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October 25, 1984
ANPP-30961-TDS/TRB

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

Attention: Mr. T. W. Bishop, Director
Division of Reactor Safety and Projects

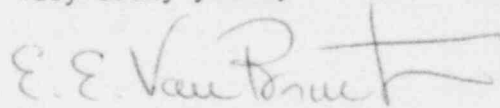
Subject: Final Report - DER 84-50
A 50.55(e) Reportable Condition Relating To Main Steam
Isolation Valves Do Not Close Within Five Seconds As Required.
File: 84-019-026; D.4.33.2

Reference: A) Telephone Conversation between D. Hollenbach and T. Bradish
on July 24, 1984
B) ANPP-30316, dated August 23, 1984 (Interim Report)
C) ANPP-30635, dated September 24, 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 84-50
Page Two

cc: Richard DeYoung, Director
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FINAL REPORT - DER 84-50
 DEFICIENCY EVALUATION 50.55(e)
 ARIZONA PUBLIC SERVICE COMPANY (APS)
 PUNGE UNITS 1, 2, 3

I. Description of Deficiency

During Unit 1 preoperational testing of the Main Steam and Feedwater Isolation Valves, the MSIVs failed to close within the test acceptance criteria of 4.2 seconds. Similarly, the FWIVs failed to fast close within the specified test acceptance criteria of 8 seconds. The valves would close at a fast rate for about 90% of the travel and then would either remain partially open or close the remaining distance at a very slow rate. The total time of closure varied from 27 seconds to 56 seconds. This condition has been reported in Nonconformance Report (NCR) SM-4266 and SM-4632.

Each unit has 4 MSIVs, 1 in each main steam line and 4 FWIVs, 2 in series in each feedwater line. The main purpose of the valves is to protect against a broken steam line or feedwater line. If one of the lines should break, all of the valves are immediately closed. The closure time is important to safety because a steam line break could cause overpressurization of the Containment Building and possible release of radioactive material to the atmosphere. The required valve closure times have been calculated and recorded in FSAR Chapter 5.1.5, Sections I-4 and I-9, as modified by SARCN 1174 and documented in DER 83-80. The required closure time for MSIVs is 5 seconds; for FWIVs, 10 seconds. During pre-operational testing the MSIVs are tested at normal operating pressure and temperature but with no steam flow. The FWIVs are tested with no flow at ambient temperature. To ensure fast closure within specified limits during actual operating conditions, the valves are required to close during pre-operational tests in 4.2 seconds for the MSIVs and 8 seconds for the FWIVs. Testing under static conditions precludes the initiation of various pressure/temperature/flow transients associated with fast closure under full flow operating condition.

To date, only Unit 1 valves have been tested. Unit 2 and Unit 3 valves will be tested during their preoperational test period. The valve tag numbers for all three units are as follows:

	<u>Unit 1</u>	<u>Unit 2</u>	<u>Unit 3</u>
MSIV	1-J-SGE-UV-170	2-J-SGE-UV-170	3-J-SGE-UV-170
	1-J-SGE-UV-180	2-J-SGE-UV-180	3-J-SGE-UV-180
	1-J-SGE-UV-171	2-J-SGE-UV-171	3-J-SGE-UV-171
	1-J-SGE-UV-181	2-J-SGE-UV-181	3-J-SGE-UV-181
FWIV	1-J-SGA-UV-174	2-J-SGA-UV-174	3-J-SGA-UV-174
	1-J-SGA-UV-177	2-J-SGA-UV-177	3-J-SGA-UV-177
	1-J-SGB-UV-132	2-J-SGB-UV-132	3-J-SGB-UV-132
	1-J-SGB-UV-137	2-J-SGB-UV-137	3-J-SGB-UV-137

Evaluation

The MSIVs and FWIVs are manufactured by the Anchor/Darling Valve Company (A/DV). The valves are normally held open with hydraulic pressure supplied by a pump and a nitrogen (N₂) filled accumulator.

During the fast close operation, hydraulic oil flows from the accumulator to the valve operator propelled by the nitrogen.

The reason for the valves' failure to close in the required time was lack of sufficient hydraulic fluid in the accumulator caused by an incorrect "Precharge Pressure vs Temperature" curve used for nitrogen precharging. The manufacturer has attributed the lack of oil to incorrect nitrogen precharge in the accumulator. If the N₂ precharge pressure is too high, full charging will occur before sufficient hydraulic oil volume is pumped into the accumulator. The actuator is most susceptible to this condition when charging at high ambient temperature when the precharge is near maximum. The hydraulic accumulator precharge pressures are temperature-related; increased nitrogen temperature increases the nitrogen pressure.

The accumulator precharge procedure is as follows:

To precharge the accumulators or to check the precharge pressure, graphs of "Precharge Pressure vs Temperature" should be used. The nitrogen temperature should be the same as the outside surface temperature at the mid-length of the accumulator; assuming stable ambient temperatures for several hours.

After dumping the hydraulic fluid from the accumulators (precharge check mode) and prior to recharging the accumulators with hydraulic fluid, the nitrogen pressure must be allowed to stabilize for a minimum of three (3) minutes before comparing with the "Precharge Pressure vs Temperature" graphs.

The original "Precharge Pressure vs Temperature" curve provided by the valve manufacturer in the instruction manual did not provide adequate oil reserve in the accumulator over the entire precharge temperature range. Based upon field testing, this curve was revised and simulated verification of the new curve was conducted. The mass of nitrogen was adjusted and the valves were operated satisfactorily over the range of the new curve. Using the revised curve and the new precharge pressure provided by A/DV, all MSIVs and FWIVs were retested and found to close within the specified 4.2 and 8.0 seconds, respectively.

II. Analysis of Safety Implications

In order to meet the safety analysis requirements, it is essential that the valves fast close within the FSAR specified limits. Since the closure time obtained during the test exceeded the specified value (in some cases by a factor of five), this condition is evaluated as reportable under the requirements of 10CFR50.55(e); since, if this condition were to remain uncorrected, it would represent a significant safety condition.

This project has also evaluated this condition as reportable under 10CFR21.21(b)(3). This report addresses the reporting requirements of the regulation with the exception of subpart (vi), regarding the number and location of such components supplied to other facilities.

III. Corrective Action

Action required to resolve this condition and to preclude recurrence is as follows:

Reduce precharge pressure such that the maximum allowable pressure will occur at the highest ambient temperature. Highest precharge pressure which permits sufficient oil volume for complete valve closure is determined by test. This value, less margin, is the recommended precharge at the highest normal ambient temperature.

Based on the above, NCR SM-4456 and SM-4632 have been dispositioned with the following final resolution in order to close the NCR action:

1. The nitrogen precharge pressure-temperature curve has been revised. The revised curve has been incorporated into the Anchor/Darling Instruction Manual (Bechtel Log No. M234A-52) via SDCN S00886.
2. N₂ accumulator low pressure alarm setpoint has been changed from 4800 psig to 5000 psig per DCN 653 to the setpoint document (Bechtel Document No. 13-J-ZZI-003, Rev. 7).

3. N₂ accumulator normal operating pressure has been changed from 5000 psig to 5200 psig. A/DV is requested per Bechtel Telex BT/ADVC-E-6649, dated 8/17/84, to revise the instruction manual to reflect this change.
4. DCPS 2SJ-SG-116 and 3SJ-SG-116 have been issued to implement the N₂ accumulator low pressure alarm setpoint change in Units 2 and 3, respectively.