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Dalwyn R. Davidson
VICE PRESIDENT
SYSTEM ENGINEERING AND CONSTRUCTION

April 1, 1982

Mr. A. Schwencer
Chief, Licensing Branch No. 2
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
Response Clarification -
Safe Shutdown Analysis
Auxiliary Systems Branch

Dear Mr. Schwencer:

This letter and its attachment is submitted to respond to issues discussed in a March 16 meeting in Reading on the status of the Safe Shutdown Analysis called for by Appendix R, Subsection G.

It is our intention to incorporate these responses in a subsequent amendment to our Fire Protection Evaluation Report.

Very Truly Yours,

Dalwyn R. Davidson

Dalwyn R. Davidson
Vice President
System Engineering and Construction

DRD: mlb

attachment

cc: Jay Silberg
John Stefano
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FIRE PROTECTION SAFE SHUTDOWN ANALYSIS

In accordance with section 9.5.1 Branch Technical Position ASB 9.5-1, position C.4.a(1) of NRC Standard Review Plan and Section III.G of Appendix R to 10 CFR Part 50, it is the NRC staff's position that cabling for redundant safe shutdown systems should be separated by walls having a three-hour fire rating or equivalent protection (see Section III.G.2 of Appendix R). That is, cabling required for or associated with the primary method of shutdown, should be physically separated by the equivalent of a three-hour rated fire barrier from cabling required for or associated with the redundant or alternate method of shutdown.

To assure that redundant shutdown cable systems and all other cable systems that are associated with the shutdown cable systems are separated from each other, so that both are not subject to damage from a single fire hazard, a safe shutdown analysis/evaluation was performed.

Section 3.1 of the Fire Protection Evaluation Report (FPER) defines the shutdown sequence that would be followed upon detection of a fire of such magnitude that shutdown of the plant is required. Table 3.2 of the FPER identifies the systems required for the shutdown, and Table 3.1 of the FPER identifies the equipment within these systems required for the shutdown.

The equipment, including instrumentation and vital support system equipment, required for the primary method of achieving shutdown was listed in a table which identified:

a. equipment required to achieve and maintain hot shutdown and equipment required to achieve and maintain cold shutdown;

b. location by fire area;
c. the redundant counterpart, where applicable;
d. all circuits (power, instrumentation, and control) serving the equipment, including non-essential, non-safety circuits associated with the equipment;
e. cable routing (by fire area) of essential circuits for the equipment.

The essential circuits were also shown on circuit drawings by system and by color-coded circuit division. Non-safety, non-essential circuits associated with the equipment were reviewed to verify that properly coordinated isolation devices exist, such that failures caused by open, ground, or hot short of cables will not affect it's associated shutdown system. Other safety related circuits serving safety related equipment not required for safe shutdown were reviewed to verify that no circuit fault (ground, hot short, open) could result in tripping a bus supplying power to safe shutdown systems.

The circuit routing drawings were reviewed to determine if circuits serving redundant equipment are routed through a common fire area. Where problem areas were identified, recommended solutions were determined.

The factors considered in determining solutions were:
a. Present separation between redundant cables and/or equipment
b. Combustible loading for the area involved
c. Fire protection features already provided for the problem area.

In some cases the recommended solutions meet the requirements of Section III.G of Appendix R. In other cases, the recommended solutions do not meet Appendix R requirements and justification for solutions to these cases is provided.

In performing the evaluation/analysis, no credit was taken for an alternate method of shutdown, except for a fire in the control room. A fire in the control room will not affect the circuits required to shut down from the alternate shutdown panel, because these circuits are isolated from the control room when the alternate shutdown mode is selected on the transfer switch at the alternate shutdown panel.

Also, for the fire in the control room, loss of two of the four Reactor Protection System cabinets does not prevent loss of function of the manual SCRAM. Loss of two of these cabinets, although unlikely, is postulated because there is only about 4.5 feet between the cabinets in each pair of cabinets. There is over 27 feet between each pair of cabinets.

Should a fire in the control room disable the diesel generator starting panel, operator action would be required at the diesel generator rooms to transfer control to the local panel. The control room circuits are isolated after control is transferred to the local panel.

The following safe shutdown systems are controlled and isolable from the alternate shutdown panel:

1. Reactor Core Isolation Cooling System (RCIC)
    a. Motor operated valve control (with indicating lights)
    b. Pumps (control switch and indicating lights)
    c. Instrumentation
        1. Flow controller and Flow indicator
        2. Square root converter
        3. Transfer switch which transfers the flow signal and at the same time transfers the controller output to the turbine electronic governor.
        4. DC to AC inverter for flow indicating and controller and square root converter.
        5. Indicating lights for:
            a. RCIC turbine tripped
            b. RCIC turbine bearing oil pressure low
            c. RCIC turbine coupling end bearing oil temperature high
            d. RCIC turbine governor end bearing oil temperature high
            e. RCIC turbine speed indicator
            f. Power supply
2. Residual Heat Removal System (RHR)
    a. Motor operated valve control (with indicating lights)
    b. Pumps (control switch and indicating lights)
    c. Instrumentation
        1. Flow transmitter

2. Flow indicator
3. Power supply

3. Nuclear Boiler System
   a. Valves non-ADS (control switch with indicating lights)
   b. Instrumentation
      1. Reactor level indicator
      2. Reactor pressure transmitter
      3. Reactor pressure indicator
      4. Reactor level transmitter
4. Emergency Service Water System
   a. Motor operated valve control (with indicating lights)
   b. Pumps (control switch and indicating lights)
   c. Instrumentation
      1. RHR heat exchanger flow indicator
      2. Emergency closed cooling heat exchanger flow indicator
5. Emergency Closed Cooling System
   a. Pumps (control switch and indicating lights)
   b. Instrumentation
      1. Emergency closed cooling heat exchanger flow indicator
6. Control Transfer:
   Means are provided to transfer control of all listed control and indication from the control room to the alternate shutdown panel. Transfer switches are located at the alternate shutdown panel.

Also included in the evaluation/analysis was a review of low pressure systems that interface with the high pressure primary coolant system and that are isolated by redundant electrically controlled devices. Circuits to redundant electrically controlled devices providing such isolation at high-low pressure interfaces were routed by fire area and shown on circuit drawings. Where problem areas were identified, justification as to the acceptability of the existing design was provided.