

From: "Locke, Kim" <Kim.Locke@nmcco.com>
To: <HKC@nrc.gov>
Date: Wed, Jun 30, 2004 10:21 AM
Subject: FW: CAP 57695

> -----Original Message-----

> From: Locke, Kim
> Sent: Wednesday, June 30, 2004 9:13 AM
> To: 'JKC@nrc.gov'
> Cc: Connolly, James W.
> Subject: CAP 57695

>

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>> <<tmtrack.pdf>>

>> <<ttrack attach.pdf>>

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> Kim Locke
> Regulatory Specialist
> x6420

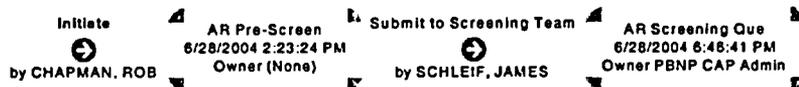
>

B-5.4

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State Change History



Section 1

Activity Request Id: CAP057635
 Activity Type: CAP Submit Date: 6/28/2004 2:23:24 PM

One Line Description: AFW Recirculation AOVs not set up in conformance with Calculations

Detailed Description: 6/28/2004 2:23:24 PM - CHAPMAN, ROB:
 During preparation of Revision 1 to Calculation 2002-0002 for the nitrogen backup system for the Motor-Driven AFW pump AOVs, it was discovered that the AFW recirculation AOVs are not set up in conformance with the calculation. This also applies to the AOVs for the Turbine-Driven AFW pump (and calculation 2001-0056). Both calculations require the AOVs to be set up such that there is a 1/4" gap between the actuator frame and the diaphragm housing when in the shut position. This serves to minimize the dead volume of the actuator. This dead volume is an input to the calculations, and the value used for this actuator (Copes Vulcan D-100-160) dead volume plus stroke volume of 291 cubic inches is contingent on the valve being set up in this manner.

A walkdown confirmed the following dimensions:

1AF-4002 1 7/8"
 AF-4007 1 1/8"
 AF-4014 7/8"
 2AF-4002 1 1/4"

The calculations contain a large amount of margin in that very conservative leakage is assumed, as well as conservatively large number of valve strokes. A review of the effects on the calculations (current revisions on record) using the worst case stroke volume (dead volume plus stroke volume) of 600 cubic inches follows:

Calculation 2001-0056 Rev 2 (TDAFP): If the worst case value of 600 cubic inches is used, it results in a required tank volume of approximately 211 gallons (the 1/2T-212 tanks are actually 150 gallons). If a realistic value of leakage is used (from recent performance of IT 8C), the required tank volume is 154 gallons. The net result of this condition is that less than 2 hours of backup air may be available, if the recirculation valves are stroked 10 times per hour.

Calculation 2002-0002 Rev 0 (MDAFP): If the worst case value of 600 cubic inches is used, it results in a bottle changeout pressure of approximately 1927 psig to ensure a minimum of 90 minutes of operation. Note that this review has also considered CAP057630 was issued earlier that has resulted in a required increase in the changeout pressure to 1950 psig.

6/29/2004 5:22:44 PM - CHAPMAN, ROB:
 See attached additional discussion for a more detailed evaluation of the effects on the calculations.

Initiator: CHAPMAN, ROB Initiator Department: EXD Engineering Safety & Design
 Date/Time of Discovery: 6/28/2004 2:19:00 PM Date/Time of Occurrence: 6/28/2004 2:19:00 PM
 Identified By: Site-identifier System: AF PB
 Equipment # (1st): (None) Equipment Name (1st): (None)
 Equipment # (2nd): (None) Equipment Name (2nd): (None)
 Equipment # (3rd): (None) Equipment Name (3rd): (None)
 Site/Unit: Point Beach- Commor
 Why did this occur?: 6/28/2004 2:23:24 PM - CHAPMAN, ROB:
 Requirements from calculations were not transferred to the field for setup of the AOVs.
 Immediate Action Taken: 6/28/2004 2:23:24 PM - CHAPMAN, ROB:
 Reviewed calculations for the effects of this condition.

6/28/2004 6:46:41 PM - SCHLEIF, JAMES:
 The following work orders were written to correct the gap setup in the identified AOV's:
 Tag 209095 - 1AF-04002
 Tag 209097 - AF-04014
 Tag 209098 - 2AF-04002

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Tag 209096 - AF-04007
All work orders are Pri 3.

Recommendations: 6/28/2004 2:23:24 PM - CHAPMAN, ROB:
The recirculation AOVs should be set up such that the gap between the actuator frame and the diaphragm housing is less than 1/4". This will bring the actuators into conformance with the calculations.

SRO Review Required?: Y

Section 2

Operability Status: Operable but degrade **Compensatory Actions:** N

Basis for Operability: 6/28/2004 6:46:41 PM - SCHLEIF, JAMES:
The AFW system and backup pneumatic system for AOV operation are capable of functioning per design however are in a non conforming condition. The AFW system is compliant with all T.S. Surveillance testing and periodicity requirements. Therefore, there is reasonable assurance that for a prompt operability determination, that the AFW system is capable of performing the intended safety function. The issues identified in this CAP pertain to setup of the identified AOV's not in conformance with design specifications. The AFW system is therefore, Operable but Non Conforming. Further justification as follows.

This issue brings into question the duration of time availability of the backup pneumatic systems due to the setup of the AOV's. The AOV's per design were to be set with a 1/4 inch gap between the actuator frame and the diaphragm housing when the valve is full shut. The increased gap on valve setup increases the dead volume on the air operator and thereby increases overall air/gas usage.

The AFW system is capable of acutating and functioning per design. Conservatism in the pneumatic system usage calculations in conjunction with realistic leakage values from the most recent IT-8C indicate 1(2)T-212 may be sized 4 gal less than volume required for 200 minutes of backup operation. Current tank size is 150 gallons, calculated size for 200 minutes under realistic operation is 154 gallons. The increased leakage for the MDAFW pump AOV's requires a minimum nitrogen bottle pressure of 1927 psig. CAP057630 was issued earlier that has resulted in a required increase in the changeout pressure to 1950 psig. Therefore, 90 minutes of AOV operation for the MDAFW pumps will be achieved.

In an accident situation, EOP's, ECA's and CSP's address the monitoring and maintaining of AFW flow. AOP-5B, Loss of Instrument Air provides direction to manually gag recirc valves and motor driven discharge pressure control valves as necessary on a loss of operating air and backup air. Therefore, as a final backup, Operator monitoring and action will be taken to manually override AOV's as necessary.

6/29/2004 12:58:46 PM - SCHLEIF, JAMES:
Correction to original screening. In the original screening of CAP057635 I incorrectly stated that the design for the backup air system for the TDAFW Pump recirc AOV's was 200 minutes. The correct time is 120 minutes (2 hours).

The design duration for the AFW backup pneumatic systems are referenced in AOP-5B, Loss of Instrument Air. Air backup to the TDAFW Pump mini recirc valves [1(2)AF-4002] is designed for 2 hours. Nitrogen backup to the MDAFW Pump mini recirc valves (AF-4007 and AF-4014) is designed for 90 minutes. AOP-5B, Loss of Instrument Air provides guidance to gag open the mini recirc valves within these time frames upon a loss of instrument air. AOP-5B fold out page provides continuous guidance to either gag open the mini recirc valves or monitor and maintain minimum AFW discharge flow or stop the affected pump, anytime Instrument Air Pressure is less than 65 psig.

PBNP FSAR (06/03) Section 10.2, does not specify a required duration for air or nitrogen backup. The FSAR states that the backup supplies are sized to provide adequate time for operators to either maintain minimum flow through the running pump(s), to secure unneeded pump(s) if necessary, to restore instrument air, or to use the manual gag on each valve to provide minimum recirculation flow.

Technical Specification Basis, Section B.3.7.5 states that for an AFW Pump System to be considered operable, the minimum recirculation path must be available and the backup pneumatic supply for the minimum recirculation AOV must be operable. There is no time duration specified.

This additional information supports the original screening of Operable but Non Conforming.

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

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[-] 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 Admri  Prescreener: (None)
 @ Project: Corrective Actn Program (CAP) / @ State: AR Screening Qui
 @ Active/Inactive: Active @ Submitter: CHAPMAN, ROB 
 @ Owner: PBNP CAP Admri  @ Last Modified Date: 6/29/2004 5:22:44 PM
 @ Last Modifier: CHAPMAN, ROB  @ Last State Change Date: 6/28/2004 6:46:41 PM
 @ Last State Changer: SCHLEIF, JAMES  @ Close Date:

NUTRK ID:

of Children: 0

References:

Update:

Prescreen Comments:

Import Memo Field:

OPR Completed?: N

OLD_ACTION_NUM:

sub_tsld: 0 original_project_id: 0

original_issue_id:

Site: Point Beacl

Cartridge and Frame:

[-] Attachments and Parent/Child Links

[Additional Discussion for CAP057635.doc](#) (28160 bytes) by CHAPMAN, ROB (6/29/2004 5:22:06 PM) 

[-] Change History

6/28/2004 6:46:41 PM by SCHLEIF, JAMES

Last State Change Date Changed From 6/28/2004 2:23:24 PM To 6/28/2004 6:46:41 PM

Last State Changer Changed From CHAPMAN, ROB To SCHLEIF, JAMES

6/29/2004 12:58:46 PM by SCHLEIF, JAMES

Basis for Operability Changed From [Original Text] To [Appended:] Correction to original screening. In the original screening of CAP057635 I incorrectly stated that the design for the backup air system for the TDAFW Pump recirc AOV's was 200 minutes. The correct time is 120 minutes (2 hours). The d[...]

Last Modified Date Changed From 6/28/2004 6:46:41 PM To 6/29/2004 12:58:46 PM

6/29/2004 5:22:10 PM by CHAPMAN, ROB

Last Modified Date Changed From 6/29/2004 12:58:46 PM To 6/29/2004 5:22:10 PM

Last Modifier Changed From SCHLEIF, JAMES To CHAPMAN, ROB

Attachment Added: Additional Discussion for CAP057635.doc

6/29/2004 5:22:44 PM by CHAPMAN, ROB

Detailed Description Changed From [Original Text] To [Appended:] See attached additional discussion for a more detailed evaluation of the effects on the calculations.'

Last Modified Date Changed From 6/29/2004 12:58:46 PM To 6/29/2004 5:22:44 PM

Last Modifier Changed From SCHLEIF, JAMES To CHAPMAN, ROB

CAP057635

6/29/2004

Additional Discussion for CAP057635

As a result of the condition identified, the total volume of air required to stroke the recirculation AOVs has been increased. The valves' current setup have dead volumes that are in excess of the value of 100 in³ used in the calculations. To determine the effect of this condition on the calculations, the maximum possible volume as stated by the vendor (600 in³) will be used. This is conservative since the actual volume will be less than this value.

The effect of this new input will be considered for both the Turbine-Driven AFW Pump air backup system (Calc 2001-0056) as well as the Motor-Driven AFW Pump nitrogen backup system (Calc 2002-0002).

Turbine-Driven AFW Pump (Calc 2001-0056 Rev 2):

Changing the valve actuator volume from 291 in³ to 600 in³ will affect the calculated required tank volume. The actual installed tank volume is approximately 150 gallons. However, to offset the effect of increasing the actuator dead volume, other inputs can be changed. Many of these inputs are very conservative, and more realistic values can be used.

- The calculation assumes a value of 0.15 SCFM for leakage from the system. Based on recent performances of IT 8C(9C), TDAFP Mini Recirc Valve 1(2)AF-4002 Accumulator Check Valve 1(2)AF-173 Pressure Decay Test – Unit 1(2), the largest measured pressure drop for both units was 8 psi in 5 minutes (based on IT 8C performed during U1R28). This would equate to a leakage of less than 0.05 SCFM (calculated using the higher actuator stroke volume of 600 in³).
- The number of required strokes is very conservative since the plant would not operate with large swings in AFW flow. A value of 10 strokes per hour was assumed, and simulator runs have confirmed that a more realistic value is 5 strokes per hour (for the first hour). However, since not all operational scenarios can be considered, a value of 8 strokes per hour will be used. This is still a very conservative number which would allow 16 total strokes over a two hour period.

Using a value of 8 strokes per hour with a leakage of 0.05 SCFM, the required tank volume is calculated to be approximately 136 gallons. This is still a conservative number since the current setup will result in an actuator volume that is less than 600 in³.

Therefore, even with the 1/2AF-4002 valves not set up in conformance with calculation 2001-0056, there is reasonable assurance that adequate backup air will be available to stroke these valves as required until the AOP 5B foldout page directs operations to manually gag open the valves and to monitor AFW forward flow. Using the revised inputs above, there are still 2 hours of operation available.

Motor-Driven AFW Pump (Calc 2002-0002 Rev 0 and Rev 1):

Based on the Rev 0 calculation, changing the valve actuator volume from 291 in³ to 600 in³ will result in a calculated nitrogen bottle changeout pressure of 1927 psig. This is less than the new bottle changeout pressure of 1950 psig, which is being instituted as a result of the Rev 1 calculation. Therefore, this new changeout pressure is bounding for the Rev 0 calculation with a larger actuator volume.

The issue in this CAP was discovered during the preparation of Revision 1 to Calculation 2002-0002. This calculation will be the basis for increasing the bottle changeout pressure to 1950 psig. Therefore, since it will imminently become the calculation of record for the Motor-Driven AFW pump backup nitrogen system, an evaluation of the effect of the higher actuator volume on this calculation is required. The Revision 1 calculation is substantially more conservative than the Revision 0 calculation. This calculation increased the assumed leakage from the system, the assumed bleed through rate for the positioners (see CAP057630), and decreased the volume of the nitrogen bottle.

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Revising the calculation input for actuator volume such that the new total volume of the actuator is 600 in³ will affect the calculated nitrogen bottle changeout pressure. However, to offset the effect of increasing the actuator dead volume, other inputs can be changed. Many of these inputs are very conservative, and more realistic values can be used.

- As stated for the Turbine-Driven AFW Pump valves above, the assumption that the valves will fully stroke 10 times per hour is very conservative since the plant will not be operated with large swings in AFW flow. Since 8 strokes per hour was used in the above evaluation for the TDAPs, it can be used here as well for the recirculation valves. This is still a very conservative number which would allow 12 total strokes over a 90 minute period.
- The assumption that the discharge AOVs will stroke fully open and closed 10 times per hours is extremely conservative. These valves will not stroke fully since they are control valves. They will likely remain in a throttled position for the duration of the event. Using a more realistic assumption of 4 strokes per hour (6 strokes in 90 minutes) is acceptable.
- The values used for constant bleed through rates for the I/P and P/P controllers are the maximum values. It is highly unlikely that these controllers actually have such high bleed through rates. An instance in February of 2002 where an IT test was aborted and the nitrogen bottles were left aligned to the system resulted in a pressure drop of 125 psi in 15 minutes. This equates to approximately 0.9 SCFM. Although the exact alignment is not known, it is highly unlikely that such a large leakage rate would come from any portion of the system other than the discharge AOV, and this shows that the total I/P and P/P bleed through is less than 1 SCFM. A very large amount of margin can be gained from the calculation by decreasing these bleed through rates. They will be considered to be approximately 90% less than the assumed values for a total bleed through of $0.95 * (1.25 + 0.86) = 2.0$ SCFM.

Using these more realistic values, the bottle changeout pressure is calculated to be 1903 psig, which is less than the new changeout pressure of 1950 psig. This is still a conservative number since the actual current setup will result in a less than 600 in³ actuator volume.

Therefore, even with the AF-4007/4014 valves not set up in conformance with calculation 2002-0002, there is reasonable assurance that adequate backup air will be available to stroke these valves as required until the AOP 5B foldout page directs operations to manually gag open the valves. Using the revised inputs above, there is still 90 minutes of operation available.