ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

July 15, 1975

Honorable William A. Anders
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: REPORT ON FAST FLUX TEST FACILITY

Dear Mr. Anders:

During its 183rd Meeting, July 10-12, 1975, the Advisory Committee on Reactor Safeguards continued its review of the Energy Research and Development Administration's (ERDA) Fast Flux Test Facility (FFTF). The ACRS reported previously on this project on July 13, 1971, January 13, 1972, and May 18, 1973. Since the last report, Subcommittee meetings were held in Richland, Washington, on July 19, 1974, and in Denver, Colorado, on March 15, 1975. A site visit was made on July 20, 1974, and the project was considered by the Committee during its Special Meeting, October 31-November 2, 1974, and during its 180th Meeting, April 3-5, 1975. During its review the Committee had the benefit of discussions with representatives and consultants of the Division of Reactor Research and Development of the ERDA, the Hanford Engineering Development Laboratory (HEDL) of the Westinghouse Hanford Company, the Advanced Reactors Division of the Westinghouse Electric Corporation and the NRC Staff. The Committee also had the benefit of the documents listed below.

At this stage of its review, the Committee has been asked to consider and comment on two questions: (1) whether sealing the head cavity in the manner proposed by HEDL would contribute significantly to safety; and (2) which of several alternate measures proposed by HEDL should be adopted for the space provided below the guard vessel for use in connection with a possible ex-vessel post-accident core retention system.

These questions, in one form or another, have been of concern to the ACRS during its entire review of this facility and have been discussed in previous reports. In its report of May 18, 1973, the Committee recommended the development of extensive additional information on

postulated accidents. The Committee recommended also that the necessary further regulatory review of the design basis work energy release and the requirements with regard to post-accident heat removal be scheduled and accomplished in timely fashion so that additional features, if necessary, could be provided prior to the scheduled reactor startup.

Additional information on postulated accidents has been developed by the contractor and extensive further review has been carried out by the NRC Staff. Although uncertainties remain, the NRC Staff has been able to make certain recommendations with which the ACRS generally concurs.

The NRC Staff has concluded that sealing the head cavity in the manner proposed by HEDL would not contribute significantly to safety. The ACRS agrees with this conclusion.

With regard to the space beneath the guard vessel, the contractor has indicated that a large amount of additional research and development would be required to design an ex-vessel post-accident core retention device and that the FFTF schedule would be delayed a matter of years if this course were followed. After considering various alternatives, the contractor recommended that this space be filled with concrete. The NRC Staff has concluded that the need for an ex-vessel core-retention device is small but cannot be ignored. The Staff has recommended that the existing space should be retained so as not to make impossible the future installation of such a device if further studies or changes in the nature or use of the facility should indicate its desirability. The ACRS concurs in the recommendation of the NRC Staff.

The NRC Staff has recommended also that hot liners should be installed wherever sodium could accumulate following a release into the reactor cavity, and that cold liners in this cavity be vented. The ACRS concurs in these recommendations.

The NRC Staff has recommended further that emergency plans be prepared for the FFTF pursuant to 10 CFR Part 50, Appendix E. The ACRS agrees with this recommendation.

For those postulated accident sequences for which venting of the containment might be desirable in order to prevent it from being overpressured the ACRS suggests that consideration be given to the possible usefulness of sand-and-gravel filters for the removal of airborne particulates.

The Committee wishes to point out that the FFTF is a special test facility, and that both the positive and negative aspects of this circumstance have been considered throughout the review of this project. The ACRS believes that the design of the FFTF and the review of its safety aspects should not be used as a precedent for establishing the safety criteria for commerical liquid metal fast breeder reactors.

The Final Safety Analysis Report (FSAR) for the FFTF is now in preparation. The Committee expects the FSAR to provide a comprehensive treatment of the accident considerations, the containment capability, and the supporting research, development, analysis, and engineering. The Committee cautions that, because the program plans for the FFTF call for its use to perform a wide range of experiments using new fuels under a variety of conditions, the safety aspects of which have not yet been examined, there will be a continuing need to review the adequacy of the safety features provided.

The Advisory Committee on Reactor Safeguards believes that, if due regard is given to the matters mentioned above, and in previous reports, it is acceptable for contruction of the FFTF to proceed. The ACRS expects to continue to review this project after the Final Safety Analysis Report has been received.

Sincerely,

W. Kerr
Chairman

ADDITIONAL COMMENTS BY MEMBER D. OKRENT

I generally concur with this report.

I would like specifically to note the NRC Staff recommendation that it is an ERDA contractor's obligation to show that the likelihood of a core discruptive accident is small and if it occurs, the energetics would not exceed the capability of the containment system either by penetration or overpressurization.

Also, I would like to observe that in view of the original and remaining continuing uncertainties with regard to the possible energy yield and mechanical work yield in low probability, postulated core-disruptive accidents, the behavior and disposition of core material following postulated accidents leading to gross fuel melting, and the efficacy of in-vessel long-term core cooling following possible accidents, a quantitative assessement of the adequacy of the currently designed containment system of FFTF is difficult.

I believe that, had the safety design philosophy pursued by the contractor been one of achievement, within practical considerations, of a near-maximization of the primary containment capability to withstand the mechanical effects of postulated core-disruptive accidents, and one of the early and timely development of an ex-vessel core retention system, an awkward and possibly undesirable situation might have been alleviated.

REFERENCES TO FFTF LETTER:

Westinghouse Advanced Reactors Division Report, FRT 1561 Rev. 1, entitled: "Ex-Vessel Core Catcher Design Requirements and Preliminary Concepts Evaluation," dated June 14, 1974

Hanford Engineering Development Laboratory letter dated September 16, 1974 (W/FFTF 7410545) concerning evaluation of FFTF Head Compartment

Argonne National Laboratory report entitled: "Summary Report on the Analysis of a Loss-of-flow (without scram) Accident in the FFTF," dated November 1974

Hanford Engineering Development Laboratory report entitled: "Post-Accident Heat Removal Assessment for the FFTF," dated November 1974

Hanford Engineering Development Laboratory Preliminary Report entitled: "Post-Accident Heat Removal Containment Transients," dated November 18, 1974

Hanford Engineering Development Laboratory Preliminary Report entitled: "Radiological Evaluation of a Postulated FFTF Core Melt-Through Accident," dated November 19, 1974

Westinghouse Advanced Reactors Division Report, WARD-2171-46, entitled: "Ex-Vessel Core Catcher (EVCC) Design Study for FFTF," dated December 1974

Directorate of Licensing, US Atomic Energy Commission, Supplement No. 1 to the Safety Evaluation of the Fast Flux Test Facility, Issued: December 13, 1974

Division of Reactor Licensing, US Nuclear Regulatory Commission, Supplement No. 2 to the Safety Evaluation of the Fast Flux Test Facility, Issued: March 7, 1975