

SEP 17 1981

MEMORANDUM FOR: Commissioner Bradford
FROM: William J. Dircks
Executive Director for Operations
SUBJECT: BROWNS FERRY REPLICATION TEST

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This memo has been prepared for your information because of your continuing interest in the fire protection replication testing program. It contains more detailed information about the Browns Ferry replication test, and the conclusions the staff has drawn from it, than will be included in the bimonthly report for the period ending August 31, 1981.

The first of the Browns Ferry replication tests was conducted on schedule at Underwriters Laboratories (UL) on Friday, July 17, 1981. The replication tests were originally proposed to determine the ability of fire protection modifications to protect one of two redundant sets of divisional cables located in the same area from damage by a single fire. Two tests were originally proposed for the replication test--one test with the automatic water spray fire suppression system operating and another test in which the fire would be allowed to burn free in order to simulate failure of the automatic water spray system. A third test was later added to the test plan, not as part of the replication program itself but using the Browns Ferry replica at UL, in which the three conduits would be enclosed in a 1-hour fire barrier to determine the margin of safety such a barrier provided.

In the test conducted on July 17, the fire was allowed to burn free for 45 minutes without either automatic or manual fire suppression attempted. Although cables in all four vertical cable trays were damaged, the redundant cables in adjacent conduits were not damaged and, therefore, functional capability was not lost. Details of the test are described in the "Quick-Look Report" distributed by David Notley (RES) on August 11.

RES and NRR have concluded that the original objective of the Browns Ferry replication test has been satisfied and that this particular test series should be terminated. They have identified several other questions that should be investigated, however, and these are being proposed through normal channels for management approval. These questions include such items as the effect of different initiating fires (size, duration, and fuel material) on cables in cable trays and the effect on cables contained in conduits that are in direct contact with the flames from an exposure fire.

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One question remains concerning the validity of the July 17 test with respect to Browns Ferry and relates to the fact that Flamemastic thickness on the test replica cables should have been 1/8-inch dry rather than 1/4-inch dry. According to Browns Ferry technical specifications, Flamemastic is to be applied to all cables at a dry thickness of one-eighth inch. Even though the Flamemastic thickness on most trays at Browns Ferry (and these trays in particular) is much greater than one-eighth inch, the test model was supposed to replicate the technical specifications. However, due to errors in communication, the trays in the UL replication model were coated to a dry thickness of one-fourth inch. This error was not discovered until the morning of the test.

Due to the configuration of the test replica, the burning cables in the cable trays constituted the only sustained exposure fire to the conduits which contained the redundant divisional cables. Because the cable trays and conduits are vertical and adjacent to each other, any fire damage to the cables in the conduits resulting from burning of the cables in the cable trays is dependent on radiant heat since no direct flame impingement from trays to conduits is possible. The participants expect that damage to cables in the cable trays would be more extensive with only a 1/8-inch-thick coating of Flamemastic. However, the results of past cable test fires offer no indication that cables with 1/8-inch-thick Flamemastic will burn with sufficient added intensity as compared with cables coated to 1/4-inch thickness to produce that much additional radiant heat. Therefore, we feel the original objective of the test has been satisfied. The staff's conclusions are as follows:

- I. The original goal of the Browns Ferry replication test program has been met, and the remainder of the tests should be cancelled.
 - A. The goal of the Browns Ferry replication test, as originally conceived, was to determine the ability of fire protection modifications to protect one of two redundant sets of divisional cables located in the same fire area from damage by a single fire. At that time functional redundancy was assumed to exist in the area that was chosen to be replicated for the test. Even though Browns Ferry later determined that functional redundancy did not exist in the area, the test was conducted under the original assumption.
 - B. The most conservative test in which the automatic fire suppression system was shut off, and the fire allowed to burn free was conducted first. No fire suppression activities were attempted for 45 minutes. The test, however, should not be considered as the most conservative configuration that could be tested at any operating nuclear power plant.
 - C. The useful information gained from a full-scale replication test is limited and expensive when compared to the useful information gained from a series of separate effects tests.

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- D. No additional useful information can be obtained within the context of the Browns Ferry replication test by prompt extinguishment of the fire using the automatic water spray or by enclosing the conduits within a 1-hour fire barrier.
- E. On these bases, the Browns Ferry replication test should be considered completed, and the two additional tests previously contemplated as a part of the complete replication test should be cancelled and the fire protection research efforts directed towards a series of separate effects tests which will give maximum useful information for NRR in their licensing reviews.

II. The other replication tests scheduled for Brunswick should also be cancelled.

As agreed to earlier, the staff reevaluated the desirability of continuing the Brunswick replication test program after the Browns Ferry tests were completed. As a result of that reevaluation, the staff concluded that full-scale replication tests are not cost effective since they produce, at high relative cost, results that are of only limited usefulness. The staff's recommendation, therefore, is that the Brunswick replication tests should also be cancelled.

The staff is continuing with the additional separate effects tests already approved by Mr. Denton (memo from Minogue to Denton dated July 2, 1981, and reply memo from Denton to Minogue dated July 27, 1981, enclosed) and those identified above as a result of this July 17 test.

(Signed) William J. Dircks

William J. Dircks
Executive Director for Operations

Enclosures: 7/2/81 memo from Minogue to Denton and 7/27/81 memo from Denton to Minogue

cc: Chairman Palladino w/encl.
Commissioner Gilinsky w/encl.
Commissioner Ahearne w/encl.
Commissioner Roberts w/encl.

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Handwritten notes: 9/1/81, 9/8/81, 9/1/81

*SEE PREVIOUS CONCURRENCES.

DET:EEB	DET:EEB	DET	DET	NRR	RES	RES
DPNotley*	DFSullivan*	LCShao	GAArlotto	HRDenton	DFRoss	RBMinogue
8/12/81	08/12/81	7/2/81	9/2/81	9/1/81	9/1/81	9/1/81
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