BEFORE THE ADMINISTRATOR
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.
PETITION FOR RECONSIDERATION OF THE ENDANGERMENT AND
CAUSE OR CONTRIBUTE FINDINGS FOR GREENHOUSE GASES UNDER SECTION 202(a) OFTHE CLEAN AIR ACT
74 FED. REG. 66496 (DEC. 15, 2009)

February 16, 2010

Office of the Administrator, EPA

EPA Associate General Counsel, Air and Radiation

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Petitioner
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I hereby request that the United States Environmental Protection Agency ("EPA" or "Agency") reconsider its *Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act* published at 74 Federal Register (FR) 66,496 (Dec. 15, 2009). My petition is based primarily on the release of email and other information from the University of East Anglia ("UEA") Climatic Research Unit ("CRU") in November 2009. The CRU information undermines the "lines of evidence" on which the Endangerment Finding rests, particularly the work of the United Nations Intergovernmental Panel on Climate Change ("IPCC") and the United States Global Change Research Program ("USGCRP"). This petition addresses the issues related to the third line of evidence:

> ***"The attribution of observed climate change to anthropogenic activities is based on multiple lines of evidence. … The third line of evidence arises from the use of computer-based climate models to simulate the likely patterns of response of the climate system to different forcing mechanisms (both natural and anthropogenic)."***

74 FR 66,518.

Given the seriousness of the flaws that the CRU material reveals in the development of the IPCC reports (and the USGCRP), and given EPA's extensive reliance on those reports, the Agency has no legal option but to reexamine the Endangerment Finding in light of this new information. Indeed, the analytical process in which EPA engaged in reaching its Endangerment Finding is so tainted by the flaws and conflicts now revealed in the IPCC (and the USGCRP) reports that the Agency must take the unusual step of convening full evidentiary hearings in order to provide an open and fair reconsideration process.

LIST OF SCIENTISTS AND THEIR UNIPCC/USGCRP ROLES INVOLVED IN THE CRU EMAIL EXCHANGES

Dr. Phil Jones - Professor, Climatic Research Unit, University of East Anglia.
IPCC: Coordinating lead author of Chapter 3 of Working Group I Report, 2007 IPCC Fourth Assessment Report.

Thomas Karl - Director, National Climatic Data Center, NOAA.
IPCC: Review editor of Chapter 3 of Working Group I Report, 2007 IPCC Fourth Assessment Report. Coordinating lead author of Chapter 2 of Working Group I Report, 2001 IPCC Third Assessment Report.
USGCRP: Major Involvement in SAP 1.1(2006) and Global Climate Change Impacts in the U.S.(2009)

Dr. Michael Mann - Director, Earth System Science Center, Pennsylvania State University.
IPCC 2001 (TAR): Lead author of Chapter 2; Contributing author of Chapter 7; Contributing author of Chapter 8 of Working Group I Report.

Dr. Benjamin Santer - Research Scientist, Program for Climate Model Diagnosis and Intercomparison at the Lawrence Livermore National Laboratory.
IPCC 1995(SAR): Lead author of Chapter 8 of the 1995 IPCC report.
USGCRP: Major Involvement in SAP 1.1(2006) "Temperature Trends in the Lower Atmosphere", and Global Climate Change Impacts in the U.S.(2009)

Dr. Susan Solomon - Senior Scientist, Chemical Sciences Division (CSD) Earth System Research Laboratory (ESRL), NOAA.
IPCC 2007 (AR4): Co-Chair, IPCC Working Group I Report, Contributing author of Chapter 4;
IPCC 2001 (TAR): Lead author of Chapter 6 of Working Group I Report

Dr. Kevin Trenberth - Senior Scientist, Head of the Climate Analysis Section at the National Center for Atmospheric Research.
IPCC 2007 (AR4): Contributing author of Chapter 1; Coordinating lead author of Chapter 3; Contributing author of Chapter 7 of Working Group I Report, 2007 IPCC Fourth Assessment Report.
IPCC 2001 (TAR): Contributing author of Chapter 8 of Working Group I Report

Dr. Thomas Wigley - senior scientist in the Climate and Global Dynamics Division, University Corporation for Atmospheric Research.

IPCC 2007 (4AR): Contributing author of Chapter 10 of Working Group I Report.
IPCC 2001 (TAR): Contributing author of Chapter 4; Contributing author of Chapter 9; Contributing author of Chapter 12 of Working Group I Report
USGCRP: Major Involvement in SAP 1.1(2006) "Temperature Trends in the Lower Atmosphere"

THE CRU MATERIAL CALLS INTO QUESTION EPA'S NEAR TOTAL RELIANCE ON WHAT IT TERMS THE "ASSESSMENT LITERATURE," AND PARTICULARLY THE WORK OF THE IPCC

A. Despite the Section 202(a) Requirement that the Administrator Exercise Her Own Expert Judgment, the Administrator Did Not Independently Judge the Science and Instead Relied Primarily on Summary Scientific Reports Produced by Third Parties

1. Section 202(a) Requires the Administrator to Exercise Independent Judgment

Section 202(a) is crystal clear that the EPA Administrator is obligated to exercise her own judgment in deciding whether or not to make an Endangerment Finding. According to section 202(a), "[t]he Administrator shall by regulation prescribe (and from time to time revise) in accordance with provisions of this section, standards applicable to the emission of any air pollutant from any class or classes of new motor vehicle engines, which may *in his judgment* cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."

2. The Administrator Relied Primarily on the "Assessment Literature" in Making Her Endangerment Finding

Despite being obligated to exercise her own judgment as to whether anthropogenic GHG emissions pose a danger to public health or welfare, the Administrator did not base her Endangerment Finding on her own review of primary scientific literature and data or on modeling performed by her staff using Information Quality Act (IQA) compliant models. Instead, as she readily conceded, she relied almost exclusively on reports produced by others summarizing their views of climate change science and the results of "black box" models, reports and analysis that she refers to as the "assessment literature." As the Endangerment Finding stated, "…the Administrator is relying on the major assessments of the USGCRP, the IPCC, and the NRC as the primary scientific and technical basis of her

endangerment decision." The Administrator's statement of her primary reliance on these reports is repeated throughout the Endangerment Finding, the Technical Support Document ("TSD") and the Response to Public Comments document. For instance, the TSD stated that it "relies most heavily" on this "assessment literature."

a. IQA Obligations Ignored

The Administrator also relied on the "assessment literature" to satisfy her obligations under the IQA as to the quality and transparency of information she relied on in the Endangerment Finding. She made clear, however, that she did not make her own expert determination as to the quality and transparency of the information summarized in the "assessment literature." Instead, she reviewed the procedures used by the entities that prepared the "assessment literature" to confirm that those entities, in her view, had adequately taken steps to ensure information quality and transparency. She stated that "[o]ur approach is consistent with these [EPA's IQA] guidelines because we thoroughly reviewed and evaluated the author selection, report preparation, expert review, public review, information quality, and approval procedures of IPCC, USGCRP/CCSP, and NRC to ensure the information adhered "to a basic standard of quality, including objectivity, utility and integrity."

B. EPA relies upon "modeling" by others as a major line of evidence yet the CRU email reveal serious questions about the validity of the IPCC models and the modelers

EPA at 74 FR 66,519:

> *Future warming over the course of the 21st century, even under scenarios of low emissions growth, is very likely to be greater than observed warming over the past century. According to climate model simulations summarized by the IPCC, through about 2030, the global warming rate is affected little by the choice of different future emission scenarios.*

1. Questions about IPCC model results:

Tom Wigley (the developer of the M.A.G.I.C.C. model used by EPA) email to Michael Mann (**Oct 14, 2009):**

> ***Mike[Mann],***
> ***The Figure you sent is very deceptive. As an example, historical runs with***

PCM look as though they match observations -- but the match is a fluke. PCM has no indirect aerosol forcing and a low climate sensitivity -- compensating errors. In my (perhaps too harsh) view, there have been a number of dishonest presentations of model results by individual authors and by IPCC. This is why I still use results from MAGICC to compare with observed temperatures. At least here I can assess how sensitive matches are to sensitivity and forcing assumptions/uncertainties. Tom[Wigley].

Kevin Trenberth email to Tom Wigley, Tom Karl, Phil Jones, Michael Mann, Gavin Schmidt (Oct 14, 2009):

Well I have my own article on where the heck is global warming? We are asking that here in Boulder where we have broken records the past two days for the coldest days on record. We had 4 inches of snow.
*...**The fact is that we can't account for the lack of warming at the moment and it is a travesty that we can't. …***

Tom Wigley email to Ben Santer copy to Susan Solomon, Phil Jones, Tom Karl, Gavin Schmidt (December 16, 2008):

Even over 1979 to 1999 some models show appreciable drift. From memory we did not account for this in our paper -- but it is an important issue.

2. Questions about the AR4 models raised by Susan Solomon (the U.S. lead on the AR4) and one paper was enough to seriously challenge the IPCC results:

Susan Solomon email to Tom Wigley and Tom Karl copied to Phil Jones and Ben Santer (December 30, 2007):

...The question I want to raise is not related to the very important dialogue on how to handle the errors and the statistics, but rather how to think about the models. The attached paper by Forster et al. appeared recently in GRL. ***It taught me something I didn't realize, namely that ozone losses and accompanying temperature trends at higher altitudes can strongly affect lower altitudes, through the***

influence of downwelling longwave.

No global general circulation model can possibly be expected to simulate this correctly unless it has interactive ozone, or prescribes an observed tropical ozone trend. The AR4 models did not include this, and any 'discrepancies' are not relevant at all to the issue of the fidelity of those models for global warming.

Peter Thorne(Met Office Hadley Centre) to **Susan Solomon copy to** Tom Wigley Thomas R Karl, Phil Jones , Ben Santer (January 2, 2008):

Maybe we need to step back and rephrase the question in terms of the physics rather than aiming solely to rebutt Douglass et al? In this case the key physical questions in my view would be:

2. Is there really a stratospheric radiative influence? If so, how low does it go? What is the cause? ***Are the numbers consistent with the underlying governing physics or simply an artefact of residual obs errors?***

3. Can any models show trend behaviour that deviates from a SALR on multi-decadal timescales? If so, what is it about the model that causes this effect? Physics? Forcings? Phasing of natural variability? Is it also true on shorter timescales in this model?

I think in the future the Forster et al paper may be seen as the more scientifically significant result when Douglass et al is no longer cared about ...

EPA at 74 FR 66,524:

The Administrator acknowledges that some aspects of climate change science and the projected impacts are more certain than others. **Our state of knowledge is strongest for recently observed, large-scale changes. Uncertainty tends to increase in characterizing changes at smaller (regional) scales relative to large (global) scales. Uncertainty also increases as the temporal scales move away from present, either backward, but more importantly forward in time. Nonetheless, the current state of knowledge of observed and past climate changes and**

their causes enables projections of plausible future changes under different scenarios of anthropogenic forcing for a range of spatial and temporal scales

EPA Response to Comments, Vol. 4 (4-34):

With respect to climate modeling, we agree that the TSD section on projected changes in U.S. temperature, precipitation patterns, and sea level relies in part on models that are necessarily global in scope, given that climate changes in one region can, in turn, affect climate in other regions. **However, we disagree that our treatment of model results was inappropriately focused on global impacts or failed to adequately distinguish between U.S. and Canadian effects. And we also disagree that EPA's use of IPCC's regional analysis of North America is inappropriate or scientifically flawed.**

Jagadish Shukla (Lead Author IPCC 2007) email copied to Susan Solomon (February 13, 2008):

Dear All,

I would like to respond to some of the items in the attached text on issues etc. in particular to the statement in the section 3.1.1 (sections 3: Drivers of required change in the future).

"There is now greater demand for a higher level of policy relevance in the work of IPCC, which could provide policymakers a robust scientific basis for action".

1. While it is true that a vast majority of the public and the policymakers have accepted the reality of human influence on climate change (in fact many of us were arguing for stronger language with a higher level of confidence at the last meetings of the LAs), how confident are we about the projected regional climate changes?

I would like to submit that the current climate models have such large errors in simulating the statistics of regional (climate) that we are not ready to provide policymakers a robust scientific basis for "action" at regional scale. I am not referring to mitigation, I am strictly referring to science based adaptation.

For example, we can not advise the policymakers about re-building the city of New Orleans - or more generally about the habitability of the Gulf-Coast - using climate models which have serious deficiencies in simulating the strength, frequency and tracks of hurricanes.

It is inconceivable that policymakers will be willing to make billion-and trillion-dollar decisions for ***adaptation to the projected regional climate change based on models that do not even describe and simulate the processes that are the building blocks of climate variability. Of course, even a hypothetical, perfect model does not guarantee accurate prediction of the future regional climate, but at the very least, our suggestion for action will be based on the best possible science.***

2. Is "model democracy" a valid scientific method? The "I" in the IPCC desires that all models submitted by all governments be considered equally probable. This should be thoroughly discussed, because it may have serious implications for regional adaptation strategies. AR4 has shown that model fidelity and model sensitivity are related. The models used for IPCC assessments should be evaluated using a consensus metric.

Is there a consensus in the climate modeling community on the validity of regional climate prediction by dynamical downscaling? A large number of dynamical downscaling efforts are underway worldwide. This is not necessarily because it is meaningful to do it, but simply because it is possible to do it. It is not without precedent that quite deficient climate models are used by large communities simply because it is convenient to use them. It is self-evident that if a coarse resolution IPCC model does not correctly capture the large-scale mean and transient response, a high-resolution regional model, forced by the lateral boundary conditions from the coarse model, can not improve the response. Considering the important role of multi-scale interactions and feedbacks in the climate system, it is essential that the IPCC-class global models themselves be run at sufficiently high resolution.

4. Questions about whether all of the IPCC models are accurate enough, new

trick of “weighting” mentioned, admission that there are no sub-set of models with any skill:

Ben Santer email to Phil Jones copied to Tom Wigley (December 5, 2007):

> ***Just a quick response to the issue of "model weighting" which you and Carl raised in your emails.***
>
> ***… I'm now in the process of repeating our water vapor D[etection]&A[ttribution] study using a subset of the original 22 models. This subset will comprise 10-12 models which are demonstrably more successful in capturing features of the observed mean state and variability of water vapor and SST - particularly features crucial to the D&A problem (such as the low-frequency variability). We've had fun computing a whole range of metrics that might be used to define such a subset of "better" models.***
>
> ***The ultimate goal is to determine the sensitivity of our water vapor D&A results to model quality. I think that this kind of analysis will be unavoidable in the multi-model world in which we now live. Given substantial inter-model differences in simulation quality, "one model, one vote" is probably not the best policy for D&A work!***
>
> *A further issue, of course, is that we are relying on results from fully coupled A/OGCMs, and are making trend comparisons over relatively short periods (several decades). On these short timescales, estimates of the "true" trend in response to the applied 20c3m forcings are quite sensitive to natural variability noise (as Peter Thorne's 2007 GRL paper clearly illustrates).* ***Because of such chaotic variability, even a hypothetical model with perfect physics and forcings would yield a distribution of tropospheric temperature trends over 1979 to 1999, some of which would show larger or smaller cooling than observed. …***
>
> *….* ***The results are fascinating, and show (at least for water vapor and SST) that every model has its own individual strengths and weaknesses. It is difficult to identify a subset of models that CONSISTENTLY does well in many different regions and over a range of different timescales.***

5. The only modeling that EPA consultants conducted raised major issues of competence using IPCC models, the models used produce conflicting results not unlike the models used in the discredited 2000 US National Assessment conducted by Tom Karl (co-chair with Jerry Mellilo and Anthony Jantos)

EPA at 74 FR 66,525:

Modeling studies discussed in EPA's Interim Assessment [**28]** show that simulated climate change causes increases in summertime ozone concentrations over substantial regions of the country, though this was not uniform, and some areas showed little change or decreases, though the decreases tend to be less pronounced than the increases.

28 *U.S. EPA (2009) Assessment of the Impacts of Global Change on Regional U.S. Air Quality: A Synthesis of Climate Change Impacts on Ground- Level Ozone. An Interim Report of the U.S. EPA Global Change Research Program. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R–07/094*

excerpts:

> **Coupling atmospheric chemical processes and the climate system presents considerable challenges because of the large number of physical, chemical, and biological processes involved, many of which are poorly understood, all interacting in complex ways.**
>
> ***Second, the science of modeling climate and atmospheric chemistry for the purposes of understanding the sensitivity of regional air quality to climate change is in its early stages.*** *This effort highlights a number of uncertainties that limit the information that can be provided to support decision-making, as well as what work is needed (some currently underway) to begin addressing these uncertainties.*
>
> **In general, differences between climate simulations tend to be more pronounced at the regional scales considered in this report than at the global scale.**
>
> For example, **there were differences across modeling groups in the regions** of the country where simulated increases in cloud cover, and hence decreases in the amount of sunlight reaching the surface, partially counteracted the effects of warming temperatures on O3 concentrations in

these regions. **This highlights current limitations in our ability to understand regional impacts of global climate change.**

SUMMARY OF POLICY RELEVANT FINDINGS

The recent Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) states, "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level" (IPCC, 2007). Directly relevant to EPA's mission to protect human health and the environment is the IPCC finding that, "Future climate change may cause significant air quality degradation by changing the dispersion rate of pollutants, the chemical environment for ozone and aerosol generation and the strength of emissions from the biosphere, fires and dust. **The sign and magnitude of these effects are highly uncertain and will vary regionally."**

IV. Modeling Uncertainties

A. *Simulated future U.S. regional air quality is highly sensitive to model configuration choices in the integrated global-to-regional climate and air quality modeling systems used in this assessment.*

3.2.2.3 Impacts of Global Climate and Emission Changes on U.S. Air Quality: University of Illinois

The University of Illinois …to capture a wider range of sensitivities, they built different versions of this system, which combines multiple **GCMs (PCM and the Hadley Centre Model, HadCM3),**

Physical and dynamical arguments suggest that future decreases in the equator-to-pole temperature gradient should drive poleward shifts in the mid-latitude storm tracks, and that this may lead to decreases in the frequency of cyclone ventilation of pollutants in the Northeast and Midwest. **The results from the Harvard 1 experiment show this clearly, while those from the CMU experiment do not seem to**.

Again from the IPCC AR4: "What does the accuracy of a climate model's simulation of past or contemporary climate say about the accuracy of its projections of climate change? This question is just beginning to be addressed…" (IPCC, 2007: Ch. 8).