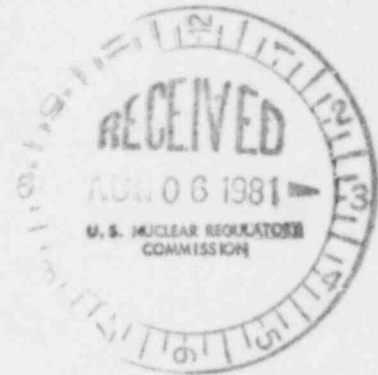


TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

July 31, 1981

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555



Dear Mr. Denton:

In the Matter of the) Docket Nos. 50-259
Tennessee Valley Authority) 50-260

In response to a letter from T. A. Ippolito to H. G. Parris dated July 20, 1981, enclosed is additional information regarding the electrical system modifications for the Browns Ferry Nuclear Plant in support of requested license amendment TVA BFNP TS 156 submitted to you by my letter dated April 9, 1981 and supplemented by letters dated June 8 and July 2, 1981. The enclosed consists of information regarding generator circuit breaker vendor testing, preoperational and periodic testing, and planned maintenance frequency.

We hope that this will resolve all of the NRC staff's concerns regarding license amendment request TVA BFNP TS 156. Because of a delay in unit 1 restart date we now need NRC approval of TS 156 by August 14, 1981. As stated in my July 2, 1981 letter to you, the technical specifications proposed in TS 156 are to be implemented on Browns Ferry units 1 and 2 when unit 1 is returned to operation following completion of the current unit 1 refueling outage.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills

L. M. Mills, Manager
Nuclear Regulation and Safety

Subscribed and sworn to before me
this 31st day of July 1981.

Bryant M. Lowery
Notary Public

My Commission Expires 4/4/82

Enclosures

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511*

ENCLOSURE
RESPONSE TO NRC REQUEST FOR INFORMATION
REGARDING TVA BFNPT 156
BROWNS FERRY NUCLEAR PLANT
(REFERENCE: T. A. Ippolito letter to H. G. Parris
dated July 20, 1981)

Question 1

Provide a table showing generator circuit breaker design specifications, testing required, tests performed, and test results.

Response

The requested data is tabulated in Table 1.

Question 2

In the GBB/TVA minutes of meeting of November 18, 1980 you discussed testing for out-of-phase switching. Have these tests been performed? If so, provide the results.

Response

Out-of-phase switching was not included in the specification for the generator breaker but was a later contract addition. Brown Boveri Corporation (BBC) is completing their 200-kA breaker developmental testing program including out-of-phase switching. The out-of-phase switching test will be performed for TVA observation after the developmental tests are complete. The breaker, as installed with 165-kA rating, was tested for out-of-phase switching. These tests are listed in KEMA Report of Performance No. 2366-74 as the tests in which the recovery voltage on opening is approximately 29-kV. See sheets 6 and 7 of Report 2366-74. A copy of the test report summary has been previously sent to NRC. The breaker made currents as high as 251-kA peak and interrupted as high as 103 kA symmetrical and 133 kA asymmetrical at 29-kV.

Question 3

In your June 8, 1981 submittal you state that the maximum fault requiring interruption is 145-kA and that the breakers are currently rated at 165-kA and will be upgraded to 212-kA. In reference to the above provide the following:

- a. What is the basis for the above ratings?
- b. Provide a time table for completion of the modifications to upgrade the breakers to 212-kA.

Response-(a)

TVA has performed short circuit studies to determine possible fault currents. The rating of 165-kA is a specification of the generator breaker established by the breaker manufacturer. This rating is adequate for the foreseeable future.

A system change which could result in fault currents above 165-kA is the temporary use of a lower impedance generator step-up transformer. This would be done only in the very unlikely event of a failure of more than two single-phase transformers.

To account for this possible situation TVA plans to increase the interrupting rating to 200-kA. (Previous references to 212-kA were incorrect. The breakers will be uprated to 200-kA). Long range short circuit studies do not indicate that the fault current will rise above 200-kA.

Response-(b)

Although the 165-kA interrupting rating will be adequate for a number of years, plans are to uprate the breaker to 200-kA during the next refueling outage of unit 2. This outage is presently scheduled for the spring-summer of 1982.

Question 4

In the GBB minutes of November 14, 1980 you reference tests that have been completed. You state these tests are listed in table II of ANSI C37.09-1978. Are these tests the same as in table II of ANSI/IEEE C37.09-1979?

Response

The reference to ANSI C37.09 in the meeting minutes of November 13-14, 1980 was in error. The correct reference is ANSI C37.09-1971 which was the standard in effect during 1978. The TVA specification E6.7.01 for Browns Ferry generator breakers refers to ANSI Standard C37.09-1971 for testing and requires TVA approval for the omission of any short-circuit test duty listed in Table II therein. At the present time, the applicable ANSI standard for generator breakers is still under development in IEEE. Because of the absence of appropriate published standard, the peculiarities of generator breaker application, and the fact that manufacturers, particularly European manufacturers, prefer to "package" their test shots (breaker operations) somewhat differently from the ANSI C37.09 test duties, this is a reasonable approach to test specifications. It should be noted that generator breakers of this high rating are only available from European manufacturers. The minutes of the meeting between Gould-Brown Boveri and TVA representatives of November 12 and 13, 1980 records TVA's acceptance of test reports of previous applicable tests, both for the breaker uprated to 200-kA and with its initial 165-kA rating, and also recognizes certain listed test duties as not applying or as being enveloped by other tests which were performed. The short-circuit test report accepted for the 165-kA rated breaker is the report of tests performed for generator breakers for TVA's Raccoon Mountain Pumped-Storage Plant witnessed by TVA.

As a result of IEEE breaker standards consolidation program during the 1970's, C37.09-1979 does include some test duties which are not listed in C37.09-1971, but none of these apply to generator breakers.

The minutes of the November 13-14, 1980 meeting relate acceptable test reports for the 200-kA breaker to ANSI test duties primarily for contract technicality purposes. However, we prefer to discuss only the 165-kA rating until the testing program is complete for the 200-kA rating. We anticipate this program will be completed by December 31, 1981.

Question 5

What onsite testing will be accomplished on the generator circuit breakers?

- a. preoperational test
- b. periodic tests
- c. maintenance frequency

Response

The following is an outline of the preoperational testing, periodic testing, and maintenance frequency of the Browns Ferry Nuclear Plant 20.7-kV generator breakers.

a. Preoperational Testing

I. Air Compressor Plant

1. Calibration of pressure switches
2. Functional check of controls circuit

II. Water Cooling Plant

1. Functional check of controls circuit
2. Checkout of conductivity meter
3. Verification of flow sensors

III. Generator Breaker

1. Calibration of pressure switches and gauges
2. Tiring tests on main, arcing, and resistor contacts of each phase
3. Doble tests (power factor) of each phase of the generator breaker
4. Air consumption tests for breaker operation
5. Functional checkout of controls circuit (blocking, annunciation, etc.), includes protective relay calibration
6. Main generator, main transformers, unit station-service transformers, and associated bus work protective relays selectivity testing

b. Periodic Testing

NOTE: The scheduling of periodic testing and maintenance frequency is based on an 18-month refueling cycle and is an estimate only. Reevaluation will be done as experience is gained with the generator breakers. The testing and maintenance will be adjusted accordingly.

A. Generator Breaker

1. Every operating cycle
 - a. Calibrate protective relays
2. Every other operating cycle
 - a. Timing tests on main, arcing, and resistor contacts of each phase
 - b. Double tests of each phase of the generator breaker
 - c. Air consumption tests for breaker operation

c. Maintenance Frequency

I. Air Compressor Plant

1. Once each operating cycle, check out compressor system
2. Every other operating cycle, service compressor plants completely

II. Cooling Water Plant

1. Once each operating cycle, relubricate pump bearings and perform general inspection of water plant
2. Every other operating cycle, relubricate motor bearings

III. Generator Breaker

1. Once each operating cycle, perform visual inspection of breaker operating parts for wear
2. Every third operating cycle, perform major overhaul on breaker

Question 6

When will changes to the FSAR which incorporate the generator breakers be submitted?

Response

Submittal of an updated FSAR is required by July 22, 1982 pursuant to 10 CFR 50.71(e). The updated Browns Ferry FSAR will be submitted in the late spring-early summer 1982 time frame consistent with the above regulation. It will contain a brief description of the Browns Ferry generator breakers consistent with the level of detail required by 10 CFR 50.71(e).

ATTACHMENT 1

BROWNS FERRY SPECIFIED RATINGS AND TESTS FOR GENERATOR BREAKERS

<u>Parameter</u>	<u>Rating</u>	<u>Tests</u>
1. Voltage kV-rms	24	Dielectric withstand 60 kV-rms, 1 minute, passed (routine test).
2. Load current (continuous) kA	36	Heat run BBC Rpt No. HAQ-2611E (on Bellefonte generator contract 72C2-85500), 40.8 kA 50 Hz = 38.51 kA 60 Hz, breaker within acceptable temperature rise.
3. Insulation level	150 kV BIL	Withstood 1.2 x 50 microseconds 195 kV crest, positive and negative waves, BBC test 1-352780-041-900 (Bellefonte).
4. Interrupting capacity, kA-rms	165	
A. Symmetrical		176 kA @ 15.5 kV. (See Raccoon Mountain DEMA test No. 2366-74. Passed.
B. Asymmetrical	-	230 kA @ 15.5 kV. (See KEMA 2366-74). Passed.
5. Close and latch, kA-peak	446	558 kA @ 20.5 kV. (See KEMA test report 624-80). Passed.
6. Short time, kA	3 sec @ 165 kA	4 seconds @ 461 kA. (See KEMA 2366-74). Passed.
7. Maximum rate of rise of recovery voltage	Not specified	3 kV/microseconds. (See KEMA 2366-74). Adequate.
8. Out-of-phase	29.5 kV, 90 kA	29.5 kV @ 98 kA asymmetrical. (See KEMA 2366-74). Passed.