to be acknowledged as authors in the final report. There is no basis to conclude that listing him as an author would have changed the content or conclusions of the chapter in any way. There is also no basis to conclude that his comments were biased or lacked objectivity, or that the resulting chapter was biased or lacked objectivity. The fact that Mann provided the Chapter 6 authors with a limited amount of information does not mean that his objectivity was compromised during the formal review process. Petitioners appear to conclude otherwise, but nothing they provide supports drawing such a broad conclusion. Finally, we note that the petitioner does not provide any examples of Mann's review comments on this chapter that they claim demonstrate bias or lack of objectivity.

- Several e-mails from June and July of 2005 (e-mail files 1122300990.txt[5], 1121869083.txt[6], and 111886641.txt)[7] show that Thomas Crowley was consulted by Keith Briffa and Jonathan Overpeck (Chapter 6 coordinating lead author) regarding a medieval warming figure that Crowley had been developing, which Briffa and Overpeck

[3] E-mail file 1102956436.txt, (December 13, 2004), page 763, line 13 of PDF version entitled: CRU Emails 1996-2009.pdf
[3] E-mail file 1103828684.txt, (December 23, 2004), page 771, line 37 of PDF version entitled: CRU Emails 1996-2009.pdf
[4] E-mail file 1103828684.txt, (December 23, 2004), page 771, line 37 of PDF version entitled: CRU Emails 1996-2009.pdf
[5] E-mail file 1122300990.txt, (July 25,2005), page 952, line 33 of PDF version entitled: CRU Emails 1996-2009.pdf
[6] E-mail file 1121869083.txt, (July 20,2005), page 916, line 42 of PDF version entitled: CRU Emails 1996-2009.pdf
[7] E-mail file 1118866419.txt, (June 15,2005), page 889, line 32 of PDF version entitled: CRU Emails 1996-2009.pdf

were possibly interested in using for Chapter 6. There is no evidence in the e-mails that Crowley helped write or develop the chapter in any other capacity. In fact, the e-mails simply document an interaction between the lead authors and Crowley, in which the authors are seeking clarification regarding a particular figure. Such inquiries are completely appropriate and in no way compromise the objectivity and credibility of that chapter's development. It appears that Crowley provided useful background and advice on the use of his figure, and the e-mails provide no support that he contributed significant text or had any editorial power over the chapter.

Given the technical nature of this field of climate science, it is reasonable and expected that IPCC authors might require detail or clarification regarding some of the underlying studies. Therefore they might need to consult the authors of specific studies to better understand how the results were achieved or to ask questions regarding how the data were applied, as was the case in this situation. Petitioners have not explained how the mere fact that this type of correspondence occurred between Crowley and Briffa/Overpeck lead to the conclusion that bias was introduced to the chapter development process. The evidence provided by the petitioner does not support this argument.

- In the same set of e-mails, Crowley also states, "I am not sure whether it is wise to add me to the CA [contributing author] list, just because the reviewer is supposed to be impartial and a CA loses that appearance of impartiality if he has now been included as a CA - may want to check with Susan S. on this one to be sure - still happy to provide advice." The petitioner alleges that Crowley's e-mail signifies that he knew of the risk of compromising objectivity and did so anyway by both contributing significantly to the chapter's development and being an expert reviewer. The evidence provided by the petitioner does not show that Crowley participated in any manner beyond having a limited role in answering questions concerning a figure he had developed, or that his doing so compromised his objectivity as a reviewer. The petitioners do not, for example, provide any examples of his review comments on this chapter that they claim demonstrate bias or lack of objectivity. As stated above, IPCC does not require informal contributors to be acknowledged in the final report. The petitioners' evidence does not show that Crowley's informal contribution and correspondence with the Chapter 6 authors led to improper and erroneous changes or conclusions in the report. Furthermore, after the exchange of these e-mails, Overpeck wrote: "Thanks for moving this forward and making sure we do it right (i.e., without any bias, or perception of bias)".[8] This demonstrates that the coordinating lead author understood IPCC's guidelines, ensured that they were properly implemented, and therefore avoided any lack of or lapse in objectivity.

The petitioner draws broad conclusions from these e-mails about the intentions of the authors and the content of the IPCC chapters, in an attempt to discredit overall the chapter development and review processes of the IPCC, and implicitly the IPCC reports themselves. However, the e-mails cited show that Mann and Crowley had very limited, informal roles in the chapter and the

[8] E-mail file 1121869083.txt, (July 20, 2005), page 918, line 8 of PDF version entitled: CRU Emails 1996-2009.pdf

e-mails provide no evidence to support assertions of bias or a lack of objectivity. The interactions that occurred are allowable under IPCC procedures, and petitioners have not demonstrated that the events in question changed the content or conclusions of the chapter in any way.

The Muir Russell investigative panel summarized information Briffa gave them on this issue, describing Briffa as having said (Russell, 2010):

> There is no proscription in the IPCC rules to prevent the author team seeking expert advice when and where needed. The Technical Support Unit (TSU) and the CLAs of Chapter 6 agree that the author team was allowed to seek such advice. Copies of communications from both CLAs (Jansen and Overpeck) and the IPCC WG1 TSU are provided by Briffa (and published on the website) to provide support to Briffa's claim that his actions did not contravene IPCC procedures.

Even if the petitioner's allegations that Mann and Crowley "significantly contributed" to the development of Chapter 6 were true—which we do not believe to be the case—and even if this contribution were atypical, this does not lead to the conclusion that the scientific integrity of the conclusions from the chapter was compromised. The evidence provided by petitioners does not indicate errors or significant changes that resulted from involvement of these persons, and does not demonstrate that the final product was either inaccurate or lacked impartiality, nor does the petitioner to any such result. We find that Chapter 6 was developed in an objective manner, is accurate, and represents the best available scientific information.

Comment (2-17):
Peabody Energy argues that the CRU e-mails show that IPCC lead authors "viewed their work as advocacy, rather than scientific analysis, which could be marshaled against opponents." In support of this argument, the petitioner provides a February 2005 e-mail from Michael Mann to Phil Jones, which states "I saw the paleo draft (actually I saw an early version, and sent Keith some minor comments). It looks very good at present--will be interesting to see how they deal w/ the contrarian criticisms--there will be many. I'm hoping they'll stand firm (I believe they will--I think the chapter has the right sort of personalities for that)."

Response (2-17):
The petitioner's interpretation of the e-mail statement is unfounded. The e-mail from Michael Mann[9] describes his reaction to a preliminary draft of a Medieval Warm Period (MWP) section of Chapter 6 ("Palaeoclimate") of Working Group I's contribution to the AR4 (Jansen et al., 2007). First, it is important to note that Michael Mann and Phil Jones were neither lead nor contributing authors for Chapter 6, as the petitioner implies. Therefore, any allegations that Mann and Jones used their authorship authority to advocate against critics of Chapter 6's findings are unfounded. For our response to allegations that Michael Mann had a significant role in the development of Chapter 6, please see Response 2-16 in this section. Moreover, the e-mail does not support the petitioner's allegation that Mann and Jones were viewing their work as "advocacy" to use "against opponents." Rather, Mann is simply stating his opinion regarding

[9] E-mail file 1107454306.txt, (Feb. 3, 2005), page 821, line 44 of PDF version entitled: CRU Emails 1996-2009.pdf

how the paleoclimate chapter should be written and that he looked forward to seeing how the Chapter 6 authors dealt with criticisms. At no point does Mann suggest that the scientific findings be manipulated to support a pre-determined view. It is clear that he is merely expressing his hope for how the authors will respond to comments they (not Mann) are tasked with addressing.

Comment (2-18):
The State of Texas argues that the IPCC scientists who wrote the CRU e-mails "wielded tremendous authority over the IPCC." In support of their argument, the petitioners state, "For example, AR4 cites Dr. Jones's work 38 times in 21 chapters of two Working Groups, Mann is cited 27 times in 7 chapters of two Working Groups, Briffa is cited 23 times in 9 chapters of two Working Groups, Wigley is cited 66 times in 18 chapters of all three Working Groups, Overpeck is cited 15 times in 5 chapters of two Working Groups, Osborn is cited 30 times in 10 chapters of two Working Groups, Trenberth is cited 58 times in 18 chapters of two Working Groups, and Santer is cited 26 times in 8 chapters of two Working Groups, just to name a few." The petitioner goes on to argue that "Thus, to the extent their objectivity, impartiality, truthfulness, and scientific integrity are compromised or in doubt, so too is the objectivity, impartiality, truthfulness, and scientific integrity of the IPCC report, the CRU temperature data, the NOAA [National Oceanic and Atmospheric Administration] temperature data, and other scientific research that is shown to have relied on their compromised research."

Response (2-18):
Many of the scientists who wrote the CRU e-mails were and still are important figures in the field of climate change science. It is important to note that the statistics provided by the petitioner regarding how frequently the studies of these scientists (e.g., Phil Jones and Michael Mann) were cited in AR4 are neither surprising nor unreasonable. The IPCC AR4 (IPCC, 2007a) cited over 18,000 peer-reviewed studies. Therefore these statistics (e.g., "Wigley is cited 66 times in 18 chapters of all three Working Groups, Overpeck is cited 15 times in 5 chapters of two Working Groups") do not support the petitioner's allegation that these studies were cited too frequently and that these scientists therefore "wielded tremendous authority over the IPCC." These scientists are some of the most well-published climate scientists in the world, and their work was synthesized across the three Working Group reports of the AR4. We conclude that these facts by themselves demonstrate nothing other than the fact that the IPCC, as intended, is assessing available, peer-reviewed literature. The simple fact that these individuals are well-published and that their studies are cited in AR4 does not imply "tremendous authority." The petitioner provided no additional evidence to support their allegation.

As explained in Section 2.2.2 (Background) of this Volume, over 1,250 scientists from 130 countries served as authors for the AR4. It was these hundreds of authors who had the authority to assess the available literature, summarize the state of the science, and reference the studies in the AR4. The IPCC has robust procedures to ensure that the assessment reports are objective, unbiased, and represent the state of the science regarding climate change. These procedures include processes to ensure that no one individual or group of individuals exerts disproportionate influence in developing any piece of the assessment reports. Further, as addressed in the specific responses in Section 2.2.3.1 of this Volume, the evidence provided by the petitioners does not show that these procedures were flawed or improperly implemented. For more information on

these procedures, please see Volume 1, Section 1, of the RTC document and this section (2.2) of the RTP document.

The mere fact that someone is frequently cited is also not evidence for the petitioners' argument. The petitioner must also demonstrate that the referenced literature is biased or flawed, which they have not done, as compared to the straightforward view that the studies produced by these scientists are very robust and of high quality. The petitioner is making allegations without giving due regard for the content of the actual science, which we thoroughly reviewed in the Endangerment Finding's RTC documents and again in the response to both the new and previously submitted comments of the petitioners.

Please see the Denial and Volume 1 of the RTP document for our response to specific allegations regarding what the CRU e-mails mean for the objectivity and integrity of the IPCC assessments, the CRU temperature data, the NOAA temperature data, and other research that is based on this information.

Comment (2-19):
Peabody Energy argues that "An IPCC chapter author should not peer review journal articles that he intends to include in his chapter because of the clear conflict of interest. The chapter author is supposed to be providing a neutral summary of the science, not advancing his own view of the science. If the chapter author reviews papers that are then included in his chapter, he could be seen as advancing his own agenda both in his review of the paper and its selection for inclusion in the IPCC report." To support their argument, the petitioner provides a July 2005 e-mail from Phil Jones to John Christy that states, "I am reviewing a couple of papers on extremes, so that I can refer to them in the chapter for AR4. Somewhat circular, but I kept to my usual standards"[10]. The petitioner goes on to state that "Jones reviewed papers so that he could get them published and therefore could refer to them in AR4 Chapter 3. The petitioner concludes that "this is indeed 'circular' and violates his supposed neutrality both as an AR4 author and as a reviewer of the paper." As additional support, Peabody Energy references another e-mail dated May 20, 2005, from Phil Jones to Michael Mann regarding Jones' review of a temperature reconstruction paper for *Climatic Change*.[11] The petitioner states: "One wonders just how unbiased Jones' review of this paper really was, particularly in light of Jones' admission that he applied less than stringent review standards to papers that he favored."

Response (2-19):
First, we find it unconvincing and unclear why, according to the petitioner, an author of an IPCC chapter should not serve as a peer reviewer of a journal paper that in turn may be incorporated into that IPCC chapter. Thus, we disagree with the petitioner's allegations that Phil Jones introduced bias and reviewed these papers unobjectively in an effort to advance his own views of the science. Jones did not appoint himself to review the papers for the journals, but was selected

[10] E-mail file 1120593115.txt, (July 5, 2005), page 906, lines 21-22 of the PDF version entitled: CRU Emails 1996-2009.pdf

[11] E-mail file 1116611126.txt, (May 20, 2005), page 882, line 45 of the PDF version entitled: CRU Emails 1996-2009.pdf

by an independent editor to be a reviewer based on his experience and expertise related to climate science. Since Jones is well-published and a prominent paleoclimate scientist, it is reasonable and logical to conclude that the editor who chose him was aware of his work on the AR4 and judged that it was not an inherent conflict of interest. In addition, Jones would not have been the only reviewer for those studies. Typically, between two and four independent experts are selected to review manuscripts. Therefore, Jones would not have had the authority or power to coerce or bias the process to "advance his own agenda." The petitioner is inferring that Jones was trying to do this, but provides no evidence that Jones' actions resulted in papers being unjustly published when they should not have been, or papers being unjustly cited in the AR4 when they should not have been.

The petitioner's claim that an e-mail between Jones and Mann represents an "admission that he [Jones] applied less than stringent review standards to papers that he favored" is also unsupported by evidence. Rather, the petitioner misinterprets and misrepresents Jones' e-mail to Michael Mann regarding Jones' review of a temperature reconstruction paper for *Climatic Change*. This e-mail sent on May 20, 2005, reads:

> Mike,
> Just reviewed Caspar's [Amman, of the National Center for Atmospheric Research] paper with Wahl [Eugene Wahl of the National Climatic Data Center] for Climatic Change. Looks pretty good. Almost reproduced your series and shows where MM [Steve McIntyre, formerly of Northwest Exploration Co., and Ross McKitrick of the University of Guelph] have gone wrong. Should keep them quiet for a while. Also they release all the data and the R software. Presume you know all about this. Should make Keith's life in Ch 6 easy! Also, confidentially for a few weeks, Christy and Spencer [John Christy and Roy Spencer of the University of Alabama in Huntsville] have admitted at the Chicago CCSP meeting that their 2LT record is wrong!! They used the wrong sign for the diurnal correction! Series now warms - not quite as much as the surface but within error bands. Between you and me, we'll be going with RSS in Ch 3 and there will be no discrepancy with the surface and the models. Should make Ch 3 a doddle now! Keep quiet about this until Bern at least. Can tell you more then. RSS (Carl Mears and Frank Wentz) found the mistake! The skeptic pillars are tumbling!
> Cheers Phil[12]

Despite the allegations by the petitioner, this e-mail shows no indication that Jones' review of the Ammann and Wahl paper for *Climatic Change* was biased or that he did not employ rigorous standards of objectivity and neutrality in evaluating the merits of the studies. The e-mail simply indicates that Jones approved of the findings by the authors and that he found the results to have important implications regarding the validity of temperature reconstructions. The petitioner is significantly skewing the meaning of these e-mails and misrepresenting what Jones said to infer improper conduct in his review of the paper.

[12] E-mail file 1116611126.txt, (May 20, 2005), page 882, lines 6-15 of the PDF version entitled: CRU Emails 1996-2009.pdf

Finally, the evidence provided by Peabody Energy does not support their allegation that Jones was biased or failed to objectively assess the available literature for the AR4 as a result of having reviewed these papers. From our review of the evidence, we conclude only that Jones reviewed the studies and that he was also an author for Chapter 3 ("Observations: Surface and Atmospheric Climate Change") of Working Group I's contribution to the AR4 (Trenberth et al., 2007). For that chapter, over 65 authors from 16 countries were tasked with reviewing and assessing the best available science regarding observed climate change and distilling this information into key messages that capture the state of knowledge. Once again, Jones would not have had the authority or power to coerce or bias the process to "advance his own agenda" by developing conclusions that do not represent the state of the science. Chapter 3, like all of the AR4, went through multiple rounds of expert and government review, in which more than 3,400 comments were received and addressed, to ensure that the conclusions accurately represent and summarize the best available science. The large number of authors, the multiple rounds of expert and government reviews, and the detailed approval process are all deliberate procedures developed by the IPCC to ensure that the reports maximize objectivity, credibility, and quality. See Section III.A of the Findings, Volume 1 of the RTC document and Section 2.2.2 (Background) of the RTP document for more information on the IPCC's report development procedures.

2.2.3.2 Allegations That Citing One's Own Papers Compromises Objectivity

Comment (2-20):
Peabody Energy states that IPCC authors cited their own papers extensively in the AR4, which invalidates the purpose of these assessment reports, which are designed to objectively look across the literature and convey the state of the science. The petitioner cites an e-mail by Jonathan Overpeck from June 2005[13] as evidence that allegedly "reveals that the IPCC authors were aware that citing their own papers could be seen as using the IPCC process to advance their own views rather than to present a neutral overview of the science." The petitioner further provides a statistic regarding the frequency at which the authors of Chapter 9 of Working Group I of AR4 cited their own papers: "About 40% of the papers cited in Chapter 9 were written by Chapter 9 authors."

Response (2-20):
It should come as no surprise that many papers by Chapter 9 authors were cited in the chapter. IPCC authors are chosen in part based on their expertise on a particular subject and the degree to which they have published recent, high-quality papers in the field. Moreover, in some areas (e.g., medieval warming period analysis, ocean acidification), there can be limited studies outside the research published by particular scientists, including IPCC authors, on which to base summaries of the science. Contrary to the petitioner's allegations, this does not mean that IPCC authors were not providing neutral and objective summaries of the science. In fact, the petitioner provides no evidence that the practice of citing one's own papers led to biased conclusions in the AR4. Given the rigor of the IPCC review process, described in Section 2.2.2 (Background) of this Volume, it is indeed highly unlikely that an author's improper citation of his or her own work would escape notice.

[13] E-mail file 1120014836.txt, (June 28, 2005), page 900, line 32 of the PDF version entitled: CRU Emails 1996-2009.pdf

Moreover, the e-mail from Jonathan Overpeck (coordinating lead author of Chapter 6 of Working Group I's contribution to the AR4), does not support the petitioner's assumption of misconduct, and instead shows that Overpeck was encouraging the authors of that chapter to *minimize* citing their own papers to the extent possible, and to only do so when "absolutely necessary." Overpeck's awareness that the authors "citing their own papers could be seen as using the IPCC process to advance their own views rather than to present a neutral overview of the science" does not mean that such citation actually was for the alleged improper purpose—especially when the e-mail demonstrates that Overpeck intentionally took steps to avoid impropriety, or even the appearance of impropriety. The evidence provided by petitioners does not show that the authors cited their own studies in order to advance their own policy views; in fact, it shows they were cautioned to avoid citing their own studies except where absolutely necessary and appropriate. The full text of Overpeck's e-mail is provided here:

> Hi all - thanks Fortunat and Stefan for more debate on the 1470. Sounds like the final decision is up to Eystein, but I can guess the way he's thinking. With regard to refs - remember that our goal is to cut the number of references significantly. Since this is an assessment and not a review, we can delete all but the most recent and comprehensive references. I don't like cutting out the original refs any more than you, but we just don't have room, and its more important to have text than exhaustive references. Our colleagues will hopefully understand, and if they don't then they need to do an ego check. It's more important that we make an impact with policy makers rather than with citation indices. Does this make sense? In any case, please help make sure we trim the total references DOWN in number by a significant number. This is not happening [to] the degree it should. Also, please not[e] that in the US, the US Congress is questioning whether it is ethical for IPCC authors to be using the IPCC to champion their own work/opinions. Obviously, this is wrong and scary, but if our goal is to get policy makers (liberal and conservative alike) to take our chapter seriously, it will only hurt our effort if we cite too many of our own papers (perception is often reality). PLEASE do not cite anything that is not absolutely needed, and please do not cite your papers unless they are absolutely needed. Common sense, but it isn't happening. Please be more critical with your citations so we save needed space, and also so we don't get perceived as self serving or worse. Again, we can debate this if anyone thinks I've gone off the deep end.
> Thanks, peck
> PS - this is not to say anything critical of the refs Fortunat is suggesting - we must cite the most relevant papers, and we must be as up to date as possible.[14]

Regarding the statistics submitted, the petitioner has not provided any evidence that the Chapter 9 authors cited their own studies more frequently than would be appropriate given the number of peer-reviewed and published studies on this particular climate science topic (understanding and attributing climate change in the case of Chapter 9), and the statistics alone, without context, prove nothing. More than 50 authors from 15 different countries contributed to the development of Chapter 9. Given the large number of perspectives and the wide-ranging expertise of this group, it is not surprising that 40% of the papers were written by the chapter's authors. Contrary

[14] E-mail file 1120014836.txt, (June 28, 2005), page 901, line 13 of the PDF version entitled: CRU Emails 1996-2009.pdf

to the petitioner's allegations, and consistent with the IPCC's report development guidelines as described in Volume 1 of the RTC document, the statistics provided by the petitioner show that the most qualified and experienced personnel contributed to the development of this chapter. When read in full, Overpeck's email clearly shows that he was taking deliberate actions to ensure that the science was presented in an objective and unbiased manner.

We note that the petitioners do not provide or reference any studies that they say should have been included instead. Importantly, petitioners again fail to show how the allegedly irregular practice that they challenge resulted in conclusions that are inaccurate or contrary to the consensus science.

2.2.3.3 Allegations That IPCC Is Biased

Comment (2-21):
The Competitive Enterprise Institute, the Southeastern Legal Foundation, the State of Texas, and the Ohio Coal Association argue that Jonathan Overpeck, the coordinating lead author for Chapter 6 ("Palaeoclimate") of Working Group I's contribution to the AR4, encouraged contributing authors to focus on findings that are most policy relevant (thereby, according to the petitioners, "supporting preconceived" assessments of the science), and that he did not encourage open and neutral presentations of the science. The petitioners draw this conclusion from an e-mail written by Overpeck and Eystein Jansen (the other coordinating lead author) to the lead and contributing authors for Chapter 6, which states, "With respect to text, try hard to get it down to size, and to ensure that it is FOCUSED on only that science which is policy relevant. ALL TEXT should support an Exec Summary Bullet"[15].

[15] E-mail file 1121392136.txt, (July 14, 2005), Page 912, Line 35 of PDF version entitled: CRU Emails 1996-2009.pdf.

Response (2-21):
The Overpeck/Jansen e-mail to Chapter 6 authors indicates that he encouraged them to focus on the findings that are most policy relevant. However, "policy relevant and compelling" does not mean or imply "policy prescriptive," as alleged by the petitioners. "Policy relevant" means the neutral and objective presentation of scientific, technical, and socio-economic factors that are relevant to the issues or policies that policymakers care about. This is to be contrasted with other issues that are less relevant to policymakers and thus less appropriate for these types of assessment reports, which aim to objectively and thoroughly synthesize scientific information to support development of informed policies. "Policy relevant" is completely different from "policy prescriptive," which refers to the presentation of scientific information with the aim of advancing a particular public policy agenda.

The e-mail from Overpeck and Jansen does not support petitioners' conclusion that they were being policy prescriptive. There is no indication that authors were encouraged to limit their contributions only to findings that supported a particular policy agenda. Rather, it shows the opposite: they were encouraged to avoid this and to provide policy relevant information that would be of use to policymakers as they consider the various possible policies. We further note that the petitioners do not identify information in Chapter 9 that is "policy prescriptive," or provide any information on what policies Overpeck and Jansen were purportedly advancing.

As the IPCC clearly states on its website regarding its mission statement, the organization reviews and assesses the most recent scientific information to produce assessment reports that are "policy relevant and policy neutral, never policy prescriptive" (IPCC, 2010c). The petitioners' evidence does not show that the IPCC failed to execute this very important principle. The petitioners' allegations and implications do not call into question the integrity of these IPCC authors. Finally, we note (as described in Volume 1 of the RTC document) that the official expert and government reviews of the summary for policymakers for each working group (IPCC, 2007c, 2007d, 2007h) further ensure that the reports are *not* policy prescriptive.

Comment (2-22):
Peabody Energy argues that the contents of several CRU e-mails from August 2005[16] between Jonathan Overpeck, Tim Osborn, and Keith Briffa show that the authors for Chapter 6 of Working Group I's contribution to the AR4 (Jansen et al., 2007) were focusing not on the presentation of "neutral science" but rather on "presenting a strong case."

Response (2-22):
The full content of the e-mails at issue is important for understanding what the authors were actually saying.

[16] E-mail file 1123268256.txt, (August 5, 2005), page 963, line 29 of PDF version entitled: CRU Emails 1996-2009.pdf; e-mail file 1123513957.txt, (August 8, 2005), page 964, line 25 of PDF version entitled: CRU Emails 1996-2009.pdf

E-mail from Overpeck to Osborn and Briffa on Monday, August 5, 2005
Hi Tim and Keith - Hope you're not going to kill me, but I was talking with Susan Solomon today, and she impressed me with the need to make several points if we can. One issue (other to come in a subsequent email) is whether we can extend the MWP box figure to include the 15th century. I don't read the blogs that regularly, but I guess the skeptics are making hay of their being a global warm event around 1450AD. I agree w/ Susan that it is our obligation to weigh in on issues like this, so.... can we extend the fig to extend up to 1500AD? Sorry about this, Tim. Of course we need it yesterday. Thanks x10**6 best, peck[17]

E-mail from Osborn and Briffa to Overpeck on Monday, August 8, 2005
Hi Peck, there is a period around 1400 AD when the proxy records we've used in this MWP figure do indicate a warm period - and all records show positive anomalies at the same time. Thus it couldn't/shouldn't be dismissed in the same way as the MWP, as a period of disparate regional behaviour, albeit with more records showing warming than cooling. For 1400, all indicate warming but with smaller magnitude than the 20th century. If the figure were extended to cover the 15th century, then it would also seem necessary to extend it to the present so that the 1400 period could be compared with the 20th century. I've attached 3 versions of the figure. 850-1350 as originally sent. 850-1500 showing warm anomaly in 1400, but cannot tell how warm relative to present-day. 850-2000 showing 1400 was not as anomalous as present-day. Take your pick, Peck! Cheers Tim and Keith[18]

E-mail from Overpeck to Osborn and Briffa on Monday, August 8, 2005
Hi Tim - Decisions, decisions... thanks so much for taking the initiative. I think - for the reason you state, we should go for the one that includes the 20th century. We make clear that these are not reconstructed temp, but normalized anomalies - this keeps us out of some trouble. But, I think the main message is that we're looking at this issue from every angle. And, we're letting others see the issue from every angle. It adds punch. this means that the MWP box needs to talk about the period around 1400 - can you make sure that's on Keith's radar screen. I believe that historians talk about the Medieval Period going to at least 1450, so what the heck... I you can adjust the caption to work, and then send both it and the final fig to Øyvind, me and Eystein that would be good - make sure Keith is ok with it all first, too. Thanks Tim! Best, Peck[19]

These e-mails describe a conversation between the three scientists in which they are deciding the most appropriate timeframe for a particular set of graphics depicting normalized temperature anomalies. From our review, the context for the e-mails in question is that Susan Solomon (of NOAA, and serving as the co-chair of IPCC Working Group I) wanted to ensure that the views

[17] E-mail file 1123268256.txt, (August 5, 2005), page 963, line 29 of PDF version entitled: CRU Emails 1996-2009.pdf.
[18] E-mail file 1123513957.txt, (August 8, 2005), page 964, line 25 of PDF version entitled: CRU Emails 1996-2009.pdf.
[19] E-mail file 1123513957.txt, (August 8, 2005), page 964, line 43 of PDF version entitled: CRU Emails 1996-2009.pdf.

of various climate change scientists were addressed in AR4. She was clearly trying to acknowledge and respond to their concerns, even to the point of reading blogs to better understand their arguments when there was no peer-reviewed literature articulating their points. In response, Jonathan Overpeck, Tim Osborn, and Keith Briffa discussed a number of options for presenting their data on normalized temperature anomalies: first extending the timeline to 1500 A.D. to address the concerns with data around 1450 A.D., then extending the timeline to the present day to provide even more context for these early data. They discussed and ultimately decided to modify the graphic to depict the relationship of the MWP to the 20th century because that approach would provide important context for understanding current temperature trends, it would be "looking at this issue from every angle. And, we're letting others see the issue from every angle." There is no evidence of bias in this decision. Their presentation of various options for the graphic demonstrates their commitment to considering alternative viewpoints and thoroughness in assessing the science. The e-mails speak for themselves and show no inappropriate behavior among these individuals. We disagree with the petitioner that these e-mails indicate that the scientists were trying to present science that is not neutral or were motivated by a desire to present a "strong case" rather than to present the best science. We further note that this graphic went through expert and governmental review and was deemed appropriate for inclusion in the IPCC chapter. The petitioner provided no additional evidence beyond the text of the e-mails to further justify this allegation.

Thus, these e-mails do nothing more than indicate that three scientists were trying to present a figure that was comprehensive and offered key contextual information on temperature trends over the past several centuries. There is nothing inappropriate or biased about that, and the petitioner has not provided evidence suggesting that there was. When examined in their full context, the e-mails do not indicate any wrongdoing by the three scientists or support the petitioner's claims.

Comment (2-23):
In support of their argument that the IPCC is a politicized and biased organization, the Competitive Enterprise Institute provided a quote from the Environment Minister of India in which he responds to the incorrect IPCC conclusion of disappearing glaciers by announcing that India is forming its own independent climate change review panel that will not depend on IPCC reports. The Minister stated that "There is a fine line between climate science and climate evangelism. I am all for climate science but not for climate evangelism. I think people misused the IPCC report" (Indo-Asian News Service, 2010).

Response (2-23):
See Subsection 2.1.3 in this Volume of the RTP document for EPA's responses regarding the validity of the IPCC's Himalayan glacier projection and our conclusion that this error does not undermine the IPCC's broader findings and the technical support for endangerment.

With respect to the implications of the statements from the Indian Environment Minister, Jairam Ramesh, they clearly show that he disagreed with the specific IPCC Himalayan glacier projection that has been identified as being an error. His statement indicates that he thought that the projection was inappropriately developed based on inconclusive science. As described in Subsection 2.1.3, the IPCC's overall assessment of observed glacier loss, projected glacier loss,

and the impacts of glacier loss on water resources in the Himalayas was not compromised by this single faulty projection. Numerous studies cited by the IPCC document a general decline in Himalayan glacier mass, project substantial future declines, and discuss the impacts of these changes on water resources and society, which is consistent with the conclusions drawn by the IPCC.

The evidence provided by the petitioner appears to mischaracterize the Minister's position. The Minister did not make any statements that support the petitioner's allegation that the IPCC is biased or politicized. Rather, the Minister expressed his disapproval of the incorrect glacier projections and stated that India needed to perform its own research related to this issue and other climate change impacts in the country. Specifically, the Minister stated (Indo-Asian News Service, 2010):

> I respect the IPCC. At the same time India is a large country... we can't depend only on IPCC. So we have launched the Indian Network on Comprehensive Climate Change Assessment... It's got 125 research institutions from across the country. We will have international collaborations. It's a kind of an Indian IPCC and not a rival to the IPCC. We will do our own assessment.

It is not uncommon for countries to undertake their own climate change assessments, and it is misleading for the petitioner to imply that the Minister's statements represent a lack of faith in the IPCC. Finally, even if the statements by the Minister were to be stretched and interpreted as a comment about the IPCC as a politicized organization, it would be the view of one representative of one country and would not represent the official position of the 194 countries that participate in the IPCC. The fact that another country chooses to complement the IPCC with another assessment process has no implications for the Endangerment Finding. For example, the United States has its own climate change science assessment process that is administered by the USGCRP, and this body has provided excellent and robust information.

Comment (2-24):
The Competitive Enterprise Institute and Ohio Coal Association argue that the IPCC is "not a scientific organization," that people in the organization realize it is not, and that the IPCC is a political "organization that reviews and reports science that support its goals." In support of their argument, the petitioner provided a quote from *The Guardian* (a UK newspaper) which in turn quoted Anton Imeson, a former IPCC Working Group II author:

> The Nobel prize was for peace not science ... government employees will use it to negotiate changes and a redistribution of resources. It is not a scientific analysis of climate change… For the media, the IPCC assessments have become an icon for something they are not. To make sure that it does not happen again, the IPCC should change its name and become part of something else. The IPCC should have never allowed itself to be branded as a scientific organization.

Response (2-24):
The quote provided by the petitioner comes from a newspaper article in *The Guardian* (Adam and Goldenberg, 2010), not a scientific journal or a comprehensive review of the IPCC. Imeson

was one of 10 lead authors for Chapter 1 ("Assessment of Observed Changes and Responses in Natural and Managed Systems") of Working Group II's contribution to the AR4 (Rosenzweig et al., 2007). He is presenting an opinion, not a scientific evaluation, and is one of more than 1,250 authors from 130 countries that wrote the AR4 with him. It appears that Imeson is concerned about potential policy implications of the IPCC reports, namely that governments may use the IPCC reports to "redistribute resources." He does not provide a specific scientific critique, but rather a critique of how governments and the media characterize the IPCC reports and government policy direction.

The evidence provided by the petitioner does not show that Imeson's views are shared by other IPCC authors. To evaluate the merits and credibility of Imeson's statements, one must look at the principles governing the IPCC's work, and the organization's established procedures for the preparation, review, acceptance, adoption, approval, and publication of the assessment reports. In addition, it is also important to assess how these principles and procedures were implemented in developing the AR4. EPA has conducted such assessments; they are described in detail in Section III.A of the Findings; Volume 1, Sections 1 and 5, of the RTC document; Appendix A of Volume 1 of the RTC document; and this section of the RTP document. Ultimately, one author's sentiments about how the IPCC's key findings may be used do not provide us with evidence indicating wrong-doing.

Comment (2-25):
The Southeastern Legal Foundation and the State of Texas argue that since the comment period closed, it has been revealed in the press that the chairman of the IPCC, Rajendra K. Pachauri, has multiple potential conflicts of interest. As support for their argument, the petitioners reference a *Daily Telegraph* (UK newspaper) article published on December 20, 2009, titled "Questions over business deals of UN climate change guru Dr. Rajendra Pachauri" (Booker and North, 2009). The article, along with several other newspaper blogs and articles referenced by the petitioners, allege that Pachauri's connections with various corporations, along with consulting services provided to some of these companies, have generated conflicts of interest and resulted in biased and compromised IPCC reports. The Southeastern Legal Foundation further states:

> It is remarkable how only very recently has the staggering scale of Dr Pachauri's links to so many of these concerns come to light, inevitably raising questions as to how the world's leading "climate official" can also be personally involved in so many organizations which stand to benefit from the IPCC's recommendations.

Similarly, the State of Texas argues:

> Pachauri's conflicts of interest weaken the Endangerment Finding. Dr. Pachauri's conflicts of interest indicate that the IPCC is being led toward a conclusion that climate change is a dire threat to the planet that must be reversed; a conclusion that would enrich Dr. Pachauri and the entities that employ him. Consequently, EPA has relied on an assessment that ensures bias and imbalance, a result that EPA claims to want to avoid.

Response (2-25):
Rajendra Pachauri is the elected, unpaid chairman of the IPCC. The IPCC chairmanship requires expertise and experience in climate change science and policy. The chairperson is elected based on this level of expertise and experience. As a result, it is difficult to imagine that a qualified candidate would not have connections and interactions with various academic, science, political, and business communities. Having such connections is not, in and of itself, evidence of conflict of interest in the development of the assessment reports. The petitioners insinuate that Pachauri's professional connections with various companies constitute conflicts of interest, yet they did not provide any evidence that Pachauri's outside activities generated conflicts of interest or violated any ethics rules of the World Meteorological Organization or the U.N. Environment Programme. In fact, in the interest of transparency, Dr. Pachauri has made available his tax returns and details regarding the honorariums and payments from his consulting activities. Further, it appears that the auditing firm KPMG examined his personal finances and found that all such payments were made to The Energy and Resources Institute, an Indian non-governmental organization chaired by Dr. Pachauri (Harvey, 2010).

Most importantly, the petitioners' argument that these consulting activities led to biased, imbalanced, and compromised IPCC assessments is completely unsupported by evidence. The petitioners do not provide a single example of a scientific conclusion that was somehow influenced by Dr. Pachauri's alleged conflicts of interest. The Endangerment Finding must and does rest on strong science, not innuendo and speculation of the sort provided by the petitioners. See Sections 2.2.2 and 2.2.3 in this volume of the RTP document, which address our view that the IPCC's procedures are sufficient to ensure that no one individual—including the IPCC chairman—or group of individuals can exert disproportionate influence in developing any piece of the assessment reports. The IPCC has robust procedures to ensure that the assessment reports are objective, are unbiased, and represent the state of the science regarding climate change. Thus, EPA has no reason to conclude, and there is no evidence to suggest, that Pachauri's professional connections influenced the IPCC reports in any way.

Comment (2-26):
The State of Texas argues that EPA's RTC document insufficiently addressed comments on the Administrator's consideration of studies that disagreed with the assessment literature. Specifically, the petitioner stated:

> In response to public comments suggesting that the Administrator should have included studies that disagreed with the Endangerment Finding, EPA notes that "IPCC, USGCRP/CCSP [the U.S. Global Change Research Program/Climate Change Science Program], and NRC [National Research Council] make considerable effort to ensure that their assessment reports reflect a balance of perspectives regarding the state of the science." To support that response, EPA quotes a National Academies report noting that the NRC screens all "provisional committee members . . . in writing and in a confidential group discussion about possible conflicts of interest.... [N]o individual can be appointed to serve (or continue to serve) on a committee of the institution used in the development of reports if the individual has a conflict of interest that is relevant to the functions to be performed." Thus, EPA identifies the National Academies' prohibition on conflicts of interest as a means of ensuring that the Endangerment Finding is balanced and unbiased.

Response (2-26):
We responded to this issue in Response 1-2 of Volume 1 of the RTC document, and we find that our response to public comments on this issue was sufficient, detailed, and responsive. The petitioner misrepresents EPA's actual response, which we provide again here to put the petitioner's allegation in perspective.

Comment (1-2):
A number of commenters (3324.1, 3394.1, 3429.1, 3440.1, 3481.1, 3533.1, 3579.1, 3596.1, 3707.1, 3747.1, 3764.1, 3915, 4509, 5716, 8624, 10197, 10948, and 11335) argue that the Administrator did not reference any documents in her decision-making process that offered alternative views on the scientific basis for causes of climate change. Commenters recommend that EPA provide a more complete discussion of global warming science by using information outside the assessment literature, including studies that do not support its conclusions and studies submitted to the docket through the public comment period for the Proposed Findings.

Response (1-2):
We disagree that the Administrator did not consider alternative views on climate change science and impacts. Such a contention incorrectly implies that all individual studies reviewed and incorporated into the assessments of U.S. Global Change Research Program (USGCRP), U.S. Climate Change Science Program (CCSP), Intergovernmental Panel on Climate Change (IPCC), and National Research Council (NRC) support uniform conclusions on the different elements of greenhouse gas (GHG) and climate change science, and that the many thousands of studies reviewed and reflected in these major assessment works represent a narrow view of GHG and climate change science. In fact, these assessment reports look at the range of the scientific literature without "cherry-picking" and it is EPA's conclusion that by placing primary reliance on the major assessment reports, we have ensured that the determinations are based on reports that have considered and weighed all views. EPA relied on the major peer-reviewed assessment reports in developing the TSD (U.S. EPA, 2009) precisely to avoid an over-reliance on and narrow consideration of individual studies and to ensure that the Administrator's decision would be based on a comprehensive assessment of the scientific literature. EPA has determined that the approach taken provided the high level of transparency and consistency outlined by EPA's *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by the Environmental Protection Agency.*

Regarding the recommendation that EPA provide a more comprehensive discussion and consideration of global warming science and literature that is representative of "alternative views," we have done this through our review of comments and literature submitted, the associated revision of the TSD, and the development of the eleven volumes of the Response to Comments document. See Section III.A. of the Findings, "The Science on Which the Decisions Are Based," for our response to comments on the use of the assessment literature and previous responses in this section regarding our treatment of new and additional scientific literature provided through the public comment

process. For EPA's responses to comments and literature provided on specific climate science issues in the TSD, please refer to the appropriate Response to Comment volumes.

Finally, we note that IPCC, USGCRP/CCSP, and NRC make considerable effort to ensure that their assessment reports reflect a balance of perspectives regarding the state of the science. We note that the CCSP report *Guidelines for Producing CCSP Synthesis and Assessment Products* state that the reports should "identify disparate views that have significant scientific or technical support" (CCSP, 2004). We refer commenters to Appendix B of this volume for the full listing of these *Guidelines*. Further, NRC (National Academies, 2006) report development procedures state that:

> [C]areful steps are taken to convene [report development] committees that meet the following criteria:
> *An appropriate range of expertise for the task.* The committee must include experts with the specific expertise and experience needed to address the study's statement of task. One of the strengths of the National Academies is the tradition of bringing together recognized experts from diverse disciplines and backgrounds who might not otherwise collaborate. These diverse groups are encouraged to conceive new ways of thinking about a problem.
>
> *A balance of perspectives*. Having the right expertise is not sufficient for success. It is also essential to evaluate the overall composition of the committee in terms of different experiences and perspectives. The goal is to ensure that the relevant points of view are, in the National Academies' judgment, reasonably balanced so that the committee can carry out its charge objectively and credibly.
>
> *Screened for conflicts of interest.* All provisional committee members are screened in writing and in a confidential group discussion about possible conflicts of interest. For this purpose, a "conflict of interest" means any financial or other interest which conflicts with the service of the individual because it could significantly impair the individual's objectivity or could create an unfair competitive advantage for any person or organization. The term "conflict of interest" means something more than individual bias. There must be an interest, ordinarily financial, that could be directly affected by the work of the committee. Except for those rare situations in which the National Academies determine that a conflict of interest is unavoidable and promptly and publicly disclose the conflict of interest, no individual can be appointed to serve (or continue to serve) on a committee of the institution used in the development of reports if the individual has a conflict of interest that is relevant to the functions to be performed."

We refer commenters to Appendix C of this volume for more information on NRC report development process. In addition, please see response to comments below regarding the IPCC report development process and procedures for ensuring a balance of perspectives.

Petitioners reference only a small part of our response in their allegations. Our full response and the record for the Endangerment Finding demonstrate that the Administrator thoroughly

considered a range of studies, including those that disagree with the conclusions of the assessment literature.

2.2.3.4 Allegations That IPCC Lead Authors Forced Consensus and Suppressed Dissenting Views

Comment (2-27):
The Southeastern Legal Foundation, the State of Texas, Peabody Energy, the Competitive Enterprise Institute, and the Ohio Coal Association argue that the CRU e-mails (in particular an e-mail from Phil Jones to Michael Mann expressing their disapproval of two new studies authored by Stephen McIntyre and Ross McKitrick) reveal that the contents of the IPCC reports, in this case Chapter 3 of the AR4 Working Group I report (Trenberth et al., 2007), were altered to eliminate any suggestion of non-consensus on key issues. Petitioners claim that this occurred so as to support a specific policy agenda, and that dissenting views were not given appropriate attention and consideration. The petitioners also argue that a group of authors have actively tried to suppress external challenges to consensus.

Response (2-27):
Although the petitioners draw broad conclusions of unethical and biased conduct from the e-mail between Phil Jones and Michael Mann, this e-mail does not show that the two IPCC authors acted unethically, or that they took any actions to suppress dissenting views, as alleged by the petitioners. The e-mail at issue was sent on July 8, 2008, and states:

> Mike,
> Only have it in the pdf form. FYI ONLY - don't pass on. Relevant paras are the last 2 in section 4 on p13. As I said it is worded carefully due to Adrian knowing Eugenia for years. He knows the're wrong, but he succumbed to her almost pleading with him to tone it down as it might affect her proposals in the future ! I didn't say any of this, so be careful how you use it - if at all. Keep quiet also that you have the pdf. The attachment is a very good paper - I've been pushing Adrian over the last weeks to get it submitted to JGR or J. Climate. The main results are great for CRU and also for ERA-40. The basic message is clear - you have to put enough surface and sonde obs into a model to produce Reanalyses. The jumps when the data input change stand out so clearly. NCEP does many odd things also around sea ice and over snow and ice. The other paper by MM is just garbage - as you knew. De Freitas again. Pielke is also losing all credibility as well by replying to the mad Finn as well - frequently as I see it. I can't see either of these papers being in the next IPCC report. Kevin and I will keep them out somehow - even if we have to redefine what the peer-review literature is!
> Cheers Phil[20]

The e-mail shows that Phil Jones strongly disapproved of the quality of the two studies[21] and that he did not deem them to be of sufficient quality and credibility for inclusion in an IPCC

[20] E-mail file 1089318616.txt, (July 8, 2008), Page 720, Line 46 of PDF version entitled: CRU Emails 1996-2009.pdf
[21] The paper Jones refers to by "MM" was McKitrick and Michaels (2004). It is not clear what the second paper is, however it was possibly De Laat and Maurellis (2006).

assessment report. In addition, both of the papers were in fact included in the IPCC assessment report. The "MM" study (McKitrick and Michaels, 2004) is referenced in the IPCC chapter, and assuming that the second study Jones referred to is De Laat and Maurellis (2006), that was included as well. This disproves the allegations of the petitioners that this e-mail is evidence that dissenting views were suppressed or that the IPCC assessment report was biased by such efforts. For example, these two studies are discussed in Chapter 3 (Trenberth et al., 2007):

> McKitrick and Michaels (2004) and De Laat and Maurellis (2006) attempted to demonstrate that geographical patterns of warming trends over land are strongly correlated with geographical patterns of industrial and socioeconomic development, implying that urbanization and related land surface changes have caused much of the observed warming.

Thus, the events surrounding the citation of the McKitrick and Michaels (2004) and De Laat and Maurellis (2006) studies provide stronger support for the proposition that the IPCC assessed and cited critical literature than for the petitioners' view that these events demonstrate that the IPCC is biased.

The e-mail between Jones and Mann, which is the only evidence offered by petitioners to support this allegation, simply does not show that either 1) the contents of this chapter, let alone all of the IPCC assessment reports, were altered to eliminate a suggestion of nonconsensus, or 2) IPCC authors actively tried to suppress external challenges to consensus. It is not uncommon for scientists to disagree with the work of others, and this e-mail does not provide evidence that Phil Jones or any other IPCC author acted unethically or took actions to suppress dissenting views, notwithstanding the loose talk in the e-mail.

Our conclusion regarding this e-mail is consistent with the findings of the Independent Climate Change E-mails Review investigation, which concluded "that it is not uncommon for strongly opposed and robustly expressed positions to be taken up in heavily contested areas of science. We take the view that such behaviour does not in general threaten the integrity of peer review or publication." The final report of the investigation also stated that the panel has "not found any direct evidence to support the allegation that members of CRU [in this case Phil Jones] misused their position on IPCC to seek to prevent the publication of opposing ideas"(Russell, 2010). On this issue, Brian Hoskins, one of three review editors for Chapter 3, provided statements to the Independent Climate Change E-mails Review that were summarized in the panel's report as stating (Russell, 2010):

> Hoskins confirmed that Las [lead authors], working individually and as small groups, were responsible for the collation and primary assessment of material relevant to the topics for which they were responsible. The CLAs [convening lead authors] led the plenary meetings of the writing team prior to production of each of the drafts, led the process of overall collation of the Chapter material and the production of the initial drafts of the First and Second Draft Reports and the Final Draft Report of the Chapter. These drafts were discussed and agreed during plenary meetings of the whole writing team.

> There were a very large number of comments from reviewers, of which a majority were from a relatively small group. The Review Editors made sure that they were all given proper consideration, and that they were either responded to by a change in the text or by an adequate reason for omission that was recorded in the author responses to expert and governmental review comments. Hoskins, as a Review Editor, took part in the Chapter 3 plenary discussions and ensured that conflicting views were addressed.
>
> Led by the two CLAs, Jones and Trenberth, the writing team for Chapter 3 was assiduous in dealing with comments. Hoskins was very impressed by Jones' attention to detail, and the rigor of the Chapter 3 process.
>
> The levels of confidence and uncertainty reflected in the drafts were based on the consensus of a group of CLAs and LAs who were chosen for their expertise and experience in relevant fields. Irrespective of whether a paper is published in a peer reviewed journal, it is the responsibility of the whole team to assess whether a paper's conclusions are robust and to justify whether its arguments should carry weight in the assessment. These decisions for each draft were taken in plenary sessions of the whole team. Hoskins said that it is inconceivable that a paper making significant claims relevant to the work of IPCC and the Chapter 3 team would not be considered by the team as a whole. The basis for rejecting one of the papers that is a focus of the allegation is included in IPCC records. Decisions about the inclusion of the MM2004 [McKitrick and Michaels] paper would have been taken by the whole team. Jones' voice would have been one amongst many.

The petitioners do not present scientific evidence or argument showing that the IPCC assessment is inaccurate or that it does not appropriately reflect the degree of scientific consensus on the issues discussed. The petitioner's broad conclusion that this is the case is unsupported by evidence or arguments on the science and assessment literature itself. Finally, we note that the science regarding this issue was raised in the comment period for the Endangerment Finding and responded to in Response 2-29 of the RTC document. Response 2-29 states:

> "In the case of de Laat and Maurellis (2006) and an earlier paper by McKitrick and Michaels (2004), IPCC (Trenberth et al., 2007) assessed these papers and noted that the locations of greatest socioeconomic development coincided with those most warmed by atmospheric circulation changes, which are not limited to urban areas but rather have large-scale coherence. When this is taken into account, IPCC concludes that the correlation of warming with industrial and socioeconomic development ceases to be statistically significant."

Comment (2-28):
The Southeastern Legal Foundation argues:

> The so-called "science" of global warming has been conducted in an ideologically charged environment, such that any possibility of giving due regard to dissenting views was foreclosed at the outset. Thus, the conclusions of organizing bodies, especially IPCC, cannot be said to reflect scientific "consensus" in any meaningful sense of that word. Instead, they reflect a political movement that has commandeered science to the service of its agenda. This is "post-normal science": the long-dreaded arrival of deconstructionism to the natural sciences, according to which scientific quality is determined not by its fidelity to truth, but by its fidelity to the political agenda. A leading climate scientist and contributor to the IPCC, Mike Hulme, has called the IPCC "a classic example" of "post normal science."

The petitioner further asserts:

> Post-normal science was defined by Eva Kunseler, in her paper "Towards a new paradigm of Science" as follows: A new concept of science was introduced by Funtowicz and Ravetz during the 1990s…The concept of post-normal science goes beyond the traditional assumptions that science is both certain and value-free…The exercise of scholarly activities is defined by the dominance of goal orientation where scientific goals are controlled by political or societal actors…Scientists' integrity lies not in disinterestedness but in their behaviour as stakeholders."(Kunseler, 2007)

Response (2-28):
We first note that this allegation that the IPCC's work does not represent objective scientific assessment but is motivated by a political agenda is not new. The petitioner is rehashing an argument previously submitted during public comment on the proposed endangerment finding. We responded to numerous comments received regarding the scientific integrity and objectivity of the IPCC's processes in developing its assessment reports in Volume 1, Section 1, of the RTC document.

We note that the evidence submitted by the petitioner—consisting of a newspaper op-ed by Mike Hulme in *The Guardian* (Hulme, 2007) and the definition of "post-normal science" from a non-peer-reviewed essay by Eva Kunseler (Kunseler, 2007)—are not new; they were both developed in 2007. Therefore, it was not impracticable to raise the objection during the public comment period and the reasons for the objection did not arise between June 24, 2009, and February 16, 2010. The petitioner could have raised this comment during the comment period on the proposed Endangerment Finding. The petitioner has not shown why it would have been impractical to do so.

In addition, the evidence does not support the petitioner's allegation that the science behind climate change has been developed in a biased and "ideologically charged environment." The petitioner mischaracterizes Hulme's discussion of post-normal science and defines what he meant by "post-normal science" with the use of an unrelated paper by Eva Kunseler that has

nothing to do with climate change. This is an excerpt of the relevant part of Hulme's op-ed in *The Guardian* newspaper:

> That science is an unfolding process of discovery is fairly self-evident. The more we seem to know, the more questions we seem to need answering. Some avenues of scientific inquiry may close off, but many new ones open up. We know a lot more about climate change now than 17 years ago when the first IPCC scientific assessment was published. And no doubt in another 17 years our knowledge of how the climate system works and the impact that humans have made on it will be significantly different to today. Yet it is important that on big questions such as climate change scientists make an assessment of what they know at key moments when policy or other collective decisions need to be made. Today is such a time. But our portrayal of the risks of climate change will always be provisional, subject to change as our understanding advances. Having challenges to this unfolding process of discovery is essential for science to thrive, as long as those challenges play by the methodological rule book that science has painstakingly written over many generations of experience.
>
> The other important characteristic of scientific knowledge - its openness to change as it rubs up against society - is rather harder to handle. Philosophers and practitioners of science have identified this particular mode of scientific activity as one that occurs where the stakes are high, uncertainties large and decisions urgent, and where values are embedded in the way science is done and spoken. It has been labelled "post-normal" science. Climate change seems to fall in this category. Disputes in post-normal science focus as often on the process of science - who gets funded, who evaluates quality, who has the ear of policy - as on the facts of science.

Hulme's discussion of post-normal science presents his opinion about how societal values and policy decisions intersect with the practice of science. His statement does not say or imply that post-normal science means that "a political movement [has] commandeered science to the service of its agenda," nor does he state that climate change is a "classic example of post-normal science." In contrast, Hulme stresses that science is a "process of discovery" that thrives on challenges that "play by the methodological rule book that science has painstakingly written over many generations of experience." This is clearly not a statement about science being controlled by politics, nor a statement that politics have prevented climate change scientists from giving "due regard to dissenting views," as the petitioner asserts.

Even if Hulme did claim an overly "ideologically charged environment," this would only represent the opinion of one person among numerous scientific fields comprising an immense number of scientists, institutions, assessment bodies, and governmental organizations. This evidence, presented as a conclusion with no supporting evidence and with no scientific explanation of the errors that resulted, would not come close to undermining the credibility and quality of the findings of the assessment literature. As described in this volume, and Volume 1 of the RTC document for the Endangerment Finding, the assessment literature upon which EPA based the Endangerment Finding has robust processes and procedures to ensure that the best available scientific information is reviewed and assessed, with checks and balances included to

produce high-quality, unbiased reports. We respond to specific objections raised by petitioners regarding the implementation of the IPCC procedures throughout Section 2.2 of this volume.

We also note that we considered and responded to multiple perspectives and views of climate science in the RTC document for the Endangerment Finding, and considered and responded again to the various perspectives of the petitioners here in the RTP document and in the Denial. As discussed extensively in our responses, the IPCC and the USGCRP also considered alternative views in their assessment processes. See Volume 1 of the RTC document and Section 2.2.2 (Background) of this Volume of the RTP document for a discussion of these report development processes.

We have reviewed the petitioner's arguments and materials and do not find that they support the allegations that the IPCC was co-opted by politics and biased against dissenting views. The balance of the scientific literature represented in the assessment reports on climate change, of which the IPCC is one, clearly supports the Administrator's findings.

Comment (2-29):
The Ohio Coal Association and the Coalition for Responsible Regulation argue that the CRU e-mails "demonstrate that climate scientists felt pressured to present a unified front - and an agreed-upon narrative of global warming - even when there was not one." Both petitioners reference an e-mail from Keith Briffa to Michael Mann which states: "I tried hard to balance the needs of the science and the IPCC, which were not always the same." Also, as evidence to support their argument, the Coalition for Responsible Regulation provides a letter to the IPCC from Christopher Landsea, a former IPCC author, in which he states that he could not "in good faith continue to contribute to a process that I view as both being motivated by preconceived agendas and being scientifically unsound" (Landsea, 2005).

Response (2-29):
Seeing the entire content of the e-mails cited by the petitioner is important to place the first issue raised by petitioners in context:

> E-mail from Mann to Briffa on Sunday, April 29, 2007
> Keith, just a quick note to let you know I've had a chance to read over the key bits on last millennium in the final version of the chapter, and I think you did a great job. obviously, this was one of the most (if not the most) contentious areas in the entire report, and you found a way to (in my view) convey the the[sic] science accurately, but in a way that I believe I will be immune to criticisms of bias or neglect--you dealt w/ all of the controversies, but in a very even-handed and fair way. bravo! I hope you have an opportunity to relax a bit now. Looking forward to buying you a beer next time we have an opportunity :) mike[22]

> E-mail from Briffa to Mann on Sunday, April 29, 2007
> Mike your words are a real boost to me at the moment. I found myself questioning the whole process and being often frustrated at the formulaic way things had to be done -

[22] E-mail file 1177890796.txt, (April 29, 2007) page 1310, line 44 of PDF version entitled: CRU Emails 1996-2009.pdf

> often wasting time and going down dead ends. I really thank you for taking the time to say these kind words. I tried hard to balance the needs of the science and the IPCC, which were not always the same. I worried that you might think I gave the impression of not supporting you well enough while trying to report on the issues and uncertainties. Much had to be removed and I was particularly unhappy that I could not get the statement into the SPM [Statement for Policymakers] regarding the AR4 reinforcement of the results and conclusions of the TAR [Third Assessment Report]. I tried my best but we were basically railroaded by Susan. I am happy to pass the mantle on to someone else next time. I feel I have basically produced nothing original or substantive of my own since this whole process started. I am at this moment, having to work on the ENV submission to the forthcoming UK Research Assessment exercise, again instead of actually doing some useful research! Anyway thanks again Mike.... really appreciated when it comes from you
> very best wishes
> Keith[23]

These two e-mails were written after the release of the Working Group I report of AR4 (IPCC, 2007e). Michael Mann writes an e-mail showing his approval of the final version of Chapter 6 ("Paleoclimate") of Working Group I report (Jansen et al., 2007) and to congratulate Briffa on the accomplishment. Keith Briffa responds to show his appreciation for Mann's e-mail; he explains some of the challenges and difficulties he encountered while finalizing the chapter and getting it through the ultimate stages of review. As stated in Section 2.2.2 (Background) and Response 2-16 above, Chapter 6 had two convening authors and 14 lead authors from 12 countries, 33 contributing authors from nine countries, and two review editors who oversaw the handling of more than 2,900 comments from the rounds of expert and governmental review. It is perfectly understandable and reasonable that Briffa, who was one of the 14 lead authors, would have been frustrated by some of the challenges in examining all of the available scientific literature on topics related to paleoclimate (whether or not it agrees with the dominant paradigms and whether or not it has yet stood the test of time compared to other studies that have considered the topic), putting that literature in context through a process of assessment, distilling the information into key messages that capture the state of knowledge at the time of the assessment, addressing all of the expert and government reviews, and developing key points for the summary for policymakers. Briffa's e-mail does not support the petitioner's allegation that he "felt pressured to present a unified front - and an agreed-upon narrative of global warming - even when there was not one." The petitioner is taking Briffa's statement that he "tried hard to balance the needs of the science and the IPCC, which were not always the same" completely out of context and making unsupported allegations. Although he describes some frustrations with the challenges of the IPCC's rigorous and robust report development procedures, Briffa's e-mail does not indicate that he was not satisfied with the final version, that he did not agree with the conclusions, nor that he felt pressured in any way to "present a unified front."

The e-mails in question also reveal that the process of scientific assessment is personally and professionally challenging because scientists who volunteer their time are taken away from their

[23] E-mail file 1177890796.txt, (April 29, 2007) page 1310, line 24 of PDF version entitled: CRU Emails 1996-2009.pdf

own research and must sideline their own personal views of what should and should not be included in the reports. In fact, Michael Mann compliments Keith Briffa's objectivity and even-handedness in handling the challenges. Briffa also clearly expresses frustration with the time spent away from doing new science, which is not the primary job of an IPCC chapter author or of the IPCC in general. The primary role of the IPCC is to assess existing science already published in the literature, i.e., in Briffa's words, "the needs of the science and the IPCC" are not always the same. In context, it is clear that the needs of the IPCC in this case are the "formulaic way things had to be done" and the need to do assessments of existing literature rather than producing "original and substantive" work or "useful research." It appears original research would be what Briffa is referring to as the needs of the science. When the e-mails are read in their full context, it is clear that the authors of these e-mails sought to convey the science accurately and address all the controversies in a fair and even-handed way. Again, petitioners appear to have selectively picked excerpts from emails.

We note that the Landsea letter provided by the Coalition for Responsible Regulation is not new. As stated in the link of the letter provided by the petitioner (Taylor, 2005), Landsea wrote this letter in January 2005. Therefore, it was not impracticable to raise the objection during the public comment period and the reasons for the objection did not arise between June 24, 2009, and February 16, 2010. The petitioner could have raised this comment during the comment period on the proposed Endangerment Finding. The Coalition for Responsible Regulation has not shown why it would have been impracticable to do so, especially given the fact that the public has been aware that EPA might rely on the IPCC assessments since the July 2008 Advance Notice of Proposed Rulemaking.

Despite this, we will respond briefly to the petitioner's allegations. Christopher Landsea served as a contributing author for the IPCC Second and Third Assessment Reports (IPCC 1995, IPCC 2001), but chose not to participate in AR4. In the initial planning stages of the AR4, Landsea wrote this letter to the IPCC expressing his disapproval with IPCC procedures. Specifically, Landsea disapproved of the fact that Kevin Trenberth, an IPCC lead author for the TAR, purportedly used his position to "promulgate to the media and general public his own opinion that the busy 2004 hurricane season was caused by global warming, which is in direct opposition to research written in the field and is counter to conclusions in the TAR [Third Assessment Report]." Landsea went on to state that "As the IPCC leadership has seen no wrong in Dr. Trenberth's actions and have retained him as a Lead Author for the AR4, I have decided to no longer participate in the IPCC AR4." This letter shows that Landsea disagreed with Trenberth regarding a particular aspect of the attribution of hurricanes to climate change and that Landsea did not approve of Trenberth representing the IPCC when discussing his views about the issue.

This impact of climate change on hurricane activity is a very dynamic issue. There are still significant uncertainties in the underlying climate science, so it not surprising that two scientists would disagree regarding the attribution of the 2004 hurricane season to climate change effects. However, the contents of the letter do not "demonstrate that climate scientists felt pressured to present a unified front - and an agreed-upon narrative of global warming - even when there was not one," as alleged by the petitioner. Landsea was not taking issue with the content of the IPCC reports, but with how Trenberth discussed certain issues during the period between the Third and Fourth Assessment Reports. The fact that Landsea disapproved of how Trenberth represented

the IPCC in discussing a specific scientific issue at a press conference preceding development of the AR4 provides absolutely no support for petitioners' claim that the conclusions reached in AR4 are incorrect or biased, or that they were developed in a way that pressured scientists into presenting "a united front." The petitioners did not provide any evidence to support that conclusion.

We also note that the discussion in AR4 of uncertainties associated with the impact of climate change on hurricane activity reflected the ongoing debate and alternative views on the issues. EPA also clearly described the uncertainties related to hurricane activity and climate change in the TSD and again in Volumes 2 and 4 of the RTC document for the Endangerment Finding. Finally, our response to allegations involving the IPCC's characterization of climate change and disaster losses can be found in Subsection 2.1.4 of this volume of the RTP document.

2.2.4 Responses to Allegations Based on Information That Is Not New

The petitioners submitted four objections concerning: 1) the collaborations among IPCC authors, 2) the general IPCC peer review process, 3) the alleged manipulation of dates and deadlines for accepting literature, and 4) the IPCC's use of gray literature. EPA has reviewed the petitioners' submissions and finds that it was not impracticable to raise the objection during the public comment period and that the reasons for the objection did not arise between June 24, 2009, and February 16, 2010. The IPCC AR4 has been public since early 2007, and petitioners could have raised these comments during the comment period on the proposed Endangerment Finding. Although, in most cases, the petitioners provide excerpts from the CRU e-mails in support of their assertions, EPA's review has determined that this evidence does not support their allegations, and that the vast majority of the information submitted by petitioners on these topics was available well before the comment period for the Endangerment Finding. Petitioners have not shown why it would have been impracticable for them to raise these issues then, especially given the fact that the public has been aware that EPA relied, in part, on the IPCC assessments since the July 2008 ANPR. Indeed, some of these same points were already raised, and responded to, in the RTC.

Despite the fact that these objections fail to meet the criteria for a petition for reconsideration, we briefly explain why, contrary to petitioners' allegation, they fail to call into question the overall integrity or validity of the IPCC AR4. As noted above, very similar comments questioning the appropriateness of IPCC author and reviewer roles were submitted and responded to during the development of the Findings (see Volume 1 of the RTC document).

2.2.4.1 Allegations of Inappropriate Collaborations Among IPCC Authors

Comment (2-30):
The State of Texas, Peabody Energy, and the Coalition for Responsible Regulation contend that the CRU e-mails show that IPCC authors and reviewers are close associates who frequently collaborate on projects and studies, and claim that such collaborations create conflicts of interest (for example, when one person authors an IPCC chapter and another serves as an official reviewer). Peabody Energy argues that the Wegman Report, *Social Network Analysis of Authorship in Temperature Reconstruction*, confirms that IPCC scientists are closely networked

with each other and dominate their field. The petitioner references testimony given by Edward J. Wegman (George Mason University) to Congress (Wegman, 2006) in arguing that "the paleoclimate field is dominated by interlinked scientists who no longer produce research that has the desired degree of independence."

Based on this report, Peabody Energy provides a detailed example of the small paleoclimate research community and how these scientists frequently co-author papers together, review each other's papers, and collaborate in other ways that generate conflicts of interest. Specifically, the petitioner, in referring to Chapter 9 ("Understanding and Attributing Climate Change") of Working Group I's contribution to the AR4 (Hegerl et al., 2007), provides a series of statistics that were also provided to EPA during the public comment period (these statistics are provided below) and argues that EPA did not respond to these specific issues in the RTC document:

- Forty of the 53 authors of this chapter co-authored papers with each other.
- More than half of the contributing authors co-authored papers with lead authors or coordinating lead authors.
- The review editor of the chapter contributed to 13 papers cited in the chapter and had co-authored these papers with 10 other authors of Chapter 9.
- Of the published papers in Chapter 9:
    - 94 were authored by two or more of that chapter's authors.
    - One cited paper had six chapter authors.
    - Five cited papers had five chapter authors.
    - 26 papers had three chapter authors, including six papers written entirely by chapter authors.
    - 50 of the cited papers listed two chapter authors each, and 10 of these papers were written entirely by chapter authors.

Response (2-30):
Neither the facts nor the evidence provided support the petitioners' claim that the collaborations among climate researchers led to conflicts of interest and bias, or that these collaborations interfered with their ability to be objective and impartial. Some climate science fields (e.g., paleoclimatology) are highly specialized and are the focus of only a limited number of researchers. In such fields, scientists who have at one point in the past collaborated on work can be called on to review each other's work. This practice is common in a variety of scientific areas with a relatively limited number of researchers, not just these specific climate science fields. It is actually the most robust practice of ensuring scientific credibility, because the reviewing scientists are the true experts who know the material and are most capable of fulfilling the review role. Petitioners' conclusions of impropriety or bias are not supported by the mere fact that authors know each other and have collaborated.

We respond to Peabody Energy's statistics regarding Chapter 9 in Subsection 2.2.3.2 of this volume of the RTP document. Given the limited number of researchers in this particular area, the statistics regarding author and reviewer roles in Chapter 9 of Working Group I's contribution

to the AR4 (Hegerl et al., 2007) are not surprising and do not indicate, as alleged by the petitioner, that there were "built-in conflicts of interest that had the potential for undermining the reliability of the reports." Rather, these statistics show that the most qualified and experienced authors and reviewers were involved in developing that particular chapter. EPA carefully reviewed and responded to these statistics regarding collaborations among IPCC authors in Volume 1 of the RTC document.

Furthermore, all scientific papers have to abide by strict ethical, conflict of interest, and scientific integrity/quality rules. The evidence provided by the petitioners does not show that these rules have been broken, that the peer-review system has been compromised, or that the assessment literature did not consider a range of perspectives in summarizing the state of the science. Essentially, the petitioners' argument can be boiled down to the view that if scientists work together and know each other, something improper is probably happening. This is an unwarranted and unjustified view of professional relationships, based on pure speculation.

Finally, we note that Peabody Energy does not provide any evidence to support its allegation that the past collaborations of these authors and reviewers actually led to "less than fully independent and rigorous" assessments of the science. The petitioner provided limited and unsubstantiated critiques of the science presented in Chapter 9, which we address in Volume 1 of this RTP document. Peabody Energy also provides no scientific argument or analysis indicating that the research produced by theses scientists or the IPCC chapter at issue was in any way biased or less than scientifically rigorous.

2.2.4.2 Allegations Regarding Insufficient Peer Review Processes for the IPCC

Comment (2-31):
Peabody Energy claims that the IPCC's peer review process is less robust and credible than the processes employed by scientific journals because IPCC lead and contributing authors are the ones who decide whether to accept or reject critical reviews. The petitioner argues that the IPCC's process is flawed because there is no neutral scientist, who was not involved in the writing, to ensure that the reviews are judged objectively.

Response (2-31):
First, we note that the petitioner provides no new information to substantiate their allegation, and that Peabody Energy's argument regarding the rigor of the IPCC's peer review does not accurately describe the actual review process used by the IPCC. As described above in Subsection 2.2.2 (Background) of this volume, lead and contributing authors are indeed tasked with initially responding to comments; however, independent and objective review editors (i.e., editors not involved in the writing of the chapter) are assigned to each chapter to ensure that each comment is addressed properly and accurately. Furthermore, the contributing authors are not allowed to simply reject critical reviews without documenting their rationale. The IPCC carefully documented all comments received on the first and second order drafts of each chapter of each working group. These comments and responses are, and have always been, publically available (IPCC, 2006a for Working Group I and IPCC, 2005 for Working Group II).

In addition, it would be illogical and inappropriate for the IPCC, as suggested by the petitioner, to allow only unrelated parties to respond to comments on chapters that they did not write. What the petitioner seems to believe would be appropriate—allowing unrelated people to respond to comments on the draft documents, as opposed to having the authors respond and revise their drafts—makes absolutely no sense and is not common in any scientific discipline because the unrelated parties would not possess the experience and context necessary to properly understand and respond to the comments. We therefore disagree with the petitioner's argument that the IPCC's peer review procedures are less rigorous than the processes employed by scientific journals. Petitioners provide no evidence that the IPCC authors inappropriately influenced the response to comments process or that review editors failed to perform their role in ensuring that all comments were properly addressed. The mere allegations and conclusory claims made by the petitioner are insufficient to support the broad conclusion they draw. Finally, we note that the petitioner did not provide examples of other peer review processes that they deemed to be more robust and credible than those procedures employed by the IPCC.

2.2.4.3 Allegations That IPCC Authors Manipulated Deadlines for New Literature

Comment (2-32):
Peabody Energy argues that the IPCC manipulated dates and deadlines for receipt of new literature to provide additional evidence in substantiating its conclusions regarding 20th-century warming. Specifically, the petitioner provides an example of two papers (both by Caspar Ammann and Eugene Wahl) on long-term temperature reconstructions, one of which was allegedly allowed to be referenced by IPCC authors in the AR4 only because, the petitioners claim, the IPCC manipulated the deadline for receipt of literature.

Response (2-32):
The evidence provided by Peabody Energy does not demonstrate that the IPCC, specifically the lead author of Chapter 6 of Working Group I's contribution to the AR4 (Jansen et al., 2007), manipulated the deadline for receipt of new literature for the purpose of including the two papers by Ammann and Wahl (Ammann and Wahl, 2007; Wahl and Ammann, 2007). We note that the IPCC AR4 has been public since early 2007, and petitioners could have raised these objections during the comment period on the proposed Endangerment Finding. Petitioners have not shown why it would have been impractical for them to do so. The only part of their argument that is "new" (i.e., has arisen since the close of the comment period on June 23, 2009) is an e-mail between Wahl and Ammann, which is a very minor part of their overall interaction. The e-mail only shows that Wahl and Ammann were making final proofing edits in September 2007. The e-mail stated:

> Hi Phil:
> There were inevitably a few things that needed to be changed in the final version of the WA paper, such as the reference to the GRL paper that was not published (replaced by the AW paper here), two or three additional pointers to the AW paper, changed references of a Mann/Rutherford/Wahl/Ammann paper from 2005 to 2007, and a some other very minor grammatical/structural things. I tried to keep all of this to the barest minimum possible, while still providing a good reference structure. I imagine that MM [Ross McKitrick and Pat Michaels] will make the biggest issue about the very existence

> of the AW paper, and then the referencing of it in WA; but that was simply something we could not do without, and indeed AW does a good job of contextualizing the whole matter. Steve Schneider seemed well satisfied with the entire matter, including its intellectual defensibility (sp?) and I think his confidence is warranted. That said, any other thoughts/musings you have are quite welcome.
> Peace, Gene[24]

As stated by the petitioner, the deadline for receipt of new literature was changed during the development of the Working Group I report. The deadline was originally December 2005 and was changed to July 24, 2006. When the coordinating lead authors for Working Group I extended the deadline for receipt of new literature, they provided the following justification (IPCC, 2006b):

> To ensure clarity and transparency in determining how such material might be included in the final Working Group I report, the following guidelines will be used by Lead Authors in considering such suggestions. In preparing the final draft of the IPCC Working Group I report, Lead Authors may include scientific papers published in 2006 where, in their judgment, doing so would advance the goal of achieving a balance of scientific views in addressing reviewer comments.

The authors of Chapter 6 followed this guidance and included the Wahl and Ammann (2007) study. We note that the Wahl and Ammann paper was accepted into *Climatic Change* on March 1, 2006, which means that at that point, the paper had passed peer review and the editor had agreed with the reviewers regarding its merit for publication. Thus, although the citation for the paper is in 2007, the acceptance date met the IPCC's revised deadline of July 24, 2006, for receipt of new literature that was established by AR4 lead authors. It appears that the same authors' other paper, Ammann and Wahl (2007), was not accepted for publication in time to meet the extended deadline for receipt of new literature, and we note that it is therefore not referenced in Chapter 6 of the AR4.

The petitioner alleges impropriety because the IPCC referenced Wahl and Ammann (2007), even though some of the underlying statistical analysis for that study, which was eventually published in Amman and Wahl (2007), had not been accepted for publication by the extended deadline. There are two flaws with petitioner's arguments. First, in the event that any of the expert reviewers for Chapter 6 expressed concern regarding the Wahl and Ammann (2007) paper, they would have had the opportunity to request any supplemental information necessary for reviewing the credibility of the Wahl and Ammann results. Second, the Ammann and Wahl paper went through peer review and was eventually published in *Climatic Change* in 2007, in the same issue as Wahl and Ammann (2007). The petitioners do not claim or demonstrate that the methods or results described in the Ammann and Wahl paper were incorrect or flawed. They simply allege that a decision to change deadlines slightly is "manipulation," even if no scientific flaw or challenge is raised against the literature affected by the date change.

[24] E-mail file 1189722851.txt, (September 12, 2007), page 1357, line 6 of PDF version entitled: CRU Emails 1996-2009.pdf

Moreover, contrary to the petitioner's argument, the evidence provided by the petitioner does not indicate that the deadline was inappropriately extended to accommodate the inclusion of these papers in AR4. On this issue, the Independent Climate Change E-mails Review found that:

> Taking into account the evidence of the Review Editor [for Chapter 6, i.e. John Mitchell], IPCC papers [documentation of IPCC responses to comments], the statement from the CLA [Jonathan Overpeck], and the importance of the issues raised by M&M2003 [McIntyre and McKitrick], we consider it to be reasonable that work that might throw further light on these issues and to ensure that assessments were as up to date as possible should be included. We do not consider therefore that these were exceptional unwarranted efforts to defend a particular position, but reasonable attempts to use up to date information that might resolve an issue. They appear to be consistent with IPCC principles and to reflect a concern for objectivity (Russell, 2010).

There was a general decision to allow extension of the deadline for the entire Working Group, and the chapter authors applied this guidance and extended the deadline for scientific studies relevant to that chapter. The fact that it was extended does not show it was extended because of these specific papers. In addition, petitioners have not shown that the extension altered the results of the report or the appropriateness of EPA's relying on it. First, inclusion of the peer-reviewed study represents one very small part in the deliberate preparation and review of a multi-volume assessment containing several thousands of pages of findings and conclusions. Second, Chapter 6 relied upon a number of long-term temperature reconstructions for its conclusions, including the findings of NRC's 2006 report (NRC, 2006) on surface temperature reconstructions. The NRC findings were fully consistent with the conclusions of the Ammann and Wahl papers. The papers in question provided additional, but not the only, evidence concerning the validity of using long-term proxy temperature reconstructions to compare historical and current climates. Indeed, and perhaps most importantly, the petitioner has provided no evidence showing that the conclusions of the Ammann and Wahl paper were mistaken or incorrect, or that the conclusions by themselves changed the findings of Chapter 6. Third, we note the statements that John Mitchell, one of two Chapter 6 review editors for Chapter 6, provided to the Independent Climate Change E-mails Review regarding how in-press material was handled and how decisions about the text of successive drafts were made. He commented as follows:

> I was not aware of the debate about whether the Wahl and Ammann paper had or had not met the deadline for the 2nd order draft for chapter 6, until after the event. The concentration on specific deadlines however misses the larger point. It must be recognized that if only published sources were used, the report would be two years old by the time of publication. In a fast-moving area such as climate change research, assessments could be significantly behind the times if important, but as yet unpublished, new results could not be used. The assessments for policymakers could also therefore be behind the times...
>
> In earlier assessments, there had been a relatively liberal regime in using unpublished material provided that there was a sound basis for regarding it as rigorous or reliable, although priority was always given to finding published sources. In AR4 however, the

regime was tightened significantly, so that such material was only to be used under exceptional circumstances, but the use of unpublished material was not prohibited. Hockey-stick issues were regarded at the time as sufficiently important to justify using new data. The dilemma between using only published material and being out of date, or using more recent unpublished material was increased in AR4 as the latest publication date was about 12 months earlier than in the process than in the previous assessment (Russell, 2010).

2.2.4.4 Allegations Regarding the IPCC's Use of Gray Literature

Comment (2-33):
The Coalition for Responsible Regulation, Peabody Energy, the Southeastern Legal Foundation, and the State of Texas argue that the IPCC's use of non-peer-reviewed literature (e.g., reports they claim are developed by environmental advocacy groups) in the AR4 calls into question the quality and objectivity of these pieces of literature and contradicts EPA's assertion that the IPCC is based on peer-reviewed science. The petitioners provide examples of gray literature sources that were used by the IPCC in AR4.

Response (2-33):
First, we note that the petitioners provided no new information in support of their allegations. As stated above, the petitioners are simply rehashing a comment that was submitted and responded to in the development of the Findings. Therefore, we find that their allegations were not impracticable to raise the objection during the public comment period and the reasons for the objection did not arise between June 24, 2009, and February 16, 2010. The IPCC AR4 has been public since early 2007, and petitioners could have raised these comments during the comment period on the proposed Endangerment Finding. Petitioners have not shown why it would have been impracticable for them to raise these issues then, especially given the fact that the public has been aware that EPA relied, in part, on the IPCC assessments since the July 2008 ANPR.

The IPCC relied on and referenced a very limited number of non-peer-reviewed sources in developing AR4. The IPCC's report development procedures recognized and allowed for the limited use of non-peer-reviewed literature where this was necessary and appropriate. Indeed, neither the IPCC nor EPA ever stated that the assessment reports relied *exclusively* on peer-reviewed material. For EPA's responses showing how the limited use of gray literature documents did not undermine the IPCC's scientific findings and the technical support for endangerment, please see Section 2.1 of this volume, including Responses 2-8, 2-9, and 2-10.

Looking across the thousands of scientific studies reviewed, assessed, and referenced by the IPCC in the AR4, it is clear that the number of non-peer-reviewed documents was dwarfed by the number of peer-reviewed references (estimated by the IPCC to be approximately 18,000). The IPCC, as clearly described in Volume 1 of the RTC document, has specific procedures to ensure that any non-peer-reviewed materials are sufficiently robust and credible in the context in which they were cited. While there are a very few instances in which erroneous conclusions were developed from the gray literature sources (see Section 2.1 of this RTP document for more detail on our responses to these issues), the overall process is exceedingly robust. Furthermore,

the few errors in this regard are trivial when viewed against the backdrop of the IPCC's multi-volume assessment containing several thousand pages of findings and conclusions. The few errors do not affect the climate change science findings or have any material or meaningful implication for the determination of endangerment to public health and welfare in the United States. The examples of gray literature provided by the petitioners were not cited by EPA in describing the key IPCC conclusions that EPA relied on in developing the TSD (U.S. EPA, 2009). The examples provided by the petitioners are cited in chapters of the Working Group II and III AR4 reports when describing climate change impacts in other world regions, which was not a focus of the TSD.

Comment (2-34):
Peabody Energy claims that the IPCC Working Group II "frequently used a citation method that did not candidly reveal an underlying affiliation with an environmental advocacy group." For example, the petitioner claims that in many instances the IPCC report "referred only to the name of the author when the work was actually sponsored by an interest group" such as the World Wildlife Fund. Peabody concludes that "It is unclear whether these sponsored works provide independent, objective, and peer-reviewed science that should be the basis for AR4, or whether they advance the environmental agenda of their sponsor. It is also unclear whether these sources were independently verified by IPCC authors and contributors."

Response (2-34):
First, we note that the IPCC's citation method for the AR4 is not new and that this information has been known since the assessment report was released in 2007 (IPCC, 2007a). Therefore, the petitioner's arguments were not impracticable to raise during the public comment period and the reasons for the objection did not arise between June 24, 2009, and February 16, 2010. The petitioner could have raised this comment during the comment period on the proposed Endangerment Finding. Peabody Energy has not shown why it would have been impractical to do so. Despite this, we respond below to the merits of their argument.

The petitioner alleges that the IPCC employed a parenthetical citation method in the text of the chapters that hid information showing that references were developed by environmental non-government organizations. In fact, the IPCC employed a common citation method for the thousands of studies that are referenced among the more than 3,000 pages in AR4. This format consists of listing the author's names first for each entry in the references section, and mentioning the publisher and/or organization (e.g., World Wildlife Fund) toward the end of the reference. Parenthetical citations, for each reference in the text of a chapter, list the author(s)' name(s) and the year of publication. This citation methodology is consistent with many established citation guidelines, including those developed by the Modern Language Association, the American Psychological Association, and the University of Chicago.

The evidence provided by the petitioner does not show that the IPCC hid the fact that some of the reports it cited were developed by non-government organizations like the World Wildlife Fund. The petitioner seems to suggest that the IPCC should have included the names of the non-government organizations in the parenthetical citations for these literature sources. However, this practice is contrary to the well-established conventions and styles that are commonly used in all disciplines of science and literature. Special treatment for these literature sources would be

inappropriate and unreasonable, and the petitioner's only justification for such an approach is the speculation that this literature might have been created to "advance the environmental agenda of their sponsor." Again, the IPCC included the names of the organizations in the full reference for each report in the references section at the end of each chapter. The IPCC did not hide the publisher or sponsoring organization's name.

For our response to the petitioner's argument that "It is unclear whether these sponsored works provide independent, objective, and peer-reviewed science that should be the basis for AR4, or whether they advance the environmental agenda of their sponsor," please see Section 2.1 of this volume, including Responses 2-8, 2-9, and 2-10.

Finally, the procedures employed by the IPCC in evaluating sources of gray literature are described in Section 1 and Appendix A of Volume 1 of the RTC document. The petitioner has provided no evidence suggesting that the reports developed by environmental non-government organizations were not evaluated by AR4 authors according to the IPCC's procedures.

2.2.5 Summary

The evidence provided by the petitioners does not support their allegations that the IPCC's peer review and report development processes are designed inappropriately, or that they were inappropriately implemented in the development of the AR4. Specifically, the evidence provided by the petitioners and all of the information in the record for the Endangerment Finding shows that, contrary to the claims of the petitioners:

- It was proper to not list certain scientists as contributing authors as they did not contribute significantly to the writing and editorial decisions in developing any AR4 chapter, including Chapter 6 of Working Group I's contribution (Jansen et al., 2007), and therefore did not compromise their objectivity during the peer-review process.

- IPCC authors did not cite their own studies more frequently than what was acceptable and reasonable.

- IPCC authors were not directed to focus on policy-prescriptive conclusions, but rather implemented IPCC guidelines by presenting policy-relevant and neutral findings.

- IPCC authors did not alter the content of reports to eliminate suggestions of nonconsensus.

- Collaborations among IPCC authors and reviewers prior to the development of AR4 did not compromise objectivity or generate conflicts of interest.

- The IPCC's peer-review processes are appropriate and adequate, and were properly implemented.

- IPCC authors did not manipulate deadlines for receipt of new literature.

- The IPCC's very limited use of gray literature does not call into question the quality and objectivity of the assessment reports.

Petitioners do not present scientific evidence or argument showing that the Chapters of assessment report at issue are inaccurate or that they do not appropriately reflect the range of scientific evidence and the degree of scientific consensus on the scientific issues discussed. The evidence they present does not support the broad assertion that this is the case. They do not present credible scientific evidence or arguments on the science itself to support their claims. Therefore, petitioners' evidence and arguments do not support changing our position, as stated in the Endangerment Finding, that the assessment literature, including the IPCC AR4, represents the "best reference materials for determining the general state of knowledge on the scientific and technical issues before the agency in making an endangerment decision."

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