Testimony of

Dr. Linda G. Blevins
Senior Technical Advisor
Office of the Deputy Director for Science Programs
Office of Science

U.S. Department of Energy

Before the

Subcommittee on Research and Science Education
Committee on Science and Technology
U.S. House of Representatives

May 8, 2008

Chairman Baird, Ranking Member Ehlers, and Members of the Subcommittee, thank you for the opportunity to testify today. I would like to provide you with the history of the DOE Office of Science's involvement in several gender equity workshops.

The 2005 demographics of academic chemistry departments as reported by *Chemical and Engineering News* told a striking story that motivated the design of a new workshop series. First, an impressive 50 percent of chemistry bachelor's degrees were awarded to women and 35 percent of chemistry Ph.D. degrees went to women.[1] Despite these strong training numbers, only 13 percent of the faculty from the "top 50" university chemistry departments in the U.S. were women.[2] This disparity between the fraction of women obtaining Ph.D. degrees and the fraction of women serving as university faculty led the chemistry community to develop a workshop concept that targeted the participation of the chairs of the top 50 university chemistry departments. Workshop organizers engaged the major federal funders of chemistry research – the Department of Energy (DOE), the National Science Foundation (NSF), and the National Institutes of Health (NIH) – for financial support and workshop involvement. A steering committee, whose members were well-recognized academic chemists respected for their research contributions, was established. The workshop used demographic data and social science to examine the underlying causes of the gender gap in university chemistry departments.

Around the time of the chemistry workshop, the National Academies report, *"Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,"* focused broad public attention on issues relating to the future of the physical sciences workforce in the United States. Soon after, another Academies report, *"Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering,"* helped raise awareness that unintentional biases can limit women's participation in science. These two reports reinforced the DOE Office of Science's motivation to support gender equity workshops.

The chemistry workshop, "Building Strong Academic Chemistry Departments through Gender Equity,"[3] was held January 29-31, 2006, and included lectures, panel discussions, and breakout sessions. Academic leaders, social scientists, and funding agency senior managers discussed demographic data and social science findings and used the breakout sessions to apply their broad, collective experience to identify action items for further work. A thought-provoking interactive theater skit on the first night demonstrated potential for implicit bias in academic mentoring, with actors staying in character to address audience questions. The social science presentations argued that most men and women exhibit unintended or implicit bias and that gender schemas[4] -- hidden assumptions about a person's behavior based on gender -- can slow women's advancement in academia and other career paths. At the conclusion of the workshop, the chairs committed to carry out at least two action items apiece from lists developed in the workshop breakout sessions.

A report describing the chemistry workshop and resultant action items for university and college departments, institutions, and funding agencies was released in 2006. Action items dealt

[1] C&E News Vol. 83 No. 44, pp. 38-39, 31 October 2005; also Vol. 84 No. 30, pp. 43-52, July 2006.
[2] "Top 50" is defined by federal research expenditures. C&E News Vol. 83 pp. 38-39, 31 October 2005
[3] http://www.chem.harvard.edu/groups/friend/GenderEquityWorkshop/index.html
[4] Valian, V. (1998). Why so slow? The advancement of women. Cambridge, MA: M.I.T. Press.

with issues such as educating others about implicit bias and developing policies that facilitate hiring of women, including spousal hiring. Forty-five of the 56 chairs who attended the workshop visited an interactive website and selected action items to implement. Results of pre- and post-workshop attitudinal surveys administered by the Committee on the Advancement of Women Chemists (COACh)[5] showed measurable changes in the chairs' views. The interactive website was developed by COACh to track progress in the chairs' implementation of action items. At the end of the first and second years after the workshop, COACh received progress updates from chairs. Twenty-five chairs have followed up with COACh to report progress this year. The high participation rate in selecting action items and following up with progress reports has been encouraging.

The chemistry workshop resulted in shifts in attitude among the university chemistry department chairs who participated. These shifts were measured using an approved survey instrument developed by COACh and the steering committee. Before the workshop, the chairs generally felt that the principal factors limiting their ability to hire women were beyond their administrative control—factors such as too few applicants, candidate loss to other departments, and lack of spousal employment opportunities. After the workshop, however, chairs were more likely to report the limiting factors were those they could affect, such as low faculty commitment to hiring women and lack of financing. Additionally, chairs' perceptions of the factors slowing the progress of women chemistry faculty changed. A paper reporting these results will appear in the archival literature.[6]

Inspired by the first workshop and follow-up within the chemistry community, the physics community approached the major funders of physics research – the DOE Office of Science and the NSF Mathematical and Physical Sciences Directorate – about hosting a similar workshop in their field. Workshop proposals were submitted and successfully reviewed at both agencies. A respected physics workshop steering committee was formed, and the time-intensive planning process began. The American Physical Society's Committee on the Status of Women in Physics[7] (APS CSWP) spearheaded the planning effort with advice from the funding agencies. The workshop, "Strengthening the Physics Enterprise in Universities and National Laboratories,"[8] was held May 6-8, 2007.

It was clear from the beginning that physics demographics were very different from those of chemistry: In 2005, only 21 percent of bachelor's degrees and 14 percent of Ph.D. degrees in physics were awarded to women,[9] while 2002 data showed that only about seven percent of faculty members in the nation's top 50 university physics departments were women.[10] Thus, in contrast to chemistry, women were under-represented in the science of physics at every level.

---

[5] http://coach.uoregon.edu/

[6] "Promoting Gender Equity in Academic Departments: A Study of Department Heads in Top-Ranked Chemistry Departments," J. Greene, P. Lewis, G.L. Richmond, and J. Stockard, Journal of Women and Minorities in Science and Engineering, In Press (2008).

[7] http://www.aps.org/programs/women/

[8] http://www.aps.org/programs/women/workshops/gender-equity/index.cfm

[9] http://www.aip.org/statistics/

[10] "A National Analysis of Diversity in Science and Engineering Faculties at Research Universities," Dr. Donna J. Nelson, Norman, OK. January, 2005.
http://cheminfo.chem.ou.edu/~djn/diversity/briefings/Diversity%20Report%20Final.pdf

Most of the physics workshop design was similar to that of the chemistry workshop, but a session on undergraduate and graduate education was added to address the demographic imbalance. Managers from DOE national laboratories were involved because of the importance of physicists to the missions of the national laboratories. Results from the pre- and post-workshop surveys are currently being analyzed, and implementation of action items is being tracked by the APS CSWP. A report from the physics gender equity workshop is in the final stages of preparation.

Inspired by the gender equity workshops, the chemistry community organized a department chair workshop addressing racial and ethnic equity, held September 24-26, 2007 with sponsorship from DOE, NSF, and NIH. The materials sciences and engineering community is currently planning a gender equity workshop of its own, with anticipated co-funding from DOE and NSF, to be held May 18-20, 2008.

The remainder of my testimony will focus on the questions proposed in the invitation letter for this hearing.

1. Based on your own experience in helping to organize workshops to address gender bias in the chemistry and physics communities in 2006 and 2007, what are the elements of an effective workshop? In answering this question, please address workshop content, format, speakers, and participant categories, in addition to any other elements that are important to an effective workshop.

To provide a little background, I personally attended the 2006 chemistry gender equity workshop and was a federal advisor to the steering committees for the 2007 physics gender equity workshop and the 2007 chemistry racial and ethnic equity workshop. A few observations can be made about the workshop series as a whole. Each workshop requires months of hard preparation work by the relevant scientific communities before the meeting occurs. A distinguished steering committee, comprised of five to ten highly respected researchers, encourages university department chairs to attend a given workshop and participate fully. At least one steering committee member should be expert in the social sciences addressing women in science to provide insight and planning advice from that perspective. The workshops have been structured by the communities and, as a result, the communities accept a strong sense of ownership of the outcomes. Follow-up activities that include reports of progress on action items are as important as the workshop itself, as they maintain attention on the action items.

Workshop attendance is by invitation and is typically limited to about 100 people to facilitate information exchange. Participant travel expenses are supported by federal agencies so that cost is not an impediment to participation. The chairs are selected from departments that produce the most Ph.D.s and/or receive the most federal research dollars. Such chairs are typically role models and have the ability to influence their own faculty as well as other department chairs. Bringing such a peer group together encourages mutual cooperation toward common goals. Steering committee members sometimes engage funding agency officials in encouraging chairs to attend. When a chair is unavailable, special effort is made to have him/her nominate an influential colleague with demonstrated departmental leadership. Each workshop audience includes a few opinion leaders, defined as either distinguished disciplinary scientists

with sway over their colleagues or other scientists with unique expertise relevant to equity for under-represented groups in science. These opinion leaders are carefully chosen by the steering committee for their potential to stimulate discourse throughout the workshop. The presence of high level federal officials from the relevant disciplinary funding programs seems important, as they reinforce the importance of gender equity among the science community participants.

For workshop content, data-driven science is emphasized over anecdotal evidence. Social science is presented objectively and dispassionately. Breakout sessions have ranged from unstructured discussions of generic questions to structured scenario analyses. Inviting a science writer to help produce a workshop is also a good idea. Creative touches such as interactive theater and implicit bias demonstrations can shift perspectives and create group experiences that encourage community action.

2. What metrics should be used to evaluate the success of such workshops in changing individual behavior and institutional culture related to gender equity in academic science and engineering?

The success metrics proposed and used by the communities have been (1) attitudinal change as measured using pre- and post-workshop surveys and (2) tracking of the documented commitment by participants to implement action items and to provide follow-up via interactive websites. Efforts have been made to keep the pre- and post-workshop surveys similar so results for different community cultures and workshop features can be compared. Involvement of COACh with survey instruments has helped maintain continuity. Survey results are still being analyzed from workshops held after the chemistry gender workshop. The chemistry department chairs who reported back to COACh two years after that workshop have described implementation of a number of new policies to encourage gender equity, including reduced teaching load after childbirth, stopping the tenure clock, mandatory mentoring plans for junior faculty, more inclusive appointment procedures for influential committees, changes in interview methods to better assure fairness, and scheduling of faculty meetings during business hours. Communities planning future workshops may consider developing other metrics that could be evaluated by the funding agencies as part of proposal merit review.

A recurring theme from these workshops and other stakeholder input is the need to collect and track demographic data. Increased percentages of women could indicate that positive changes are taking place. Some science communities, like chemistry and physics, have ready access to data from professional societies. Others, like the materials sciences and engineering community, need to develop sources for such data.

3. Are there challenges in overcoming gender bias that are unique to the National Laboratories? Should the workshops have sessions that are tailored specifically to National Laboratory participants?

The workshops have not revealed differences in the potential for implicit bias between Federally Funded Research and Development Centers (FFRDCs) and universities. Social science research and understanding suggest that implicit bias would exist in many technical

environments, which might include universities, national laboratories, and other FFRDCs. Thus, approaches to identify and raise awareness of implicit bias could be similar in any of them.

The physics gender equity workshop did, however, highlight some organizational differences between FFRDCs and universities that create workshop planning challenges. First, FFRDCs do not necessarily have discrete disciplinary units as do academic departments. FFRDC managers lead groups, divisions, directorates, branches, centers, etc., with various disciplines represented among tens to hundreds of scientists. The development of surveys that would apply to both university and FFRDC structures as well as the selection of chair rank- and scope-equivalent FFRDC managers have proven to be challenging in organizing workshops and devising data collection tools. A single FFRDC manager with full responsibility and authority to identify problems and implement changes for a scientific discipline may not exist. Second, universities typically have tenure systems, while FFRDCs can have various promotion systems. Some FFRDCs have versions of tenure; some operate more like corporations. No one model applies to all.

To date, workshop information has emphasized academic practice; it must be adapted to be relevant to FFRDCs. Structuring some workshop sessions specifically for FFRDCs is a good suggestion that may provide more information more useful for them.

Despite their organizational differences, laboratories have been influenced by findings from the gender equity workshops. For example, Brookhaven National Laboratory undertook an activity inspired by the two gender equity workshops. Brookhaven had sent a representative to the 2006 chemistry workshop and another to the 2007 physics workshop. These individuals returned to the laboratory with specific ideas about steps that could be taken toward improving gender equity and, after discussion, laboratory management decided to form a new team. The Family Friendly Committee, a group of 15 laboratory employees from various job levels, was commissioned by the laboratory director and met nine times during its first year. The Family Friendly Committee, in turn, formed subcommittees to consider such topics as alternate work schedules, leave policies, and family services. The subcommittees examined current practices at Brookhaven and developed some 15 suggestions for improvement. These recommendations are currently being assembled into an internal report to laboratory management. The Family Friendly Committee also hosted two distinguished gender equity experts for day-long visits to the laboratory. Each of their seminars attracted about 100 people.

The workshop series continues to be driven by the scientific communities, which have been encouraged by the demonstrated success of their initial efforts. Each science discipline has a unique culture and demographic. These differences necessitate somewhat different features for each workshop. The model for these workshops continues to evolve, and communities wanting to organize such workshops for themselves continue to propose innovative ideas for consideration by appropriate funding agencies. The agencies funding and advising these workshops have forged good working relationships with each other and with the communities working to achieve gender equity. The innovative nature of the workshop concept has drawn and maintains DOE's interest in participating.

That concludes my testimony, Mr. Chairman. Thank you, again, for the opportunity to speak before you today. I would be happy to answer any questions the Committee may have.