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MIDDLE SOUTH UTILITIES SYSTEM

May 2, 1984 W3P84-1214
3-A1.10

Director of Nuclear Reactor Regulation
Attention: Mr. G.W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Waterford SES Unit 3
Docket No. 50-382
Results of Emergency Feedwater (EFW)
Control System Meeting on April 26, 1984

Dear Sir:

On April 26, 1984 a meeting was held in Bethesda, Maryland to pursue closure of all remaining open items pertaining to the Waterford SES Unit 3 EFW Control System. In attendance were representatives of the NRC, LP&L, Ebasco and Combustion Engineering. Prior to this meeting seven items which required additional clarification had been identified via telecon between R. Stevens (NRC-ICSB) and R. Savoie (LP&L Licensing). These items, along with a brief description of the resolutions reached are listed in Attachment I. As this attachment indicates, verbal agreement was reached in all cases. To support the agreements reached, LP&L committed to docket certain information which was noted to the NRC staff during this meeting. The information requested included time estimates for filling a steam generator for certain levels, FSAR references on nitrogen accumulator operation, and a summarized description of the Auxiliary Relay Cabinet (ARC) failure study. The first two requests are supported by the information included in Attachment I and the ARC failure study is summarized in Attachment II.

As per the verbal agreements reached at the subject meeting, this information should be sufficient to close any remaining open items on the EFW Control System of Waterford 3.

If I can be of further assistance please advise.

Yours very truly,

K. W. Cook

K.W. Cook
Nuclear Support & Licensing Manager

KWC/RAS/pco
Attachments

cc: E.L. Blake, W.M. Stevenson, J.T. Collins, D.M. Crutchfield,
J. Wilson, G.L. Constable, R. Stevens

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ATTACHMENT I

EFW CONTROL SYSTEM

ITEMS DISCUSSED AND AGREEMENTS REACHED - APRIL 26, 1984

- Steam generator overfill on control valve failure

  Time frame for operator control and failure scenario acceptable based on the following time estimates:

	Flow Rates		
Time to fill a steam generator for specific levels	200 gpm	400 gpm	800 gpm
1) From the SG Hi-Level Alarm (85.4% Narrow Range) to the Main Steam Nozzle	124 min.	62 min.	31 min.
2) From 30% Narrow Range to 100% Narrow Range	142.5 min.	71.3 min.	35.6 min.
3) From 100% Narrow Range to Main Steam Nozzle	97.8 min.	48.9 min.	24.5 min.

- Analysis of possible failure(s) within the aux relay cabinet

  Analysis performed and results achieved are acceptable - refer to Attachment II.

- Nitrogen accumulator operation

  24 hour operation based on 30 minute modulation frequency acceptable - Time required for safe shutdown described via LP&L response to FSAR Question 211.94.

- EFAS and EFW control testing per technical specifications

  Additional functional testing shall be required during cold shutdown per Tech Spec change to be initiated by ICSB.

- Valve actuator operation

  Pneumatic flow(s) and power supply independence acceptable.

- Updated Drawings showing any design change(s) provided and acceptable.

- Reset operation discussed in detail and determined to be acceptable.

ATTACHMENT II

SUMMARY OF FAILURE ANALYSIS ON ESFAS

AUXILIARY RELAY CABINET

On January 17, 1984, the NRC raised a concern regarding the failure of a single Auxiliary Relay Cabinet (ARC) and its effect on the ability of the EFWS to operate properly. One set of shutoff and control valves is indirectly controlled by one train of the ARC, while the other set of valves is controlled by the remaining train of the ARC. Should a single failure exist which would prevent one of the ARCs from actuating, then feedwater to that generator could not be provided since both legs of piping having a series valve within it are controlled by the failed ARC. The ARC has to fail in the unactuated state to maintain the valves closed. If they fail actuated, then the other train of the ARC would provide the appropriate feed or isolation. Subsequently, a review of the ARC should be limited to failures which could prevent actuation.

As illustrated in FSAR Figure 7.3-10, EFAS valves are controlled directly from Plant Protection System (PPS) SSRs 1A and 3A without the use of a lockout relay. These relays are called cycling relays because they cycle depending on the status of the PPS relays. Actuation relays, which latch in the actuated state upon initiation of the PPS EFAS, control actuation of the feedwater pumps. Since both trains of the ARC control the operation of the feedwater pumps, a single failure of a train would lead to the failure of only one pump to energize. The remaining two pumps would energize and thus the failure of the actuation relays need not be considered. Also, the ARC cabinet is powered from two separate 120 V power busses such that deenergization of a single bus will have no effect on the operation of the ARC.

A question may arise as to what single failure would prevent both cycling relays from deenergizing (or actuating). When the SSR in the PPS deenergizes, only a short circuit from the positive bus to the top of the cycling relays could maintain power to the relays. What must be considered next is what failure would have the same effect for both cycling relays.

With regard to ARC critical components, the following should be noted:

- All latching relays and their associated output terminal blocks are located in the rear bays of the cabinet. The only wires penetrating the thermal barrier to the front bays are the coil lead wires. Since no part of these wires is exposed to the rear bays, failure in the rear bays is limited from propagating to the front bays.

- Cycling relays are located in the front bays along with their associated terminal blocks.

- Cycling relays associated with the left side of the cabinet are physically and thermally isolated from the cycling relays associated with the right side of the cabinet. Subsequently, failures affecting the left side of the cabinet do not affect the right side of the cabinet.

It should also be noted that a considerable amount of effort has been expended to prevent any single failure from maintaining a cycling relay energized. A large amount of conduit is used in the system to maintain the control wiring for the actuation relays. The conduit also maintains separation of the positive bus wiring from the negative bus wiring.

Another failure consideration is the presence of a fire. Since each of the 4 sections of the ARC is separated from the others by a thermal barrier, the effect of a fire in any one quadrant is limited from affecting another quadrant.

In conclusion, failures on one side of the cabinet can affect only one cycling relay, thus yielding results comparable to the failure of a single valve in the AFWS. Consequently, a single failure which could prevent the proper operation of both cycling relays is not credible.