

Statement of Oak Ridge National Laboratory in Response to Recent Allegations of Research Misconduct

“An independent, external investigation has concluded unanimously that there was no evidence for research misconduct, although some errors were made that have been acknowledged by the authors. These errors were judged to have had no material impact on the scientific conclusions.” (Statement of the Independent Investigating Committee, http://www.ornl.gov/ornlhome/research_integrity/Ext_Cmte_Invest Stmt_0805.pdf)

Over the past two years, authors currently and previously associated with the ORNL electron microscopy group led by Stephen Pennycook received a number of communications raising allegations or concerns associated with numerous papers published between 1988 and 2006. The initial allegations and concerns originated from anonymous sources and were received through the editor of a scientific journal or a member of the press. Later concerns were sent directly to ORNL by the complainants. These communications included specific accusations of research misconduct, as well as numerous concerns generally posed as questions or technical comments. While ORNL’s response to individual concerns has been timely, it took two years to receive the full set of allegations, making an earlier formal response impractical.

Consistent with DOE policy, ORNL follows the process described by the Office of Science and Technology Policy for responding to allegations of research misconduct. After an allegation is received, an inquiry is conducted to determine if further investigation is warranted. The purpose of the inquiry is to eliminate frivolous, unjustified, or erroneous allegations. If warranted, a formal investigation is conducted, including an examination of the record leading to a recommendation for dismissal of the case or for a finding of research misconduct or other appropriate remedy. The investigation is followed by adjudication, which includes reviewing the recommendations and determining appropriate corrective actions.

Internal inquiries were conducted for all of the allegations and concerns. In three cases, a formal investigation was recommended, and the matter was referred to an independent external committee appointed by ORNL for this purpose. The committee members, who have agreed to make their names public, were C. Barry Carter (Head, Department of Chemical, Materials, and Biomolecular Engineering, University of Connecticut), Paul S. Percy (Dean of the College of Engineering and Professor of Materials Science and Engineering at the University of Wisconsin–Madison), and David B. Williams (President, University of Alabama in Huntsville). Professors Carter and Williams are former presidents of national electron microscopy societies and editors of major electron microscopy journals, and Dean Percy is a member of the National Academy of Engineering and former Councilor of the American Physical Society and Materials Research Society. Their expertise includes the research areas relevant to this case.

The independent external committee concluded that there was no evidence of research misconduct or fraud, although the authors had made some errors associated with the work. These errors resulted in two corrections to the scientific record. The committee

further judged that the errors were the result of carelessness and not intended to deceive, that they had no material effect on the scientific conclusions, and that there was no pattern of misrepresentation of data. The committee was unanimous in their conclusions.

The remaining allegations and concerns involved a variety of issues including several careless mistakes by the authors, typographical errors, a few instances of failure to properly cite one's own work, a few cases of incomplete figure descriptions, and journal printing errors, as well as misconceptions by the complainants. None of the mistakes by the authors materially affected the scientific conclusions of any paper. In all cases, with the exception of a paper from 1993 where the raw spectra could not be located, the published results were directly traceable to original data.

An unfortunate aspect of this matter is that a number of unsubstantiated allegations have been widely circulated. A particularly damaging example involves an implication of data fabrication associated with low temperature electron microscopy results briefly referred to in a 2006 *Cond. Mat.* posting. The basis for this allegation appears to be that the ORNL microscope is not capable of low temperature operation. In fact, the 100 K measurements were taken on a microscope at the University of Illinois-Chicago. Archive time-stamped original data files clearly show the presence of the features described in the paper.

In addition to the formal investigation, ORNL asked the Science and Technology Committee of the UT-Battelle Board of Governors to review the process followed by the Laboratory in investigating this matter. This committee, drawn from senior research administrators from major research universities across the Southeast, is the oversight authority for science and technology matters at ORNL. The committee concluded unanimously that the investigation was handled appropriately, that the investigation was free of conflict of interest, and that the process was consistent with applicable federal guidelines.

This occurrence could have been avoided had the authors been more careful in the preparation and review of two manuscripts (and related versions of these manuscripts), one published 15 years ago (Browning et al., *Nature* 366, 143–146 (1993)) and the second posted on the arXiv preprint server (Varela et al., *Cond. Mat.* 050864 (2006)). While this did not affect the scientific conclusions, the resulting mistakes revealed weaknesses in the preparation and reviewing of these manuscripts. This issue has been taken seriously, and review practices have been strengthened to prevent recurrence.

This occurrence has also provided important lessons for the Laboratory as a whole. As with all research institutions, ORNL must maintain the highest standards of integrity and accuracy in research. While the Laboratory has earned a good reputation in this area, this commitment must be continuously nurtured by ensuring that all staff fully understand and implement the best possible practices. This is particularly important since advances in electronic publishing and digital image processing have created gray areas where guidance is unclear or evolving. As a result of this incident and increased awareness nationally, ORNL has reviewed and strengthened its policies for proposing, performing,

and publishing research. In addition, the ORNL director has communicated his personal expectations in this area to the staff.

This has been a difficult issue for all involved, particularly since the allegations were received over a period of two years. This greatly extended the time required to reach closure. ORNL followed applicable federal guidelines in resolving this matter. All allegations were thoroughly investigated, including internal inquiries and referral to an independent external committee as appropriate. Based on the results of extensive internal and external review, ORNL concludes that the allegations are not substantiated and considers the matter closed.