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Professor Charles C. Baker
Chair, FESAC
Fusion Priorities Panel
Engineering Building II, Room L-309
University of California, San Diego
9500 Gilman Drive, Mail Code 0420
La Jolla, California 92093-0420

Subject: The role of inertial confinement fusion.

Dear Professor Baker:

I have seen the charge to your FESAC Subpanel on priorities, and it is a challenging one. Defining the scope of the fusion program beyond ITER construction is no easy task. Clearly, ITER support has to be number one, but there are many options beyond that, including alternatives. I will only want to comment on one corner of that task - the role of the inertial confinement fusion program in DOE's portfolio.

The Office of Science funds heavy ion fusion (HIF) while Defense Programs funds the laser and pulsed-power applications. This has had the unfortunate result of putting the vast majority of inertial fusion funding into lasers and pulsed-power while a whole series of review panels, going back to the late 1970's, have consistently indicated that HIF has the most promise as a source of energy. Here is a brief list:

1. The 1979 Foster Committee produced a classified report which is hidden some place in the bowels of the DOE. However, Johnny Foster reported to the Energy Research Advisory Board at its May 3, 1979, meeting saying,

“...heavy ion accelerators have great promise as reactor candidates because of their inherently high efficiency, developed repetitive-pulse technology, and favorable theoretical predictions of target coupling.”

2. The Jason Report of January 1983 (JSR82-302) stated, “We conclude that the uncertainties in coupling physics for high-energy heavy ions are minimal.”
3. The National Academies of Sciences Report of March 1986 entitled, “Review of the Department of Energy’s Inertial Confinement Fusion Program” stated “Heavy ion beams may well be the best eventual driver for energy applications.”
4. The 1990 report of the Fusion Policy Advisory Committee (Stever Panel) recommended parallel development of inertial and magnetic fusion with a budget level of about \$30 million per year for HIF.
5. The 1993 Fusion Energy Advisory Committee (Davidson Panel) said, “We recognize the great opportunity for fusion development afforded the DOE by a modest heavy-ion driver program that leverages off the extensive target program being conducted by the Defense Department... .”
6. The 1996 FESAC (Sheffield) report said, “In agreement with previous reviews, we consider the heavy ion accelerator to be the most promising driver for energy applications.”

I am sure that there are other reports back in early times and in more recent times that say the same thing. Unfortunately, the HIF Program has been consistently starved for funds, and a full-scale HIF-driver could probably have been easily built on the cost over-runs on the laser and pulsed-power inertial fusion programs. Given the history, I think it is time for the Office of Science’s Fusion Program to either make a commitment to HIF or turn these people loose to go on to more productive things.

I would recommend a significant increase in their funds, and I would further recommend that there be some kind of coordinated review of the NNSA and SC Inertial Fusion Programs. Such a coordinated review would most likely come out with the same conclusion that all previous reviews have come out with, to wit, the HIF Program is the most promising route to civilian energy. Such a conclusion has never made any difference in the past and may be unlikely to make any difference in the future, but it is at least worth a try.

Sincerely,



Burton Richter