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MEMORANDUM FOR: Brian K. Grimes, Acting Assistant Director for Systems Engineering, Division of Operating Reactors

FROM: R. Ferguson, Section Leader C, Plant Systems Branch, Division of Operating Reactors

THRU: G. Lainas, Chief, Plant Systems Branch, Division of Operating Reactors

SUBJECT: SUPPLEMENTAL FIRE PROTECTION STAFF POSITIONS - ASSOCIATED CIRCUITS AND OIL COLLECTION SYSTEMS

My July 17, 1979 memorandum to you indentified seven areas where staff positions are being developed. These staff positions will be used to expedite the completion of the evaluations of certain remaining open items from our fire protection reviews of operating plants.

The attached are two of these staff positions that will be used in the evaluation of the effects of postulated fires on associated non-safety circuits and the evaluation of oil collection systems for reactor coolant pumps.

R. Ferguson, Section Leader
Plant Systems Branch
Division of Operating Reactors

Contact:
H. George, X27136

Enclosures:
1. Associated Circuits
2. Reactor Coolant Pump Oil Collection System

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cc w/enclosures:
See next page

7912180 115

cc w/enclosures:
D. Eisenhut
L. Shao
W. Gammill
R. Vollmer
J. Miller
S. Hanauer
V. Moore
W. Morrison
D. Notley
G. Bennett
R. Feit
G. Lainas
V. Benaroya
T. Wambach
J. Stone, I&E
R. Ferguson
H. George
R. Scholl
PSB Section C
BNL Consultants

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# STAFF POSITION ON ASSOCIATED CIRCUITS

## Staff Concern

Certain "associated circuits" are circuits connected to equipment necessary for safe shutdown. Examples of this may be remote indicating Lights for MOV boards, MCC's, breakers, etc. that provide indication of valve or breaker position but do not perform a safety function and therefore are classed as non-safety related. Typically, these are connected to safety equipment in such a manner that failures in these circuits, such as open circuits, hot shorts, or shorts to ground, will not prevent operation of the safety equipment to which they are connected. However, at some facilities these circuits may be connected in such a way that a "hot short" in cables of these associated circuits may prevent proper operation of the safety equipment. Operation of a large amount of safety related equipment from both safety divisions was precluded during the Browns Ferry fire due to "hot shorts" in associated circuits.

Because such associated circuits are termed "non-safety", cables for these circuits may be routed in non-safety cable trays. Because of this a fire involving non-safety cable trays without affecting any safety cable trays has the potential for preventing operation of redundant safety equipment by causing "hot shorts" in associated circuits.

Current licensing criteria contained in Revision 2 to Regulatory Guide 1.75, "Physical Independence of Electric Systems," which endorses IEEE 384-1974, require that cabling from associated circuits be routed with the safety division that corresponds to the safety equipment to which the associated circuit is connected. Such guidance was followed by a number of operating plants; however, many of the older plants did not have such guidance to follow. Therefore, these older plants may be susceptible to the loss of shutdown systems because of fire damage in non-safety related cables that include the above described associated circuits.

## Staff Position

To provide adequate assurance that safe shutdown can be achieved for fires affecting associated circuits, one of the following should be satisfied:

(1) The method of electrically isolating associated circuits from safety equipment is such that hot shorts, open circuits, or shorts to ground in the associated circuit will not prevent operation of the safety equipment;

(2) Associated circuits are considered safe shutdown circuits, and the separation and barriers between trays/conduits containing associated circuits to one safe shutdown division and trays/conduits containing associated circuits or safe shutdown cables from the redundant division is evaluated to assure that a postulated fire will not affect safe shutdown capability by affecting associated circuits. An acceptable method of complying with this alternative would be to meet R.G. 1.75 position 4 related to associated circuits and IEEE 384-1974 (Section 4.5) where trays from redundant safety divisions are sufficiently protected so that postulated fires only affect trays from one safety division.

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# STAFF POSITION ON

# REACTOR COOLANT PUMP OIL COLLECTION SYSTEM

## Staff Concern

Each reactor coolant pump motor assembly typically contains 140 to 220 gallons of lube oil. Oil leaking from some portions of the lube oil system may come in contact with hot surfaces. The resulting fire could be large, and access or fighting such a fire would be delayed due to the time required to enter the containment. Containment air temperature would increase, with severe localized environments in the area of the fire and generation of large amounts of smoke. Such effects could affect operability of safety-related equipment inside containment.

Several operating plants have oil collection systems. Some of these are acceptable, but many of these do not adequately collect leakage from all potential leakage points or do not have adequate storage capacity for the amount of oil that may leak.

Additionally, the existing lube oil system piping and oil collection systems may not be designed to withstand a design basis seismic event. An SSE then could potentially result in a large oil leak and a failure of the oil collection system resulting in a large fire inside containment. Appendix A to BTP 9.5-1 states that for operating plants, "postulated fires or fire protection system failures need not be considered concurrent with other plant accidents or the most severe material phenomena." This was based on considering the random occurrence of a fire at the same time as some natural phenomenon. However, the concern identified above is one where the natural phenomenon (i.e., the SSE) causes the fire, and therefore the protection should be designed to handle such an event.

## Staff Position

One of the following should be provided: (1) an oil collection system, or (2) an automatic suppression system.

If option (1) is selected, the reactor coolant pump oil collection system should be installed, or the existing system upgraded where required, to provide capability for collecting leakage from all potential leakage points such as the following: flanged connections; threaded pipe coupling; drain plugs; fill points; upper and lower reservoirs; sight glasses; lift pump; and external oil cooler. The leakage should be collected and drained to a closed container that is adequate to hold the entire lube oil system inventory. The drain line should be adequate to accommodate a large oil leak.

To provide adequate protection for an SSE, one of the following should be provided:

(1) The lube oil system components whose failure could result in leakage should be designed to withstand an SSE without leakage; and, the dropping of oil collection system components during an SSE should not cause loss of operability of safety-related equipment; or

(2) The oil collection system should be designed to withstand an SSE and continue to be able to collect and drain leakage that may occur during an SSE. In this case the oil collection system should be adequate to collect oil from any external lube oil piping not designed to withstand an SSE, in addition to leakage from points identified above.

If option (2) is selected, either the automatic and manual fire suppression system or the lube oil system components whose failure could result in leakage should be designed to withstand the SSE.

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