TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

May 14, 1984

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of) Docket No. 50-390
Tennessee Valley Authority)

As discussed with NRC representatives during a March 1, 1984 teleconference, we are formally transmitting proposed modifications and corresponding justifications concerning the testing of circuit breakers as discussed in the Watts Bar Nuclear Plant unit 1 draft technical specifications. These proposed changes consist of alternate testing methods for circuit breakers. It should be noted that the change to surveillance requirement 4.8.4.1 is less extensive than that which we proposed during the conference call. The deletion of Table 3.8-1 was also proposed and favorably received by the NRC representatives during the call. This information can be located in an appropriate plant procedure.

Also, per NRC's request, we have included a cost analysis associated with our proposed testing. Please note that this analysis is for one refueling outage only. Enclosed are the proposed changes and corresponding justifications (Enclosure 1) as well as the cost analysis (Enclosure 2).

If you have any questions concerning this matter, please get in touch with D. B. Ellis at FTS 858-2681.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 14th day of May 1984

Paulette H. White
Notary Public
My Commission Expires 9-5-84

Enclosures (2)

cc: See page 2

A001
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cc: U.S. Nuclear Regulatory Commission (Enclosures)
Region II
Attn: Mr. James P. O'Reilly Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT
PROPOSED MODIFICATIONS AND CORRESPONDING JUSTIFICATIONS
FOR UNIT 1 TECHNICAL SPECIFICATIONS

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3/4.8.4 ELECTRICAL EQUIPMENT PROTECTIVE DEVICES

CONTAINMENT PENETRATION CONDUCTOR OVERCURRENT PROTECTIVE DEVICES

LIMITING CONDITION FOR OPERATION

3.8.4.1 All containment penetration conductor overcurrent protective devices ~~given in Table 3.8-1~~ shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one or more of the above required containment penetration conductor overcurrent protective device(s) inoperable:

a. Restore the protective device(s) to OPERABLE status or deenergize the circuit(s) by tripping the associated backup circuit breaker or racking out or removing the inoperable circuit breaker within 72 hours, declare the affected system or component inoperable, and verify the backup circuit breaker to be tripped or the inoperable circuit breaker racked out, or removed, at least once per 7 days thereafter; the provisions of Specification 3.0.4 are not applicable to overcurrent devices in circuits which have their backup circuit breakers tripped, their inoperable circuit breakers racked out, or removed, or

b. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.4.1 All containment penetration conductor overcurrent protective devices ~~given in Table 3.8-1~~ shall be demonstrated OPERABLE:

a. At least once per 18 months:

1) For at least one 6900-volt reactor coolant pump circuit such that all reactor coolant pump circuits are demonstrated OPERABLE at least once per 72 months by performance of the following:

a) A CHANNEL CALIBRATION of the associated protective relays,

b) An integrated system functional test which includes simulated automatic actuation of the system and verifying that each relay and associated circuit breakers and control circuits function as designed ~~and as specified in Table 3.8-1~~, and

SURVEILLANCE REQUIREMENTS (Continued)

c) For each circuit breaker found inoperable during these functional tests, an additional circuit breaker of the inoperable type shall also be functionally tested until no more failures are found or all circuit breakers of that type have been functionally tested.

INSERT "B"

2) By selecting and functionally testing a representative sample of at least 10% of each type of lower voltage circuit breakers. Circuit breakers selected for functional testing shall be selected on a rotating basis. For the lower voltage circuit breakers the nominal Trip Setpoint and short circuit response times are listed in Table 3.8-1. Testing of these circuit breakers shall consist of injecting a current in excess of the breakers nominal Setpoint and measuring the response time. The measured response time will be compared to the manufacturer's data to insure that it is less than or equal to a value specified by the manufacturer. Circuit breakers found inoperable during functional testing shall be restored to OPERABLE status prior to resuming operation. For each circuit breaker found inoperable during these functional tests, an additional representative sample of at least 10% of all the circuit breakers of the inoperable type shall also be functionally tested until no more failures are found or all circuit breakers of that type have been functionally tested; and

3) By selecting and visually inspecting a representative sample of each type of fuse on a rotating basis. Each representative sample of fuses shall include at least 10% of all fuses of that type. The visual inspection shall ensure that the fuse shows no sign of deterioration or degradation and, for clip type fuses, that the proper size and type of fuse is installed and that the connections are clean, tight, and free of visible oxidation. Fuses found to be inoperable during these visual inspections shall be repaired or replaced with OPERABLE fuses prior to resuming operation. For each fuse found inoperable during these visual inspections, an additional representative sample of at least 10% of all fuses of that type shall be visually inspected until no more failures are found or all fuses of that type have been visually inspected.

b. At least once per 60 months by subjecting each circuit breaker to an inspection and preventive maintenance in accordance with procedures prepared in conjunction with its manufacturer's recommendations.

Insert "B"

By selecting and functionally testing a representative sample of at least 10 percent of each type of electrically operated circuit breaker. Electrically operated circuit breakers selected for functional testing shall be selected on a rotating basis. The functional test shall consist of injecting a current input at the specified setpoint to each selected electrically operated circuit breaker or trip device and verifying that each electrically operated circuit breaker functions as designed. For each device found inoperable during the functional tests, an additional representative sample of 10 percent of the defective type electrically operated circuit breakers shall also be functionally tested until no more failures are found or all electrically operated circuit breakers of that type have been functionally tested; and

WATTS BAR NUCLEAR PLANT UNIT 1

TECHNICAL SPECIFICATION/SURVEILLANCE REQUIREMENT 4.8.4.1 OF DEMONSTRATING OPERABILITY OF CONTAINMENT PENETRATION CONDUCTOR OVERCURRENT PROTECTIVE DEVICES - JUSTIFICATION TO REMOVE THE SURVEILLANCE REQUIREMENT FOR THE MOLDED CASE CIRCUIT BREAKERS FROM THE TESTING PROGRAM

TVA's Amendment 48 to the Final Safety Analysis Report for Watts Bar Nuclear Plant submitted an analytical analysis in Appendix 8E, "Probability/Reliability Analysis of Protection Device Schemes for Associated and Nonclass 1E Cables," for the reliability of specific redundant protective schemes as compared to the reliability of a single circuit breaker which is periodically tested. The reliability of the schemes is as follows: (1) 0.9981 for a single circuit breaker periodically tested, (2) 0.990 for a fuse, (3) 0.9976 for two redundant circuit breakers, and (4) 0.9995 for a circuit breaker and fuse combination. The conclusion of the analytical analysis stated that the protection given a circuit by a fuse, two redundant circuit breakers, and a circuit breaker and fuse combination is at least as reliable as a single circuit breaker which is periodically tested. Therefore, any one of the protection schemes could be utilized in lieu of periodically testing a single circuit breaker.

The containment penetration conductor overcurrent protection scheme at Watts Bar utilizes either a circuit breaker and fuse combination or two redundant circuit breakers. The circuit protection devices are selected with a high degree of quality commensurate with their importance to safety and with appropriate characteristics to interrupt an overcurrent condition within the 1,000-second rating of each containment penetration, thus preventing degradation of containment for an overcurrent condition. It is our position that the analytical analysis performed for the associated and nonclass 1E circuit protection schemes is also applicable to the containment penetration conductor overcurrent protection schemes. Therefore, functional testing of the circuit breaker is not required because of the high reliability of the protection schemes utilized.

LIMITING CONDITION FOR OPERATION

3.8.3.3 All circuit breakers actuated by fault currents that are used as isolation devices protecting IE busses from non-qualified loads shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With one or more of the above required circuit breakers inoperable:

a. Restore the inoperable circuit breaker(s) to OPERABLE status within 8 hours, or

b. Trip the inoperable circuit breaker(s), rack-out the circuit breaker(s) within 8 hours and verify the circuit breaker(s) to be racked out at least once per 7 days thereafter; the provisions of Specification 3.0.4 are not applicable to racked-out circuit breakers, or

c. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.3.3 Each of the above required circuit breakers shall be demonstrated OPERABLE: INSERT 'A'

~~a. At least once per 18 months by selecting and functionally testing a representative sample of at least 10% of each type of circuit breaker. Circuit breakers selected for functional testing shall be selected on a rotating basis. The functional test shall consist of injecting a current input at the specified Setpoint to each selected circuit breaker or relay and verifying that each circuit breaker functions as designed. For each device found inoperable during these functional tests, an additional representative sample of at least 10% of each over current protection device of the inoperable type shall also be functionally tested until no more failures are found or all devices of that type have been functionally tested; and~~

~~b. At least once per 60 months by subjecting each circuit breaker to an inspection and preventive maintenance in accordance with procedures prepared in conjunction with its manufacturer's recommendations.~~

Insert "A"

a. At least once per 18 months by selecting and performing a functional test on a representative sample of at least 10 percent of each type of molded-case circuit breakers. The molded-case circuit breakers selected for functional testing shall be selected on a rotating basis. The functional test (in accordance with NEMA Standard AB2-1980) shall consist of manually tripping (exercising) the circuit breaker twice and observing that the mechanical linkage is not binding or excessively loose, and inspecting all connections to the molded-case circuit breaker for tightness and signs of overheating. For each device found inoperable during the manual operating portion of the functional test of the selected molded-case circuit breakers, an additional representative sample of at least 10 percent of the defective type molded-case circuit breakers shall also be functionally tested until no more defective molded-case circuit breakers are found or all devices of that type have been functionally tested.

b. At least once per 18 months by selecting and functionally testing a representative sample of at least 10 percent of each type of electrically operated circuit breaker. Electrically operated circuit breakers selected for functional testing shall be selected on a rotating basis. The functional test shall consist of injecting a current input at the specified setpoint to each selected electrically operated circuit breaker or trip device and verifying that each electrically operated circuit breaker functions as designed. For each device found inoperable during the functional tests, an additional representative sample of 10 percent of the defective type electrically operated circuit breakers shall also be functionally tested until no more failures are found or all electrically operated circuit breakers of that type have been functionally tested; and

c. At least once per 60 months by subjecting each electrically operated circuit breaker to inspection and preventive maintenance in accordance with procedures prepared in conjunction with the manufacturer's recommendations.

WATTS BAR NUCLEAR PLANT UNIT 1

TECHNICAL SPECIFICATION/SURVEILLANCE REQUIREMENT 4.8.3.3 OF TESTING OVERCURRENT PROTECTIVE DEVICES - JUSTIFICATION TO REPLACE REQUIREMENT OF FAULT CURRENT INJECTION BY MANUAL TRIPPING (EXERCISING) MOLDED-CASE CIRCUIT BREAKERS

Past experience has revealed that serious problems exist with the required periodical testing program of injecting fault current to verify the automatic tripping of molded-case circuit breakers. When a molded-case circuit breaker has fault current injected to test the operability of the breaker, unnecessary detrimental effects to the breaker occur by thermal degradation of the internal components and burning of the electrical contacts. The testing requirement is destructive in nature.

NEMA Standard AB2-1980 states that, "Molded-case circuit breakers have an excellent record of reliability that is, to a great extent, due to the enclosed design which minimizes tampering and exposure to dirt, dust, and other contaminants. This reliability also depends on proper installation and careful application, particularly with reference to the maximum available short-circuit current of the circuit to which the the circuit breaker is applied." TVA takes into consideration the environment in which the equipment will be utilized and the available fault current that the circuit breaker will be required to interrupt when specifications are written to purchase the electrical boards and panels.

NEMA Standard AB2-1980 also states, "There is adequate experience to indicate that where electrical testing is not practical, or cannot be justified, the manual mechanical exercising of a circuit breaker is usually effective in assuring its probable proper electrical operation. A few operations of the handle, performed periodically, together with careful visual inspection of terminal connections for tightness, physical damage, or evidence of overheating are considered good practice. This will keep mechanical linkages free, and the wiping action by contacts will tend to avoid resistance buildup and thereby minimize heating. Circuit breakers used for frequent switching need no further exercising."

To inject fault current into a molded-case circuit breaker, the equipment must be isolated. Extensive man-hours will be involved in each unit refueling outage in removing, testing, and reinstalling the molded-case circuit breakers required to be tested that outage. Because of the excessive man-hour requirement and the potential of serious damage to the molded-case circuit breaker with no significant increase in safety or assurance of proper breaker operation, it is our position that exercising and inspecting all electrical connections to the molded-case circuit breakers as the functional test is sufficient to ensure a high reliability of correct operation as opposed to the injection of fault current.

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT UNIT 1

COMPARISON OF COST ESTIMATES FOR TESTING MOLDED-CASE CIRCUIT BREAKERS AS PRESENTLY REQUIRED BY THE TECHNICAL SPECIFICATIONS (SR-4.8.3.3.a AND SR-4.8.4.1.a.2) VERSUS TVA'S PROPOSED TESTING METHOD

TVA considers the present testing method of fault current injection into each molded case circuit breaker as required by the technical specifications to be detrimental to the equipment under test. TVA has proposed an alternate testing method of mechanical exercising molded-case circuit breakers which is recognized in NEMA Standard AB2-1980 as a viable testing procedure to ensure the breaker will function properly to interrupt a faulted condition.

We estimate the engineering for the preparation and review of the procedure for either testing method will require approximately 40 manhours. For an estimate of $30 per manhour, the cost to TVA to prepare a procedure is estimated to be approximately $1200. This is considered a one time initial expense and will not be included in the estimates for either method. However, we estimate 10 manhours for each unit refueling outage will be required for scheduling and tracking of the actual work performance, and for review of the completed instruction. For an estimate of $30 per manhour, the cost to TVA will be $300. This cost will not be included for either method since it is inclusive to both methods.

We estimate there will be approximately 180 molded-case circuit breakers which will be surveillance tested each unit refueling outage. We estimate 17 manhours will be required to test each molded-case circuit breaker by fault current injection and is summarized as follows:

1 manhour	- Obtaining clearance
2 manhours	- Removing breaker from compartment
8 manhours	- Testing of circuit breaker
2 manhours	- Installing breaker in compartment
1 manhour	- Removing clearance
1 manhour	- System checks
2 manhours	- Quality engineering checks
17 manhours	- Total manhours estimated to test each molded-case circuit breaker by fault current injection

For an estimate of $25 per manhour, the cost to TVA to test 180 molded-case circuit breakers by fault current injection, each unit refueling outage is estimated to be $76,500.

TVA's preferred method of mechanical exercising the molded-case circuit breaker operating mechanism and checking tightness of the connections for the surveillance requirement is estimated to require 3 manhours and is summarized as follows:

1	manhour	- Obtaining clearance
1/2	manhour	- Mechanical exercising the operating mechanism and checking tightness of connections
1	manhour	- Removing clearance
1/2	manhour	- Quality engineering checks
3	manhours	- Total manhours estimated to test each molded-case circuit breaker by mechanical exercising

For an estimate of $25 manhour, the cost to TVA to test 180 molded-case circuit breakers by mechanical exercising the operating mechanism and checking tightness of the connections, each unit refueling outage is estimated to be $13,500.

As can be seen, there is a significant difference in the cost estimate for both surveillance testing procedures.