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

November 8, 1978

Honorable Joseph M. Hendrie
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: REPORT ON THE FAST FLUX TEST FACILITY

Dear Dr. Hendrie:

During its 223rd meeting, November 2-4, 1978, the Advisory Committee on Reactor Safeguards completed its review of the proposed operation of the Department of Energy's (DOE) Fast Flux Test Facility (FFTF). The ACRS reported previously on the construction phase of this project on July 13, 1971, January 13, 1972, May 18, 1973, and July 15, 1975. The project was also considered during the 221st meeting, September 7-9, 1978 and at Subcommittee meetings held in Washington, DC on July 12, 1978 and August 10, 1978. During its review, the Committee had the benefit of discussions with representatives of the Reactor Research Technology Division of the DOE (Project), their contractors and consultants, and the NRC Staff. The Committee also had the benefit of the documents listed below.

The FFTF is a 400 MWt sodium cooled fast reactor located at DOE's Hanford Reservation in Benton County, Washington. The site is about 4 1/2 miles from the Columbia River, the nearest boundary of the reservation, and about 10 miles north of Richland, Washington.

In view of the fact that this reactor is unique, appropriate detailed procedures and standards of the kind used in the review of light water reactors were not available for the review of FFTF. Because the FFTF is a DOE facility the scope of the NRC review was defined by the DOE request that NRC provide advice regarding the adequacy of the FFTF design and technical specifications to ensure safe operation. The NRC review did not include construction audits, assessments of the "as built" configuration, or evaluation of acceptance test results that would verify that the plant was constructed in accordance with the design criteria and documentation. Provisions for safeguards and security were also excluded from review.

The NRC Staff agrees with the Project that failure of the reactor inlet piping need not be considered as a cause of a core disruptive accident (CDA) provided that certain conditions are met. These include preservice and inservice inspection of piping, leak detection instrumentation, and an appropriate materials surveillance program. The Project has committed to developing an ultrasonic testing (UT) device for high temperature use, to inservice inspection of selected, high stress welds on the secondary sodium loops when the UT device is available, and to installation of sodium aerosol leak detection systems in the heat transport cells. A materials surveillance program will be conducted using test subassemblies, as well as in-reactor and hot leg components that are removed. In addition, the NRC recommends that a cold preservice inspection be conducted on the hot crossover piping welds and that inservice inspections be implemented as soon as practicable. The Committee supports these recommendations.

The Project has performed studies of various postulated core disruptive accidents (CDA). The NRC Staff has concluded that the calculated prompt energetics from CDAs are within the capability of the containment system. The ACRS concurs with the Staff conclusion.

The FFTF does not have a Class 1E power supply to provide decay heat removal. Instead, the Project will depend upon natural convection cooling in the event of loss of offsite power and failure of the onsite diesel generators. The Project's calculations indicate that natural circulation will provide decay heat removal. It is proposed that the natural circulation decay heat removal be measured during the startup testing. The ACRS concurs that the adequacy of the decay heat removal by natural circulation should be experimentally verified.

The NRC Staff and the Project have not yet agreed on the adequacy or containment for dealing with the consequences of some low probability accidents which lead to the potential for generation and release to containment of significant quantities of sodium aerosols, hydrogen and other volatile gases. In its report of July 15, 1975, the ACRS recommended that consideration be given to the possible usefulness of sand-and-gravel filters for the removal of airborne particulates. During the current review, the NRC Staff has recommended that measures be taken by the Project to permit the measurement and control of the hydrogen concentration in the containment, to further reduce the chance of a damaging explosion. The NRC Staff has also recommended that means be included for controlled venting. The ACRS supports these Staff positions and recommends development of additional mitigation measures, such

as a sand and gravel filter, for possible addition to the controlled venting system to provide still further assurance of limited radioactivity releases in the event that one of these low probability accidents should occur.

As pointed out in a previous report, the ACRS has recognized that the FFTF is a special test facility located on a favorable site. Both positive and negative aspects of this situation have been considered throughout the review. The ACRS believes that if due regard is given to the matters mentioned above, and in previous reports, it is acceptable for startup and operation of the FFTF to proceed.

Sincerely,

Stephen Lawroski

Stephen Lawroski
Chairman

References:

1. U.S. Energy Research and Development Administration (now DOE), "Final Safety Analysis Report, Fast Flux Test Facility," Vols. 1-10, dated December 1975 with Amendments 1-27 and Supplements 1-28.
2. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report, USDOE, Fast Flux Test Faciltiy," USNRC Report, NUREG-0358, dated August 1, 1978.
3. Letter from R. L. Ferguson, ERDA, to R. P. Denise, NRC, Subject: NRC Review and Advice on the FFTF, dated November 13, 1975.
4. Letter from R. L. Ferguson, ERDA, to R. P. Denise, NRC, Subject: Scope of NRC Review of FFTF FSAR, dated August 20, 1976.
5. Letter from R. L. Ferguson, ERDA, to R. P. Denise, NRC, Subject: FFTF Safeguards and Security, dated July 14, 1977.