

INTERNAL
CORRESPONDENCE

NPM 2002-0583

To: Ken Peveler

From: A. J. Cayia

Date: October 31, 2002

Subject: POTENTIAL AFW COMMON MODE FAILURE EVENT RESOLUTION
TEAM

Copy To:	D. Schoon	S. Thoms	J.P. Cown	J. Anderson
	J. Freels	T. VandenBosch	T. Coutu	K. Davison
	R. Flessner	R. Wood	T. Kendall	B. Zipp
	M. Rosseau	File		

I am forming an event resolution team to provide management oversight to drive resolution of the issue involving the potential to have a common mode failure due to orifice plugging in the AFW minimum flow recirc line orifices and am assigning you as the team leader for this effort. This issue is described in CAP 029952 attached. The following organization is established which will report to you to ensure that we effectively resolve this issue:

- Incident Investigation - Stu Thomas
- On-line Work Risk Management – John Anderson
- Interim Corrective Actions – Duane Schoon
- Issue Resolution Team and Root Cause Evaluation – Jim Freels

Fritzie Flentje is assigned to support you in your efforts. I would like you to step out of your role as Nuclear Oversight Manager and assign your supervisors to act in your stead until this issue is resolved. I expect that schedules and actions will be established for each of the focus areas identified. Additionally, you, Fritzie Flentje and each of the managers above will comprise our Inspection Interface Team for the special inspection, which will commence Thursday, October 31, 2002.

The assignments and tasks below should continue to be revised as you pursue resolution of this issue. The assignments for each of the above efforts are as follows:

Incident Investigation – Stu Thomas

The scope of this effort is to conduct an incident investigation to collect the facts surrounding the maintenance conducted on the P-38 A motor driven auxiliary feedwater pump, the post maintenance testing, the evaluation of the corrosion products discovered in the recirc orifice and concluding with the decision to declare the auxiliary feedwater pumps inoperable on Tuesday, October 29, 2002. The incident investigation is to be completed using applicable portions of NP 5.3.3 "Incident Investigation and Post-trip Review" for guidance.

On-line Work Risk Management – John Anderson

The focus of this effort is to ensure that we comply with procedure 10.3.7 "On-line Safety Assessment" while we are in elevated risk due to the potential for common mode plugging of

the AFW recirc orifices. This effort should continue and provide you daily updates until interim corrective actions have restored on-line risk to a "green" condition.

Interim Corrective Actions – Duane Schoon

The focus of this effort is to complete the interim corrective actions which are comprised of administrative controls, training for the operators, and procedure changes and also to perform an independent objective review of the adequacy of each of these corrective actions.

1. Complete the interim administrative controls, operator training and EOP and AOP changes to establish appropriate operator guidance for all accident sequences of interest.

Issue Manager: Duane Schoon
Team Leader: Terry Vandebosch

2. Independently evaluate the procedure changes being made to the EOPs and AOPs and assess their adequacy to provide adequate operator guidance. Additionally, evaluate the adequacy of the temporary information tags and objectively evaluate our decision to declare the AFW pumps operable after taking interim actions to address this issue on Tuesday October 29, 2002.

Responsible Manager: Tom Coutu/K. Davison

3. Independently evaluate the briefings and training conducted or planned for operating crews. We would like an objective look to ensure that the training was adequate and well documented.

Responsible Manager: Kevin Davison/T. Coutu

Engineering Resolution Team and Root Cause Evaluation

In addition to completing the root cause evaluation, the efforts of this team are to include completing the risk evaluation on an expedited basis, analyzing the potential for the orifice to become plugged, and conducting testing as appropriate to provide input to the PRA efforts being conducted.

1. Ensure that the root cause evaluation team completes the RCE in a timely and objective manner. The root cause team must evaluate why the original modification that installed the recirc orifices did not address the potential for orifice plugging and as importantly why our organization did not identify the issue when the recirc line was changed to provide a safety related open function in response to the recent red AFW finding. The charter for the RCE team is attached.

Issue Manager: Jim Freels
RCE team leader: Rich Flessner

2. Ensure that the PRA work to evaluate the risk significance of this potential common mode failure is completed expeditiously.

Responsible Manager: Jim Freels
Team Leader: Rick Wood

3. Evaluate hydraulic system response to determine if the orifices could become plugged.

Responsible Manager: Jim Freels
Team Leader: Tom Kendall

4. Develop a test plan to evaluate plugging of a spare orifice. Use the vendor utilized by Kewaunee to evaluate the AFW suction orifice issue as appropriate.

Responsible Manager: Jim Freels
Team Leader: Tom Kendall

5. Analyze the sample of corrosion products for metallurgical content to enable us to determine the source of the corrosion products.

Responsible Manager: Jim Freels
Team Leader: Bill Zipp

6. Evaluate the auxiliary feedwater system to determine the sources and quantity of potential corrosion products.

Responsible Manager: Jim Freels
Team Leader: Bill Zipp

7. Contact the vendor of the orifice to obtain test data and other relevant information that could be used as input to the PRA work.

Responsible Manager: Jim Freels
Team Leader: Tom Kendall

8. Identify all other applications of this type of orifice in the Point Beach units and determine applicable operating history. Evaluate suitability of this orifice type in all other applications.

Responsible Manager: Jim Freels
Team Leader: Tom Kendall

9. Ensure that modifications to the orifice design or a replacement orifice are pursued expeditiously to resolve any questions relating to the potential for the orifice to become plugged.

Responsible Manager: Jim Freels
Responsible Design Lead: Mike Rosseau

STATE CHANGE HISTORY

Initiate



AR Pre-Screen
10/29/2002 12:41:27 PM
Owner (None)

by WILLIAM ZIPP

*Safety
chgs change
process*

SECTION 1

Activity Request Id: CAP029952
Activity Type: CAP Submit Date: 10/29/2002 12:41:27 PM

One Line Description: Possible Common Mode Failure of Aux Feed Recirculation Lines

Detailed Description: 10/29/2002 12:41:27 PM - WILLIAM ZIPP:
Partial plugging of the mini-recirc orifice (RO-4008) in the recirc line from aux feed pump P-38A occurred during testing on 10/24. This is documented in CAP 029908. Flow through the recirc line remained above operational limits during the event, and the remaining aux feed pumps were run to check for extent of condition with no reduction in recirc flows found. Review of this event has led to the conclusion that it is possible the mini-recirc orifices for all the aux feed pumps (3 per unit) could plug during an emergency when aux feed is needed. Plugging of the recirc orifice could then render its associated pump inoperable, as this flowpath provides a safety related function to maintain a required amount of flow for pump protection. This considers use of our credited water supply (service water), but may also be an issue using the normal CST water supply. This is because of the small orifice opening sizes compared to the size of material that might credibly be introduced into the system from service water, such as rust nodules from the carbon steel supply piping, sand/silt, and lake grass. Material could also be introduced from the CST water supply, though this is thought to be a very pure supply of water.

Initiator: ZIPP, WILLIAM Initiator Department: EESB Engineering Equipment Systems BOP Mechanical PB

Date/Time of Discovery: 10/29/2002 11:21:55 AM Date/Time of Occurrence: 10/29/2002 11:21:55 AM

Identified By: Site-identified System: (None)

Equipment # (1st): (None) Equipment Type (1st): (None)

Equipment # (2nd): (None) Equipment Type (2nd): (None)

Equipment # (3rd): (None) Equipment Type (3rd): (None)

Site/Unit: Point Beach - Common

Why did this occur?: 10/29/2002 12:41:27 PM - WILLIAM ZIPP:
My opinion: It is explained via considering the history for the aux feed recirc lines:

2-3 years ago, due to recirc line vibration, cavitation, and ensuing weld failures, the recirc orifices were redesigned and a modification was initiated to replace the existing orifices with anti-cavitation models. All four have been replaced, the last one being done last month during U1R27. The new orifices have smaller passages than the original model. At the time the mod was conceptualized, the recirc line's function was to LIMIT flow, ensuring adequate forward flow to the steam generators. Potential for blockage of the orifices was explored, and considered possible, but justified based on the short length of time the recirc line is needed at the beginning of an accident. The recirc line's function to limit flow bounds any postulated orifice blockage.

Nov/Dec 2001: Issue of recirc line AOV failing closed on loss of instrument air; subsequent "red" finding. PBNP design philosophy evolves to needing recirc line flow to maintain aux feed pump operability. EOPs and AOPs revised to ensure minimum forward flow required to protect the pumps from overheating is maintained, and absent that, that recirc flow is present. The means of verifying recirc flow is that the recirc AOV indicates open, as there is no control room indication of recirc flow. Apparently, the impact of the new orifice mod was not considered.

Unclear to me at this point.

Summer 2002. Recirc line AOV function to open becomes a safety related function. The internals of the check valve in the common return line to the CSTs was removed to eliminate a potential common mode failure. Again, the orifice appears to have not been considered.

Immediate Action Taken: 10/29/2002 12:41:27 PM - WILLIAM ZIPP:
Discussed with engineering management, Ops management including the on-shift DSS, Licensing. The shift manager declared all four aux feed pumps inoperable at approx. 1025 on 10/29/2002. Came to consensus on immediate actions needed.

Recommendations: 10/29/2002 12:41:27 PM - WILLIAM ZIPP:
1) Write and hang temp info tags on the pump handswitches, requiring that a minimum forward aux feed flow of greater than 50 gpm (P-38 A/B) or 75 gpm (1/2 - P29) be maintained, if not, stop affected pump.; brief the Ops crews on the issue. (Ops)
2) Make changes to affected AOPs, EOPs, and other critical procedures to ensure that minimum forward flow is maintained, or the affected pump is stopped. (Ops, Engr support 50.59)
3) Review for reportability; report the issue (Licensing)
4) Review from PSA significance determination process perspective. Evaluate the present way the orifices are modeled (PSA).
5) Review for impact on aux feed pump unavailability for NEI cornerstone performance indicator (EESN).
6) Redesign the recirc line orifices to make use of an orifice design that has aperture size of >1/8" (basis: service water zurn strainer size is 1/8"). Consider providing Control Room with indication of recirc line flow. (design engr)

◆ Notify Me During Eval?: N ◆ SRO Review Required?: Y

SECTION 2

Operability Status: (None) ◆ Compensatory Actions: N
Basis for Operability:
◆ Unplanned TSAC Entry: N ◆ External Notification: N

SECTION 3

Screened?: N ◆ Significance Level: (None)
INPO OE Req'd?: N Potential MRFF?: N
◆ QA/Nuclear Oversight?: N ◆ Licensing Review?: N
Good Catch/Well Doc'd?: NA

SECTION 4

Inappropriate Action:
Process: (None) Activity: (None)
Human Error Type: (None) Human Perf Fail Mode: (None)
Equip Failure Mode: (None) Process Fail Mode: (None)
Org/Mgt Failure Mode: (None) ◆ Group Causing Prob: (None)
Hot Buttons: (None)

SECTION 5

CAP Admin: PBNP CAP Admin Prescreener: (None)
◆ Project: Corrective Action

Program (CAP)

♦ State: AR Pre-Screen ♦ Active/Inactive: Active
 ♦ Submitter: WILLIAM ZIPP  ♦ Owner: (None)
 AR Type: Parent ♦ Last Modified Date: 10/29/2002 6.32:25 PM
 ♦ Last Modifier: DAN WEBER  ♦ Last State Change Date: 10/29/2002 12:41:27 PM
 ♦ Last State Changer: WILLIAM ZIPP  ♦ Close Date:

NUTRK ID:

of Children: 0

References:

Update:

Prescreen Comments:

Import Memo Field:

OPR Completed?: N

OLD_ACTION_NUM:

sub_tsid: 0 original_project_id: 0

original_issue_id:

Site: Point Beach

Cartridge and Frame:

ATTACHMENTS AND PARENT/CHILD LINKS

 [Principal to OPR000031: Possible Common Mode Failure of Aux Feed Recirculation Lines](#)

CHANGE HISTORY

10/29/2002 6:23:38 PM by DAN WEBER

Last Modified Date Changed From 10/29/2002 12:41:27 PM To 10/29/2002 6:23:38 PM

Last Modifier Changed From WILLIAM ZIPP To DAN WEBER

10/29/2002 6:32:25 PM by DAN WEBER

Last Modified Date Changed From 10/29/2002 6.23:38 PM To 10/29/2002 6.32:25 PM

Attachment Added: Principal to OPR000031: Possible Common Mode Failure of Aux Feed Recirculation Lines

Root Cause Investigation Charter

CAP029952
RCE000191

Issue Manager:
Jim Freels

Problem Statement:

Discovery during the evaluation of CAP029908 (P-38A, MDAFW Pump had inadequate recirc flow during IT-10) that the recirculation line restricting flow orifices had become plugged during plant operation causing a reduced flow (but above minimum required) and that a potential existed for a common mode failure where all AFW pump recirculation lines could have restricted flow rates resulting in eventual pump failure.

Investigation Scope:

Determine the following:

- Timeline of key events
- The root and contributing causes of why the condition exists, including any potential human performance issues
- Why the problem was not identified previously

Make recommendations for:

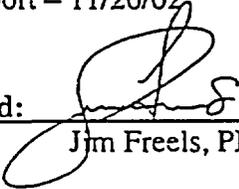
- Correcting the problem, including any remedial actions
- Preventing recurrence of the problem
- Applicability of the root cause to other areas (extent of condition), including verification that a safety-related AFW recirculation flow path exists for the postulated failure modes

Team Members:

Team Leader – Richard Flessner, Engineering Processes
Team Member – Kevin Bennett, Engineering Processes
Team Member – Eric Schmidt, System Engineering
Team Member – William Bosacki, KNPP Design Engineering

Milestones:

Status Update – 11/4/02
Status Update – 11/11/02
Draft Report – 11/18/02
Final Report – 11/26/02

Approved: 
Jim Freels, PBNP Engineering Director

Date: 10/30/02