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REASONS FOR DELAYING
THE PUSH TO
COMMERCIALIZE THE
FAST BREEDER REACTOR

Statement of the
Natural Resources Defense Council
At
The Energy Research and Development Administration
Hearings on
The Liquid Metal Fast Breeder Reactor Program

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Mr. Chairman and members of the Presiding Board, we appreciate this opportunity to discuss with you the Liquid Metal Fast Breeder Reactor (LMFBR) program and the proposed final environmental impact statement (PFES) prepared by the Atomic Energy Commission (AEC) for that program. Our views on these two related matters can be stated as follows. First, we believe continuation of the present LMFBR program would be a mistake because of the great risks inherent in such a course. And second, we view the PFES as seriously misleading and hence unacceptable because of the repeated occurrence of promotional bias. Because of this bias, and because of the PFES's failure to "study, develop and describe"^{*/} alternatives involving lower priority LMFBR efforts, we do not consider the PFES to be a useful decisionmaking document for Energy Research and Development Administration (ERDA) officials.

I.

Three problems posed by the present LMFBR program bear emphasis at this time because they were not stressed in our report Bypassing the Breeder, which has previously been submitted to you. First, and most immediate, continuation of the present breeder effort will increasingly give rise to private organizations and public bureaucracies with deep

^{*/} Section 102(2)(D), National Environmental Policy Act of 1969.

psychological and financial commitments to developing and deploying the breeder. Such groups tend to view their private interests as synonymous with the public interest, and the single-minded pursuit of their objectives, thus rationalized, makes it extraordinarily difficult for public officials to obtain unbiased assessments and to act free of unwanted pressures.

It is not our purpose to conjure up an image of a monolithic phalanx or sinister cabal of breeder promoters. But this Board cannot help being aware of the pressures ERDA is already under to continue the current effort to achieve early commercialization of the LMFBR -- these pressures are clearly reflected in Dr. Seamans' April 23 letter to Senator Pastore -- and of the fact that these pressures will increase as the program grows. Indeed, we believe it is fair to say that once construction of the Clinch River Breeder Reactor (CRBR) is underway, it will be essentially impossible to halt or redirect the overall program because of the attendant political realities.

Thus, the first risk of the current LMFBR program is that it is spawning its own self-perpetuating complex of public and private interests that will make objective assessment or modification of the LMFBR program increasingly difficult. It would be naive for ERDA to believe that it will be able to cut back the LMFBR program once the demonstration plant phase is seriously underway, and it would be naive for the public to believe that an objective decision regarding the risks and

benefits of deploying LMFBR's commercially could be made 10-15 years from now after many billions have been spent and vast personal and financial commitments have accumulated.

In short, ERDA has a unique opportunity now because of its newness and expanded mission to break with the AEC's priorities. But once you endorse the current LMFBR program with its focus on the CRBR, you will have the proverbial tiger by its tail.

A second danger inherent in continuing the LMFBR effort in its current form is that its costs, and cost-overruns, will cut deeply into the funding available to other options. The current estimate of LMFBR program costs to completion (\$8.4 billion), though high in itself, does not include substantial cost items, e.g., while only \$300 million is in the present budget as the government subsidy for the Near Commercial Breeder Reactors, the actual subsidy required could be several billion dollars. Nor does the \$8.4 billion reflect the fact that major cost overruns are inevitable. Nothing in the history of the LMFBR program, and little in the history of complex government-sponsored development efforts generally, inspires confidence that cost projections will be realized. We would guess that the ultimate costs of the LMFBR program would be 2 to 3 times current estimates but for the fact that past estimates have almost always underestimated actual increases. We emphasize, however, that we do not believe the LMFBR program is unique in this regard. Other energy development efforts will also be expensive, and the

currently estimated costs of these other programs are surely also underestimates.

NRDC vigorously supports the development of:

- solar energy, including thermal energy space heating and cooling systems for buildings, electric power generation by thermal conversion and photovoltaic technologies, as well as secondary solar systems based on wind and ocean thermal differences;
- environmentally acceptable technologies for the mining and burning of coal, including low Btu gasification, coal liquification, fluidized bed combustion, emission control technologies such as stack gas scrubbers, and total energy systems;
- geothermal technologies, including hot brine, but particularly the development of technologies for tapping hot dry rock resources;
- energy conservation, conversion, transmission and storage technologies, including fuel cells, advanced gas turbine steam cycles, magnetohydrodynamics (MHD), binary cycles, superconducting generators and transmission lines, electric storage batteries, hydrogen and other chemical storage techniques.
- fusion energy, including both magnetic confinement and laser fusion;
- substitute fuels including the collection and combustion of organic waste and also hydrogen and methane production.

We believe it is unrealistic in light of funding constraints to expect that all of these technologies as well as the LMFBR can be developed on an accelerated basis. Particularly in the next few years as these non-fission technologies move into the hardware phase, the pressures on the federal R&D dollar will mount. In this competition for limited funds, it will certainly not be the LMFBR program that will suffer. The LMFBR program has the funds, the momentum and the commitments. This particularly will be the case when the CRBR is launched. So it will be the non-fission technologies that will lose out, just as they have in the past.

The final danger inherent in continuing the present LMFBR program is that the end product will be a reactor system with truly unprecedented public acceptability problems. The whole concept of fission power is presently under vigorous attack here and abroad, to the point that it is reasonable to question its long-term viability. The reasons for public concern are not difficult to find: questions relating to the safety of the nuclear fuel cycle are dominated by unresolved issues and uncertain and potentially unacceptable risks:

- the probability and upperbound consequences of a major reactor accident are questions of sharp dispute;
- the issue of whether plutonium and similar materials can be adequately and acceptably safeguarded from theft, and nuclear facilities

and shipments protected from sabotage, is now conceded to be an open one which will take several years to decide;

- thirty years into the nuclear age there is still no plan for the long-term storage of high-level radioactive wastes.

These issues are in addition to the serious questions which have arisen regarding the economics and reliability of nuclear plants.

The introduction of the LMFBR would heighten the overall risks of nuclear power by introducing a new range of major accident risks, including the core disruptive accident, and by moving the country deeper into the nightmarish plutonium economy. Breeder technology would thus heighten what is already a major public acceptability problem. If present trends continue, it can be predicted with assurance that deployment of LMFBR's commercially will be met with widespread and intense public concern and opposition.

These three factors are interrelated. A decision in the coming months to continue with the CRBR project and the priority LMFBR program would lock ERDA into a long-term commitment to developing the reactor. It would tie up a major share of the agency's budget, thus holding back the development of preferable non-fission options. Then, having spent enormous sums, the country would find itself with a reactor which must eventually be used only because of the great public and private investments in it and our failure to have developed appropriate alternatives. The error would be compounded because any attempt

to deploy the LMFBR widely would raise the energy-environment confrontation to an unprecedented intensity. ERDA's gift to the nation would then be not an acceptable source of abundant energy but rather a running sore -- a continuing source of national divisiveness and disappointment.

Our recommendation to you in light of these considerations is that ERDA postpone for a period of years the push to commercialize the LMFBR. This would involve cancelling the CRBR and reorganizing the program into a smaller, lower priority effort focused on the Fast Flux Test Facility (FFTF). The funds thus released should be applied to accelerate development of the more acceptable non-fission technologies set out previously.

Consider the many benefits of such a restructuring of the LMFBR effort. First, it would provide time for the better resolution of critical issues which bear on the risks and public acceptability of the breeder and nuclear power generally. The Nuclear Regulatory Commission (NRC) has recently stated that it intends over the next three years to address comprehensively the difficult question of safeguards against nuclear theft and sabotage. Involved in the NRC review is the question whether plutonium is too dangerous to be used commercially as a fuel, and the outcome could obviously be fatal to the LMFBR's prospects. Similarly, ERDA and perhaps NRC are now undertaking major reexaminations of the unsolved problem of long-term radioactive waste management. Again the

outcome of these reviews could seriously affect the future viability of nuclear power and the LMFBR. Delaying the LMFBR program would also provide the additional and badly needed time to address two other issues the resolution of which could be fatal to the LMFBR program: the core disruptive accident risk and plutonium toxicity.

The second benefit of delay at this time is that issues relevant to the economics of the LMFBR could be better resolved. In several years we will have a clearer picture than we do now of future energy demand, of domestic and world uranium supplies, and of enrichment costs.

Delay would also permit the decision on whether to pursue the LMFBR into the demonstration plant phase to be made with greater information in hand on the prospects for solar, geothermal, clean fossil, fusion and other energy technologies, and thus on the prospects for bypassing the breeder in favor of these options. Delay would permit this increased information to be assessed and the LMFBR evaluated without the pressures that an ongoing CRBR effort would create. Practically speaking, delaying the demonstration plant phase of the LMFBR effort at this time would free up funds for non-fission R&D, would focus attention on non-fission programs and would allow these programs to compete on a more equal basis with the LMFBR program in the future.

Finally, delaying the LMFBR effort today would lay the groundwork for a much sounder LMFBR effort tomorrow if it later appears that launching the push to commercialization of

the LMFBR is desirable. FFTF operating experience could be factored into future decisions; the questions of what type of demonstration plant, with what objectives, financed and managed by whom could be rethought; and a more mature ERDA would then be better in control of its enormous program and more certain of its objectives.

For all of these reasons, the decision on whether to launch the demonstration phase of the LMFBR program will be a better decision if it is made a number of years from now with the information and in the context that could then exist.

What are the costs of this approach? Only two have been seriously suggested, and neither can withstand scrutiny. First, it has been argued that delaying the demonstration plant effort will result in postponing the date by which the LMFBR could be available commercially beyond the present target date of 1990. And this delay, according to the AEC's cost-benefit analysis of the LMFBR program, will impose an economic penalty, in the form of higher electricity costs from nuclear power. This analysis holds up, however, only if one accepts the exaggerated and biased assumptions of the AEC's cost-benefit analysis. We believe that a more credible analysis would conclude that a delay in LMFBR commercial introduction of perhaps 20 years is economically justified, and we have presented one such analysis in the Appendix to Bypassing the Breeder. In this context, NRDC,

EPA and many others find completely untenable the argument that a delay in the breeder program for a much shorter period of 5-10 years would impose an economic penalty. Yet even if there were such a penalty, it would be small and certainly worth the benefits outlined previously.

The second argument for continuing the present LMFBR program brings us to the heart of the real world issue. It is the contention that it would be disruptive to break up the team that has already been assembled to pursue the CRBR. Yet this is simply the argument of a bureaucracy trying to perpetuate itself; it has nothing to do with long-term public policy considerations which should govern ERDA's decisions of the critical LMFBR questions now before the agency. If the demonstration plant phase of the LMFBR program should be delayed, the past error of initiating that effort prematurely should not be perpetuated into the future. Strong ERDA leadership will be needed to undo the mistakes of the past. Moreover, we find little substance in the implicit assumption that the present organizational and financial arrangements for the CRBR deserve to be perpetuated. A better case can be made for the conclusion that the entire demonstration plant effort is in need of a thorough overhaul.

II.

Turning now to consideration of the PFES, we reiterate that we view this statement as inadequate under the National Environmental Policy Act, principally for the following reasons:

- (1) A candid, adequate EIS for the LMFBR program, unlike the PFES, would highlight that plutonium -- the material bred in breeder reactors -- was properly described by its discoverer as "fiendishly toxic," that it has been described by the ICRP as "the most formidable radionuclide in the periodic table," that microgram quantities have regularly produced cancer in the lungs of experimental animals, and that the LMFBR program, by proposing to make this material into our principal energy fuel, at the very least establishes the preconditions for a new and major public health risk.
- (2) A candid statement, unlike the PFES, would stress that plutonium is believed by some qualified experts to be even more toxic than reflected in current radiation protection standards; that the hypotheses proposed by these experts would require a tightening of current standards from two to five orders of magnitude; and that use of the risk estimates of these hypotheses in the EIS -- particularly the hot particle hypothesis of Tamplin and Cochran -- would substantially increase the health consequences projected to result from a mature LMFBR industry.

(3) A candid statement, unlike the PFES, would also stress that LMFBR's will introduce the possibility of a new and particularly risky type of reactor accident involving a small nuclear explosion -- the core disruptive accident; that the upperbound consequences, including the maximum plutonium release, of such an accident cannot now be definitively set; that conceivable consequences exceed those possible with today's reactors; and that it is not yet clear that such accidents can be economically contained.

(4) A candid statement would also emphasize that the estimate in the EIS for the amount of plutonium released by a mature LMFBR industry is based on routine releases from model plants; that such estimate does not include the plutonium contribution from accidents, including the core disruptive accident, or from deliberate releases; and that actual plutonium releases in an advanced LMFBR industry may well be dominated by accidental and deliberate releases so that the estimates in the EIS are idealized, probably of little relevance, and certainly no basis for forming judgments as to the implications of commercializing plutonium.

(5) A candid statement, unlike the PFES, would further stress that development of LMFBR's would enhance the risk of plutonium theft and terrorism, plutonium black markets and the proliferation of illicit nuclear

weapons to subnational groups, separatists factions, fanatical terrorists, blackmailers and even deranged individuals; that the question of whether adequate safeguards can be developed to counter sabotage, plutonium theft and nuclear weapons proliferation is still unanswered and that no firm program to accomplish that objective has yet been described or adopted; that whatever safeguards system is eventually adopted it will leave a residual risk that heinous events will occur; that informed opinions differ as to whether this residual risk will be tolerable; and that safeguard measures currently under consideration could have major sociopolitical implications including internationalization of substantial portions of the nuclear fuel cycle and abrogation of traditional civil liberties.

(6) A candid statement would indicate that the central economic issue of the LMFBR debate is the timing issue, i.e. whether the current program is needed now or whether it is premature; that one's view on this issue depends largely upon what assumptions one makes regarding the projected growth of nuclear power, the supply of uranium and the capital cost difference between LMFBR's and today's reactors; and that the assumptions used in the EIS favor the early commercialization of the LMFBR, are vigorously disputed, and are sharply at variance with a substantial body of independent opinion.

(7) Finally, an adequate EIS, unlike the PFES, would fully describe and evaluate alternative means of addressing the energy needs, real and perceived, to which the LMFBR is addressed, and would acknowledge that the "alternatives" discussed in Vol. III of the PFES are actually the elements or building blocks of alternatives which must be discussed under NEPA. A candid statement would stress that, in the judgment of expert panels convened under National Science Foundation auspices, a combination of solar related energy options have the potential for supplying over 20% of our year 2020 electrical energy needs and that this solar contribution together with a modest reduction of 30% in projected energy demand (attributable to energy price increases and energy conservation) could account for all the energy projected from LMFBR's in the year 2020 and thus in themselves hold out the prospect that the LMFBR will not be needed at all. A candid statement would further acknowledge that this prospect that the LMFBR might never be needed is significantly enhanced by possible developments with respect to geothermal and fusion energy. And, of course, an adequate EIS would fully discuss the option of delaying the LMFBR program advocated here and in Bypassing the Breeder.

Because the PFES fails in all these respects it is fundamentally biased and misleading. We believe the assessment of Dr. John Edsall of Harvard University, a former president of the

International Congress of Biochemistry and a member of the National Academy of Sciences, is apt:

"In short I think that the "Proposed Final Statement" on the LMFBR is not a genuinely broad and objective inquiry; rather it resembles a legal brief prepared by a party for one side in an adversary proceeding. I urge that ERDA should not regard this document as acceptable. It was perhaps natural for the AEC, whose mission was to promote atomic energy, to push for the breeder as its favored project. ERDA has a much broader mission . . .

"The choices we make now will largely determine the kind of world in which we and our descendents for the next few generations are going to live. In making them we need to do a far deeper, broader, and more searching job than was done in this statement that was passed on to ERDA by the AEC. ERDA should rise to the greatness of the occasion, and do a thorough and critical job."