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November 3, 1982

Docket Nos. 50-348
50-364

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

Attention: Mr. S. A. Varga

Farley Nuclear Plant - Units 1 and 2
Farley Protection Upgrade Response to 10 CFR 50.48
and 10 CFR 50 Appendix R Requirements

Gentlemen:

On October 6 and October 19, 1982, conversations were held with representatives of Alabama Power Company and its architect-engineer and with representatives of the NRC Staff and its consultant regarding the Alabama Power Company design description, dated July 1, 1982, for alternative and dedicated shutdown systems to satisfy the requirements of 10 CFR 50.49(c)(5). A summary of the conversations is attached and is submitted as an appendix to the Alabama Power Company design description dated July 1, 1982 in order to provide necessary clarifications.

If there are any questions, please contact this office.

Yours very truly,

F. L. Clayton, Jr.

FLCJr/MAL:lsh-D9
Attachment
cc: Mr. R. A. Thomas
Mr. G. F. Trowbridge
Mr. J. P. O'Reilly
Mr. E. A. Reeves
Mr. W. H. Bradford

A006

Manual Revision Instructions

Appendix 1 - Alabama Power Company Responses to NRC Questions During Conversations on October 6 and October 19, 1982

This appendix is intended to be inserted into the Alabama Power Company Alternative Shutdown Design Description, dated July 1, 1982.

Alternative Shutdown Capability - Appendix 1
10 CFR 50 Appendix R

Appendix 1

On October 6 and October 19, 1982, conversations were held with representatives of Alabama Power Company and its architect-engineers (Bechtel Power Corporation) and with representatives of the NRC Staff and its consultant regarding the Alabama Power Company design description, dated July 1, 1982, for alternative shutdown systems to satisfy the requirements of 10 CFR 50.48(c)(5). Below is a summary of NRC questions and Alabama Power Company responses which provide clarifications to the July 1, 1982 submittal.

NRC Question 1:

The control room for both units does not meet the requirements of Appendix R. Is the licensee planning to submit an exemption request from the requirements of Section III.G.2 or provide alternative shutdown per Section III.G.3?

APCo Response

In accordance with the requirements of Appendix R, Section III.G.3, Alabama Power Company proposes alternative shutdown capability, as delineated in the July 1, 1982 design description, when redundant trains of systems required for hot standby do not satisfy the requirements of Section III.G.2. The alternative shutdown capability presently provided at Farley Nuclear Plant - Units 1 and 2 with the proposed modifications described by Alabama Power Company submittal dated July 1, 1982, would be sufficient to achieve and maintain hot standby[1] and to bring the plant to cold shutdown[1] in the event of a cable spreading room fire or a main control room fire that would require its evacuation. Therefore, an exemption from Section III.G.2 of Appendix R for the main control room is not necessary as the main control room will be in compliance with Section III.G.3. Section AA.VIII, p. 11; Section AA.X.4, p. 14; and Section BB.I.A., p. BB.I-1 have been revised to reflect the above clarification.

[1]As defined by the Unit 1 and Unit 2 Technical Specifications

NRC Question 2

In Section BB.I of the licensee's submittal, it is stated that all areas of the plant except for the control room, cable spreading room and containment will be in compliance with Section III.G.2 "or the existing design can be justified." Would the licensee please clarify this statement?

APCo Response

NRC Generic letter 81-12, dated February 20, 1981, states that, if the requirements of Section III.G.2 of Appendix R are not satisfied, "the Licensee must provide alternative shutdown capability in conformance with Section III.G.3 or request an exemption if there is some justifiable basis." Additionally, NRC letter dated May 4, 1982, Enclosure I, page 7, states, "Requests for exemption pursuant to 50.48(c)(6) must include a sound technical basis that justifies the proposed alternative in terms of protection afforded to post-fire shutdown capability." In both instances, exemptions from Section III.G.2 for fire areas that have equivalent shutdown capability in a post-fire condition are required to be justified.

The statement of the Alabama Power Company submittal, "or the existing design can be justified," is intended to clarify that the existing design of certain fire areas at Farley Nucler Plant have the equivalent shutdown capability in a post-fire condition and are technically justified as exemptions in accordance with the aforementioned NRC letters. Specifically, the containments of Units 1 and 2 are requested to be exempted from the requirements of Appendix R, Section III.G.2 by Alabama Power Company letters dated June 18 and July 27, 1982 and are technically justified therein.

The subject statement of Section BB.I.A., page BB.I-1 has been revised to read, "or have been requested to be exempted from the requirements of III.G.2 and accordingly justified."

NRC Question 3

The Licensee should provide further clarification and examples in regards to his exclusion of certain components from analysis based on the "series" and "parallel" rules.

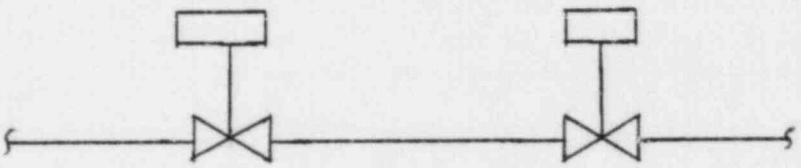
APCo Response

The series and parallel rules are used to exclude components, based on their redundancy, from the Hot Standby Component List which identifies the equipment necessary to achieve a hot standby condition in the unlikely occurrence of a fire at Farley Nuclear Plant. Section AA.VII.C.1. and 2. of the July 1, 1982 submittal state as follows:

1. Components were excluded by the "Series Rule" if a required boundary was established by two opposite train components in series.

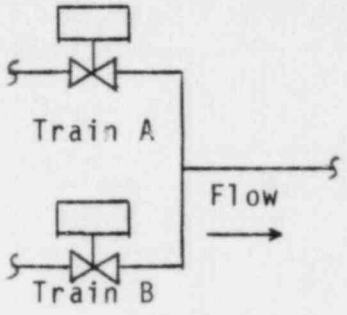
2. Components were excluded by the "Parallel Rule" if the components were opposite train components which were in parallel in a flow path that is required to remain open.

To clarify the series rule, opposite train components that are in series and are essential to establish a boundary (i.e., remain in a closed position) are not included on the Hot Standby Component List. As an example, two opposite train valves in series are shown:



Either of these valves may remain closed and still establish a boundary that is essential to achieve a hot standby condition following a postulated cable spreading room fire. To breach the boundary, an improbable series of events must occur in a hypothetical chronological scheme. The cables of opposite main components are routed in separate enclosures. A single fire in the cable spreading room must damage both opposite train, separately enclosed cables and also produce simultaneous hot shorts of sufficient voltage and current to concurrently open both valves and breach the boundary. It is the opinion of Alabama Power Company that this postulated chain of events is so highly improbable as to justify the use of the series rule.

The meaning of the parallel rule is that opposite train components in parallel legs of an essential flow path are not included on the Hot Standby Component List. As an example, two opposite train valves are shown in parallel legs of a flow path:



Either of these valves may remain open and still maintain flow in order to achieve a hot standby condition following a postulated cable spreading room fire. To impair the flow path, a single cable spreading room fire must damage both opposite train, separately enclosed cables and also produce simultaneous hot shorts of sufficient voltage and current to concurrently close both valves. As with the series rule, it is the opinion of Alabama Power Company that these postulated events are so highly improbable as to justify the use of the parallel rule.

The series and parallel rules are applicable only to those components that would be in the required hot standby position at fire initiation and are not applicable to components requiring repositioning to achieve and maintain hot standby. Additionally, the series and parallel rules were not used to exclude the Main Steam Isolation Valves, RHR Inlet Isolation Valves and Pressurizer PORV's and Block Valves from the Hot Standby Component List.

NRC Question 4

In regards to the licensee's proposal for alternative shutdown independent of the cable spreading room, it should be demonstrated that sufficient manpower is available to perform the activities required to achieve hot and cold shutdown conditions, including all temporary circuit modifications.

APCo Response

As requested by Items 8(f) and 8(h) of Enclosure 1 to NRC Generic Letter 81-12, dated February 20, 1981, Alabama Power Company is to demonstrate that procedures describing the tasks to effect the shutdown method have been developed and that sufficient manpower is available to perform the shutdown tasks described in these procedures. In Section DD of the proposed Alternative Shutdown Capability, Alabama Power Company presented a point-by-point review of the information requested in Section 8 of Enclosure 1 to NRC Generic Letter 81-12, dated February 20, 1981. Specifically, point 8(f) of the submittal states, "Procedures describing the tasks to be performed to effect the shutdown method will be developed after the NRC approval of the proposed alternative shutdown capability;" and point 8(h) states, "After NRC approval of the proposed alternative shutdown capability and after completion of the procedures describing the tasks to be performed to effect the shutdown method, and assessment of the manpower requirements will be completed."

In summary, Alabama Power Company has committed to the development of procedural guidance and manpower assessments to effect post-fire shutdown subsequent to the NRC approval of the proposed Alternative Shutdown Capability. Unnecessary changes to the procedures and manpower assessments could result from even minor alternations to the proposed Alternative Shutdown Capability due to NRC review. It is therefore prudent to complete the development of procedures and manpower assessments after the NRC approval of the Alternative Shutdown Capability.

The proposed Alternative Shutdown Capability was developed with consideration of the manpower requirements and to facilitate procedural development as shown by Tables I, II and III of Section B.B.II. Column 16 of Table II indicates the number of hours that may elapse following the accident before the service of the addressed component is required. These time frames are also applicable to duration required to complete the manual actions delineated in the six HSD Instruction Sheets of Section B.B.II.B. For all six HSD Instruction Sheets, the time frame is 24 hours. Alabama Power Company would provide sufficient personnel to complete these manual actions and achieve hot standby within the stated 24-hour time frame and cold shutdown within 72 hours, and such personnel would not be assigned other activities that would conflict or interfere with those activities needed to provide alternative shutdown capability.

Alabama Power Company will satisfy Items 8(f) and 8(h) of Enclosure 1 to Generic Letter 81-12 after the completion of the final design and procurement but no less than twelve months prior to the complete installation of the proposed alternative shutdown modifications. As presented in Alabama Power Company letter dated June 18, 1982, the final design and procurement to satisfy Section III.G.3 of Appendix R is scheduled for eight months following NRC approval of the proposed Alternative Shutdown Capability and the complete installation of the proposed modifications is scheduled for the second outage following NRC approval.

NRC Question 5

Will alternate process monitoring capability be provided for reactor coolant system cold leg temperature or Tavg., source range monitoring, and level indications for RWST and boric acid tanks?

APCo Response

The instrumentation proposed for alternate process monitoring described in the proposed Alternative Shutdown Capability submittal is consistent with Alabama Power Company positions regarding other licensing issues such as Regulatory Guide 1.97, NUREG-0700, NUREG-0588, IEB 79-01B, NUREG-0737 and SECY 82-111. A consistent application of shutdown methodology is essential to support instrument use during emergency conditions and operator training. The proposed Alternative Shutdown Capability describes the instrumentation that is essential to achieve and maintain a safe shutdown condition following the occurrence of a fire at Farley Nuclear Plant. The alternative process monitoring capability suggested by this NRC question is not essential at Farley Nuclear Plant as discussed below:

Reactor Coolant System Cold Leg Temperature

A fire in the cable spreading room is assumed to cause a loss of offsite power and trip the reactor coolant pumps. Initially in this event, the reactor is also tripped and placed in a hot standby condition. The reactor is subsequently cooled and depressurized to cold shutdown. Natural circulation during this period will transfer reactor core heat to the steam generators. During natural circulation, the cold leg temperature approximates the saturation temperature corresponding to secondary pressure. Pressure indications for all three generators are presently available on the control panel for alternative shutdown capability.

The Westinghouse nuclear steam supply system is designed such that the cold leg temperature approximates the saturation temperature corresponding to secondary pressure. Westinghouse has confirmed that there would be only a small variance between the actual cold leg temperature and the saturation temperature at steam generator pressure during cooldown to cold shutdown. This correlation has been verified during Farley Nuclear Plant operations.

Current plant procedures and operator training supports the use of the saturation temerature for steam pressure to determine cold leg temperature. Attached is Table 1 from a current Farley Nuclear Plant emergency operating procedure that provides the steam pressure-temperature conversion. Due to the relatively slow reactor coolant loop transient time during natural circulation operation, the use of this conversion table is adequate since the temperature trends are more important than the value of the temperature itself.

Consequently, utilizing steam generator pressure to determine cold leg temperature is sufficient and cold leg temperature indication is not required for the control panel for alternative shutdown capability.

Source Range Monitoring

Plant operators at Farley Nuclear Plant verify that the reactor core is subcritical with adequate shutdown margin to preclude inadvertent criticality 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.

In determining the shutdown margin, certain information must be considered in order to satisfy the Technical Specifications and are obtained as follows:

	Information	Data Source
1.	Reactor coolant system boron concentration	Post-accident sampling
2.	Control rod position	Main control board prior to evacuation
3.	Reactor coolant system average temperature	Main control board or alternative control panel (based on approximations of the cold leg temperature)
4.	Fuel burnup based on gross thermal energy generation	Power history
5.	Xenon concentration	Power history
6.	Samarium concentration	Power history

All of this information is available to the operators in the main control room or at the control panel for alternative shutdown capability to verify the shutdown margin in acordance with the Unit 1 and Unit 2 Technical Specifications. As required, the capability for boration to maintain an adequate shutdown margin is provided in the main control room and at the alternative control panel.

While a source range monitor would provide information concerning subcriticality, it does not directly determine the shutdown margin nor can it provide information required by the Farley Technical Specifications and therefore has not been included on the control panel for alternative shutdown capability.

Refueling Water Storage Tank Level

The RWST could be used to provide the reactor coolant pump seal injection and/or the maximum expected boron requirements of the reactor coolant system. In accordance with Unit 1 and Unit 2 Technical Specifications 3/4.5.5, the minimum RWST volume of 471,000 gallons with a boron concentration between 2000 and 2200 ppm is maintained. The basis for Farley Technical Specifications 3/4.1.2.6 states the maximum expected boron requirements to provide shutdown margin is 11,336 gallons of 7,000 ppm borated water from the boric acid storage tanks or 71,000 gallons of 2000 ppm borated water from the RWST.

The reactor coolant pump seal injection flow requirement for all three pumps is conservatively estimated at 25 gpm. The minimum technical specification RWST volume of 471,000 gallons would provide 314 hours of seal injection. If the RWST was also used to achieve the shutdown margin, there would be sufficient capacity to supply up to approximately 275 hours of seal injection.

Therefore, the minimum technical specification RWST volume more than satisfies the shutdown requirements and a RWST level indication for alternate process monitoring would provide no useful information.

Boric Acid Tank Level

In accordance with Unit 1 and Unit 2 Technical Specifications 3.1.2.6, the minimum BAT volume of 11,336 gallons with a boron concentration between 7000 and 7700 ppm of boron is maintained. The Bases of Farley Technical Specifications of 7,000 to 7,700 ppm borated water 3/4.1.2 states the maximum expected boron requirements to provide shutdown margin is 11,336 gallons of 7,000 ppm borated water from the boric acid storage tank or 71,000 gallons of 2000 ppm borated water from the refueling water storage tank. The minimum technical specification boric acid tank volume satisfies the shutdown requirements and, therefore, a boric acid tank level for alternative process monitoring would provide no useful information. A local tank level indicaton is provided for normal operational use.

NRC Question 6

Can cold shutdown conditions be achieved within 72 hours following a fire in the cable spreading room?

APCo Response

Yes, cold shutdown conditions could be achieved within 72 hours following a fire in the cable spreading room with the implementation of the proposed Alternative Shutdown Capability. Section BB.II.C of the proposed Alternative Shutdown Capability presents the results of the cold shutdown system requirement analysis.

NRC Question 7

Has the licensee addressed shutdown logic circuits in his analysis?

APCo Response

Yes, shutdown logic circuits are addressed by the proposed Alternative Shutdown Capability.

TABLE 1

Steam Pressure vs. Temperature Conversion

Temperature ^{0}F	Pressure - PSIG
558	1100
557	1092
556	1083
555	1074
554	1065
553	1057
552	1048
551	1039
550	1030
549	1022
548	1013
547	1005
546	997
545	989
544	980
543	972
542	964
541	956
540	948
539	940
538	932
537	924
536	916
535	909
534	901

Revised Pages

These revised pages have been modified to provide the necessary clarifications discussed in Appendix 1. The revised pages are intended to be inserted into the Alabama Power Company Alternative Shutdown Capability design description, dated July 1, 1982.

RECORD OF REVISION

Issue	Date
Review	June 4, 1982
Review	June 24, 1982
Initial Issue	July 1, 1982
Amendment 1	October 18, 1982

Section	Description	
DD.	Point by Point Review of Information Requested in Section 8 of Enclosure 1 to NRC Generic Letter 81-12, dated February 20, 1981.	
EE.	Review of Information Requested in Enclosure 2 of NRC Generic Letter 81-12, dated February 20, 1981, and Information Requested in Enclosure 2, Attachment 2 of NRC Letter dated May 4, 1982 to APCo.	
Appendix 1	Alabama Power Company responses to NRC questions during conversation on October 6, 1982.	1

1. Components were excluded by the "Series Rule" if a required boundary was established by two opposite train components in series.

2. Components were excluded by the "Parallel Rule" if the components were opposite train components which were in parallel in a flow path that is required to remain open.

VIII. Specific Criteria Used on FNP 1 & 2 for Performing the Alternative Shutdown Capability Analysis (As stated in Section III.E above, this criteria is applied to hot standby components and cabling in fire areas, except those fire areas for which exemptions have been requested, that cannot be brought into complete compliance with the requirements of Paragraph III.G.2 of Appendix R. Section X addresses the APCo position concerning fire protection criteria and alternative shutdown capability for the Main Control Room.) 1

A. Review the hot standby circuitry/components which could be affected by a fire in the fire area to determine if the affected components will fail to the required hot standby operating position or remain in the required hot standby operating position due to deenergization (open circuit, short to ground) or loss of control air supply. If the hot standby components do not fail in the proper position to meet hot standby requirements, determine if alternate shutdown capability exists external to the fire area to meet the hot standby requirements. If alternate shtudown capability does not exist, modifications will be proposed.

B. Review the hot standby circuitry/components which could be affected by a fire in the fire area to determine if the affected components are required to be modulated/repositioned in order to meet the hot standby requirements. If modulating/repositioning of the component is required and this requirement may be impaired due to hot shorts, open circuits, or shorts to ground by the fire, determine if alternate shutdown capability exists external to the fire area. If alternate shutdown capability does not exist, modifications will be proposed.

C. Review the affects of hot shorts for each hot standby cable that is located in a common enclosure in the fire area. A common enclosure is defined as a single raceway, termination cabinet/box, junction box or local control panel. Coincident Hot shorts are not postulated to occur for redundant hot standby cabling contained in other enclosures in the fire area. If hot standby cable failures in a single enclosure can result in the inability to maintain hot standby, modifications will be proposed.

D. Review the affects of hot shorts, open circuits, or shorts to ground for each hot standby cable in the fire area that is related to electrically controlled components which are used to isolate or preclude breaching the RCS primary coolant boundary. If maloperation can occur as a result of the fire which would result in a breach of the RCS boundary, modifications will be proposed.

b) The control room HVAC design will provide isolation from products of combustion generated external to the control room. Thus evacuation will not be required even for a fire external to the control room area. Additionally the control room HVAC system is sufficient to remove the small amounts of smoke generated during the incipient stages of a fire and can be operated to remove denser smoke if required.

c) Self contained breathing apparatus are available to the operators so that evacuation would not be required solely because of smoke conditions.

d) The short duration of the fire as discussed in the preceeding sections will result in a minimum hazard to personnel and will decrease the probability of the control room becoming uninhabitable.

e) The fire training which will be received by all personnel will decrease the likelihood of panic and will consequently decrease the probability of control room evacuation that is not absolutely necessary.

f) The control room fire area is compartmentalized from the rest of the plant by three hour rated walls, floors, doors and penetration seals. Thus any fires outside the control room would not be a cause for evacuation.

4. Alternative Shutdown Capability for the Main Control Room

A. In the unlikely event that a Main Control Room fire would require evacuation of the main control room, the Alternative Shutdown Capability provided and proposed for addition to FNP 1 and 2 for the Cable Spreading Room Area is sufficient to achieve and maintain hot standby and, within 72 hours, to achieve and maintain cold shutdown. 1

B. The functional requirements for hot standby and cold shutdown due to a fire in the Main Control Room are identical to those required for a fire in the cable spreading room and are covered by the Alternative Shutdown Capability Analysis Results contained in Sections BB.II.A, BB.II.B and BB.II.C of this report. The specific circuity analysis criteria that are applicable to the main control room are provided in Sections AA.VIII. A, B, and D of this report. The specific circuitry criteria of Section AA. VIII.C of this report is not applicable to the main control room as no credible fire could propagate across inter-divisional barriers or separation. (Reference Section AA.X.2.b). The associated circuit analysis results presented in Sections CC.II and CC.III for a cable spreading room fire are also applicable for a fire in the main control room. 1

BB. ALTERNATE SHUTDOWN CAPABILITY ANALYSIS FOR J. M. FARLEY UNITS 1 & 2

I. Explanation of Alternative Shutdown Capability Analysis

A. The only fire area in FNP 1 & 2 which will require Alternative Shutdown Capability is the Cable Spreading Room. All other fire areas of FNP 1 & 2 will be in compliance with Paragraph III.G.2 of Appendix R or have been requested to be exempted from the requirements in III.G.2 and accordingly justified. (See Section AA.X for the main control room fire protection criteria and alternative shutdown capability position). 1

B. The Alternative Shutdown Capability Analysis for the Cable Spreading Room was performed by applying the criteria described in Section AA. VIII against the functional requirements of each system required to achieve and maintain hot standby and to go to cold shutdown described in Section AA. VI assuming a loss of offsite power. The analysis was divided into three segments which consist of the Immediate/Short Term System Requirements Analysis, the Long Term System Requirements Analysis, and the Cold Shutdown System Requirements Analysis. Immediate/Short Term Requirements are defined as system functional requirements which are initially required to achieve and stabilize the plant in hot standby. Long Term Requirements are defined as system functional requirements which are required to maintain hot standby after plant stabilization. Cold Shutdown Requirements are defined as system functional requirements which are required to go from hot standby to cold shutdown.

For the Immediate/Short Term System Requirements Analysis and the Long Term System Requirements Analysis, the circuitry related to each component which is required to achieve and maintain hot standby was analyzed against the criteria of Section AA. VIII to determine if adequate alternative shutdown capability exists or if alternative shutdown capability must be provided for a cable spreading room fire. Results of the Immediate/Short Term System Requirements analysis are tabulated in Section BB.II.A. Results of Long Term System Requirements Analysis are tabulated in Section BB.II.B.

For the Cold Shutdown System Requirements Analysis, the circuitry and local manual control capabilities of each component which is required to go to cold shutdown from hot standby were analyzed to determine what manual actions or repairs would be required to go to cold shutdown for a cable spreading room fire. These results are tabulated in Section BB.II.C.