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Alabama Power
the southern electric system

April 20, 1990

10CFR50.73

Docket No. 50-348

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Dear Sir:

Joseph M. Farley Nuclear Plant - Unit 1
Licensee Event Report No. LER 89-004-01

Joseph M. Farley Nuclear Plant, Unit 1 Licensee Event Report No. LER 89-004-01 is being submitted in accordance with 10CFR50.73. This is a revision to LER 89-004-00 submitted on October 17, 1989.

If you have any questions, please advise.

Respectfully submitted,

W. G. Hairston, III

WGH,III/LCT:mV8.66

Enclosure

cc: Mr. S. D. Ebneter
Mr. G. F. Maxwell

IE22
1/1

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Joseph M. Farley - Unit 1	0 5 0 0 0 3 4 8	1 OF 0 8

TITLE (4)

Potential Design Inadequacy in the Service Water System

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 6	1 6	8 9	8 9	0 0 4	0 1	0 4	2 0	9 0	J. M. Farley - Unit 2	0 5 0 0 0 3 6 4
										0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.406(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.406(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
D. N. Morey, General Manager-Nuclear Plant	2 0 5 8 9 9 - 5 1 5 6

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

In 1989, Alabama Power Company voluntarily conducted a Self-Initiated Safety System Assessment (SSSA) of the Service Water System modeled after Safety System Functional Inspections conducted by the NRC. On June 16, 1989, during this SSSA, it was determined that calculations were unavailable to demonstrate that the service water system was capable of maintaining design flow to the safety related loads under the scenarios of an LOSP, a seismic event, or combination of these two events. Compensatory measures were promptly implemented until calculations could be performed to address the identified scenarios.

A flow balance model of the service water system has been prepared and the postulated scenarios of an LOSP, seismic event, and combination LOSP/seismic event have been analyzed. These analyses indicate that operator action would be necessary to ensure sufficient flow to selected safety related components. Accordingly, this event is being reported as a condition that alone could have prevented the fulfillment of the safety function of the service water system which is needed to mitigate the consequences of an accident.

Plant and System Identification

Westinghouse - Pressurized Water Reactor
Energy Industry Identification System codes are identified in the text as [XX].

Description of Event

In 1988, Alabama Power Company decided to conduct an SSSA to evaluate the effectiveness of the existing Configuration Management program for Farley Nuclear Plant. A detailed SSSA plan was developed which delineated the methodology for conducting the assessment, including the means for addressing operability and reportability concerns which may result from the SSSA. A team of 10 personnel conducted the SSSA on May 22-26, June 5-9, and June 19-23, 1989.

On June 16, 1989, based on a documented finding by the SSSA team, it was determined that calculations were unavailable to demonstrate that the service water system was capable of maintaining design flow to safety related loads under the scenario of an LOSP, seismic event, or combination LOSP and seismic event. On June 16, revisions to operating procedures were implemented to isolate significant non-safety related loads upon indication of an LOSP and to provide for isolation of a major service water system line break resulting from a seismic event. These compensatory measures were implemented until further evaluation and analysis could be conducted to address the acceptability of flowrates to safety related loads during an LOSP and/or seismic event. All on-shift licensed personnel were informed of the potential concern via Operations Night Orders. Additionally, the NRC resident inspector was notified of the concern and the actions taken. The service water system was considered operable based on the establishment of interim compensatory measures.

A subsequent training change notice was issued to all licensed personnel noting the procedure changes implemented as interim compensatory actions and other concerns and procedure changes resulting from the SSSA. In September 1989, during a review of the SSSA corrective action status, several of the operations procedures were further revised to provide additional guidance to the operators.

The preparation of a flow balance model of the service water system was begun in response to the identified scenarios. On September 13, 1989, Alabama Power Company briefed NRC Region II management on the status of the SSSA program. Based on discussions with the Staff, Alabama Power Company decided to submit a voluntary report concerning the potential service water system flow inadequacy. On September 18-21, 1989, the NRC conducted a special announced inspection of

Description of Event (Continued)

the initial SSSA on the service water system and the draft program for future SSSAs (reference NRC Inspection Report Nos. 50-348/89-24, 50-364/89-24). The NRC concluded that the general program and SSSA schedule were well organized, had sufficient dedicated resources to complete the program in a timely and accurate manner, and the methodology used to evaluate and correct problems appeared effective.

The preliminary model was developed using assumed design conditions of the service water piping. An independent check and verification of the model was performed to ensure its completeness and accuracy. Field flow measurements were then taken to incorporate current field conditions into the model. Many variations of the LOSP, seismic and combination LOSP/seismic events were analyzed by the model. The analyses contain the following assumptions:

A. Assumptions applicable to LOSP, seismic and LOSP/seismic

1. The service water system discharge is aligned to recirculate to the pond or changes from discharging to the river to discharging to the pond due to the transients created by these scenarios. This is the emergency mode of operation for the system.

2. The temperature of the service water at the inlet to the system is 95°F and remains at this temperature for the short duration associated with these scenarios.

3. The service water pumps are assumed to be performing in a degraded manner consistent with the maximum degradation (10%) allowed by Section XI of the ASME Boiler and Pressure Vessel Code.

4. Only active failures are postulated to occur in the short term.

5. No credit for operator action is taken to mitigate the consequences of the event.

6. If the instrument air system compressors are lost, the following service water system air-operated valves (AOVs) fail open immediately (without consideration for potential delay due to air bleed-down):

   a) Component Cooling Water (CCW) heat exchanger discharge throttle valves

Description of Event (Continued)

b) Steam generator blowdown throttle valve
c) Circulating water system makeup control valve
d) Various turbine building throttle valves

7. If Unit 1 Train A electrical power is lost, the service water intake structure air compressors are lost, which results in the service water pump mini-flow valves on both units failing open.

B. LOSP Assumptions

The analysis of the LOSP event contains the following assumptions in addition to those presented in A above:

1. The LOSP affects both trains of both units and causes all five diesel generators to receive a start signal.

2. The LOSP causes a loss of power to the instrument air system compressors.

3. Due to postulated single failures associated with the diesel generators, either one train of service water or the same train of service water on both units may be lost.

4. The recirculation of the system discharge to the pond is conservative because the circulating water system makeup AOV (in the discharge line to the river) failing open on loss of instrument air causes less system backpressure than recirculating the discharge to the pond. The higher system backpressure created by recirculating the discharge to the pond results in lower flowrates to safety related loads.

C. Seismic Assumptions

The analysis of the seismic event contains the following assumptions in addition to those present in A above:

1. No breaks or cracks are postulated to occur in the seismic Category I service water piping because the service water system piping is classified as low energy piping.

Description of Event (Continued)

2. The seismic event results in only one line break of any Category II line (non-seismic) in the service water system or the instrument air system, whichever results in the most adverse consequences. If the line break is postulated to occur in the turbine building, only the double-ended guillotine break of the largest supply line within the building is postulated to occur because the original licensing basis for FNP did not consider a spectrum of break sizes in the turbine building.

3. For the turbine building line break analysis, the line break is postulated to occur in one unit and a single failure is postulated to cause the loss of one train of service water in the opposite unit. This is conservative because a loss of a train and a turbine building line break on the same unit would result in the automatic isolation of the turbine building service water supply in both trains of that unit, which would increase the available service water flow to safety related components.

4. A single failure results in the loss of one train of service water in one unit or the spurious actuation of one dilution bypass valve in one unit to the open position.

D. LOSP/Seismic Assumptions

The analysis of the combination LOSP/seismic event contains each of the assumptions presented in A, B and C above except for the assumption of a single failure resulting in the spurious actuation of the dilution bypass valve in one unit to the open position. This potential single failure is not considered in the analysis of an LOSP (and resultant loss of instrument air) because the valve is normally closed and fails closed on a loss of air. With a loss of air, the postulated failure of this valve to the open position is considered a passive failure.

The results of the analyses were evaluated for effects upon the adequacy of flow to the safety related components. Service water flows less than design flow to safety related room coolers, the containment coolers, the CCW heat exchangers, and the diesel generators (for a limited time period) have been determined to be acceptable based upon the impact of the reduced flows and the requirements for operation of these components in response to the LOSP, seismic or combination LOSP/seismic events. Additionally, the service water flows to the control room

Description of Event (Continued)

HVAC condensers, the service water pump motor oil coolers, and the service water pump bearings have been evaluated and determined to be acceptable for these scenarios.

These analyses have demonstrated that the original service water system design condition of a LOCA with an LOSP is not the worst-case design condition for the system. For the LOSP and combination LOSP/seismic event, at least one train of service water on each unit would be available and capable of supplying sufficient cooling water to safety related components without any operator action during the first 15 minutes following the event. Following this 15 minute period, operator action would be necessary to establish sufficient flow to the diesel generators. The compensatory measures previously implemented have been determined to be sufficient to increase the flow to the diesel generators.

For the seismic event, the analyses indicate that the service water system has the capability to provide sufficient flow to safety related loads; however, a throttle valve in the service water discharge line from each CCW heat exchanger may prevent the required CCW heat exchanger from receiving adequate service water flow. Thus, prompt operator action to open the throttle valve is necessary to ensure that the CCW heat exchanger receives sufficient flow.

Cause of Event

The FSAR and start-up test data indicate that the original service water system design assumed the LOCA with LOSP event would be the bounding design condition. No documented evidence could be found to demonstrate that this original design assumption was a more limiting condition than the scenarios identified by the SSSA.

Reportability Analysis and Safety Assessment

For the LOSP and combination LOSP/seismic event, the analyses have demonstrated that at least one train of service water on each unit would be available and capable of supplying sufficient cooling water to safety related components without any operator action during the first 15 minutes following the event. Following this 15 minute period, operator action would be necessary to establish sufficient flow to the diesel generators. It was also determined that the compensatory measures previously implemented are sufficient to maintain adequate flow to the diesel generators.

For the seismic event, the analyses indicate that the service water system has the capability to provide sufficient flow to safety related loads; however, a throttle valve in the service water discharge line from each CCW heat exchanger may prevent the required CCW heat exchanger from receiving adequate service water flow. Thus, prompt operator action to open the throttle valve is necessary to ensure that the CCW heat exchanger receives sufficient flow. It is very likely that the operator would take the proper action without the specific compensatory procedure changes that have been made; however, it is possible that this action may not have been taken. Accordingly, this event is being reported as a condition that alone could have prevented the fulfillment of the safety function of the service water system which is needed to mitigate the consequences of an accident.

Corrective Action

For the seismic event (without an LOSP), the normal operation throttle position of the service water flow control valve to each CCW heat exchanger may not allow adequate service water flow to the required heat exchanger in response to the various postulated line breaks. This valve is an AOV. Since an LOSP is not assumed to occur, the AOV is not assumed to change positions and therefore restricts the service water flow to the CCW heat exchanger during these postulated accident conditions. Accordingly, plant procedures have been revised to require operator actions to monitor CCW temperature in response to a seismic event and to open the throttle valve to ensure sufficient service water flow to the CCW heat exchanger.

For the LOSP or combination LOSP/seismic event, the analyses indicate that at least one train of service water on each unit would be available and capable of supplying sufficient cooling water to safety related components without operator action during the first 15 minutes following the event. Although one train of service water would be available without operator action during the first 15 minutes of the event, plant modifications and/or prompt operator actions are necessary to prevent low service water flow rates which could potentially result in the failure of and possible mechanical damage to the diesels on the other train of each unit (as many as three diesels). Additionally, operator action is necessary after the first 15 minutes to ensure possible damage does not occur to the diesel generators operating the one train of available service water on each unit. The procedure changes for operator action which were implemented until the calculations could be completed have been determined by the analyses to be sufficient to prevent damage to the diesels. Accordingly, these operating procedures will be maintained in effect unless system enhancements are implemented which would prevent possible damage to any diesel generator under these postulated scenarios without the need for operator action after 15 minutes.

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TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

Corrective Action (Continued)

In accordance with 10CFR50.71(e), the results of these new analyses will be incorporated into the FSAR.

Based on the results of the service water SSSA, Alabama Power Company performed in 1989 a design review of the mechanical systems associated with the diesel generators and a mini-SSSA on the CCW system that focused on assessing the design of the system. No significant design analysis weaknesses were found in either of these assessments. In addition, Alabama Power Company intends to continue its SSSA program to review other selected safety systems during the next five years. Therefore, a program is in place to correct service water issues and to evaluate the original design assumptions for other safety systems.

Additional Information

No components failed during this event.

No similar LERs have been submitted by Farley Nuclear Plant.