

RA-10 Final Investigation Report Involving Dr. Michael E. Mann
The Pennsylvania State University
June 4, 2010

Composition of the Investigatory Committee:

Sarah M. Assmann, Waller Professor
Department of Biology

Welford Castleman, Evan Pugh Professor and Eberly Distinguished Chair in Science
Department of Chemistry and Department of Physics

Mary Jane Irwin, Evan Pugh Professor
Department of Computer Science and Electrical Engineering

Nina G. Jablonski, Department Head and Professor
Department of Anthropology

Fred W. Vondracek, Professor
Department of Human Development and Family Studies

Research Integrity Officer:

Candice Yekel, Director of the Office for Research Protections

Background of the alleged misconduct as described in the RA10 Inquiry Report:

On and about November 22, 2009, The Pennsylvania State University began to receive numerous communications (emails, phone calls and letters) accusing Dr. Michael E. Mann of having engaged in acts, beginning in approximately 1998, that included manipulating data, destroying records and colluding to hamper the progress of scientific discourse around the issue of anthropogenic global warming. These accusations were based on perceptions of the content of the emails stolen from a server at the Climatic Research Unit of the University of East Anglia in Great Britain as widely reported.

Given the sheer volume of the communications to Penn State, the similarity of their content and the variety of sources, which included University alumni, federal and state politicians, and others, many of whom had had no relationship with Penn State, Dr. Eva J. Pell, then Senior Vice President for Research and Dean of the Graduate School, was asked to examine the matter. The reason for having Dr. Pell examine the matter was that the accusations, when placed in an academic context, could be construed as allegations of *research misconduct*, which would constitute a violation of Penn State policy.

Under The Pennsylvania State University's policy, Research Administration Policy No. 10, (hereafter referred to as RA-10), *Research Misconduct* is defined as:

- (1) fabrication, falsification, plagiarism or other practices that seriously deviate from accepted practices within the academic community for proposing, conducting, or reporting research or other scholarly activities;
- (2) callous disregard for requirements that ensure the protection of researchers, human participants, or the public; or for ensuring the welfare of laboratory animals;
- (3) failure to disclose significant financial and business interest as defined by Penn State Policy RA20, *Individual Conflict of Interest*;
- (4) failure to comply with other applicable legal requirements governing research or other scholarly activities.

RA-10 further provides that “research misconduct does not include disputes regarding honest error or honest differences in interpretations or judgments of data, and is not intended to resolve bona fide scientific disagreement or debate.”

On November 24, 2009, two days after receipt of the allegations, Dr. Pell initiated the process articulated in RA-10 by scheduling a meeting with the Dean of the College of Earth and Mineral Sciences (Dr. William Easterling), the Associate Dean for Graduate Education and Research of the College of Earth and Mineral Sciences (Dr. Alan Scaroni), the Director of the Office for Research Protections (Ms. Candice Yekel), and the Head of the Department of Meteorology (Dr. William Brune).

At this meeting, all were informed of the situation and of the decision to initiate an inquiry under RA-10. Dr. Pell then discussed the responsibilities that each individual would have according to the policy. Dean Easterling recused himself from the inquiry due to a conflict of interest. As the next administrator in the line of management for the college, Dr. Scaroni was asked to take on Dean Easterling’s function in the ensuing inquiry.

The Inquiry Committee assigned to conduct the inquiry into the matter consisted of Dr. Eva J. Pell, Senior Vice President for Research, Ms. Candice Yekel, Director of the Office for Research Protections, and Dr. Alan Scaroni, Associate Dean for Graduate Education and Research of the College of Earth and Mineral Sciences. Dr. William Brune, Head of the Department of Meteorology, was to serve in a consulting capacity for the Inquiry Committee. Dr. Henry C. Foley, then Dean of the College of Information Sciences and Technology, was added to the Inquiry Committee in an ex-officio role for the duration of 2009, since he had been named to succeed Dr. Pell as the next Vice President for Research, beginning January 1, 2010.

At the time of initiation of the inquiry, no formal allegations accusing Dr. Mann of research misconduct had been submitted to any University official. Therefore, the emails and other communications were reviewed by Dr. Pell, and from these she synthesized the following four formal allegations. To be clear, these were not allegations that Dr. Pell put forth but rather her best effort to reduce to reviewable allegations the many different accusations that were received from parties outside of the University. The four synthesized allegations were as follows:

1. Did you engage in, or participate in, directly or indirectly, any actions with the intent to suppress or falsify data?
2. Did you engage in, or participate in, directly or indirectly, any actions with the intent to delete, conceal or otherwise destroy emails, information and/or data, related to AR4, as suggested by Phil Jones?
3. Did you engage in, or participate in, directly or indirectly, any misuse of privileged or confidential information available to you in your capacity as an academic scholar?
4. Did you engage in, or participate in, directly or indirectly, any actions that seriously deviated from accepted practices within the academic community for proposing, conducting, or reporting research, or other scholarly activities?

On November 29, 2009, Dr. Pell and Dr. Foley met with Dr. Mann to inform him personally that he had been accused of research misconduct and that an inquiry under RA-10 would take place. On November 30, 2009, a letter was delivered by Dr. Pell to Dr. Mann to notify him of these allegations and Dr. Pell's decision to conduct an inquiry under RA-10. The inquiry phase of RA-10 was thereby formally initiated on November 30, 2009.

From November 30 to December 14, 2009, staff in the Office for Research Protections culled through the 1073 files that contained emails or email strings that were purloined from a server at the University of East Anglia. A subset of the files containing emails or email strings was reviewed. This subset of files included emails that were sent by Dr. Mann, were sent to Dr. Mann, were copied to Dr. Mann, or discussed Dr. Mann (but were neither addressed nor copied to him). In summary, the following were found:

- 206 files that contained emails or email strings that contained message/text from Dr. Mann somewhere in the chain;
- 91 files that contained emails or emails strings that were received by Dr. Mann, but in which he did not participate; and
- 79 files that contained emails or email strings that dealt with Dr. Mann, his work or publications but that he neither authored nor was listed as copied.

From among these 376 files, the Inquiry Committee focused on 47 files that contained emails or email strings that were deemed relevant. On December 17, 2009, the Inquiry Committee (Pell, Scaroni, Yekel), Dr. Brune and Dr. Foley met to review the emails, the RA-10 inquiry process, and their respective activities. It was agreed that these individuals would meet again in early January and that they would use the time until that meeting to review the relevant information, including the above mentioned e-mails, journal articles, OP-ED columns, newspaper and magazine articles, the National Academy of Sciences report entitled "Surface Temperature Reconstructions for the Last 2,000 Years," ISBN: 0-309-66144-7 and various blogs on the internet.

On January 4, 2010, Dr. Foley, in his capacity as the new Vice President for Research and Dean of the Graduate School, became the convener of the Inquiry Committee as Dr. Pell had left the University to become the Under-Secretary of Science for the Smithsonian Institution. On January 8, 2010, Dr. Foley convened the Inquiry Committee to discuss their thoughts on the evidence presented in the emails and other publically available materials. At this meeting, it was decided that each Inquiry Committee member would send to Dr. Foley specific questions to be used by the Inquiry Committee during the interview of Dr. Mann. During the interview, Dr. Foley would moderate the interview and ask each of the initial questions with follow-up questions coming from the other Inquiry Committee members.

On January 12, 2010, the Inquiry Committee (Foley, Yekel, Scaroni) and Dr. Brune met with Dr. Mann. Dr. Mann was asked to address the four allegations leveled against him and to provide answers to the fifteen additional questions that the Inquiry Committee had compiled. In an interview lasting nearly two hours, Dr. Mann addressed each of the questions and follow-up questions. A recording was made of the interview and was later transcribed. The Inquiry Committee members asked occasional follow-up questions. Dr. Mann answered each question carefully:

- He explained the content and meaning of the emails about which the Inquiry Committee inquired;
- He stated that he had never falsified any data, nor had he had ever manipulated data to serve a given predetermined outcome;
- He stated that he never used inappropriate influence in reviewing papers by other scientists who disagreed with the conclusions of his science;
- He stated that he never deleted emails at the behest of any other scientist, specifically including Dr. Phil Jones, and that he never withheld data with the intention of obstructing science; and
- He stated that he never engaged in activities or behaviors that were inconsistent with accepted academic practices.

On January 15, 2010, Dr. Foley conveyed via email on behalf of the Inquiry Committee an additional request to Dr. Mann. Dr. Mann was asked to produce all emails related to the fourth IPCC report ("AR4"), the same emails that Dr. Phil Jones had suggested that he delete. On January 18, 2010, Dr. Mann provided a zip-archive of these emails and an explanation of their content. In addition, Dr. Mann provided a ten page supplemental written response to the matters discussed during his interview.

On January 22, 2010, the Inquiry Committee and Dr. Brune met again to review the evidence, including but not limited to Dr. Mann's answers to the Inquiry Committee's questions, both in the interview and in his subsequent submissions. Dr. Foley reviewed the relevant points of his conversation with Dr. Gerald North, a professor at Texas A&M University and the first author of the NAS 2006 report that included Dr. Mann's research on paleoclimatology. Dr. Foley also relayed the sentiment and view of Dr. Donald Kennedy of Stanford University and the former editor of Science Magazine about the controversy currently swirling around Dr. Mann and some of his colleagues. Both were

very supportive of Dr. Mann and of the credibility of his science. Dr. Brune gave his opinions and suggestions for next steps of the process, and then was dismissed from further discussion pursuant to RA-10 policy role which was consult to the rest of the Inquiry Committee members.

On January 26, 2010, Dr. Foley convened the Inquiry Committee, along with University counsel, Mr. Wendell Courtney, Esq., in case issues of procedure arose.

After a careful review of all written material, and information obtained from the purloined emails, the interview of Dr. Mann, the supplemental materials provided by Dr. Mann and all the information from other sources, the Inquiry Committee found as follows with respect to each allegation:

Allegation 1: “Did you engage in, or participate in, directly or indirectly, any actions with the intent to suppress or falsify data? “

Decision 1: The Inquiry Committee determined there was no substance to this allegation and further investigation of this allegation was not warranted.

Allegation 2: “Did you engage in, or participate in, directly or indirectly, any actions with the intent to delete, conceal or otherwise destroy emails, information and/or data, related to AR4, as suggested by Phil Jones?”

Decision 2: The Inquiry Committee determined there was no substance to this allegation and further investigation of this allegation was not warranted.

Allegation 3: “Did you engage in, or participate in, directly or indirectly, any misuse of privileged or confidential information available to you in your capacity as an academic scholar?”

Decision 3: The Inquiry Committee determined there was no substance to this allegation and further investigation of this allegation was not warranted.

Allegation 4: “Did you engage in, or participate in, directly or indirectly, any actions that seriously deviated from accepted practices within the academic community for proposing, conducting, or reporting research or other scholarly activities?”

Decision 4: The Inquiry Committee determined that “given that information emerged in the form of the emails purloined from CRU in November 2009, which have raised questions in the public’s mind about Dr. Mann’s conduct of his research activity, given that this may be undermining confidence in his findings as a scientist, and given that it may be undermining public trust in science in general and climate science specifically, an Investigatory Committee of faculty peers from diverse fields should be constituted under RA-10 to further consider this allegation.”

An Investigatory Committee of faculty members with impeccable credentials was appointed and asked to present its findings and recommendations to Dr. Henry C. Foley within 120 days of being charged.

The charge to the RA-10 Investigatory Committee:

The Investigatory Committee was charged by Dr. Henry C. Foley, Vice President for Research, on March 4, 2010, as follows:

The Investigatory Committee's charge is to determine whether or not Dr. Michael Mann engaged in, or participated in, directly or indirectly, any actions that seriously deviated from accepted practices within the academic community for proposing, conducting, or reporting research or other scholarly activities.

Sources of support for the related research or publications:

Dr. Mann's research has been sponsored by many different agencies including the National Science Foundation, the Department of Energy and the National Oceanic and Atmosphere Administration.

Documents available to the Investigatory Committee:

- 376 files containing emails stolen from the Climate Research Unit (CRU) of the University of East Anglia and originally reviewed by the Inquiry Committee
- Documents collected by the Inquiry Committee
- Documents provided by Dr. Mann at both the Inquiry and Investigation phases
- Penn State University's RA-10 Inquiry Report
- House of Commons Report HC387-I, March 31, 2010
- National Academy of Science letter titled, "Climate Change and the Integrity of Science" that was published in Science magazine on May 7, 2010
- Information on the peer review process for the National Science Foundation (NSF)
- Department of Energy's Guide to Financial Assistance
- Information on National Oceanic and Atmospheric Administration's peer review process
- Information regarding the percentage of NSF proposals funded
- Dr. Michael Mann's *curriculum vitae*

Interview process:

The interviews were audio-taped and verbatim transcripts were prepared. All interviewed individuals were provided an opportunity to review the transcripts of their interviews for accuracy. The transcripts will be maintained in the Office for Research Protections as part of the official record. Statements or information relevant to the Investigatory Committee's findings are noted in the paragraphs below. The Investigatory Committee interviewed the following individuals:

April 12, 2010: Dr. William Easterling, Dean, College of Earth and Mineral Sciences,
The Pennsylvania State University

April 14, 2010: Dr. Michael Mann, Professor, Department of Meteorology, The
Pennsylvania State University

April 20, 2010: Dr. William Curry, Senior Scientist, Geology and Geophysics
Department, Woods Hole Oceanographic Institution

April 20, 2010: Dr. Jerry McManus, Professor, Department of Earth and Environmental
Sciences, Columbia University

May 5, 2010: Dr. Richard Lindzen, Alfred P. Sloan Professor, Department of Earth,
Atmospheric and Planetary Sciences, Massachusetts Institute of
Technology

**Summary of Investigatory Committee’s Interview with Dr. Michael E. Mann,
Professor, Department of Meteorology, Penn State University – April 14, 2010**

On April 14, 2010, the RA-10 Investigatory Committee (Assmann, Castleman, Irwin, Jablonski, and Vondracek) and Candice Yekel interviewed Dr. Michael Mann. In advance of the interview, the Investigatory Committee prepared several questions focusing on whether Dr. Mann “engaged in, or participated in, directly or indirectly, any actions that seriously deviated from accepted practices within the academic community for preparing, conducting, or reporting research or other scholarly activities.” In addition to the prepared questions, Investigatory Committee members asked a number of follow-up questions. Dr. Mann answered the questions in a detailed manner.

The first question was “Would you please tell us what you consider in your field to be accepted, standard practice with regard to sharing data?” A follow-up question asked how Dr. Mann had dealt with requests for data that were addressed to him during the period covered by the stolen emails. Dr. Mann offered a brief historical perspective on the issue of sharing data in his field, concluding with the observation that data are made generally available (e.g., in the NOAA public database) after those scientists who obtained the data have had a chance to be the first to publish findings based on the data. He noted that sometimes data are made available on a collegial basis to specific scientists before those who collected the data have published their initial findings. Typically, this involves a request to not release the data to others until the data are made publically available by the scientists who obtained the data. Dr. Mann concluded his answer by stating that he has always worked with data obtained by other scientists, and that when such data were not already in the public domain, he made them available as soon as he was permitted to do so by those who initially obtained the data.

Dr. Mann drew a distinction between actual data and intermediate data that are produced as part of the analytic procedures employed. He indicated that while such intermediate data may occasionally be shared with colleagues, it is not standard practice to publish or make generally available this intermediate data (to which he and others refer to as “dirty laundry” in one of the purloined emails). Finally, he indicated that someone who wanted to reproduce his work would be able to independently reproduce this intermediate data and that, in fact, other researchers had done this.

The Investigatory Committee next inquired how he constructed his source codes and what he considered to be accepted practice in his field for publishing source codes. Dr. Mann indicated that in his field of study, in contrast with some other fields such as economics, publishing the source code was never standard practice until his work and that of his colleagues came under public scrutiny, resulting in public pressure to do so. He indicated that he initially was reluctant to publish his source codes because the National Science Foundation had determined that source codes were the intellectual property of the investigator. Also, he developed his source codes using a programming language (FORTRAN 77) that was not likely to produce identical results when run on a computer system different from the one on which it was developed (e.g., different processor makes/models, different operating systems, different compilers, different compiler optimizations). Dr. Mann reported that since around 2000, he has been using a more accessible programming style (MATLAB), and since then he has made all source codes available to the research community.

The next question was “Do you believe that the perceived hostility and perceived ulterior motives of some critics of global climate science influenced your actions with regard to the peer review process, particularly in relation to the papers discussed in the stolen emails?” Dr. Mann responded by affirming his belief in the importance of the peer review process as a means of ensuring that scientifically sound papers are published, and not as a means of preventing the publication of papers that are contrary to one’s views. He elaborated by stating that some of the emails regarding this issue dealt with his concern (shared by other scientists, the publisher, and some members of the editorial board of the journal in question) that the legitimacy of the peer review process had been subverted.

Next, Dr. Mann was asked “Did you ever, without first getting express permission from the original authors, forward to a third party an in-press or submitted manuscript on which you were not a co-author?” In response to this question, Dr. Mann first responded by saying that to the best of his knowledge he had not done so. He then clarified that he may have forwarded such a manuscript to a specific, close colleague, in the belief that permission to do so had been implicit, based on his close collegial relationships with the paper’s authors. An illustrative case of such a circumstance would have been the manuscript by Wahl and Ammann, which Dr. Mann forwarded to Dr. Briffa. In response to a follow-up question, Dr. Mann asserted that such judgments about implied consent are quite typical in his field, but they are made only as long as it is understood that such sharing would take place only among trusted colleagues who would maintain the confidentiality of the manuscript.

The next question for Dr. Mann was posed as follows: “What is your reply to the email statements of Dr. McIntyre (a) that he had been referred to an incorrect version of your data at your FTP site (b) that this incorrect version was posted prior to his request and was not formulated expressly for him and (c) that to date, no source code or other evidence has been provided to fully demonstrate that the incorrect version, now deleted, did not infect some of Mann’s and Rutherford’s other work?” Dr. Mann responded by

stating that neither he, nor many of his colleagues, put much reliability in the various accusations that Dr. McIntyre has made, and that, moreover, there is “no merit whatsoever to Mr. McIntyre’s claims here.” Specifically, Dr. Mann repeated that all data, as well as the source codes requested by Dr. McIntyre, were in fact made available to him. All data were listed on Dr. Mann’s FTP site in 2000, and the source codes were made available to Dr. McIntyre about a year after his request was made, in spite of the fact that the National Science Foundation had ruled that scientists were not required to do so. The issue of an “incorrect version” of the data came about because Dr. McIntyre had requested the data (which were already available on the FTP site) in spreadsheet format, and Dr. Rutherford, early on, had unintentionally sent an incorrectly formatted spreadsheet.

In response to a couple of follow-up questions, Dr. Mann stressed that the stolen emails represent part of a larger context of active communication among scientists, and that he remains on friendly terms with scientists with whom he has had ongoing, and sometimes heated, disagreements about scientific matters. He also commented that he and other scientists fear that the stolen emails will have a chilling effect on the way scientists communicate with each other, partly because members of the public may not appreciate the lingo or jargon (e.g., “dirty laundry” or “trick”) that scientists often use when communicating with each other about their science.

At the conclusion of the interview, Dr. Mann indicated that he would be very happy to provide additional information if the Investigatory Committee felt that this would be helpful.

Summary of Investigatory Committee Interview with Dr. William Easterling, Dean, College of Earth and Mineral Sciences, Penn State University – April 12, 2010

On April 12, 2010, the RA-10 Investigatory Committee (Assmann, Castleman, Irwin, Jablonski, and Vondracek) and Candice Yekel interviewed Dr. William Easterling, Dean of the College of Earth and Mineral Sciences, Penn State University. The Investigatory Committee had a number of prepared questions, starting with a request to learn how Dr. Easterling knew Dr. Mann. Dr. Easterling reported that he had known Dr. Mann for about six or seven years prior to his appointment at Penn State in 2008. In response to a question about when and how he had become aware of the allegations against Dr. Mann, Dr. Easterling reported that it was the week before Thanksgiving 2009, when he started receiving emails suggesting a connection between the stolen East Anglia emails and Dr. Mann’s work.

The next question for Dr. Easterling was posed as follows: “In your judgment, are accepted and ethical research practices in scientific fields related to global climate change significantly different from such practices in other fields of scientific inquiry?” Dr. Easterling’s response to that question was “Absolutely not!” In a follow-up question, Dr. Easterling was asked whether he saw any difference between certain kinds of experimental scientific fields and observational ones like paleoclimatology. He responded by stating that much of what we know about climate change is the result of a combination

of observation and numerical modeling, making the classic idea of falsification of a hypothesis, which may be applicable to a laboratory science, of limited applicability in the study of climate change. Thus, even though there are a number of highly sophisticated, physically sound models that are used to analyze and predict various features of the earth's climate system, human judgments are invariably involved, and a certain amount of subjectivity is introduced.

Another follow-up question inquired about the likely number of different statistical models that might be applicable to Dr. Mann's work. Dr. Easterling indicated that Dr. Mann and his colleagues were primarily interested in looking at historical data (which tend to be "noisy"), using a relatively small number of statistical models, such as principal components analysis, which has a long tradition in various sciences.

The next question addressed to Dr. Easterling was whether, in his judgment, Dr. Mann's work was very aggressive, very conservative, or somewhere in the middle in how it portrayed global warming. Dr. Easterling responded by stating that Dr. Mann's early work showed a more dramatic upturn in warming, but that his more recent work has led to the conclusion that the change has been slightly less dramatic. Moreover, Dr. Easterling added that Dr. Mann's findings have been replicated by independent teams of researchers.

Dr. Easterling was asked whether he knew of any other investigations related to the stolen emails other than the University of East Anglia and Penn State University, and he responded that he was unaware of any others.

The Investigatory Committee then questioned Dr. Easterling about various scientists in the field of climate science who might be interviewed by the Investigatory Committee regarding their views of what constitutes accepted and ethical practice with regard to the conduct of research in the field. The Investigatory Committee wanted a choice of scientists who had disagreed with Dr. Mann's findings as well as others who had agreed but who had not collaborated with Dr. Mann or his collaborators.

At the conclusion of the interview, Dr. Easterling offered to be available to the Investigatory Committee if the Investigatory Committee members thought that this would be helpful.

Summary of Investigatory Committee Interview with Dr. William Curry, Senior Scientist, Geology and Geophysics Department, Woods Hole Oceanographic Institution – April 20, 2010

On April 20, 2010, the RA-10 Investigatory Committee (Assmann, Castleman, Irwin, Jablonski, and Vondracek) and Candice Yekel interviewed Dr. William Curry, Senior Scientist, Geology and Geophysics Department, Woods Hole Oceanographic Institution. The Investigatory Committee had four prepared questions, but Investigatory Committee members were free to ask additional questions as well as follow-up questions as they saw fit.

The first question addressed to Dr. Curry was: “Would you please tell us what you consider in your field to be accepted standard practice with regard to sharing data and unpublished manuscripts?” With regard to sharing data, Dr. Curry indicated that standard practice is that once a publication occurs, the pertinent data are shared via some electronic repository. He stated that not all researchers actually comply with this practice, and that there may be special arrangements with the funding agency, or the journal that publishes the research, that specify when data need to be made available to other researchers. In Dr. Curry’s case, for example, the National Science Foundation allows a two-year window during which he has exclusive rights to his data. After that period he must make it available to others.

On the issue of sharing unpublished manuscripts, Dr. Curry stated that if the manuscript was accompanied by a request to keep it confidential, he would not share it with anyone; if it was not accompanied by an explicit request for confidentiality, he might talk about it with colleagues but would not usually forward it.

Next, Dr. Curry was asked: “Would you please briefly explain how codes are developed in the process of evaluating data in your field, e.g., are these codes significantly different from published software packages? Then please tell us what you consider in your field to be accepted standard practice with regard to sharing codes.” Dr. Curry reported that in his area, most codes are fairly basic and researchers use software packages to construct them. He also reported that he was not aware of any public archive for such codes, but that he was fairly certain that if he asked another researcher to share such codes, he would most likely get them. He added that overall compliance with requests to share codes would probably be equal to the rate of compliance with requests for sharing data.

Next, Dr. Curry was asked to respond to the following: “How do the processes of data acquisition, analysis and interpretation in paleoclimatology affect practices of data sharing in the field? Are any of these processes unique to paleoclimatology?” Dr. Curry asked for clarification and was told that the question referred to whether the laborious and expensive way in which most data are collected in paleoclimatology had an effect on data sharing. He then responded that requests for raw data would be the exception rather than the rule, because transforming the raw data into usable information is labor intensive and difficult. Nevertheless, because of NSF requirements, he would release all data after two years. He added that some scientists, however, do seek to maintain proprietary access to their data even after two years.

Finally, Dr. Curry was asked whether he wanted to share anything else with the Investigatory Committee. In his concluding comments to the Investigatory Committee, Dr. Curry noted that in the last ten years things have changed rather rapidly with regard to sharing data and information. He reported that he has become more aware of how he would be affected if people started asking him step-by-step details of his work, and that while he has always been diligent about documenting his work, ten years ago he would not have been able to document every single step in his analytical work. Thus, “accepted practices” are not fixed and are always evolving.

**Summary of Investigatory Committee Interview with Professor Jerry McManus,
Professor, Department of Earth and Environmental Sciences, Columbia University
– April 20, 2010**

On April 20, 2010, the RA-10 Investigatory Committee (Assmann, Castleman, Irwin, Jablonski, and Vondracek) and Candice Yekel interviewed Dr. Jerry McManus, Professor, Department of Earth and Environmental Sciences, Columbia University. The Investigatory Committee had four prepared questions, but Investigatory Committee members were free to ask additional questions as well as follow-up questions as they saw fit.

To start the interview, Dr. McManus was asked to respond to the following question: “Would you please tell us what you consider in your field to be accepted standard practice with regard to sharing data [and] . . . with regard to sharing unpublished manuscripts?” Dr. McManus responded by first drawing a distinction between published and unpublished data, noting, however, that there is a range of standard practices with regard to both. Nevertheless, the mode of behavior regarding unpublished data is to share “in a fairly limited fashion with individuals or groups who make specific requests and typically who are known to the researcher.” Regarding published data, Dr. McManus indicated that standard practice is to make such data available through any of a broad range of means, including providing access to electronic repositories and institutional archives.

Regarding the sharing of unpublished manuscripts, Dr. McManus indicated that there is a broad range of typical and accepted behaviors, with such manuscripts commonly shared with a limited number of colleagues. In a follow-up question, it was inquired whether it may be considered standard practice to share an unpublished manuscript with others without getting express permission to do so from the author. Dr. McManus responded by saying “no” to such sharing as standard practice, but allowing that there is not necessarily only one acceptable practice, as permission may be given implicitly or explicitly. Without specific encouragement for wider distribution, however, it is generally understood, according to Dr. McManus, that unpublished papers are not intended for third-party distribution.

The next question was stated as follows: “Would you please briefly explain how codes are developed in the process of evaluating data in your field (e.g., are these codes significantly different from published software packages)? Then please tell us what you consider in your field to be accepted, standard practice with regard to sharing codes.” Dr. McManus indicated that most, but not all, details of such methods are usually reported when research is published, and that some of these details may be shared in a “somewhat ad hoc basis.” Generally, however, the tendency is to “try to provide the conditions by which any research can be replicated. . . .” Dr. McManus agreed that generally, codes are treated the same way as any other method.

Summary of Investigatory Committee Interview with Dr. Richard Lindzen, Alfred P. Sloan Professor, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology – May 5, 2010

On May 5 2010, the RA-10 Investigatory Committee (Assmann, Irwin, Jablonski, Vondracek; Dr. Castleman was not available) and Candice Yekel interviewed Dr. Richard Lindzen, Professor, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology. The Investigatory Committee had four prepared questions, but Investigatory Committee members were free to ask additional questions as well as follow-up questions as they saw fit.

Before the Investigatory Committee's questioning began, Dr. Lindzen was given some general background information regarding the process of inquiry and investigation into allegations concerning Dr. Mann, with a focus on the particular allegation that is the subject of the current review by the Investigatory Committee. Dr. Lindzen then requested, and was provided with, a brief summary of the three allegations previously reviewed. When told that the first three allegations against Dr. Mann were dismissed at the inquiry stage of the RA-10 process, Dr. Lindzen's response was: "It's thoroughly amazing. I mean these are issues that he explicitly stated in the emails. I'm wondering what's going on?"

The Investigatory Committee members did not respond to Dr. Lindzen's statement. Instead, Dr. Lindzen's attention was directed to the fourth allegation, and it was explained to him that this is the allegation which the Investigatory Committee is charged to address. Dr. Lindzen was then asked the first question formulated by the Investigatory Committee: "Would you please tell us what you consider in your field to be accepted, standard practice with regard to sharing data, and the second part of the question is would you tell us what you consider in your field to be accepted, standard practice with regard to sharing unpublished manuscripts?"

Dr. Lindzen responded by stating that "with respect to sharing data, the general practice is to have it available." With respect to unpublished manuscripts, he indicated that "those are generally not made available unless the author wishes to." In response to a number of follow-up questions, Dr. Lindzen indicated that if an unpublished manuscript is sent to a scientist by the author, it would be common practice to ask for permission before sharing it with others; if it was sent by someone else it would be common practice to ask if they had permission to share the paper. According to Dr. Lindzen, a scientist might conclude that there is implicit permission to disseminate an unpublished paper only when the author made it clear that the results may be disseminated.

The next question inquired whether, in Dr. Lindzen's view, climatologists normally make their codes (used in the analysis of data) available for other people to download. Dr. Lindzen responded by stating that "it depends." He elaborated, saying that if the codes are very standard, it is unnecessary to share them, but if it's an unusual analysis it would be his practice to make the codes available to anyone who wishes to check them. In a follow-up question, Dr. Lindzen was asked whether he would have issues with people

running into compatibility issues or compilation issues. He responded by saying that even if people “screw it up” or if you have reservations about sharing codes, “if somebody asks you how did you get this, you really should let them know.”

The next questions presented to Dr. Lindzen were as follows: “How do the processes of data acquisition, analysis, and interpretation in paleoclimatology affect practices of data sharing in the field? Are any of these processes unique to paleoclimatology?” Dr. Lindzen indicated that he did not think that these processes are unique to paleoclimatology, and that since most of the data are acquired using public funds, there is no basis for investigators being proprietary with their data. In response to a follow-up question, Dr. Lindzen acknowledged that prior to publication, scientists may have a variety of reasons to keep things confidential, but after publication “there’s an obligation to explain exactly how you got them, especially if they’re controversial.”

Standard of proof used by the Investigatory Committee:

Preponderance of the evidence (happen more likely than not or 51% certainty). All committee votes are unanimous unless otherwise indicated.

Level of intent considered by the Investigatory Committee:

The Investigatory Committee considered various levels of intent in order of increasing severity from *careless*, to *reckless*, to *knowingly*, to *intentional*. These terms are defined as follows:

- *careless* - a reasonable person would not have known better or honest error – this is not considered research misconduct.
- *reckless* - a reasonable person should have known better.
- *knowingly* - a reasonable person knew better but did it anyway.
- *intentional (purposeful)* – a reasonable person knew better but did it anyway with the intent to deceive.

The level of intent regarding the specific allegation will be addressed below.

Summary of Investigation:

The Investigatory Committee investigated the following potential acts of misconduct:

“Did Dr. Michael Mann engage in, or participate in, directly or indirectly, any actions that seriously deviated from accepted practices within the academic community for proposing, conducting, or reporting research or other scholarly activities?”

The Investigatory Committee was given access to 376 files that contained emails stolen from the Climate Research Unit (CRU) of the University of East Anglia. These emails were either sent by Dr. Mann, sent to Dr. Mann, copied to Dr. Mann, or discussed Dr. Mann (but were neither addressed nor copied to him). The Investigatory Committee also

reviewed the documents collected by the Inquiry Committee, as well as the Inquiry Committee's findings and report. In addition, the Investigatory Committee reviewed a number of documents provided by Dr. Mann in response to requests from both the Inquiry and Investigatory Committees. A number of public documents were also made available to the Investigatory Committee, including a number of editorials, both pro and con Dr. Mann, an open letter from 255 members of the National Academy of Sciences, published in *Science* magazine, May 7, 2010, and the full text of the British House of Commons' Science and Technology Committee report on "The disclosure of climate data from the Climatic Research Unit at the University of East Anglia," which was published on March 31, 2010.

In the course of the investigation, the Investigatory Committee interviewed Dr. Michael Mann, as well as his immediate supervisor, Dr. William Easterling, Dean of the College of Earth and Mineral Sciences at the Pennsylvania State University. Dean Easterling and Dr. David Verardo, National Science Foundation Program Director for Paleo Perspectives on Climate Change, agreed to suggest names of eminent scientists who might agree to be interviewed by the Investigatory Committee in its efforts to establish the range of "accepted practices within the academic community for proposing, conducting, or reporting research or other scholarly activities." As previously described, the Investigatory Committee contacted, and subsequently interviewed, three eminent scientists from the field of climate research: Dr. William Curry, Senior Scientist, Geology and Geophysics Department, Woods Hole Oceanographic Institution; Dr. Richard Lindzen, Alfred P. Sloan Professor, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology; and Dr. Jerry McManus, Professor, Department of Earth and Environmental Sciences, Columbia University.

Based on the documentary evidence and on information obtained from the various interviews, the Investigatory Committee first considered the question of whether Dr. Mann had seriously deviated from accepted practice in *proposing* his research activities. First, the Investigatory Committee reviewed Dr. Mann's activities that involved proposals to obtain funding for the conduct of his research. Since 1998, Dr. Mann received funding for his research mainly from two sources: The National Science Foundation (NSF) and the National Oceanic and Atmospheric Administration (NOAA). Both of these agencies have an exceedingly rigorous and highly competitive merit review process that represents an almost insurmountable barrier to anyone who proposes research that does not meet the highest prevailing standards, both in terms of scientific/technical quality and ethical considerations.

NOAA and NSF research grant proposals are both evaluated through similarly rigorous and transparent merit review (peer review) processes. To illustrate, we describe the NSF review process, which has two stages. In Stage 1, proposals are sent out to several external experts for merit review (mail review) based on the two NSF review criteria established by the National Science Foundation Board -- Intellectual Merit and Broader Impacts. In Stage 2, the proposal and its external expert reviews (mail reviews) are taken to a 8-15 person external expert panel and evaluated over a several day period (panel review). Panel review members are not the same persons as the mail review members. In

Stage 1, the external reviewers only see individual proposals and rate them on a 5-point scale in descending order from Excellent, Very Good, Good, Fair, and Poor. In Stage 2, the entire panel (except those members who have a conflict of interest with the proposal) see all the proposals in the competition (usually about 140 proposals in the NSF program to which Dr. Mann has typically submitted his proposals) and rate them based on the same two NSF criteria on the same rating scale, but at this stage they evaluate the proposals in comparison with all the other proposals that were submitted. All reviews are then taken under advisement by the director of the particular NSF program to which the proposal was submitted, who then recommends whether a project should be funded. The program director is guided by the expert reviews, but may also take programmatic balance and other NSF criteria into account before making a final recommendation. The rate of funding varies by program, but rarely exceeds 25 percent.

The results achieved by Dr. Mann in the period 1999-2010, despite these stringent requirements, speak for themselves: He served as principal investigator or co-principal investigator on five NOAA-funded and four NSF-funded research projects. During the same period, Dr. Mann also served as co-investigator of five additional NSF- and NOAA-funded research projects, as well as on projects funded by the Department of Energy (DOE), the United States Agency for International Development (USAID), and the Office of Naval Research (ONR). This level of success in proposing research, and obtaining funding to conduct it, clearly places Dr. Mann among the most respected scientists in his field. Such success would not have been possible had he not met or exceeded the highest standards of his profession for proposing research.

The second part of the Investigatory Committee's charge was to investigate whether Dr. Mann had engaged in any actions that seriously deviated from accepted practices within the academic community for *conducting* research or other scholarly activities. One focus of the committee's investigation centered on whether Dr. Mann had deviated from accepted practice with regard to sharing data and source codes with other investigators. First, the Investigatory Committee established that Dr. Mann has generally used data collected by others, a common practice in paleoclimatology research. Raw data used in Dr. Mann's field of paleoclimatology are laboriously collected by researchers who obtain core drillings from the ocean floor, from coral formations, from polar ice or from glaciers, or who collect tree rings that provide climate information from the past millennium and beyond. Other raw data are retrieved from thousands of weather stations around the globe. Almost all of the raw data used in paleoclimatology are made publicly available, typically after the originators of the data have had an initial opportunity to evaluate the data and publish their findings. In some cases, small sub-sets of data may be protected by commercial agreements; in other cases some data may have been released to close colleagues before the originators had time to consummate their prerogative to have a limited period (usually about two years) of exclusivity; in still other cases there may be legal constraints (imposed by some countries) that prohibit the public sharing of some climate data. The Investigatory Committee established that Dr. Mann, in all of his published studies, precisely identified the source(s) of his raw data and, whenever possible, made the data and or links to the data available to other researchers. These

actions were entirely in line with accepted practices for sharing data in his field of research.

With regard to sharing source codes used to analyze these raw climate data and the intermediate calculations produced by these codes (referred to as “dirty laundry” by Dr. Mann in one of the stolen emails) with other researchers, there appears to be a range of accepted practices. Moreover, there is evidence that these practices have evolved during the last decade toward increased sharing of source codes and intermediate data via authors’ web sites or web links associated with published scientific journal articles. Thus, while it was not considered standard practice ten years ago to make such information publicly available, most researchers in paleoclimatology are today prepared to share such information, in part to avoid unwarranted suspicion of improprieties in their treatment of the raw data. Dr. Mann’s actual practices with regard to making source codes and intermediate data readily available reflect, in all respects, evolving practices within his field. Dr. Mann acknowledged that early in his career he was reluctant to publish his source codes because the National Science Foundation had determined that source codes were the intellectual property of the investigator. Moreover, because he developed his source codes using a specific programming language (FORTRAN 77), these codes were not likely to compile and run on computer systems different from the ones on which they were developed (e.g., different processor makes/models, different operating systems, different compilers, different compiler optimizations). Since then, however, he has used a more accessible method for developing his source codes (MATLAB) and he has made all source codes, as well as intermediate data, available to the research community, thereby meeting and exceeding standard practices in his field. Moreover, most of his research methodology involves the use of Principal Components Analysis, a well-established mathematical procedure that is widely used in climate research and in many other fields of science. Thus, the Investigatory Committee concluded that the manner in which Dr. Mann used and shared source codes has been well within the range of accepted practices in his field.

The issue of whether Dr. Mann had engaged in any actions that seriously deviated from accepted practices within the academic community for *conducting* research or other scholarly activities was examined by the Investigatory Committee via a number of additional means. When a scientist’s research findings are well outside the range of findings published by other scientists examining the same or similar phenomena, legitimate questions may be raised about whether the science is based on accepted practices or whether questionable methods might have been used. Most questions about Dr. Mann’s findings have been focused on his early published work that showed the “hockey stick” pattern of climate change. In fact, research published since then by Dr. Mann and by independent researchers has shown patterns similar to those first described by Dr. Mann, although Dr. Mann’s more recent work has shown slightly less dramatic changes than those reported originally. In some cases, other researchers (e.g., Wahl & Ammann, 2007) have been able to replicate Dr. Mann’s findings, using the publicly available data and algorithms. The convergence of findings by different teams of researchers, using different data sets, lends further credence to the fact that Dr. Mann’s conduct of his research has followed acceptable practice within his field. Further support

for this conclusion may be found in the observation that almost all of Dr. Mann's work was accomplished jointly with other scientists. The checks and balances inherent in such a scientific team approach further diminishes chances that anything unethical or inappropriate occurred in the conduct of the research.

A particularly telling indicator of a scientist's standing within the research community is the recognition that is bestowed by other scientists. Judged by that indicator, Dr. Mann's work, from the beginning of his career, has been recognized as outstanding. For example, he received the Phillip M. Orville Prize for outstanding dissertation in the earth sciences at Yale University in 1997. In 2002, he received an award from the Institute for Scientific Information for a scientific paper (published with co-authors) that appeared in the prestigious journal *Nature*; also in 2002, he co-authored a paper that won the Outstanding Scientific Paper Award from the NOAA Office of Oceanic and Atmospheric Research, and *Scientific American* named him as one of 50 leading visionaries in science and technology. In 2005, Dr. Mann co-authored a paper in the *Journal of Climate* that won the John Russell Mather Paper award from the Association of American Geographers, and in the same year, the website "RealClimate.org" (co-founded by Dr. Mann) was chosen as one of the top 25 "Science and Technology" websites by *Scientific American*. In 2006, Dr. Mann was recognized with the American Geophysical Union Editors' Citation for Excellence in Refereeing (i.e., reviewing manuscripts for *Geophysical Research Letters*). All of these awards and recognitions, as well as others not specifically cited here, serve as evidence that his scientific work, especially the conduct of his research, has from the beginning of his career been judged to be outstanding by a broad spectrum of scientists. Had Dr. Mann's conduct of his research been outside the range of accepted practices, it would have been impossible for him to receive so many awards and recognitions, which typically involve intense scrutiny from scientists who may or may not agree with his scientific conclusions.

The third area of investigation was to address whether Dr. Mann had engaged in any actions that seriously deviated from accepted practices within the academic community for reporting research or other scholarly activities. Dr. Mann's record of publication in peer reviewed scientific journals offers compelling evidence that his scientific work is highly regarded by his peers, thus offering de facto evidence of his adherence to established standards and practices regarding the reporting of research. To date, Dr. Mann is the lead author of 39 scientific publications and he is listed as co-author on an additional 55 publications. The majority of these publications appeared in the most highly respected scientific journals, i.e., journals that have the most rigorous editorial and peer reviews in the field. In practical terms, this means that literally dozens of the most highly qualified scientists in the world scrutinized and examined every detail of the scientific work done by Dr. Mann and his colleagues and judged it to meet the high standards necessary for publication. Moreover, Dr. Mann's work on the Third Assessment Report (2001) of the *Intergovernmental Panel on Climate Change* received recognition (along with several hundred other scientists) by being awarded the 2007 Nobel Peace Prize. Clearly, Dr. Mann's reporting of his research has been successful and judged to be outstanding by his peers. This would have been impossible had his activities in reporting his work been outside of accepted practices in his field.

One issue raised by some who read the stolen emails was whether Dr. Mann distributed privileged information to others to gain some advantage for his interpretation of climate change. The privileged information in question consisted of unpublished manuscripts that were sent to him by colleagues in his field. The Investigatory Committee determined that none of the manuscripts were accompanied by an explicit request to not share them with others. Dr. Mann believed that, on the basis of his collegial relationship with the manuscripts' authors, he implicitly had permission to share them with close colleagues. Moreover, in each case, Dr. Mann explicitly urged the recipients of the unpublished manuscripts to first check with the authors if they intended to use the manuscripts in any way. Although the Investigatory Committee determined that Dr. Mann had acted in good faith with respect to sharing the unpublished manuscripts in question, the Investigatory Committee also found that among the experts interviewed by the Investigatory Committee there was a range of opinion regarding the appropriateness of Dr. Mann's actions. Opinions ranged from one expert who contended that it is never acceptable to share an unpublished manuscript without first obtaining explicit permission from the author(s) to do so, to another expert who felt that, when working with close colleagues, it is sometimes acceptable to do so by assuming that implicit permission had been granted. **The Investigatory Committee considers Dr. Mann's actions in sharing unpublished manuscripts with third parties, without first having received express consent from the authors of such manuscripts, to be careless and inappropriate. While sharing an unpublished manuscript on the basis of the author's implied consent may be an acceptable practice in the judgment of some individuals, the Investigatory Committee believes the best practice in this regard is to obtain express consent from the author before sharing an unpublished manuscript with third parties.**

The Investigatory Committee would like to note that Dr. Mann, after being questioned by the Investigatory Committee about this issue, requested and received confirmation that his assumption of implied consent was correct from the author of one of the papers in question. This "after the fact" communication was not considered by the Investigatory Committee in reaching its decision.

Conclusion of the Investigatory Committee as to whether research misconduct occurred:

The Investigatory Committee, after careful review of all available evidence, determined that there is no substance to the allegation against Dr. Michael E. Mann, Professor, Department of Meteorology, The Pennsylvania State University.

More specifically, the Investigatory Committee determined that Dr. Michael E. Mann did not engage in, nor did he participate in, directly or indirectly, any actions that seriously deviated from accepted practices within the academic community for proposing, conducting, or reporting research, or other scholarly activities.

The decision of the Investigatory Committee was unanimous.