ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

July 13, 1971

Honorable Glenn T Seaborg
Chairman
U. S. Atomic Energy Commission
Washington, D.C. 20545

Subject: REPORT ON FAST FLUX TEST FACILITY

Dear Dr. Seaborg:

At its 135th meeting, July 8-10, 1971, the Advisory Committee on Reactor Safeguards continued its review of the Commission's Fast Flux Test Facility. This project was also considered at the 132nd, 133rd, and 134th meetings of the Committee on April 1-3, May 6-8, and June 10-12, 1971, respectively; and at Subcommittee meetings on December 4, 1970 at Hanford, Washington, on January 5 and February 3, 1971 in Washington, D. C., on March 11, 1971 in Denver, Colorado, and on March 31, May 5, June 9, and July 7, 1971 in Washington, D.C. During its review the Committee had the benefit of discussions with representatives and consultants of the Commission's Division of Reactor Development and Technology, the WADCO Corporation, the Hanford Engineering Development Laboratory, the Westinghouse Electric Corporation, the Bechtel Corporation, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed.

The Fast Flux Test Facility (FFTF) is to be located on the Commission's Hanford Reservation in Benton County, Washington. The FFTF site is about 5½ miles northwest of the 300 Area of the Hanford Reservation, and is about 4½ miles from the west bank of the Columbia River, the nearest boundary of the reservation. The closest residences are on the east side of the river, about 5½ miles from the FFTF site. The nearest population center is Richland, Washington, located about 10 miles south of the site. The FFTF will be a 400 MWt sodium-cooled fast test reactor, with associated supporting facilities and systems, to be used to investigate the behavior of fuels, materials, and components of interest in the Commission's fast breeder reactor program.

Site preparation work for the FFTF has gone on for some months and is essentially complete. The contractor forces are now ready to start construction of the reactor containment. The Committee's review of the project was started in September, 1970 with receipt of the

Preliminary Safety Analysis Report, and has proceeded as supplementary information has been received. It is intended that the review will continue as additional information is provided.

The Committee recognizes the importance of the FFTF project in the Commission's fast breeder reactor program and the desirability of avoiding, if possible, delays in the FFTF construction schedule. The Committee believes it acceptable to proceed with initial construction of the containment provided sufficient flexibility is retained to accommodate modifications and additions that might be required, and subject to additional review steps as discussed below.

A design basis earthquake having a ground acceleration of 0.25g has been proposed for the facility. Additional surveys are now in progress to better define the geologic structure underlying the site and to confirm the adequacy of the proposed design basis earthquake. The Regulatory Staff should review the results of these surveys as they become available. No foundation concrete should be placed for the reactor containment, or for other seismic Class I structures, until the Regulatory Staff is satisfied with the results of the surveys and the adequacy of the proposed design basis earthquake.

The Committee believes that some FFTF structures should be strengthened to give assurance that plant features essential to safety, including the reactor containment building, air dump heat exchangers, and irradiated fuel transfer systems, would not be damaged in a 300 mph tornado in such a way as to lead to consequences in excess of site criteria guidelines.

The ability of the reactor cavity and the reactor access cell to contain postulated core-disruptive accidents is determined by the structure erected in the reactor building above elevation -74 ft. (referred to finished grade). Similarly, the ability to provide a post-accident core retention and cooling system below the reactor depends upon the design provisions made in the region above an elevation of -74 ft. These are the main areas of Committee concern with regard to retaining flexibility to accommodate modifications in the internal portions of the facility below grade. However, the Committee notes that further review of the primary system and other features may lead to other considerations which influence this portion of the facility. Design provisions proposed by the contractor to provide the desired flexibility to contain a larger-than-proposed core-disruptive accident and to provide a core retention system below the reactor, should be reviewed by the Regulatory Staff and the Committee before concrete is placed above elevation -74 ft.

The Committee believes that the site proposed is suitable for a facility of the FFTF type, and that, subject to the comments above, initial construction of the facility can proceed on the basis described.

Dr. Spencer H. Bush did not participate in the review of this project.

Sincerely,

/s/ C. P. Siess

C. P. Siess
Acting Chairman

References attached.

References - Fast Flux Test Facility (FFTF)

1. BNWL-1350, "Fast Flux Test Facility Site Safety Analysis", dated April 1, 1970

2. Preliminary Safety Analysis Report for FFTF; dated September 21, 1970, Volumes 1 and 2

3. DRD&T Letter dated September 25, 1970; AI-AEC-12977, "Aerosol Modeling of Hypothetical LMFBR Accidents"

4. DRD&T Memo dated October 28, 1970; J. A. Blume Report, "Seismic and Geologic Siting Evaluation, FFTF Near Richland, Washington", dated August 1970; USGS Report, "Geologic Investigations of Faulting in the Hanford Region, Washington", dated 1970

5. DRD&T Letter dated November 2, 1970; Appendix H to FFTF PSAR, "Surveillance and Inservice Inspection Guidelines"

6. DRD&T Memo dated December 16, 1970; "Site Investigation Report for Fast Flux Test Facility", by Bechtel Corporation, dated December, 1970

7. DRD&T Memo dated January 5, 1971; "Review of FFTF Preliminary Safety Analysis Report"

8. DRD&T Memo dated February 4, 1971; JABE-WADCO-02, "Seismic Design Criteria for the FFTF Site, Richland, Washington", and "Revisions to FFTF Seismic Design Criteria"

9. DRD&T Memo dated February 18, 1971; HEDL-TME-71-30, "Summary of Computer Codes Used for FFTF Containment and Siting Studies"; WHAN-SA-26, "An Integrated Model for Analyzing Disruptive Accidents in Fast Reactors"

10. DRD&T Memo dated February 26, 1971; HEDL-TME-71-31, "Sodium Fire Analysis for the FFTF"; HEDL-TME-71-33, "Radiological Evaluation of a Hypothetical Core Disruptive Accident"; HEDL-TME-71-35, "Review of Tornado Considerations for FFTF"

11. DRD&T Memo dated March 4, 1971; JABE-WADCO-04, "Supplementary Geologic Investigations for Seismic Evaluation of FFTF Site Near Richland, Washington"; "Seismic Velocity and Elastic Moduli Measurements", Sheet 2 of Bechtel Site Investigation Report; JABE-WADCO-02, "Seismic Design Criteria for the FFTF"; JABE-WADCO-03, "Seismic Evaluation and Development of Ground Acceleration and Response Spectra for FFTF Site"; H. B. Seed Report, "Determination of Spring Constants for

References - FFTF (cont'd)

Seismic Analysis of FFTF, Determination of Damping Factors for Seismic Analysis of FFTF"

12. DRD&T Memo dated March 4, 1971; HEDL-TME-71-22, "Functions and Requirements from the System Design Descriptions of the FFTF"; WARD-AT(45-1)-2171-11, "An Analytical Evaluation of Fuel Failure Propagation for the FFTF"

13. DRD&T Memo dated March 9, 1971; "Response to Part 5.0, Containment and Structures, of Additional Information Required", dated February 1971; "Response to RDT FFTF PSAR Site/Radiological Questions", dated February 1971

14. DRD&T Memo dated March 9, 1971; Figure of Foundation; Sketches of Core Support Structures

15. DRD&T Memo dated March 26, 1971; FPS-930, "Evaluation of Possibilities for Gas Entrainment Into the FFTF Core"

16. DRD&T Memo dated March 26, 1971; "Partial Response to 'Additional Information Required'", dated February 1971

17. DRD&T Memo dated March 28, 1971; HEDL-TME-34, "Assessment of Magnitude and Uncertainties of Hypothetical Accidents for the FFTF"

18. DRD&T Memo dated March 29, 1971; Supplement 15.A to the FFTF PSAR, "Safety Analysis for the Improved Core"; FRT-372, "Values Selected for the FFTF Engineering Hot Channel Factors"

19. DRD&T Memo dated March 31, 1971; ANL/RAS-71-12, "Post-Accident Heat Removal in LMFBR's, In-Vessel Consderations"

20. DRD&T Memo dated April 1, 1971; HEDL-TME-71-46, "Parameter Lists from the System Design Descriptions of the FFTF"; HEDL-TME-71-25, "FFTF Outlet Region Feature Model, 300 Series Air Entrainment Tests Report"

21. DRD&T Memo dated April 9, 1971; JABE-WADCO-05, "Microearthquake Activities Near Wooded Island and Its Effect Upon Seismic Evaluation of the FFTF Site"

22. DRD&T Memo dated April 9, 1971; "Partial Response to 'Additional Information Required, FFTF'"; FRT-406, "Possibility of Closed or Open Loop Disruptive Failures Causing Significant Motion of Adjacent Fuel Material"; FPS-962, "A Preliminary Analysis of Pipe Whipping Potential in the FFTF Heat Transport System"

References - FFTF (cont'd)

23. DRD&T Memo dated April 15, 1971; WHAN-M-14, "Quality Assurance Program Plan for FFTF", Revision 1, January, 1971; WHAN-M-2, "Quality Assurance Manual", February 1, 1971

24. DRD&T Memo dated April 19, 1971; HEDL-TME-71-53, "Material Considerations in Support of the FFTF Preliminary Safety Analysis Report", Volumes I and II; "Answers to Points Raised at DRL Aerosol Modeling Meeting on February 25, 1971"

25. DRD&T Memo dated April 20, 1971; "Answers to DRL Information Request No. 2"

26. DRD&T Memo dated April 26, 1971; HEDL-TME-71-50, "Mechanical Consequences of Hypothetical Core Disruptive Accidents"

27. DRD&T Memo dated April 30, 1971; "Answers to Questions Listed at ACRS Subcommittee Meeting of January 5, 1971"

28. DRD&T Memo dated May 5, 1971; ANL/RAS-71-14, "Final Report on Comparision of a Two-Dimensional Hydrodynamics Code (REXCO) to Excursion Experiments for Fast Reactor Containment", dated January 1971

29. DRD&T Memo dated May 6, 1971; "Answers to Review Questions on FFTF PSAR"

30. DRD&T Memo dated May 19, 1971; WARD-AT(45-1)-2171-13, "Plant Transient Following a Large Pipe Rupture in the FFTF Primary System", March 1971

31. DRD&T Memo dated June 16, 1971; FRA-425, "The Impact of Irradiation Induced Swelling, Creep and Ductility Loss on the Design of FFTF Core Components", March 1971