EXCLUSIVE

Dramatic Fusion Breakthroughs Clear Way For Fusion Energy In 1980's

The following reports on experimental breakthroughs in laser and electron beam fusion, together with excerpts from testimony before the House Science and Technology Subcommittee on Energy March 4, 1977 on laser fusion, clearly demonstrate that the potentially rapid development of unlimited, clean, safe, cheap energy from nuclear fusion reactions is being consciously sabotaged by the Carter Administration. The recent Alcator Tokamak experimental breakthrough at MIT, together with a broad front of similar magnetic confinement fusion research successes, has shown that there are virtually no scientific obstacles to the realization of this form of fusion power in the 1980's. These advances in inertial confinement fusion reported below represent a similar benchmark. Dr. Edwin Kintner, the ERDA director of the Magnetic Fusion Energy Division, made this clear when he pointed out before the same committee that the only obstacles to harnessing fusion energy were *political* obstacles.

The simple fact that the Carter Administration is planning to delay the development of both electron beam and carbon dioxide lasers just as these systems are demonstrating that they are capable of being rapidly developed to full-scale power reactor and other applications for civilian energy is sufficient evidence of the sabotage. But the testimony by Dr. Robert Hofstadter and Dr. Henry J. Gomberg of KMS Fusion, especially when contrasted with that of the ERDA Laser Fusion Director C. Martin Stickley, makes this indisputable.

Testimony On Inertial Confinement Fusion Program

Statement by Dr. C. Martin Stickley, Director, Division of Laser Fusion on the Inertial Confinement Fusion Program before the House and Technology Committee Subcommittee on Fossil and Nuclear Energy Research, Development and Demonstration, March 4.

ERDA is requesting funding for inertial confinement fusion research — the application of laser, electron and ion beams to pellet fusion — of $94 million in operating outlays and $21 million for plant and capital equipment authority for Fiscal Year 1978. These funds would enable us to continue research directed toward impacting nuclear weapons technology development and toward determining the scientific feasibility of inertial confinement fusion as a virtually inexhaustible energy source for civilian power production.

Among other reasons, magnetic and inertial confinement differ fundamentally in that inertial confinement has near-term military applications. An inertial confinement fusion device would reproduce on a laboratory scale much of the fundamental physics and, if sufficiently large, many of the radiation effects of nuclear weapons. Laser and particle beam target experiments can provide data for weapons technology development; for example, late-time effects that cannot be measured in an underground test because of its destructive effects on diagnostic equipment can be analyzed on the basis of laboratory data.

Experience with nuclear weapons development provided much of the impetus to inertial confinement fusion research and has contributed to the advanced pellet designs that appear at this time to have the best chance of attaining high energy gain implosions. In return, actual experimental results have begun to contribute to weapons technology development. This contribution is expected to grow to be a very significant one as we attain higher and higher thermonuclear yields from pellet implosion experiments.

It is our best judgement at this time that the advanced pellet designs will permit us to reach the fusion regime, in which pellet energy gains substantially exceed breakeven, by the early to mid-1980's. A relatively low-cost program to continue experimentation with unclassified pellet concepts appears to be warranted because of the eventual need to develop very low cost pellets for use in civilian inertial confinement fusion reactors.

High pellet energy gains, that is many times more energy from each pellet implosion than is deposited in the form of beam energy for driving the implosion, must be achieved before we think we would be justified in embarking on a major program to develop the reactor technology required for civilian energy applications. Furthermore, the weapons applications do not require high repetition rate operation. A few shots per week, which is well within present capability, are all that will be required for the weapons applications that we now foresee. Many weapons technology applications are

possible in the ERDA weapons laboratories before we have achieved high pellet gain implosions.

Other research efforts are directed toward meeting the long-term energy technology goals of inertial confinement fusion. These latter efforts are relatively small because the energy goals are more distant ones.

Based on the pertinence of the background experience of the ERDA weapons laboratories to inertial confinement fusion, the relevance of the early phases of this research to weapons technology design questions, and the relative ease of carrying out single pulse (one firing per day) experiments, the following program objectives have been established:

Near-Term

** demonstrate single-pulse inertial confinement fusion
** assist nuclear weapon development and testing

Long-Term

** develop the technology for energy and power plant (multiple pulse) applications

The Outlook for Inertial Confinement Fusion

The pursuit of major phases of this program towards significant civilian applications can be modular in that the task of scientific feasibility demonstration (that is, achieving high energy gain from pellets in single pulse experiments), can be addressed separately from the applications engineering tasks. These would follow upon a decision to proceed toward an experimental power reactor, for example. While there is as yet no discernible critical path to this major decision point, we believe that the program, as now structured, represents an orderly, low risk approach to feasibility demonstration.

Testimony Of KMS Fusion, Inc. On Laser Fusion

The following are excerpts from the testimony of KMS Fusion, Inc., on laser fusion by Dr. Robert Hofstadter and Dr. Henry J. Gomberg before the House Science and Technology Committee Subcommittee on Fossil and Nuclear Energy Research, Development and Demonstration on March 4.

Dr. Robert Hofstadter

For many years, I have been a consultant for the Harshaw Chemical Co. I cite this record to show experience in scientific matters and in industrial work. This background is appropriate since what I am going to say may be at variance with other testimony you may have heard or will hear. I want to assure this Committee that I have given much thought to how civil energy needs may be advanced in the shortest possible time.

I regard the future of laser fusion energy as much closer than most others — but only if the program of development in this field is given adequate financial support and scientific freedom of investigation. I want to see laser fusion energy production in my life time and I am 62 years old. If I felt otherwise I would work on other subjects.

On the whole, however, a civil energy laser fusion program is nonexistent. I think our national policy needs a severe prod in order to reverse its direction. I should point out that our national program is essentially oriented towards weapons development, weapons simulation and weapons design. But civil energy needs, I submit, are very different from weapon needs, and there are innumerable deviations in the two approaches. My interest and KMS Fusion's interests are in the civil energy department.

In the case of fission energy, which was developed in war time, alternate methods of separating uranium isotopes were investigated simultaneously and alternate designs of the ultimate bomb were also developed. One of the successful designs was based on the implosion phenomenon, an invention of Dr. Seth Neddermeyer, a close friend of mine.

It is essential, in my opinion, to have several different groups working on the development of laser fusion energy and not to have the work directed exclusively from a single masterminding center.

It is to be noted that Russion competition has been a driving force in this field. In fact, the Russian scientist, Basov, is the inventor of the laser fusion concept.

The laser itself was developed in a private laboratory, namely the Bell Telephone Labs. by C. H. Townes, and Arthur Chawlow, who is now a colleague of mine at Stanford. Furthermore, the first laser, a ruby laser, was made by Theodore Maiman, a former Stanford gratuate student who did his epoch-making work in an industrial laboratory.

Forty years of experience as a physicist have convinced me that several investigators, pursuing their own lines of thought, can make discoveries that no one can anticipate. Thus a single undirected weapons approach, such as the one now in effect in the United States, should be changed in my opinion. We need variety, freshness, and freedom of investigation.

Dr. Henry J. Gomberg

KMS Fusion appears before this Subcommittee because we believe that there is much to be done through science and technology in solving vital social and economic problems that should be addressed more aggressively.

In doing so we tread on dangerous ground. The existence of our company and our program in laser fusion is now dependent on government-funded programs. Yet we come to present views which differ from those prepared for presentation before this Subcommittee by the Division of Laser Fusion (DFL) which administers our contract.

We raise no questions as to the merit of the government-funded programs for the stated purposes. The weapons laboratroies in which the vast bulk of the proposed DLF program is placed, are organizations of proven performance. But, in the past, individual groups have seen matters differently on problems of more limited scope than we address today. Difference, there-