

Arizona Public Service Company

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ANPP-30644-TDS/TRB REGION V IAE

U. S. Nuclear Regulatory Commission
Region V
Creskide Oaks Office Park
1450 Maria Lane - Suite 210
Walnut Creek, California 94596-5368

Attention: Mr. T. W. Bishop, Director
Division of Resident
Reactor Projects and Engineering Programs

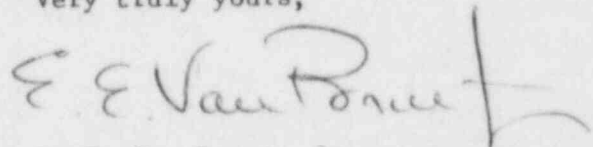
Subject: Final Report - DER 83-51
A 50.55(e) Reportable Condition Relating to Unit 1 Auxiliary
Feedwater Pump Failed To Meet Requirements of Hot Functional
Tests.
File: 84-019-026; D.4.33.2

Reference: A) Telephone Conversation between P. Narbut and R. Tucker on
August 2, 1983
B) ANPP-27602, dated August 27, 1983 (Interim Report)
C) ANPP-29830, dated June 26, 1984 (Time Extension)
D) ANPP-30189, dated August 13, 1984 (Time Extension)
E) ANPP-30492, dated September 12, 1984 (Time Extension)

Dear Sir:

Attached is our final written report of the Reportable Deficiency under
10CFR50.55(e), referenced above.

Very truly yours,



E. E. Van Brunt, Jr.
APS Vice President
Nuclear Production
ANPP Project Director

EEVB/TRB/nj
Attachment

cc: See Page Two

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Mr. T. W. Bishop
DER 83-51
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FINAL REPORT - DER 83-51
DEFICIENCY EVALUATION REPORT 50.55(e)
ARIZONA PUBLIC SERVICE COMPANY (APS)
PVNGS UNIT 1

I. Description of Deficiency

Three separate deficiencies have been reported on the turbine-driven auxiliary feedwater pump in DER 83-51. These are:

- 1) Pump shaft and suction piping vibration;
- 2) Unacceptable pump "head-capacity" performance; and
- 3) Pump failed to meet capacity acceptance criteria as defined in Test Procedure 91 HF-1AF01.

The first deficiency was subsequently documented in DER 84-49. Its description, evaluation, reportability assessment, and corrective action will be addressed in the final report of DER 84-49. The second and third deficiencies are covered herein as concerns "A" and "B".

Concern "A"

The results of the auxiliary feedwater hot functional test procedure 91HF-1AF01 indicate that the turbine-driven auxiliary feedwater pump (Tag No. IMAFAP01) did not meet its head flow capacity requirement as specified in the Final Safety Analysis Report (FSAR). Per FSAR Section 10.4.9.1.G, the auxiliary feedwater pump shall be designed to deliver feedwater at a rate of 875 gpm to the steam generators for removal of decay heat from the reactor coolant system under accident conditions. The guaranteed performance of the pump, per FSAR Table 10.4-6, is 1010 gpm at 3280 feet TDH (1420 psig). The 1010 gpm allows for 135 gpm minimum recirculation flow to protect the pump with a net design flow of 875 gpm to the steam generator.

Nonconformance Report (NCR) SM-2282, dated June 29, 1983, documents that auxiliary feedwater pump IMAFAP01 did not meet the flow/head acceptance criteria which is based on the above-guaranteed performance. The pump was run with all flow directed to steam generator No. 1. The block valves on the minimum recirculation path and the surveillance path were closed and the flow to steam generator No. 2 was isolated. The test configuration is shown on the attached sketch. Comparison of the test results with the pump performance curve show that the pump failed to meet the specified requirements.

Concern "B"

NCRs SM-4643 and SM-4712 document the condition that both the motor-driven and turbine-driven Q Class auxiliary feedwater pumps failed to meet the capacity requirement as specified in the acceptance criteria of test procedure 91HF-1AF01. The acceptance criteria requires that 875 gpm of feedwater be delivered to the steam generator. This value is based on Combustion Engineering (C-E) interface requirements.

Evaluation

Concern "A"

Further investigation revealed that the root cause of the deficiency was that the surveillance test path block valve 1PAFAV018 was leaking. This condition is noted on NCR SM2961. As a result of the leaking block valve, the flow to the steam generator was reduced.

The surveillance test path was provided to perform full flow, periodic testing of the pump. However, there are no requirements for a full flow surveillance test loop in the ASME Codes and the technical specifications. The overall system operability is demonstrated at 18-month intervals by directly pumping to the steam generators. Therefore a spectacle blind flange was installed in the surveillance path and the block valves were removed. The pump was tested again in the same configuration as before except for the addition of the spectacle blind flange to eliminate the leak path as shown in the attached sketch. Evaluation of the test data indicates that the pump can deliver the required flow at rated head.

Investigation of the leaking block valve indicated that the valve leakage was common to both the "A" train and "B" train block valves. Even though the valves were not designed for flow modulation, they had to be throttled to obtain the required flow rates during surveillance testing. The valves did not withstand the conditions that resulted from throttling and as a result, were damaged and leaked. The subject valves were designed for use as isolating valves. As such, the installation of these valves in the surveillance path is a case of misapplication and incorrect installation.

Concern "B"

During preoperational testing of the auxiliary feedwater pumps, the piping system connected to both the motor-driven and turbine-driven Q Class pumps experienced hydraulic resonance when operating in the miniflow configuration. The resolution of this problem was achieved by increasing the miniflow recirculation rate. This reduced the feedwater delivery rate to the steam generator from 875 gpm to 750 gpm. The documentation of this change is included in DER 84-49.

Since at the time the two NCRs were generated C-E had not yet finalized their analysis to determine the acceptability of the reduced delivery rate, the test procedure did not reflect this lower value. C-E has completed the evaluation and the results show that 750 gpm delivery rate to the steam generator is acceptable. SARC N 1239 has been initiated to change the FSAR. The NCR's disposition requires that the acceptance criteria in the test procedure be changed. In summary, there existed no deficiency regarding the pumps' ability to meet the required flow rate. The problem stemmed from the fact that, while the auxiliary feedwater system was being modified to troubleshoot and resolve vibration problems, testing was conducted in accordance with the original test acceptance criteria.

II. Analysis of Safety Implications

Concern "A"

The auxiliary feedwater pumps are required to deliver emergency feedwater at a predetermined rate to the steam generators for removal of decay heat from the reactor coolant system. If this condition had gone uncorrected, the ability of the auxiliary feedwater system to perform its intended safety function could have been impaired.

Based on the above, this condition is evaluated as reportable under the requirements of 10CFR50.55(e); since, if this condition were to remain uncorrected, it could represent a significant safety condition.

This condition is evaluated as not reportable under the requirements of 10CFR 21, since this system had not been released for use by Operations.

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Concern "B"

Based on the information contained under the description and evaluation sections, this condition is evaluated as not reportable under the requirements of 10CFR50.55(e) or 10CFR21; since, if this condition were to remain uncorrected, it would not represent a significant safety condition.

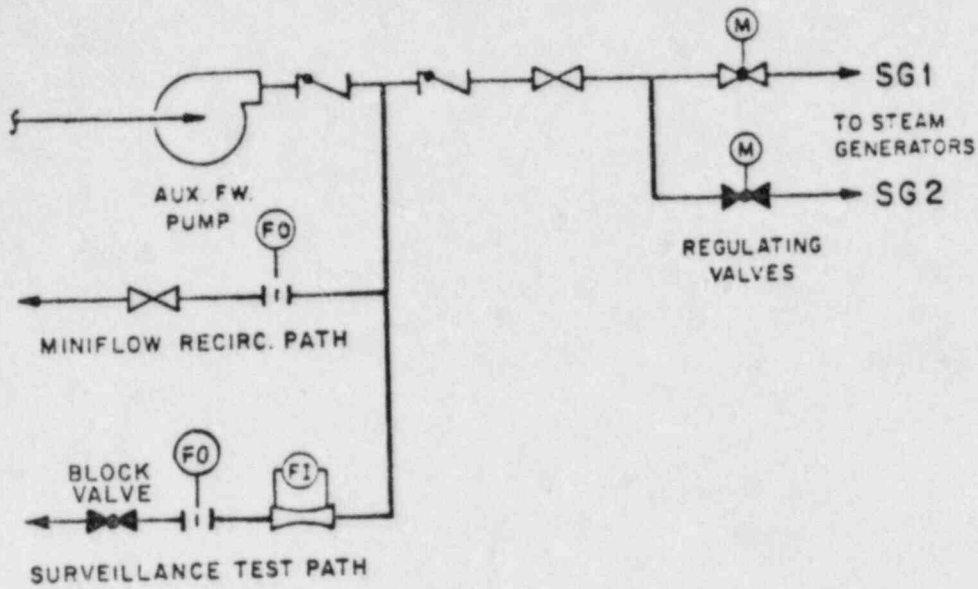
III. Corrective Action

Concern "A"

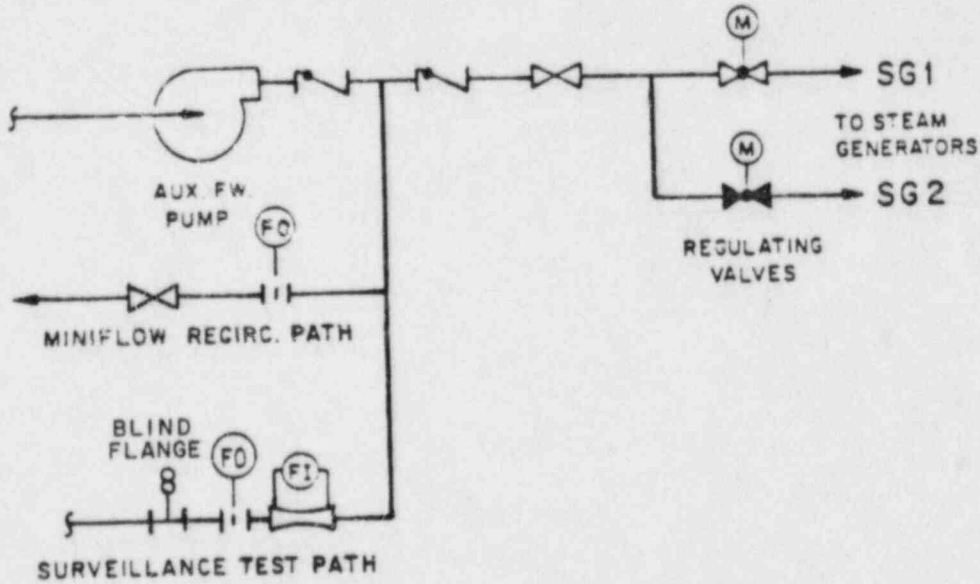
DCPs 1SM-AF-062, 2SM-AF-062, and 3CM-AF-062 have been issued to eliminate the surveillance path by removing the block valves and adding a spectacle blind flange. SARC� 1165 has been issued to delete reference to the surveillance flow path from the FSAR. These DCPs will be implemented prior to fuel load in each unit.

Concern "B"

Safety Analysis Report Change Notice 1239 has been initiated to change the required feedwater delivery rate to the steam generator to 750 gpm.



ORIGINAL TEST CONFIGURATION



REVISED TEST CONFIGURATION