

## Submission of P A W Bratby to the Independent Climate Change Email Review

1. My submission is based on my professional experience from over 35 years of work in a scientific/engineering environment coupled with a detailed review of the CRU emails/data in relation to my experience.
2. I was involved in a review and commentary of the emails. The findings from the perspective of working physicists are given at:  
[http://scienceandpublicpolicy.org/reprint/climategate\\_analysis.html](http://scienceandpublicpolicy.org/reprint/climategate_analysis.html)
3. The following are my main impressions of the scientists and the work at CRU.
4. There is a complete lack of professionalism at CRU. The scientists were attempting to do work for which they were not SQEP (suitably qualified and experienced persons). It is evident that the main areas of expertise required to construct global climate dataset (e.g. CRUTEM) and climate histories are statistics and software development. Both these skills are lacking at CRU. The major backgrounds appear to be in obtaining field data in the areas of dendro- and paleo-climatology without any understanding of the physics of the climate. There was no attempt to obtain people with the correct skills or even to seek assistance from such people.
5. There is no evidence of the application of even a most basic quality management system. There appears to be no policy in the areas of data control, data archiving, software development, software documentation and software configuration and control. There is no evidence of an archiving system or of the use of International standards such as ISO9001 (for business processes) and TickIT certification (for IT standards) to manage the work.
6. The work of the CRU scientists passed from academic science into recommending society-wide economic and industrial engineering through the influence of the CRU involvement in the IPCC. As an engineering project affecting society at large, a transition the CRU scientists voluntarily promulgated through their participation in the IPCC, their work should no longer have been exempt from an engineering-quality validation effort.
7. Scientific advancements occur by building on prior work. For the advancement to be valid, it is vital that all prior work is correct. This necessitates replication and thus verification of all work. For such replication to occur, all data and methods must be freely available to all scientists.

I now specifically deal with CCER Issues Items 6 and 7. My responses are given immediately after each question below.

### **CCER Issues Item 6:**

**The scrutiny and re-analysis of data by other scientists is a vital process if hypotheses are to rigorously tested and improved. It is alleged that there has been a failure to make important data available or the procedures used to adjust and analyse that data, thereby subverting a crucial scientific process.**

- *Do you agree that releasing data for others to use and to test hypotheses is an important principle?*

It is an imperative in science that all data and methods are available for others to use to verify and replicate. There can be no trust in hidden science. If data cannot be released due to commercial agreements, then it should not be used in public science. Peer review does not involve replication and of itself, peer-review is insufficient to verify and demonstrate correctness of published papers; therefore replication is vital.

- *If so, do you agree that this principle has been abused?*

The emails reveal that not releasing data and methods has been endemic in climate science for a very long time. Publishing journals in the field of climate science have been remiss in not enforcing their policies on release of data and methods. This has encouraged the scientists to refuse to release data, methods and codes.

- *If so, should not data be released for use by those with the intention to undermine your case, or is there a distinction you would wish to make between legitimate and illegitimate use?*

There is no such thing as legitimate and illegitimate use of data. Scientists should release data and should welcome the use of the data by others to confirm or falsify a hypothesis. Falsification of a hypothesis is the foundation of science.

- *If not, do others have reasonable access to the data at all levels and to the description of processing steps, in order to be able to carry out such a re-analysis?*
- *Can you describe clearly the data-sets and relevant meta-data that have been released; what has not been released and to what extent is it in useable form? Where has it been released?*
- *Where access is limited, or not possible, or not meaningful, for legitimate reasons please explain why?*

## **CCER ISSUES Item 7:**

### **The keeping of accurate records of datasets, algorithms and software used in the analysis of climate data**

It is evident from the emails that CRU operates, or has operated, without any policy on quality management. There is no evidence of the application of even the most basic quality management systems. There appears to be no policy in the areas of data control, data archiving, software development, software documentation, software configuration and control and in document control. There is no evidence of an archiving system or of the use of International standards such as ISO9001 (for business processes) and TickIT certification (for IT standards).

The CRU has obtained external funding for most of its work and a considerable amount of the funding has come from DEFRA and the Met Office. It is surprising that there appears to have been no oversight of the work of CRU by the funding bodies. The Met Office proclaims that it is ISO9001 and TickIT compliant and yet it appears to place contracts with CRU without carrying out any audits of the work of CRU as a sub-contractor. The Review Team should investigate how the Met Office and DEFRA project/contract managers place these contracts without any quality

requirements and without performing any oversight, including regular audits. The contents of the contracts should be examined by the Review Team.

It is apparent that CRU has been operating in a very ‘amateurish’ manner. There is no excuse for not employing an ‘off-the-shelf’ quality management system. It would appear from an examination of the emails that a considerable proportion of the CRU budget has been spent on attending meetings and conferences in exotic locations and that little, if any, money has been spent on quality systems. Quality costs very little. Inexpensive data archiving systems have been available for at least 40 years. Microfilms and microfiches were common in the 1970s and 1980s to store data, computer listings and computer output; electronic storage systems have been available since the 1990s.

- *Were formal ‘data dictionaries’ kept of the data sets acquired by the CRU at various times from other bodies such as the UK Meteorological Office Hadley Centre and its equivalents around the World?*

It is evident from many disclosures in the emails that CRU has no data archiving and retrieval policy or any quality procedures. The question that should be asked is why CRU operates without any quality procedures?

- *Were comprehensive records kept of the way these various data sets were used, the statistical and other algorithms used in processing them, and the various software programmes and modules used to carry out that processing?*

It is evident that CRU has no procedures for the control and documentation of methods and software development and use. Again, the question is why CRU operates without any quality procedures?

- *Does a formal library of algorithms and software used by the CRU exist?*

It is evident that CRU has no procedures for the development, configuration, documentation, archiving and use of algorithms and software. Again, the question is why CRU operates without any quality procedures?

- *What quality control measures were used to test the various algorithms and software modules developed by the CRU?*

It is evident that CRU has no procedures for the verification and validation of algorithms and software. Again, the question is why CRU operates without any quality procedures?

- *What techniques did members of the CRU employ to ensure the integrity of the various applications used to process climate data?*

It is evident that CRU does not have a quality management system and no verification procedures. Again, the question is why CRU operates without any quality procedures?

- *What policies are in place to ensure the formal archiving of data sets and resultant analyses for future use and review.*

It is evident that CRU does not have any formal archiving system for data and methods. Again, the question is why CRU operates without any quality procedures?

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