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POINT BEACH NUCLEAR PLANT

FAX

TO: KEN O'BRIEN

FROM: TOM KENDALL

DATE: 11/26/02

PAGES: 20

SUBJECT: MSSM 92-09, 92-11, 92-12 ECERPTS
ALSO— EXCERPTS FROM REV. 0 OF AFW DBD
ADDRESSING THE RECIRC MOV AND THE AFW RECIRC
FLOW CONTROL ORIFICE.

A1354

POINT BEACH NUCLEAR PLANT
MANAGER'S SUPERVISORY STAFF
HELD ON JUNE 16, 1992

MSSM 92-11
July 23, 1992
Page 1

LIFETIME _____ YRS
NON-PERMANENT _____ YRS
FILE NO. A8.5.1

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1. Auxiliary Feedwater (AFW) Controller QA Upgrade. Mr. Sopata reported on the project which upgrades AFW pressure controllers, pressure transmitters, I/P transducers and position indicators for AF-4012/4019 air-operated AFW discharge valves. (See MSSM 92-09 for previous discussions).

   The following AFW discharge pressure controllers and mini-recirculation flow controllers were evaluated:

   - Asco Model HT8302C25 Solenoid: Allows the solenoid-controlled pneumatic mini-recirculation pressure control valve to reposition based upon an electrical differential pressure signal. The solenoid energizes, allowing instrument air to open the mini-recirculation valve, when the associated AFW pump discharge flow drops below 30 gpm and deenergizes, bleeding off air, when flow is greater than 75 gpm. The valve is designed to fail shut upon a loss of power or instrument air.

   - Copes-Vulcan Model 40814 Discharge Control Positioner: Repositions the motor-driven AFW pump pneumatic-operated discharge pressure control valve based upon an electrical signal; maintaining an AFW discharge pressure of 1200 psig. The valve is designed to fail open upon a loss of power or instrument air.

   - Foxboro Model 611GM Discharge Pressure Transmitter: Provides an accurate electrical representation of AFW pump discharge pressure to the pressure control loop.

   - Foxboro Model 62H-UE Discharge Pressure Transmitter: Controls the electrical signals in the discharge pressure current loop.

   - Foxboro Model M/610A Discharge Pressure Loop Power Supply: Provides power to the discharge pressure current loop.

   - Foxboro Model 69TA-1 Discharge Pressure Control I/P Transducer: Converts the electrical signal received from the controller into a representative air signal.

   The above instruments are required to function properly to ensure they automatically initiate AFW flow upon receipt of an actuation signal. Mr. Sopata said that based upon existing calibration and test procedures and an excellent operating history, the existing equipment will function adequately in a safety-related application once reclassification and required recommended actions are complete.

Mr. Sopata evaluated the AFW components in accordance with QP 2-1 "Safety-Related and QA-Scope Classification Upgrade or Downgrade Process." The methodology of EPRI-5652, "Guidelines for the Utilization of Commercial Grade Items in Nuclear Safety-Related Applications" as described in QP 4-2, "Technical Evaluation of Replacement Items" was also used during the evaluation. In accordance with QP 2-1, Mr. Sopata determined that Method 4, which allows for justification of rescoping the items to QA-Scope based upon the operating performance of the item, is the most appropriate method for this upgrade.

Mr. Sopata said the following parts need to be replaced:

- Mini-Recirculation Solenoids: These solenoids will be replaced with models that will allow for manual operation. The modification, when issued, should ensure the replacements are procured and maintained as QA-Scope components. If the available QA-Scope solenoids are not suitable for this application, a solenoid should be commercially dedicated per QP 4-2.

- Foxboro I/P Pressure Transducers: The presently installed I/P transducers are obsolete and are no longer repaired because spare parts are not available. QA-Scope I/P transducers suitable for this application cannot be procured. A commercial grade I/P transducer will have to be dedicated per QP 4-2.

- Foxboro Pressure Transmitters: The presently installed pressure transmitters are obsolete. Replacement parts are still available onsite; however, new parts are no longer available from the vendor. A Spare Parts Equivalency Evaluation Document (SPEED) will be issued to replace these transmitters.

The remainder of the components were determined to be in a condition to perform their intended function based on adequate testing and good operating performance. A comprehensive review of all spare parts will be completed to ensure the components have been reclassified as QA-Scope. All spare parts that may be used on the affected components must also be rescoped and stocked accordingly.

Mr. Sopata continued by stating a design review of existing hardware indicates the functional requirements of NUREG-0800, "Standard Review Plan" IEEE 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations" and NUREG-0737, "Clarification of TMI Action Plan Requirements" for safety-related systems, structures and components are met with the following exceptions:

- P38A&B motor-driven AFW pump existing electrical cabling associated with the discharge pressure loop was field verified. Inadequate channel independence (physical separation of cabling) was noted; however, this does not agree with the current data in the CARDS system. The cables from the controllers to the pressure transmitters and I/P transducers are routed through a common raceway. Mr. Sopata recommended rerouting the cables to ensure a single failure will not disrupt the power supplies to the components. He also recommended re-evaluation of the CARDS system because of noted discrepancies.

- In our response to NRC Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," 52 relief requests were submitted requesting relief from measuring full stroke test times of valves. VRR-28 requested relief of this testing from AF-4002, AF-4007 and AF-4014 (air-operated AFW pump mini-recirculation valves) in accordance with ASME Section XI IWV-3413. We maintained that these valves are control valves because they respond to discharge flow and may actually be in a throttled position. According to ASME IWV-1200, as control valves they are exempt from testing. The NRC denied our request based on the fact that IWV-1200(b) exempts only those valves that do not have a required safety function. This is clarified in ASME Code Interpretation XI-1-83-59 and NRC GL 89-04, which dictates the valves provide a safety function to close ensuring full design flow to the steam generators and to open to provide flow for pump protection.

- A new model solenoid will be installed that allows manual actuation in order to full stroke test the valves in accordance with ASME Section XI requirements.

A review of Westinghouse drawings indicates both control solenoids for 1&2P29 turbine-driven AFW pump mini-recirculation discharge valves are powered from 125 Vdc distribution panel D12. In order to protect from a single failure (loss of D12), the power supplies should be modified to provide independent sources of power to both channels. The power supplies for P38A&B motor-driven AFW pump mini-recirculation valve solenoids are powered from D13 and D11, respectively; however, bus D01 supplies power to panels D11 and D12. A loss of D01 would cause the mini-recirculation valves for both turbine-driven and one motor-operated AFW pumps to fail shut. This could leave the pumps in an operating condition that may damage them. Mr. Sopata recommended a modification be initiated to reconfigure the 1&2P29 AFW pump mini-recirculation valve solenoids to 125 Vdc distribution panels D31 and D41. This provides a separate source (station battery) of DC power to each. However, if a loss of instrument air occurred, this would prevent any of the mini-recirculation valves from opening. This could jeopardize the operation of all four AFW pumps. A possible modification of the controller configuration may also be needed. A solution may be to modify the instrument air system to provide a backup source to the controllers or to the entire AFW system.

A seismic walkdown was performed of the AFW system to address NRC GL 81-14, "Seismic Qualification of Auxiliary Feedwater Systems," to determine if the system is seismically qualified. Noted discrepancies from the walkdown were corrected as of 1985. A second preliminary walkdown was performed this month to ensure the existing equipment still meets seismic standards. No gross seismic inadequacies were found; however, two concerns were noted:

- Control room cabinets 1C105 through 1C114 are improperly bolted per the Seismic Qualification Users Group (SQUG) methodology. CR 92-360 was issued to address this problem.

- The solenoids and positioners for the mini-recirculation valve controllers are mounted on the valve operators. The SQUG generic implementation procedure requires the solenoid, operator and positioner be evaluated together as one unit (or box). The solenoids failed the procedures distance criteria; however, due to the relatively small-sized solenoid, further acceptance criteria may demonstrate the arrangement is adequate.

Mr. Sopata said that as his recommendations are preliminary, no action by the staff is necessary at this time. He will present his final report containing recommendations needing to be acted upon by the next MSS meeting (see MSSM 92-12).

3. TM 92-020, Installation of Temporary Portable Diesel Generator. Mr. Jaeckle presented a 10 CFR 50.59 evaluation for installation of a portable temporary diesel generator (TDG). The machine is a Caterpillar Model 3516 diesel generator that will be used as a standby power supply for alternate shutdown considerations during the G05 gas turbine maintenance overhaul outage. The TDG will also be used in lieu of G05 to address station blackout concerns associated with gas turbine reliability. This evaluation covered the siting and connection aspects of the TDG. Separate evaluations will be presented as necessary to address procedure changes required to operate the machine. (SER 92-049)

4. Auxiliary Feedwater Controller QA Upgrade. Mr. Sopata lead the discussions on the QA/Non-QA status of AFW pressure controllers, pressure transmitters, I/P transducers and position indicators for AF-4012/4019 air-operated AFW discharge valves. AFR A-P-90-12-075 identified two concerns regarding the design and qualification of these valves. Because of P38A&B motor-driven AFW pump non-QA valve-controlling instrumentation, any postulated failure would be in addition to the single failure assumed during an accident analysis. The audit recommended assessment of the adequacy of using unqualified instrumentation and upgrade of the equipment as necessary. The assessment was completed and found our FSAR states that the design of the AFW system should be such that the automatic actuation of AFW to both units provide a minimum flow of 200 gpm to each unit, even after assuming the most restrictive single failure of an active safety grade component. This failure would be one P29 turbine-driven AFW pump because of its high capacity of 400 gpm each. If both units required AFW flow and AF-4012/4019 remained shut due to a failure of their non-safety grade controllers, then no flow would be available to the unit in which the turbine-driven AFW pump is assumed to have failed. In addition, the recirculation line isolation valve controllers are also non-safety grade, and the pumps could also be without recirculation flow.

   The second concern defined in the audit is AF-4012 and AF-4019 failing to open. The effects of the resulting increase on diesel loading from operating the motor in an overloaded condition have not been addressed. The audit recommended the acceptability of allowing these valves to fail open on a loss of instrument air be reassessed. A recently performed static loading analysis of the EDGs showed that the diesel should be able to handle the additional power requirements. EDG transient analysis results are pending additional information from the diesel manufacturer. NRC IR 91-030 conducted from December 16, 1991 through January 16, 1992, considered the calculations performed to be inclusive. The inspectors concurred with our recommendation to upgrade the discharge valve controllers by June 30, 1992.

   NCR N-91-035 and calculation N-91-007 was performed on the effectiveness of these valves opening. NCR N-91-035 recommended the non-safety grade controllers for P38A&B motor-driven AFW pump discharge valves and the recirculation system be upgraded to QA and safety grade classification. FSAR Section 14.1.11 "Loss of All AC Power to the Station Auxiliaries," assumes the AFW system is capable of automatically providing AFW flow to each SG coincident with a single active failure within one minute of the initiated accident. Since the failure of the discharge valve controllers without operator intervention would prevent the fulfillment of this safety system to mitigate the consequences of the accident, it is reportable under 10 CFR 50.73. The NCR recommended an LER be written. LER 266/91-001-00 "Minimum AFW Flow During Automatic Actuation" was submitted to the NRC on May 6, 1991.

   An engineering evaluation of these components will be performed to identify the required actions needed to ensure that the necessary safety-related functions will be performed acceptably once the reclassification is complete. The results may dictate that some or all of the components need to be modified or replaced.

   A seismic evaluation will be performed to ensure that the components will meet seismic standards. This will be accomplished by a Seismic Qualification Utility Group (SQUG) walkdown of the AFW system. A preliminary walkdown is scheduled for early June to determine if any changes may be needed to meet seismic standards. A formal walkdown is scheduled later in June when more personnel will be qualified to perform a SQUG walkdown.

Mr. Sopata will be working with Mr. Roseau on MR 89-127, Train Specific Power Supplies for PC-4012 and PC-4019. The modification request reroutes power supplies to the AFW discharge valve controllers to the same instrument bus as their respective loop power supplies.

The afore mentioned action items are being tracked via CMTRK LER 266/91-001-00/1.

QP 2.1, "Safety-Related and QA-Scope Classification Upgrade or Downgrade Process," requires initial approval. The staff concurred with Mr. Sopata's request to continue with this project. Mr. Reisenbuechler approved form QP 2-1.1.

5. Safeguards Logic Testing LCO Entrance. Mr. Branam presented memo PBLE 92-0202 from Mr. Wiczewski of Halliburton NUS, dated May 14, 1992. He explained that 16 I&C procedures are on hold pending resolution of TS-related questions.

Mr. Branam questioned if and when an LCO should be entered for various redundant parameter monitoring. The staff recommended an administrative LCO be entered because the NRC recommends entering an LCO during any testing. The LCO should remain in effect for the duration of the procedure. A statement should be added to the procedure to include LCO effective time limit.

TS Section 15.3.5 "Instrumentation System," will be forwarded to Regulatory Affairs for inclusion as a TS change. Mr. Branam transmitted this change to Mr. Padovano via PBM 92-0596. The proposed change is as follows:

> "B. I&C relay functional testing required by Technical Specifications Table 15.4.1-1 may be performed on-line during power operations, limited according to the requirement shown in Table 15.3.5-2 through 15.3.5-4. Automatic actuation functions of tested instrumentation and controls shall not be declared incapable of performing their related support function(s) providing that:
>
> 1. The entire test be completed within one shift.
>
> 2. Instrumentation and controls are restored to service within one shift.
>
> 3. No instrumentation and controls are discovered to be inoperable."

In accordance with TS 15.6.5.1.6.c, the staff recommended approval of the proposed TS change. This also expedites the I&C procedures that are on hold.

6. SEG Outage Recommendation Responses. Mr. Winget discussed SEG recommendations from the U1R19 outage schedule, detailed in memo PBM 92-0554 dated May 8, 1992. Messrs. Millen and Becka conducted an outage schedule review risk assessment prior to the outage. They made 16 recommendations based on a review of Revision D of the schedule.

Mr. Winget said the majority of the recommendations have been resolved; however, Mr. Reisenbuechler requested the following open items be placed on the NPD commitment tracking system to ensure resolution:

- Modify the step in OP-3C which directs tagout of the fan coolers to allow keeping the fan coolers in service if reduced inventory is anticipated. This would make the coolers more readily available in the event they are needed. Also, clarify the terminology "service water out of containment" -- could be construed to mean service water is depressurized inside containment, which is not the case. (MSSM 92-09/*)

Mr. Guokas said the modification would be completed within 30 days. He said based upon the low probability of a seismic event during the 30 day period, his engineering judgement was the existing cabinet welds and design would not result in damage of the equipment in the event of an SSE.

The staff agreed with the recommendations Mr. Guokas presented as a result of the engineering evaluation.

Auxiliary Feedwater (AFW) Controller QA Upgrade. Mr. Sopata presented his final recommendations and action items for the AFW controller QA upgrade. (See MSSM 92-09 and 92-11 for previous discussions.)

Mr. Sopata recommended the following action items be pursued:

- Perform a modification to the cabling for the I/P transducers and the pressure transmitters associated with discharge pressure control valves AF-4012 and AF-4019 to route the cabling via separate raceways. Update CARDS. This was assigned to Site Construction and Engineering.
- Perform a modification to the power supplies for the mini-recirculation pressure control valves 1AF-4002 and 2AF-4002 to power them from D31 and D41. Update CARDS. This was assigned to Electrical Systems Engineering.
- Evaluate the cabinets associated with the discharge pressure loop power supply cabinets 1C105 and 2C105. (CMTRK CR 92-360/*)
- Evaluate the existing instrument air system for seismic adequacy. If the system is found to be seismically inadequate, a modification request will be needed to address the feasibility of providing a backup supply to the AFW system components. This was assigned to Nuclear Safety.
- Perform a calculation showing seismic adequacy of the mini-recirculation control solenoids. This was assigned to Nuclear Safety.
- Modification requests 92-091, 92-092 and 92-093 were issued to replace the control solenoids for 1&2AF-4002, AF-4007 and AF-4014, the mini-recirculation valves, to allow for manual full stroke testing.
- Prepare appropriate documentation (SPEED or MR) to ensure I/P transducers for the AFW discharge pressure control loops for P38A&B be commercially dedicated for use in the AFW system. This was assigned to SQA/I&C.
- Prepare appropriate documentation (SPEED OR MR) to replace P38A&B AFW pressure control loop pressure transmitters. This was assigned to SQA/I&C.
- Perform a comprehensive review of all spare parts issues to ensure all spare parts that could be used on affected AFW components are properly scoped and stocked in the storeroom. This was assigned to SQA.
- Update the Q-List/CHAMPS equipment database to reflect the AFW upgrade. This was assigned to CPS.
- Update Appendix B of the NPD Policy Manual to reflect the AFW upgrade. This was assigned to Quality Support.

The staff accepted Mr. Sopata's recommendations. All the items are being tracked as part of the QA status upgrade project by Mr. Sopata. Mr. Maxfield approved form QP 2-1.1 authorizing the upgrade.

10.5.110 Instrument & Controls Procedure ICP 6.59, Condensate Storage Tank Level & Service Water Pressure Transmitter, Revision 0, 11/01/90.

10.5.111 WE Nuclear Power Department Quality Assurance Policy Manual, Revision 9, dated 3/1/91.

10.5.112 WE Internal Memo, NPM-91-0368, Hoynacki to Frieling, Krieser, Lipke, Maxfield, and Newton, dated 3/5/91.

10.5.113 PBNP Modification Request M-55, Change Feedwater Check Valve AF-100 and AF-101.

10.5.114 PBNP Modification Request 86-123, Change the Operator's Gear Ratio on 2MS-2019 and 2020.

10.5.115 PBNP Modification Request 87-25, Change the Operator's Gear Ratio on 1MS-2019 and 2020.

10.5.116 PBNP Administrative Control Policies and Procedures Manual, PBNP 8.4.1, Secondary Water Chemistry Monitoring Program, Revision 16, 11/2/90.

10.5.117 PBNP Modification Request 88-99 (including MR 88-99*A, *B, *C, *D), AFW Pump Mini-Recirc Flow Enhancement.

10.5.118 PBNP Modification Request IC-274 (CANCELED), Modify the Control Scheme of AFW Pump Recirc Flow Control Valves to keep valves normally open.

10.5.119 PBNP ISI Testing Program Background Document, Rev. 3, (Appendix B).

10.5.120 PBNP Modification Requests 85-213 and 85-214, Anticipated Transient Without Scram Mitigating System Actuation Circuit (AMSAC)

10.5.121 MSSM 90-23

10.5.122 PBNP Background Document BG-EOP-3, Rev. 13.

10.5.123 AOP-10A, "Control Room Inaccessibility", Rev 12. 10/7/91

10.5.124 Deleted.

10.5.125 SPEED 91-002, "Ashton-Crosby Relief Valve, Model GC-32, 100 psig set pressure, Crosby Drawing G-31436-1".

10.5.126 PBNP Modification Request M-623, TDAFWP Cooling Water Modification for Independence from AC Power.

10.5.127 PBNP Modification Request M-624, TDAFWP Cooling Water Modification for Independence from AC Power.

COMPONENT FUNCTIONS
Section 4.8

Component ID	Service
AF-4007,4014 1/2AF-4002	AFW Pump Recirc Flow Control Valves (AOV)

Safety-Related Functions

1. These valves shall open automatically and remain open to provide a recirculation flowpath from AFW pump discharge to the CST when flow in the AFW discharge line is insufficient to prevent pump damage. **[REF 10.5.117]**

2. These valves shall close automatically to prevent the unnecessary diversion of AFW pump discharge during high-flow conditions where adequate pump discharge flow is removing pump heat.

3. These valves shall passively maintain the AFW system pressure boundary integrity.

Augmented Quality Functions

1. 1/2 AF-4002 shall be capable of being manually "gagged" in the open position to ensure minimum pump recirculation flow to Turbine-Driven AFW Pumps during plant fires. [Reference 10.2.59]

Non-Safety Functions

1. These valves shall close automatically after the AFW pump is secured (and remain closed) to prevent a flowpath of MFW backleakage to the CST. Under such abnormal conditions, this flow would defeat the function of existing temperature instruments (located in the discharge line) to indicate the backleakage condition. **[REF 10.5.118]**

COMPONENT PARAMETERS SUMMARY
Section 4.8 (continued)

Component ID	Service
AF-4007,4014 1/2AF-4002	AFW Pump Recirc Flow Control Valves (AOV)

PARAMETER	VALUE	REFER TO
PERFORMANCE REQUIREMENTS		
1. Controls		4.8.1
Automatic	Open/Shut	
Manual Handwheel	Open/Shut	
2. Operating Differential Pressure		4.8.2
Specified "Available D/P"	195 psid	
Specified "Maximum D/P" (4007,4014)	1410 psid	
Specified "Maximum D/P" (4002)	1440 psid	
3. Design Flow at the "Available D/P"		4.8.3
AF-4007, 4014	80 gpm	
1/2AF-4002	>100 gpm	
4. Position		4.8.4
Normal Position	Closed	
Failure Position	Closed	
5. Operational Requirements	Gagged Open during Plant Fires	4.8.5
OTHER DESIGN REQUIREMENTS		
6. Material	Stainless Steel	3.15
7. Design Code	Unspecified	10.6.95 2.2
8. Design Pressure, Temperature	1410 psig 100 F	10.6.95
9. Valve Type	Globe	10.6.95
10. Operator Air Loading Pressure	45 psig	10.6.95

COMPONENT PARAMETER WORKSHEET
Section 4.8.1

Component ID	Service
AF-4007,4014 1/2AF-4002	AFW Pump Recirc Flow Control Valves (AOV)

A. Parameter Controls

B. Value

Automatic	
' Open	Pump On, Discharge Flow < Reqd Mini-Flow[1]
' Close	Pump On, Discharge Flow > Reqd Mini-Flow[1]
Manual Handwheel	Open/Shut

C. Source
1. MR 88-99 [REF 10.5.117]
2. WE Internal Memo response to IEN 84-06 [REF 10.5.5]
3. MR IC-274 [REF 10.5.118]
4. MSSM 84-28 [REF 10.5.8]

D. Background/Reason

As stated in the **Source 1**: "To ensure this minimum flow [70 gpm] is met, the setpoints for the valve's [AF-4007, -4014] controlling instrumentation will be adjusted so that the mini-recirc valve is open when flow in the discharge line is less than 80 gpm". Also, **Source 1** adjusted the automatic operating setpoints of 1/2AF-4002 accordingly:

1/2AF-4002	145 GPM (increasing)	Valve Close
	110 GPM (decreasing)	Valve Open

REF 10.5.117 states that, "after each AFW pump is up to rated speed and flow [as sensed by the discharge flow instrument], a shut signal is sent to its associated mini-recirc valve which shuts after a 3-minute delay". The time delay is activated whenever a signal is generated to close the valve. **Source 1** suggests two bases for this time delay function:

(1) the delay prevents the system from "hunting" for its operating point, and
(2) the delay allows pump heat removal during pump coastdown.

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[1]These automatic controls are required to function only when the associated pump is running (as indicated by a closed MDAFWP breaker or open steam-admission valve to the TDAFWP). Without this feature, these valves would be open when the AFW system was in its normal standby lineup. The automatic control signals to close these valves are delayed 3-minutes.

COMPONENT PARAMETER WORKSHEET
Section 4.8.1 (continued)

These two bases compete with the performance objectives of IEN 84-06 to prevent water hammer in AFW discharge piping. **Sources 2 and 3** suggested that the coastdown control feature described above did not provide an "abrupt change" in differential pressure to ensure good seating of the discharge check valves. **Source 4** would have allowed operators to defeat this time delay function (to allow better valve seating), but it was cancelled in lieu of improvements to the check valve design.

Another detriment of the time delay is its effect on pump runout analyses. The time delay maintains an additional discharge path for the AFW pumps upon startup and increases pump output. This effect has been evaluated in **Source 1.**

COMPONENT PARAMETER WORKSHEET
Section 4.8.2

Component ID	Service
AF-4007,4014 1/2AF-4002	AFW Pump Recirc Flow Control Valves (AOV)

A. Parameter: Operating Differential Pressure

B. Value:

Specified "Available D/P"	195 psid
Specified "Maximum D/P" (4007,4014)	1410 psid
Specified "Maximum D/P" (4002)	1440 psid

C. Source 1. AOV Spec M-181 [REF 10.6.95]

D. Background/Reason

This valve was originally specified with an "available" differential pressure of 195 psig, which was used in the vendor's design to achieve the design flowrate of 30 gpm specified on the original valve specification [Source 1].

This valve was originally specified with a "maximum" differential pressure of 1410 psig for the recirc valves on the motor-driven AFW pumps, and 1440 psig on the turbine-driven AFW Pump recirc valves. These values are probably derived from the values of shutoff head on each pump 1305 psig (MDAFWP) and 1340 psig (TDAFWP) plus a maximum suction pressure of 90 psig attributable to the maximum operating pressure of the Service Water System.

COMPONENT PARAMETER WORKSHEET
Section 4.8.3

Component ID	Service
AF-4007,4014 1/2AF-4002	AFW Pump Recirc Flow Control Valves (AOV)

A. Parameter: Design Flow at the "Available D/P"

B. Value:

AF-4007, 4014	80 gpm
1/2AF-4002	>100 gpm

C. Source 1. MR 88-99 [REF 10.5.117]

D. Background/Reason

These valves do not "control flow" by virtue of throttle-control capabilities, but rather, they open or close (at prescribed setpoints of AFW flow) to initiate or secure flow through the recirculation line. The amount of recirculation flow is determined by the flow resistance in the line, which is predominantly controlled by the restricting orifice.

Source 1 established the design flow through valves 4007 and 4014 as 80 gpm. This value of flow is based on the recirculation line design, and provides 10 gpm margin above the minimum recirculation value required by the Motor-Driven AFW Pump (70 gpm). Source 1 established the design flow through valves 1/2AF-4002 as 125 gpm, which provides an approximate 25 gpm margin to the minimum recirculation value required by the Turbine-Driven AFW Pump (100 gpm). Source 1 installed new valves to accommodate the increased design flow of the recirculation lines.

COMPONENT PARAMETER WORKSHEET
Section 4.8.4

Component ID	Service
AF-4007,4014 1/2AF-4002	AFW Pump Recirc Flow Control Valves (AOV)

A. Parameter: Position

B. Value: Normal Position: Closed
Failure Position: Closed

C. Source:
1. WE Calc N-87-041 [REF 10.4.3]
2. MR 88-99 [REF 10.5.117]
3. MR IC-274 [REF 10.5.118]

D. Background/Reason

Failure Position

Although no documented basis has been found for the selection of an air-operator in this application (as opposed to motor-operator), several facts support the design requirement to have an operator which fails to the closed position. Since this valve has a safety function to close, and a less significant function to open (long-term pump protection) it is most reliable therefore to have the valve fail (upon loss of power or instrument air) to the closed position. THIS INFORMATION HAS BEEN DERIVED LOGICALLY, BECAUSE NO DOCUMENTED BASIS COULD BE FOUND. THEREFORE, THE ABOVE IS PROVIDED FOR INFORMATION ONLY.

Interestingly, **Source 1** concludes that "adequate minimum pump flow will exist for all auxiliary feed pumps under all design basis conditions with an assumed failure of the pneumatic recirculation control valves". This evaluation, however, did not consider the potential for instrument air loss (causing recirc valve closure) in combination with the single active failure (i.e., the associated discharge MOV fails shut).[1] The "worst case" recirculation flow would occur if the air-operated recirc valve(s) and the air-operated discharge valve(s) failed in the closed position.

Failure of one of these valves in the open position would cause a reduction in AFW System flow to the steam generators during an accident; however, the value of flow-reduction is

[1]This concern is based on the NUREG-0800 assumption that all non-safety grade equipment may fail to its worst-case condition in addition to one limiting safety grade failure. In this case, such an assumption would result in no flow through the pump. As NUREG-0800 has not been incorporated into the PBNP licensing basis, this combination of failures appears to fall outside the system design and licensing basis.

COMPONENT PARAMETER WORKSHEET
Section 4.8.4 (continued)

bounded by the single failure condition created if the TDAFW Pump fails to start [Source 2].

Normal Position

In the AFW System is in a standby lineup, these valves are normally closed to limit backleakage (from MFW) to the CST. As discussed in Source 3, allowing such leakage would mask the failure of AFW discharge check valves by allowing flow and keeping AFW piping temperatures and pump suction pressures below levels that would otherwise be indicative of a problem.

COMPONENT PARAMETER WORKSHEET
Section 4.8.5

Component ID	Service
AF-4007,4014 1/2AF-4002	AFW Pump Recirc Flow Control Valves (AOV)

A. Parameter: Operational Requirements

B. Value: Gagged Open during Plant Fires

C. Source:
1. Fire Protection Evaluation Report [REF 10.2.59]
2. AOP-10A, "Control Room Inaccessibility" [REF 10.5.123]

D. Background/Reason

According to the text of the Safe Shutdown Analysis of the PBNP Fire Protection Evaluation Report [Source 1], valves 1/2 AF-4002 shall be manually "gagged" in the open position to ensure minimum pump recirculation flow to Turbine-Driven AFW Pumps during fires requiring Control Room evacuation. Spurious closure caused by control circuit damage could lead to pump damage if the AFW pump is started with its discharge valve closed. Refer to Source 2 for implementation of these requirements.

COMPONENT FUNCTIONS
Section 4.15

Component ID	Service
R0-4008,4015 1/2RO-4003	AFW Pump Recirculation Line Orifice

Safety-Related Functions

1. These orifices shall provide passive flow resistance in the recirculation line of each AFW pump; thereby establishing the required mini-recirc flow and the pressure drop from AFW pump discharge pressure to CST pressure. These orifices must provide adequate flow to prevent low-flow instabilities and excessive fluid temperature rise in the AFW pumps.

2. These orifices shall limit the recirculation flow in the event that the recirculation control valve fails to close during the AFW operation response to an accident **[REF 10.5.117]**.

3. These orifices shall passively maintain the AFW system pressure boundary integrity.

COMPONENT PARAMETERS SUMMARY
Section 4.15 (continued)

Component ID	Service
R0-4008,4015 1/2RO-4003	AFW Pump Recirculation Line Orifice

PARAMETER	VALUE	REFER TO
PERFORMANCE REQUIREMENTS		
1. Design Flow		4.15.1
TDAFWP Orifice	100 gpm	
MDAFWP Orifice	70 gpm	
OTHER DESIGN REQUIREMENTS		
2. Design Code	Unspecified	2.2

COMPONENT PARAMETER WORKSHEET
Section 4.15.1

Component ID	Service
R0-4008,4015 1/2RO-4003	AFW Pump Recirculation Line Orifice

A. Parameter: Design Flow

B. Value:
TDAFWP 100 gpm
MDAFWP 70 gpm

C. Source:
1. IEB 88-04 and WE Responses [REF 10.2.61, 10.2.62, 10.2.63]
2. MR 88-99 [REF 10.5.117]
3. AFW DBD Validation Report [REF 10.3.32]
4. WE Calc N-91-32 [REF 10.4.21]

D. Background/Reason

In response to the NRC IEB 88-04 concerns [Source 1], WE committed to increase the miniflow capacity of the AFW pumps to the flow rates recommended by the pump manufacturer. Source 2 upgraded the recirc orifice capacity to meet the AFW Pump minimum recirculation flow requirements stated in section 4.1.3.

Source 3 determined that test data provided the following flow indications through the MDAFWP recirculation lines:

Pump P-38A 86.gpm
Pump P-38B 88.3 gpm

Source 4 estimated the effect of the increased recirculation line size on flow rates to the steam generators if the recirc valve stuck open. The calculation showed that minimum steam generator flow rate will still be achieved in these conditions.