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Alabama Power

the southern electric system

May 20, 1983

Docket Nos. 50-348
50-364

Director, Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. S. A. Varga

Joseph M. Farley Nuclear Plant - Units 1 and 2
Fire Protection - 10 CFR 50, Appendix R

Gentlemen:

During the week of April 18, 1983, the Farley NRC Project Manager, Mr. E. A. Reeves, discussed the results of the NRC Staff's review of the design description for Alternative Shutdown Capability at Farley Nuclear Plant - Units 1 and 2 with Mr. R. L. George of Alabama Power Company. This design description was transmitted to the NRC in Alabama Power Company letter dated July 1, 1982 and outlines modifications to the Farley Nuclear Plant to satisfy 10 CFR 50, Appendix R, Section III.G.3. Based on the NRC Staff's review, Mr. E. A. Reeves requested that Alabama Power Company evaluate adding the reactor coolant system cold leg temperature (RCS T_{cold}) indication and source range neutron monitor to the Hot Shutdown Panels for Farley Nuclear Plant - Units 1 and 2.

Alabama Power Company has completed an evaluation of the additions of RCS T_{cold} indication and source range neutron monitor to the Farley Hot Shutdown Panels. Based on this evaluation, Alabama Power Company has determined that the addition of RCS T_{cold} indication is an appropriate modification. Alabama Power Company has determined that the addition of a source range neutron monitor to the Farley Hot Shutdown Panel would be a very expensive modification (\$390,000.00) that would not contribute to the determination of an adequate shutdown margin as defined by the Technical Specifications and current Emergency Operating Procedures.

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Reactor Coolant System Cold Leg Temperature Indication

The design concept for adding RCS T_{cold} indication to the Farley Hot Shutdown Panels is similar to the design for the existing reactor coolant system hot leg temperature indication. One RCS T_{cold} indication will be provided. The existing cable for the RCS T_{cold} indication will be routed from the electrical containment penetration to the Farley Hot Shutdown Panel Room. The Class 1E signal processing and isolation equipment as well as an indicator for each unit will be installed in the Farley Hot Shutdown Panel Room. The Class 1E power supply to the signal processing equipment will be provided from the existing Farley Hot Shutdown Panels. An isolated signal will be provided to the associated protection cabinet for normal control room indication. Separation of cable and equipment for this RCS T_{cold} indication to the Farley Hot Shutdown Panels and for an existing control room indication will be provided in accordance with 10 CFR 50, Appendix R, Section III.G. The total estimated cost for the modification to both units is \$214,400.00 as shown below:

<u>Estimated Cost</u>	
A. Hardware Costs	\$ 20,340.00
B. Installation Costs	144,060.00
C. Design Costs	<u>50,000.00</u>
Total Estimated Cost	\$ 214,400.00

The installation of RCS T_{cold} indication will provide the operator with the capability to monitor natural circulation of the reactor coolant system from the Farley Hot Shutdown Panels without the use of the steam generator pressure-temperature conversion table provided in the current Farley Nuclear Plant Emergency Operating Procedures. The installation of the RCS T_{cold} indication to the Farley Hot Shutdown Panels will be performed in accordance with the schedule for alternative shutdown capability presented in Alabama Power Company letter dated June 18, 1982.

Upon NRC approval of the design description for Alternative Shutdown Capability, the design description will be revised to reflect the addition of the RCS T_{cold} indication.

Source Range Neutron Monitor

Alabama Power Company reviewed three alternative design concepts for providing a source range neutron monitor in the Farley Hot Shutdown Panels.

The alternatives consist of:

- 1) relocating one of the existing source range channelized signal processing drawers from the main control room to the Hot Shutdown Panel Room and providing isolated signals back to the main control room process and protection cabinets,
- 2) adding a new source range signal processing and monitoring drawer in the Hot Shutdown Panel Room that could be manually connected to the existing source range instrumentation when operation is desired, and
- 3) adding a new source range channel that could be dedicated to the Farley Hot Shutdown Panels.

Due to the complexity of the requirements for signal isolation as well as electrical and physical separation, Alternative 1 was determined not to be feasible. While Alternative 2 is feasible, it would be more costly to implement than Alternative 3 and, more importantly, would require manual actions to establish this instrumentation as operational. During an emergency condition, the number of manual actions taken by the operator should be minimized so as to ensure that attention is placed on effectively implementing the Emergency Operating Procedures. Alternatives 1 and 2 are considered not to be favorable design concepts.

The design concept for Alternative 3 consists of adding a new source range channel that would be dedicated to the Farley Hot Shutdown Panels. A new independent channel for each unit could be installed using a separate detector located in a spare detector well, a pre-amplifier, and a signal processor and monitor located in the Hot Shutdown Panel Room. Separation of the cable and equipment for this source range channel and for an existing control room indication could be provided in accordance with 10 CFR 50, Appendix R, Section III.G. Two different hardware suppliers were evaluated. The total estimated cost for this modification to both units based on the least expensive hardware supplier is \$389,916.00 as shown below:

Estimated Cost

A. Hardware	\$ 145,100.00
B. Installation	171,816.00
C. Design	<u>73,000.00</u>
Total Estimated Cost	\$ 389,916.00

Alabama Power Company has evaluated the usefulness of a source range neutron monitor on the Farley Hot Shutdown Panels. Plant operators at Farley Nuclear Plant verify the reactor core is subcritical with adequate shutdown margin to preclude inadvertant subcriticality in the shutdown condition. Current plant procedures provide for the determination of the shutdown margin from full power to hot standby and from hot standby to cold shutdown without the use of source range indication.

As discussed in Alabama Power Company letter dated November 3, 1982, six information items to determine the shutdown margin must be considered in order to satisfy the Technical Specifications. These six information items are the reactor coolant system boron concentration, control rod position, reactor coolant system temperature and three other parameters related to fuel history. Reactor coolant system temperature is presently available on the Farley Hot Shutdown Panels and control rod insertion is verified by the operator prior to main control room evacuation in accordance with Emergency Operating Procedures. Information related to power history will be maintained at the Farley Hot Shutdown Panels. The reactor coolant system boron concentration is obtained from an analysis of a reactor coolant sample. The post-accident sampling system, which satisfies the provisions of NUREG-0737, II.B.3, would be utilized to obtain the reactor coolant sample.

In accordance with the Emergency Operating Procedures, the operator would calculate the boron concentration necessary to establish the required shutdown margin at the hot xenon-free condition. The operator would ensure that the reactor coolant system is sufficiently borated to maintain the hot xenon-free condition. The capability for boration to maintain an adequate shutdown is provided at the Hot Shutdown Panels using the emergency boration system as presented in the design description for Alternate Shutdown Capability. The reactor coolant system boron concentration would be verified by analysis of periodic samples.

While a source range neutron monitor would provide information related to reactivity changes, it does not directly determine the shutdown margin nor can it provide information required by the Farley Technical Specifications.

10 CFR 50, Appendix R considers a fire scenario without a concurrent design basis event. Alabama Power Company has evaluated the potential for a boron dilution event (the only non-accident scenario whereby the reactor could approach criticality). This event would require a multiple malfunction of Reactor Makeup Water (RMW) pumps and the boric acid flow control valves. To preclude any possibility of unborated water being introduced into the RCS, Alabama Power Company will provide

for the de-energization of the RMW pumps in the design description for Alternate Shutdown Capability. The reactor could therefore not be returned to criticality due to a fire at Farley Nuclear Plant based on the assumptions used to provide fire protection in accordance with 10 CFR 50, Appendix R. In the opinion of Alabama Power Company, the additional instrumentation provided to monitor such an event is therefore unnecessary and the high cost of adding such instrumentation does not appear to have adequate cost/benefit.

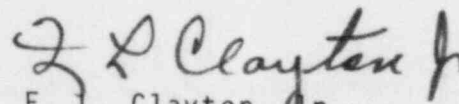
Conclusion

Alabama Power Company will install the cold leg temperature indication at each unit in accordance with the schedule for alternative shutdown capability presented in Alabama Power Company letter dated June 18, 1982.

Alabama Power Company has determined that the addition of a source range neutron monitor to the Farley Hot Shutdown Panels does not appear to represent an adequate cost/benefit. It has been determined that the use of a source range neutron monitor would not satisfy the Technical Specifications or current Emergency Operating Procedures. Adequate shutdown margin would be verified by determining that the reactor is in a tripped condition prior to main control room evacuation and by continued monitoring and operational adjustments, as necessary, based on instrumentation, controls, and information available at the Farley Hot Shutdown Panels. It is the opinion of Alabama Power Company that the addition of a source range neutron monitor at the Farley Hot Shutdown Panels is not needed to satisfy 10 CFR 50, Appendix R, Section III.G.3 or to prudently place and maintain Farley Nuclear Plant in a safe shutdown condition.

If there are any questions regarding this issue, please contact this office.

Yours very truly,


F. L. Clayton, Jr.

FLC/MAL:1sh-D22

cc: Mr. R. A. Thomas
Mr. G. F. Trowbride
Mr. J. P. O'Reilly
Mr. E. A. Reeves
Mr. W. H. Bradford