UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
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MESSAGE

Ken + Ken,

Attached is an Op Eval + CAP that discusses a single 125 VDC power supply failure that could impact 3 of 4 AFWP's. Previous comp. measures in place for the orifice issue apply here. Nonetheless, I believe it is reportable for pre-10.72 11/20 10/29/02

Paul

NRC FORM 386 (RIII)
(2-2002)

UNITED STATES
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REGION III
801 Warrenville Road, Suite 255
Lisle, Illinois 60532-5351

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MESSAGE

Diedra.

The attached materials are as per your discussion with Ken Reimer.

Thanks Ken O'B

Wisconsin Electric POWER COMPANY

231 W Michigan, P.O. Box 2046, Milwaukee, WI 53201

AUDIT FINDING REPORT
NUCLEAR QUALITY ASSURANCE

AFR # A-P-90-12-075

Audit Dates 9/5-10/22/90

COMPLETED BY WE NQAD

Scope of Audit: Vertical Slice Audit - Aux. Feedwater System

Organization Audited: PBNP, NSEAS, NPERS, QAS

Reference / Requirements:
Calculation P-87-001
MSSM 87-13
NEPB-88-90
VPNPD-89-090
MR 89-127

Auditor Signature: Mark Bogenschutz for Andy Kellen

☐ Finding (Mandatory Response)
☒ Observation
Response Required: ☒ YES ☐ NO

Priority: 2

Description

See Attached Sheet.

Recommended Corrective Action

See Attached Sheet.

Responsible for Corrective Action	Required Response Date	Potentially Reportable ☒ No
NSA	January 4, 1991	☐ 10CFR21 ☐ Other:

COMPLETED BY AUDITED ORGANIZATION

Corrective Action Performed and/or Planned

See the attached evaluation. CA Cutt 12-17-90

Scheduled Corrective Action Completion Date:

Form QAI 18.1-4
Rev. 1

AFR #A-P-90-12-075

Description:

Electric auxiliary feed pump discharge pressure is controlled by air-operated valves AF-4012 (for P-38A) and AF-4019 (for P-38B). These valves are normally closed, and throttle open in response to increasing pump discharge pressure in order to maintain a discharge pressure of 1200 psi. Two specific concerns were identified regarding the design and qualification of these valves and their controlling instrumentation:

1) The pressure transmitters, pressure controllers, I/P transducers, and positions for these valves are non-seismic and non-QA. Although these valves are designed to fail open upon the loss of power of instrument air pressure, it cannot be concluded that all credible failures will result in opening the valves. Because of the non-qualified nature of the valve-controlling instrumentation, any postulated failure would be in addition to the single failure assumed during an accident analysis. As determined during the engineering evaluation for MR 89-127 (Train-specific power supplies for PC-4012 and AF-4019 and their associated pressure controllers are both run in the same cable tray. This exacerbates the potential for a common mode failure which could incapacitate both electric auxiliary feed pumps.

2) Various analyses have been done in the past (see references), which have determined that a failure of AF-4012 and AF-4019 in the open direction is acceptable and will not jeopardize the ability of the auxiliary feed system to perform its safety function. It is not clear, however, that all applicable factors have been taken into account in these analyses. During MSSM 87-13, for example, it was noted that if the discharge valve failed open, the pump motor would trip on overload before runout flow occurs. This was determined to be acceptable, as the pumps could be restarted after resetting the overload trip. The effects of the resulting increase on diesel loading (approximately 80 kw at the maximum long delay overload trip setpoint) from operating the motor in an overloaded condition were not addressed.

Recommended Corrective Action:

1) Assess the acceptability of utilizing unqualified instrumentation to control the electric auxiliary feed pump discharge pressure control valves. Upgrade this equipment if necessary.

2) Reassess the acceptability of allowing these valves to fail open upon loss of instrument air pressure. Consider adding a backup to the instrument air supply or providing other compensatory measures, as appropriate.

Provide feedback on the results of all analyses as a design input for MR 89-127.

Wisconsin Electric POWER COMPANY

231 W Michigan, PO Box 2046, Milwaukee, WI 53201

AUDIT FINDING REPORT

NUCLEAR QUALITY ASSURANCE

AFR # A-P-90-12-075

Audit Dates 9/5-10/22/90

COMPLETED BY AUDITED ORGANIZATION

Cause of Deficiency

See attached CA Cartell 12-17-90

Action to Prevent Recurrence

See attached CA Cartell 12-17-90

Submitted By	Date	Management Approval/Date
CA Cartell	12/21/90	R.K. Hannem 12/20/90

COMPLETED BY WE NQAD

Response Accepted By	Date	Root Cause/Trend Code
[illegible]	2/20/91	282

Follow-up Verification Will f/u on evaluation from NCR-91-035 for A/I #1. No further action is necessary for A/I #2, resp. shifted to ESE. ESE to provide C/A for A/I #2 due 9/30/91. - 5/23/91 Evaluated NCR #91-035 & proposed C/A (rev'd/app. by eval group, SQA & PH. Mgr.) and found acceptable to close out this A/I #2. SQA will track resolution of this NCR. MH 5/23/91. Action Item #2 extension accepted MH.

Closed By	Date	Approved By	Date Closed	Files

Form QAI 18 1-4 Rev. 1

Corrective action evaluation for AFR #A-P-90-12-075

1) <u>Corrective Action Performed and/or Planned</u>

The first concern states that the pressure transmitters, pressure controllers, I/P transducers, and position indicators used to control valves AF-4012 and AF-4019 are not currently considered to be seismic or QA qualified. The concern also states that because of the non-qualified nature of the valve controlling instrumentation, any postulated failure would be in addition to the single failure assumed during an accident analysis.

Obviously, if the non-safety grade controllers for AF-4012 and AF-4019 failed to the worst position, both valves would remain shut. Some form for manual override would be necessary to open the valves (i.e. the air supply must be isolated or stopped and the valves' operators must be vented). No flow from the electric motor driven pumps would be available during the time that the valves are shut. Additionally, the pumps could be without recirculation flow because the recirculation flow control is non-safety grade.

The design of the AFW system for Point Beach should be such that the automatic actuation of auxiliary feedwater to both units should provide a minimum flow of 200 gpm to each unit, even after assuming the most restrictive failure of an active safety grade component. For Point Beach this failure is one of the turbine driven auxiliary feedwater pumps, because they have the highest capacity. If the flow control valves from the electric motor driven auxiliary feedwater pumps remain shut due to failure of their non-safety-grade controllers, then no flow would be available to the unit in which the turbine driven pump is assumed to fail.

I have attempted to determine what would be the capability of the AFW system if this deficiency was corrected. To make this determination I performed calculation N-90-095, "Minimum AFW Flow for Actuation to Both Units." If the controllers for valves AF-4012 and AF-4019 operated as designed, they would control flow from P38A and P38B to be about 200 gpm from each. In calculation N-90-095, I showed that if the steam generator pressures in the unit with the operating turbine driven pump were about 1000 psig and the steam generator pressures in the unit without an operating turbine driven pump were about 1100 psig, the unit without ~~the~~ an operating turbine driven pump would not receive any AFW flow. This situation could be rapidly corrected by the operators if they isolated the flow paths from the electric motor driven pumps to the unit with the operating turbine driven pump.

Since operator action would be necessary to initiate flow if the valves function properly, it may be possible to argue

that operator action to initiate flow if the valves malfunction is also acceptable. The main difference being that if the AF-4012 and AF-4019 valves function, the operators could establish flow using valve control switches in the control room and if they do not function, manual manipulation of the AF-4012 and AF-4019 valves may be necessary. The manual manipulation may take longer than the repositioning of valves from the control room, but in either case operator action is required.

Cause of Deficiency

Inadequate design of the AFW system.

Action to Prevent Recurrence

I have generated an NCR due to the inability of the system to automatically provide flow as required to meet the assumptions of the FSAR accident analyses. The ultimate corrective action for this concern will depend on the resolution of this NCR.

2) Corrective Action Performed and/or Planned

The second concern essentially states that the effects of increased diesel loading from running the electric motor driven AFW pumps at higher than design flow rates has not been addressed in evaluations of runout in the AFW system. Runout of the electric motor driven auxiliary feedwater pumps was evaluated by A. R. Jones in calculation P-87-001. That calculation showed that the flow rate from one electric motor driven auxiliary feedwater pump, with the discharge valve failed open, to one steam generator varies with steam generator pressure. From the results of calculation P-87-001 it can be seen that the flow rate from one electric motor driven auxiliary feedwater pump to one steam generator varies from 265 gpm at 1050 psia to 500 gpm at 390 psia. Runout of P38A and P38B is at approximately 500 gpm.

The electric motor driven auxiliary feedwater pumps use more power as flow rate increases. The results of calculation P-87-001 prove that flow rates above 200 gpm are possible from these pumps. Therefore, I recommend that this issue be referred to S. F. Mayer for evaluation in the diesel generator loading calculation.

Cause of Deficiency

This should be determined by the diesel loading evaluation.

Action to Prevent Recurrence

This should be determined by the diesel loading evaluation.

AFR# A-P-90-12-075 CORRECTIVE ACTION 2 by:S.F.Mayer 2/13/91

The P38A and P38B auxiliary feedwater pumps have pressure control discharge valves which serve to maintain flow through the pumps at about 200 gpm. The pump motors are 250 HP and appear to be sized based upon the pump supplying the 200 gpm flow value. The pump discharge valves are non-safety related and a calculation has been done which indicates that if the valves fail open, the pump flow rate will be about 500 gpm. The pump curves indicate that at 200 gpm, the break horsepower will be about 240 HP and at 500 gpm, it will be about 330 HP. A question has been raised as to the effect this load increase has on the diesel loading calculation.

The diesel load calculation used the motor nameplate horsepower rating of 250 HP. Therefore this potential failure could increase loading by 80 HP over what was assumed in the calculation. This corresponds to 66.3 KW. Note that the original AFR description appears to be incorrect in that it states that the diesel loading would increase by 80 KW.

330 HP corresponds to 273.5 KW or 365.5 amps at 480V and a .9 PF. The P38A&B supply breakers are 1B52-12C and 2B52-31C. The existing time-overcurrent curves for these breakers indicate that at 365A, the breakers will trip in about 200 seconds. For the most heavily loaded diesel, if the failure occurred at them worst time, the extra 66.3 KW would load the diesel to just over the 200 hour rating. Since the breaker would trip out on overload in about 3 and 1/2 minutes this would have very little effect on the static loading of the diesels. I therefore recommend that no change be made to the diesel loading calculation. Note that when a motor is overloaded, the power factor is typically much worse than .9 . This means that the current is probably greater and the breaker will trip faster than indicated above.

Another consideration is what effect this additional load would have on the transient loading of the diesels. On an SI with loss of off-site power, the major safety related loads are sequenced onto the diesels. The auxiliary feedwater pump is one of these loads. From the information in the component instruction manual, it is my judgement that the diesels would be able to handle this additional load. We will shortly be performing a transient diesel loading analysis to verify the adequacy of the original design of the load sequencing onto the diesel. We will add to the scope of this analysis the case where the auxiliary feedwater pump is at the heavier load value. This should be done by 9/30/91.

Because of the timing on the existing breaker overcurrents, the 66.3 KW load addition is not a significant concern on the static loading of the diesels. However modification MR# 87-034*H will replace the existing overcurrents. Care should be taken when establishing the new settings for the amtector overcurrents that at 365A the trip will not occur at much greater than 200 seconds.