**Department of Energy**
Office of Science
Washington, DC 20585

**Office of the Director**

April 13, 2012

Dr Martin Greenwald
Plasma Science and Fusion Center
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, MA 02139

Dear Dr. Greenwald:

The U.S. fusion program has demonstrated leadership capability in plasma dynamics and plasma control science. It also has made major contributions to fusion materials science, but our effort there has been relatively modest. Progress on both fronts is required to establish the scientific basis for fusion.

A leading concern is how best to use the resources available. This includes positioning the U.S. to capture the science of ITER and, reciprocally, how to position the U.S. to be as influential as possible in the ITER era. Such influence can come both through the science directed to ITER, and that science which complements it. It also includes consideration of opportunities that will complement ITER and burning plasma science research. Indeed, in both the plasma and fusion materials sciences, gaps have been identified that, if filled, will lead to U.S. leadership and the chance to accelerate the time line to establish the scientific basis for fusion energy.

For planning purposes, it will be of value to the Office of Science and the Office of Fusion Energy Sciences to have an assessment by FESAC of priorities among and within the elements of the magnetic fusion energy science program. Note that General Plasma Science and High-Energy-Density Laboratory Physics programs, while recognized by the Office as important to the broader plasma sciences, are not part of this charge. I therefore ask FESAC to consider the following charge related to scientific priorities for magnetic fusion. Please assume that the ITER project is ongoing, will be until the end of this decade, and is supported separately from the rest of the program:

1. With the focus on research that supports burning plasma science and that addresses critical challenges for long-pulse/steady-state operation including plasma-wall interactions and materials, prioritize among and within the FY2013 elements of the non-ITER magnetic fusion portion of the Fusion Energy Sciences program. Assume funding at the FY2013 Presidential budget request level of effort, and that a sustained investment in the US ITER project will extend over much of this decade. New elements may be inserted into the prioritization after FY2013, with an accompanying adjustment in priorities.

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2. Considering the same focus as in (1), again prioritize the elements of the non-ITER part of the magnetic fusion portion of the FES program, but assume a restoration of the budget to the 2012 level for that part of the program. New elements may be inserted in the prioritization after FY2013.

3. Prioritize the elements of a U.S. program that has a substantially enhanced emphasis on fusion materials science. Consider the five year period following the roll-off in ITER project construction funding. Assume that the roll-off allows a 50 percent increase in the non-ITER magnetic fusion level of effort during that 5-year period over that in the FY2013 budget, and that research on fusion materials science and harnessing fusion power will capture much of this increase.

In assessing an element's value, consider the role of cross-links between program elements. Consider research opportunities overseas to be part of a U.S. research program. Your assessment should be informed by the recent FESAC reports in international collaboration opportunities and materials science, the 2009 Research Needs for Magnetic Energy Sciences Workshop (ReNeW) report, the 2007 FESAC report on Priorities, Gaps, and Opportunities, and earlier input by the National Academies and FESAC.

Yours Sincerely,

W. F. Brinkman
Director, Office of Science, DOE