Statement
On The
Fiscal Year 2001 Fusion Energy Science Budget
Before The
Subcommittee on Energy and Water Development

Mr. Chairman and Members of the Subcommittee:

In response to Congressional Report Language associated with the FY1999 budget, the Department of Energy commissioned the Secretary of Energy Advisory Board (SEAB) to review the Department's efforts in Fusion Energy. After an extensive, high-level review, SEAB Chairman Athy reported to the Secretary of Energy that "**The task force concluded that the current funding level for fusion energy is subcritical. Funding on the order of $300M/yr will be required to support an appropriately balanced fusion energy program**."

This recommendation is fully consistent with the 1995 and 1997 reviews by the President's Council of Advisors on Science and Technology (PCAST). The SEAB task force also concluded that "DP [DOE Defense Programs]... might appropriately take the lead in the development of high-average-power lasers…" for Inertial Fusion Energy. In the context of the SEAB Report, the Fusion Energy Sciences Advisory Committee subsequently developed a detailed research plan, establishing balance and priorities across the program, and setting key assessment points at 5, 10, and 15 years, for an overall budget of $300M. The FY2000 Energy and Water Appropriations Conference Report on Fusion Energy Science said, in full, "The conferees are pleased with the highly supportive recent report on fusion energy science from the Secretary of Energy's Advisory Board and with the comprehensive scientific plan developed the Fusion Energy Sciences Advisory Committee (FESAC). The FESAC plan should be used by the Department as guidance in the allocation of the resources provided for fusion energy sciences."

In light of these Reports, the fusion energy science community requests that Congress fund the DOE/SC Office of Fusion Energy Science at $275M for FY2001, as authorized by the House Science Committee, and that related laser research be funded at $25M, to be allocated between DOE/DP Office of Inertial Confinement Fusion and the DOE/SC Office of Fusion Energy Sciences as deemed appropriate by the Subcommittee.

The Administration's Proposed Budget Cuts Research Below FY2000 Levels.

The FY2001 budget proposed by the Administration ($247M for OFES) is a significant positive step as measured against the Administration's FY2000 proposal ($223M However, the Administration's request for Fusion Energy Sciences includes $9M of additional funding above FY2000 levels for decommissioning and clean-up activities. While these activities are important, they decrease the dollars available for research activity. Further, the Administration request for ICF includes no funds

for IFE-related laser research. Taken together, these reductions mean that when compared with the FY2000 Appropriation, the FY2001 request would result in a sharp decrease in research activity

Our request, therefore, comprises two parts. In the first, a most critical priority, our request is for provision of an additional $7M of funds to restore research budget cuts within OFES, which are in the range of 5 – 6% for affected programs both at the larger national facilities and at universities, and restoration of $10M for IFE-related laser development. At this level, however, the program would still be unable to fully utilize existing facilities, take advantage of exciting scientific opportunities through international collaboration, nor continue expanding in the areas of IFE and magnetic alternates, as recommended by external reviews.

The Fusion Community has Developed a Detailed Scientific Plan for $300M/year.

The second part of our request is designed to extend fusion energy science research beyond the FY2000 level, in accordance with the detailed plan of the FESAC, based on a careful analysis of program priorities and balance. Within MFE some of the over-riding science issues to be addressed in the near future include:

- Verification of the theoretical explanation for recently discovered techniques for suppressing plasma turbulence;
- Demonstration of plasma profile control tools to provide access to regimes wherein the plasma produces its own confining field in a sustained manner;
- Study of plasma self-organization through chaotic magnetic fields; and
- Exploration of plasma confinement in a complex geometry with underlying magnetic symmetry.

Within IFE key issues include:

- the understanding of laser dynamics at high repetition rates;
- the dynamics of intense non-neutral plasmas associated with heavy ion beam accelerators; and
- and scientific issues of beam propagation and focussing across long distances.

To pursue these goals, the FESAC plan made specific recommendations for increases from a base which was approximately the FY2000 distribution of funds, and this plan has been received positively by Congress. While further peer review of some specific elements will still be required, the key FESAC goals and funding balance represent a strong consensus of the fusion research community. Four key thrust areas, and associated requirements for incremental support, were identified in MFE research, with a goal of providing data for a 5-year assessment point:

1) Strengthen theory and computation, and general plasma science, including research on near-term applications of plasma science and technology. (+ $3 million) This will strengthen our ability to model and predict plasma phenomena in current and proposed experimental facilities, and to transfer the science learned in all elements of the fusion energy science program to other disciplines

2) Pursue an aggressive portfolio of innovative confinement concepts, both at the Proof of Principle and Concept Exploration levels. (+ $6.5 million) This will broaden preliminary explorations of plasma phenomena in a portfolio of small-scale facilities focussed on addressing specific scientific issues, and support integrated tests of new approaches to plasma confinement.
3) Focus moderate-pulse Advanced Tokamak research both in the U.S. and through international collaboration, and to a lesser degree Spherical Torus research, on a 5-year assessment point; and prepare for participation in a burning plasma experiment. (+ $6.5 million) This will allow fuller utilization our larger scientific facilities and permit a small increase in international collaboration, for example, in the deuterium-tritium capable Joint European Torus and later the Korean steady-state, advanced-tokamak KSTAR.
4) Revitalize the fusion technology program focusing on innovation, including advanced system studies. (+ $3 million) This will strengthen the development of technologies necessary both to the pursuance of fusion science and to the evaluation of fusion options for energy applications.

Two key thrust areas, and associated requirements for incremental support, were identified for IFE research, also aimed at a 5-year assessment point:

1) Efficient and affordable rep-rated driver systems. (IFE-related laser research, + $15M; Heavy ion beams, + $3M). This will bring both of these activities to a level that the necessary progress could be achieved for the 5-yr assessment point.
2) Associated fusion chamber and target technologies. (+ $1M) Together with the base funding, this will permit, in both of these areas, the addressing of scientific issues key to practical IFE in a timely fashion.

We request the provision of $300M in total annual support in FY2001-04. Such funding will allow the set of 5-year objectives established by the FESAC to be achieved in a timely fashion, without sacrificing the SEAB-recommended balance among elements in the program. This plan will provide the Nation with the information needed to make clear and timely decisions on the future direction of fusion energy science.