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March 6, 2012

Dr. William F. Brinkman
Director - Office of Science, SC-1
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Dr. Brinkman,

With this letter, the Fusion Energy Sciences Advisory Committee transmits two reports addressing your charge of July 22, 2011. The first, from the Panel on International Collaboration in Fusion Energy Sciences Research, responds to charge points 1 and 2. The second report, from the panel on Materials Science and Technology Research Opportunities responds to point 3. We want to thank Dr. Meade, Dr. Zinkle and members of both panels for their efforts.

As requested, the first report summarizes research opportunities on international facilities and reviews mechanisms and research modes best suited for fusion science. The panel has put the collaboration opportunities into a strategic context, defining a set of criteria for assessing scientific opportunities and recommending research areas with the greatest impact and net benefit to the U.S. To address the charge's second point, the panel carefully reviewed approaches taken in different fields of science and incorporated experiences already accumulated in the fusion program. Taken together, their recommendations point toward more consistent, systematic and effective processes for developing and executing impactful collaborative research.

Turning to the second report, the materials panel has conducted a thorough survey of the technical issues, identified a set of scientific grand challenges and proposed guiding principles and detailed research campaigns that would address the relevant science and technology. The report noted a critical role for computation, but did not detail the advances in applied math or computer science that would be required. A follow-on study on this subject could be timely and productive. The panel has produced a well-organized, comprehensive set of findings and recommendations, backed up by extensive detail and cogent argument. Aside from its principal aim, to inform DOE planning, we expect this report to be a valuable reference work for years to come.

Both studies generated wide-ranging and lively discussion at the recent FESAC meeting after which the committee voted unanimously to endorse each report.

Sincerely,

A handwritten signature in blue ink that reads "Martin Greenwald". The signature is written in a cursive style with a large initial 'M'.

Martin Greenwald
Chair, Fusion Energy Sciences Advisory Committee

Cc: Patricia Dehmer
Edmund Synakowski
Al Opdenaker