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STATEMENT OF

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Before the

Subcommittee on Energy and Environment

House Committee on Interior & Insular Affairs

Hearings on Nuclear Energy

June 2, 1975

Mr. Chairman and members of the Subcommittee, thank you for inviting me back to testify on the Clinch River Breeder Reactor (CRBR), the proposed demonstration plant of the Liquid Metal Fast Breeder Reactor (LMFBR) program. I shall begin by reviewing once again my background and then very briefly the thrust of my previous testimony before this Committee.

I am a staff scientist at Natural Resources Defense Council (NRDC), a non-profit environmental law firm with offices in Washington, D.C., New York, and Palo Alto. Prior to joining NRDC in 1973, I was a Senior Research Associate at Resources for the Future (RFF) here in Washington, where I wrote The Liquid Metal Fast Breeder Reactor: An Environmental and Economic Critique. Since 1971 I have been engaged full time following developments in the civilian nuclear power industry, concentrating principally on the Federal Government's LMFBR program.

In my previous testimony I stressed several points:

(a) Our economic analysis indicates, contrary to the Energy Research and Development Administration's (ERDA's) position, that the LMFBR program can not now be cost justified. The current program, which is aimed at having commercial LMFBR's available in the early 1990's

is premature.

(b) The LMFBR program has proceeded as the highest priority energy R&D effort in the face of mounting apprehension concerning the human and societal hazards of nuclear fission reactors, apprehension which would only be increased by the LMFBR.

(c) In view of the points above, the push to commercialize the LMFBR should be postponed, the CRBR should be cancelled and the overall program should be relegated to a relatively low-priority program.

(d) By reordering our energy R&D priorities today, it is probably that we can provide the basis for bypassing the breeder altogether.

In other words, we are suggesting that federal energy officials should delay the commercial component of the LMFBR program a decade. The program is premature and there would be no penalty in such a delay. During this period, the LMFBR effort should be recast as a low-priority program centered on the FFTF (Fast Flux Test Facility), and current plans for going ahead with the costly Clinch River demonstration plant should be cancelled. By greatly reducing the overall costs of the program, funds will

freed for the accelerated development of solar, geothermal, fossil, fusion and conservation technologies, and the tremendous public and private investments which could foreclose the option of ever stopping the LMFBR will be avoided. Such a postponement would provide a period during which several types of data which bear critically upon the desirability of the LMFBR program could be gathered and assessed. First, more accurate information on uranium availability and future energy demand could be obtained. Second, during the coming decade knowledge regarding the potential of solar, geothermal, and fusion energy should increase dramatically with appropriate funding. And, third, this grace period could also be used to answer critical health and safety questions raised by the LMFBR with far more certainty than now present. The plutonium recycle issue also can be resolved.

The problems associated with the present reactor program strongly suggest that we are only perpetuating and compounding a bureaucratic blunder by pursuing the current LMFBR program. The alternative strategy we present would provide an opportunity to correct that mistake -- before it is too late. Construction is scheduled to commence on the Clinch River demonstration plant shortly, with the necessary Congressional and Nuclear Regulatory Commission (NRC) approval

coming much sooner. Once construction of the CRBR has begun, it will probably be impossible to reorient this increasingly massive program.

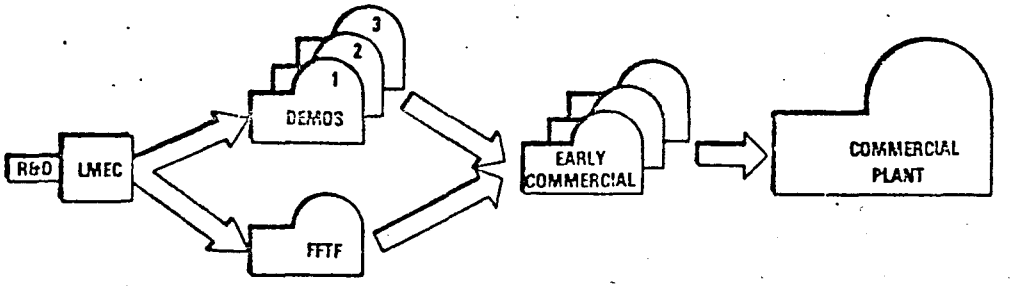
Having made these brief remarks concerning the desirability, need and timing of the LMFBR program, I want to turn to the much narrower issue of the CRBR and its role in meeting the overall objective of the LMFBR program,*/ which we do not accept. I want to preface my remarks by noting that I have not made a comprehensive analysis of the various CRBR alternatives, with respect to its size, design, management structure, the optimum number of demonstration plants or the risks and advantages inherent in bypassing the demonstration plant phase. Therefore, my comments are limited to whether the present justification for the CRBR appear reasonable in light of recent program changes. In this regard, it is useful to start by reviewing the changes.

The purpose of the LMFBR demonstration plant program, along with the related industrial engineering efforts, has

*/ The objective of the U.S. LMFBR Program according to the revised (1973) LMFBR Program Plan [WASH-1101, 2nd Ed., Vol. 1, p.13] is "to develop a broad technological and engineering base with extensive utility and industrial involvement which will lead to the establishment of a strong and competitive commercial breeder industry in the mid-1980's." Due to schedule slippage the target date is now early-1990.

always been to serve as the key to effecting the transition of the fast breeder program from the technology development stage to the point of large-scale commercial utilization. The selection of a 300 to 500 Mw demonstration plant was thought to represent a small enough size to permit practical extrapolations of components without undue risk and to represent a reasonable financial investment, yet large enough to test the performance of large systems. Originally, there were to be a sequence of three demonstration plants to provide a competitive industrial base among the three lead vendors, G.E., Westinghouse and Atomic International, which had shown an interest in the program. Three plants would also facilitate the comparison of a variety of plant and component designs. The three demonstration plants would effect the transition to a commercial industry, as the next round of plants were to be early commercial plants financed entirely by the industry (See Figure 1). OMB never approved funding for more than one demonstration plant. However, the JCAE authorized one or two million dollars for design studies of the second demonstration plant. In order to reduce the cost and scale-up risk, the first demonstration plant (CRBR) was protypical of the FFTF. Hence, in major respects, the CRBR represents a duplication of the FFTF.

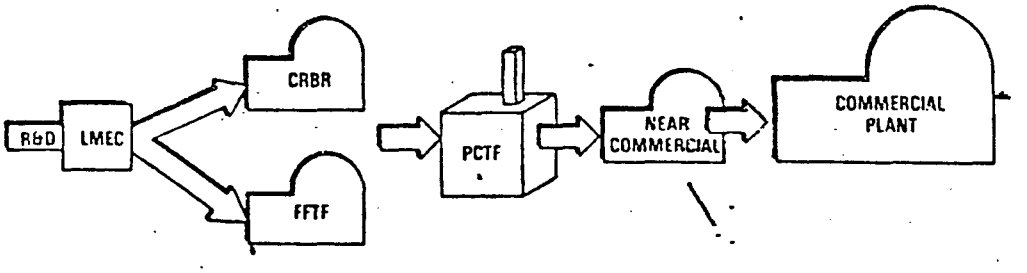
COMPONENT DEVELOPMENT
PREVIOUS PROGRAM



COMPONENTS DEVELOPMENT DURING CONSTRUCTION

FIGURE 1

COMPONENT DEVELOPMENT
REVISED PROGRAM



COMPONENTS DEVELOPMENT BEFORE CONSTRUCTION

FIGURE 2

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Early this year, ERDA revised the LMFBR program and the management structure of the CRBR. The second and third demonstration plants have been scrapped. These have been replaced by a Plant Component Test Facility (PCTF), scheduled for completion in the 1980's (Figure 2). As presently conceived, the purpose of the PCTF is to test large components which under the previous program were to have been developed and tested in the additional demonstration plants. Also, in recognition that the follow-on commercial LMFBRs will not be competitive, ERDA has introduced what it calls a Near Commercial Breeder Reactor (NCBR), scheduled to be completed in 1987.*/ It will be commercial-size (1000 to 1500 Mw).

There is only $300 million earmarked for one NCBR in ERDA's proposed budget. Like the CRBR, the NCBR will be first-of-a-kind plant, only 3 to 4 times larger. It will cost considerably more than the CRBR. Hence, ERDA is presently banking on the need for only one NCBR, the utilities being willing to finance the bulk of its cost, a reversal of the situation with respect to the CRBR. I do not believe these expectations are reasonable.

The tremendous cost overruns associated with the CRBR are now well recognized by this Committee. In part at

*/ The LMFBR commercial introduction date has slipped until 1993 which more reasonably represents the earliest date of NCBR operation.

least this is due to the fact that the CRBR is designed to serve too many -- in some cases unnecessary -- purposes. Besides its component scale-up role, the CRBR is designed to test the marriage of these components as an integral system, to serve as a licensing test bed for future LMFBRs, to qualify hardware suppliers of LMFBR components, and to provide utility management and operating experience. These are the goals offered as justification for the present CRBR program by a late-1974 internal AEC review of the LMFBR program which addressed the question, "Does the CRBR represent a reasonable justified step in the development of a commercial LMFBR technology?"*/ The need to reassess whether to proceed with the CRBR at this time is demonstrated by examining the four justifications offered by the Review Group. One of the four findings of the Review Group was that the CRBR will:

> "Provide information and training for utilities at all levels of their organization and provide for the infusion of the utilities' expertise into the design, development and operation of an LMFBR power plant."

Using the CRBR to provide information and training for utilities is really a spurious argument in that utilities will not be ordering commercial LMFBRs for another 15 years or so. If one wants

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*/ Report of the Liquid Metal Fast Breeder Reactor Program Review Group (ERDA-1), January 1975.

to train utilities in LMFBR operations, this is probably better done once operating procedures are established for commercial-size LMFBRs.

The objective of providing for infusion of utility expertise into the design seems equally inappropriate. One of the arguments for reorganizing the CRBR management was that the present management structure was cumbersome and the utilities were not serving a particularly useful role. With the reorganization, ERDA's Division of Reactor Research and Development (RRD) will take control over the CRBR project. The Project Management Corporation (PMC) will be significantly reduced in scope, and the Project Steering Committee will, in the future, serve only in an advisory role. Thus, regardless of the merits of the utility and involvement objective, it has now largely been shifted from the CRBR to the NCBR. This objective is also more consistent with the proposed NCBR cost sharing arrangement.

For much the same reason I believe it is premature to try to use the CRBR to qualify hardware suppliers when the suppliers cannot expect to see any big orders for another 15 years, even assuming ERDA's projections. The demand for LMFBR components simply won't sustain these suppliers over this period. As GAO has indicated, this may be a serious problem with respect

to fabrication of FFTF and CRBR fuel. Lack of interest by component suppliers has undoubtedly led to the high cost of the CRBR and the FFTF. Low bids and delivery priorities on one-of-a-kind LMFBR components will not be forthcoming from suppliers who see a larger market in light water reactor components.

A second finding of the AEC Review Group was that the CRBR will:

> Provide information on and expertise with the issues associated with licensing a new type of nuclear power plant."

The licensibility of LMFBRs must be established eventually, assuming continuation of the program. However, this issue is not critical to the pace of the CRBR or the LMFBR program, except to the extent that the CRBR licensing process causes further delays in the CRBR schedule. This objective could be met more appropriately by the NCBR after several important safety issues are resolved. Although FFTF does not require a license, much of the information and experience with generic LMFBR licensing issues will be gained through the FFTF safety analysis review currently being conducted by the Nuclear Regulatory Commission (NRC) and the Advisory Committee on Reactor Safeguards (ACRS).

It is important to understand that licensability is strongly design dependent. The NRC has still not established

clear regulatory requirements for the light water reactors. New Regulatory Guides are being issued almost daily. The CRBR is only one-third to one-fourth the size of a commercial-size LMFBR. Licensing the CRBR will not demonstrate that commercial-size LMFBRs are licensable in the United States, and the NRC is not about to say that a CRBR licensing decision establishes clear precedence for commercial-size LMFBRs.

A third AEC finding was that the CRBR will:

> "Provide a demonstration of LMFBR power plant operation in a utility environment and technical information on system performance, safety, fuel performance, reliability, maintainability and the implications of utility operations."

The first and last of these objectives -- providing a demonstration of LMFBR operation in a utility environment and technical information on the implications of utility operations -- are objectives that will be met with the NCBR. It would appear that the remaining objectives of providing technical information on system performance, safety, fuel performance, reliability and maintainability could be met by the FFTF and large scale component testing in the PCTF. I will come back to this in my discussion of the last finding

of the AEC Review Group. Assuming a demonstration plant remains as an integral part of the LMFBR program, the appropriate way to utilize technical information on system performance, safety, fuel performance, reliability and maintainability would be to construct the FFTF and the demo sequentially rather than concurrently. A principal contribution to the FFTF cost overruns and schedule slippage is that it was a major federal program whose unique design, technology development and construction has proceeded concurrently. This is also a characteristic of the entire LMFBR program. Under the existing program there will be a considerable overlap in the schedules of the FFTF and CRBR, and the CRBR will not operate in a utility environment until well after commitments of NCBRs must be made. Hence, under the present program the CRBR can be expected to be more expensive than necessary, and the CRBR's usefulness severely compromised by its concurrent development with the FFTF.

FFTF construction was only 36 percent complete through December 1974. The FFTF schedule has slipped 5 years and construction is optimistically expected to be completed by November 1977, and full power operation in mid-1979. The CRBR target for criticality has already slipped from 1980 to 1982. But more important, the ground breaking for the CRBR is scheduled to begin in late 1975 or early 1976, fully 5 years before useful operating experience will be gained from the

FFTF. The FFTF, if properly programmed, should suggest at least some things about the appropriate design of any demonstration plant that is built, for example, in terms of reactor sodium system operations and fuel performance. If CRBR construction begins next year, the design of long lead time components of the CRBR will be fixed, and these components ordered before this operating experience is gained, and even before the final safety analysis of the FFTF is made, before key FFTF safety decisions are made, and before the final FFTF design is fixed. Delaying these decisions could lead to significant cost savings and possible elimination of the CRBR. In short, it is better to learn from the FFTF before building any demonstration plant, CRBR or otherwise. Moreover, as I have noted previously, we believe there is no reason to be concerned about delay that may result from this phased approach.

The fourth and last finding was that the CRBR will:

> "Provide a step in the scale-up of LMFBR technology, and the accompanying scale-up in industrial capability. This will be particularly so for those features outside of the reactor core."

This is the one remaining contribution I believe the CRBR can make under the current LMFBR program structure, but it bears little relevance to the pace of the CRBR or the LMFBR program. Again, this is because of the recognized slippage in the program due to the light water reactor cancellations and deferrals and the recent low energy demand growth, and as shown in Bypassing the Breeder the commercial LMFBR is not needed in the 1990s anyway.

There are really two considerations here -- the scale-up of components and the marriage of these into an integrated system. Looking at the three European LMFBR demonstration plants, it appears that an unresolved problem is the preformance of the steam generator and not the intergration of the total system. The Russian BN-350 has experienced one steam generator explosion and leaks in two others, forcing the reactors to operate at about 30 percent power for most of 1974. According to the New York Times (May 19, 1975, p.C43), the British PFR-250 experienced leaks in two of the system's three steam generators which forced their removal from service shortly after the plant began power operation last September. Small leaks appeared in the third system last month forcing it out of service as well. The French Phenix-250 has operated successfully without

steam generator problems but according to the New York Times its steam generators were purposely overdesigned. Some people believe its design is much too large (and expensive) for scaling up to a commercial power plant. In sum, it may be more useful to refocus the program on component (particularly steam generator) testing in the proposed plant component test facility.

In closing, I want to reemphasize that the real issue in our view is the timing of the overall program and not the narrower issues of whether current CRBR design is the best design or not. We believe the CRBR should be delayed because the overall program should be delayed.

The strategy that results from these considerations is to postpone plans for the CRBR and proceed to gather operating experience with FFTF. During this period one could reassess whether to proceed with the CRBR or proceed with a demonstration plant of another size and a different design, and possibly with a different management and cost sharing structure. Regarding cost sharing, I would like to note in closing that it would certainly indicate more enthusiastic utility support for the CRBR and the LMFBR generally if the utilities were willing to accept a share of the open ended financial risks of the CRBR. And it makes little sense to

proceed with the CRBR at this time without any evidence that the utilities are willing to make a substantial financial commitment to the NCBR.