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DUKE POWER

May 24, 1990

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Catawba Nuclear Station
Docket No. 50-414
LER 414/89-10, Rev. 1

Gentlemen:

Attached is Licensee Event Report 414/89-10, Revision 1, submitted as a Courtesy Report concerning FAILURE OF MOTOR ACTUATED BORG-WARNER MODEL 6J-219 VALVE TO FULLY CLOSE UNDER HIGH DIFFERENTIAL PRESSURE CONDITIONS DUE TO MANUFACTURER'S DESIGN DEFICIENCY.

This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Tony B. Owen
Station Manager

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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Catawba Nuclear Station, Unit 2	0 5 0 0 0 4 1 4	1 OF 1 0

TITLE (4) Failure of Motor Actuated Borg-Warner Model 6J-219 Valve To Fully Close Under High Differential Pressure Conditions Due To Manufacturers Design Deficiency

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
									N/A	0 5 0 0 0
0 3	1 4	8 8	8 9	— 0 1 0	— 0 1	0 5	2 9	9 0		0 5 0 0 0

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	Courtesy LER
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
C.L. Hartzell, Compliance Manager	8 0 3 — 8 3 1 — 3 6 6 5

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B	B A	V	B 3 5 0	Y							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16)

On March 14, 1988, Unit 2 was in Mode 4, Hot Shutdown. At 1154 hours, while flushing the Auxiliary Feedwater (CA) piping, 2CA62A, CA Pump 2A Discharge to S/G 2A Isolation, failed to completely close resulting in a Feedwater Isolation addressed in LER 414/88-013. During the investigation, a Problem Investigation Report was initiated for 2CA62A failing to close completely. Testing of 2CA62A found that the valve was set up per the design documents. The valve would not fully close under high D/P conditions until the valve actuator was setup at the highest torque switch setting allowed by the tolerances. Further testing of the Borg-Warner model number 6J-219 valves has yielded valve factors 27% to 147% greater than those used by the valve manufacturer to size the valve actuators. This incident is attributed to a Manufacturer's Design Deficiency due to valve factors greater than those used in the original actuator sizing calculations. The testing and operability evaluations were expanded to include Borg-Warner valves of similar design. As necessary, modifications to the actuator torque switch setting increased the actuator torque output to meet the actual D/P conditions that exist for each application. Compensatory Actions were initiated to maintain operability when modifications could not be initiated immediately. This report is a Courtesy LER.

BACKGROUND

The Auxiliary Feedwater [EIIS:BA] (CA) System assures sufficient feedwater supply to the Steam Generators [EIIS:HX] (S/G) for decay heat removal in the event of loss of Main Feedwater [EIIS:SJ]. The CA System is independent for each Unit. Each Unit has two 100% capacity Motor Driven CA Pumps [EIIS:P] and one 100% capacity Turbine [EIIS:TRB] Driven CA Pump (CAPT).

Each CA pump is normally aligned to supply two of the four S/Gs per Unit. Each CA pump discharge line is equipped with a motor [EIIS:MO] operated isolation valve [EIIS:V], an air operated fail-open control valve, and a check valve. To mitigate any condition which could cause low S/G pressure and cause the CA pumps to operate beyond their design capacity, runout protection is provided to automatically close the Motor Driven CA Pump Discharge valve to S/G B or C if the Turbine Driven CA Pump is operating and the Motor Driven CA pump of the opposite train fails to start after a 30 second time delay. The Motor Driven CA Pump Discharge valves which supply flow to S/Gs B and C will also individually and automatically close on a high pump discharge flow indicating excessive pump runout. Also, the CAPT discharge isolation valves to S/Gs A and D are aligned to the closed position while the CA System is aligned for Standby Readiness. These measures ensure that in the case of failure of a Motor Driven CA pump, that might otherwise be the only effective motor driven pump that would feed two effective S/Gs, the remaining motor driven CA pump and CAPT would not be affected by a common mode failure caused by depressurization of a shared S/G. There are eight motor operated CA pump discharge valves per Unit. Six of these valves are normally open when the CA System is aligned for standby readiness. Two of these six valves, CA 46B and CA 58A, receive an automatic signal to close for runout protection as described above. The remaining motor operated CA pump discharge valves are provided with essential train related power. However, they do not receive any automatic signals to reposition.

The CA pump motor operated discharge isolation valves are Borg-Warner item number 6J-219, 4 inch 1500 psi gate valves with a flexible wedge gate. These valves are equipped with Rotork Motor Actuators [EIIS:XCV] which are set up to stop closing at a specified torque output of the motor which relates to the stem thrust required to seat the valve. The motor opening circuit has a specified torque switch [EIIS:XIS] setting to prevent damage to the actuator and motor during the opening cycle and a 95% open limit switch which prevents the valve from backseating. In certain applications where the valve opening is necessary to insure safety of the plant, the valve open torque switches are bypassed.

Duke Power Company is using valve signature analysis tests to obtain valve signature data and properly set the actuator torque switches to the manufacturer specified thrust values for opening and closing valves. Development of thrust values for gate and globe valves is based primarily on the standard formula:

Thrust = Differential Pressure Seat Load + Stem Rejection Load + Packing Load

The packing load is due to frictional resistance on the valve stem from the valve packing. The packing load is verified by cycling the valve under zero differential pressure (D/P) conditions and subtracting the stem rejection load. The stem rejection load is calculated by multiplying the upsteam pressure by the valve stem cross-sectional area. This force aids in valve opening and resists valve closing. The differential pressure seat load is the largest variable in the thrust equation and uses an empirically derived valve factor for each valve type. Flex wedge gate valves typically use a valve factor of 0.3 and globe valves use a valve factor of 1.1. The valve factor is multiplied by the valve seat area and the differential pressure across the valve to approximate the sliding disk friction component against the seat rings.

NRC Bulletin 85-03, Motor Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings, was issued on December 15, 1985. This bulletin requests licensees to develop and implement a program to insure that switch settings on certain safety-related motor-operated valves are selected, set and maintained correctly to accommodate the maximum differential pressures expected on these valves during normal and abnormal events within the design basis. This bulletin was issued by the NRC due to earlier events in the nuclear industry where motor operated valves failed due to improper torque switch setting. The scope of this bulletin was expanded to all safety-related motor operated valves by NRC Generic Letter 89-10, Safety Related Motor Operated Valve Testing and Surveillance, issued December 28, 1989.

EVENT DESCRIPTION

On March 14, 1988, Unit 2 was in Mode 4, Hot Shutdown, and the Control Room Operator (CRO) was performing a flush of the CA piping to S/G 2A using Motor Driven CA Pump 2A. At 1154 hours, the CRO attempted to close 2CA62A, CA Pump 2A Discharge to S/G 2A Isolation valve. The CRO secured CA Pump 2A in an attempt to prevent overfilling S/G 2A. 2CA62A failed to completely close which contributed to the overfill of S/G 2A and resulted in a Feedwater Isolation that was addressed in LER 414/88-013.

On April 1, 1988, Problem Investigation Report (PIR) 2-C88-0143 was initiated by the Catawba Safety Review Group, during the investigation for LER 414/88-013, to determine the cause of 2CA62A failing to completely close. On April 6, 1988, Compliance issued an Intrastation Letter that determined 2CA62A to be operable pending a Design Engineering operability evaluation. On April 20, 1988, Design Engineering issued an Operability Evaluation for 2CA62A that determined the valve to be operable based on the following reasons:

1) 2CA62A does not receive any automatic signal to close,

2) The function of 2CA62A is to isolate Motor Driven CA Pump 2A from S/G 2A and this is done by Operator action in the event of a faulted S/G 2A,

3) If the valve did not close during a design basis event with a faulted S/G 2A, a condition will not result where insufficient flow is delivered to the intact S/Gs even with the single failure of either of the two remaining CA pumps. Also, the CA flow from CA Pump 2A to Containment through the faulted S/G 2A is bounded by the existing FSAR Chapter 15 analysis.

On April 21, 1988, Performance issued Work Request 6398 PRF to investigate and repair the actuator on 2CA62A after performing a review of the PIR. On April 27, 1988, the valve actuator was tested per the work request and the torque switch settings were found to be correct per the design documents. Since no problems were found with the torque switch settings, 2CA62A was retested at 1800 psi D/P conditions by Performance, on April 28, 1988, and it failed to fully close. Instrumentation and Electrical (IAE) adjusted the torque switches on 2CA62A to the maximum allowed by the manufacturing design tolerance. After the adjustment of the torque switches, 2CA62A was retested by Performance and it fully closed under 1800 psi D/P flow conditions on April 30, 1988. On June 15, 1988, 2CA62A was tested again and little or no change was found in the torque switch settings from the set up performed on April 30, 1988. Therefore, the motor operator was determined to be acceptable.

On July 18, 1988, Design Engineering revised the Proposed Problem Resolution on the PIR to have the internals of 2CA62A inspected during the next outage to determine if excessive tolerances are present in the valve disk guides that might be causing binding and thus the higher open to close valve thrust. The PIR resolution also addresses the remaining CA pump discharge isolation valves and states that a review of work requests finds that no work requests were identified relating to valve actuator problems since the valves were setup using the valve signature analysis testing, although it was not known with certainty whether the remaining valves had been cycled under full D/P conditions. Therefore, Design Engineering recommended that the Borg-Warner 6J-219 valves continue to be monitored.

On November 4, 1988, Duke Power Company performed valve signature analysis testing on a Borg-Warner 6J-219 valve on the boiler feed loop at Riverbend Steam Station. This test resulted in higher than anticipated seating loads at high D/P conditions, and the valve failed to close on two of the tests completed with D/P greater than 1500 psid. The letter reporting the results of this testing stated that further testing needs to be completed with more instrumentation to better determine the cause of the problem.

As a result of the November 4 testing at Riverbend, the operability evaluation for PIR 2-C88-0143 was revised. Revision 1 expanded the scope of the operability evaluation to address the ability to close of all the motor operated CA pump discharge valves. This operability evaluation concludes that the CA pumps motor operated discharge isolation valves are operable if they can close against a D/P of 1425 psid, based on design basis accident conditions. The operability evaluation further stated that valves CA58A and CA46B are the only

valves that receive an automatic closure signal and must be able to close when D/P across the valve is less than or equal to 1425 psid. The remaining valves, CA38A, CA42B, CA50A, CA54B, CA62A, and CA66B, are closed by Operator action and the failure of any or all of these remaining valves would not result in a condition where insufficient flow is delivered to the S/Gs. The operability evaluation also states that review of the Riverbend test data and the as-left valve signature analysis test data for the affected valves indicates all valve operators provide sufficient thrust to close against 1425 psid.

On November 15, 1988, further testing was conducted on the flow loop at Riverbend Steam Station after the valve tested on November 4, 1988 had been disassembled and metal spacers had been installed between the wedge guide ring and the bonnet. The results of this test were not appreciably different than the results of the test performed on November 4.

On November 26, 1988, during the Unit 1, End of Cycle 3 (EOC-3) refueling outage, 1CA42B, 1CA46B, 1CA58A, and 1CA62A were tested at 1800 psi D/P conditions. 1CA42B was the only valve that would not close enough to isolate flow. All four valves indicated intermediate position after valve closing and were from 1/8" to 1/2" from their initial closed position when the valves were closed with zero D/P. 1CA46B indicated fully closed the second time it was stroked under 1800 psid conditions. 1CA58A seated far enough to stop flow indication. However, it stopped about 3/8" from the reference stroke under D/P conditions and the actuator stopped on motor thermal overloads instead of on the torque switch setting. Work Request 6710 PRF was initiated on November 28, 1988 to determine why 1CA58A would not stroke. Work Request 6710 PRF was completed on January 20, 1989, at the end of the EOC-3 outage. The Rotork actuator was replaced and found to have a damaged stem nut thrust bearing. The torque switches were found to be set correctly on 1CA58A. Due to problems with the valve signature analysis test data acquisition equipment, valve signature data was not obtained during the D/P testing on the Unit 1 CA valves.

On March 13, 1989, while Unit 2 was beginning the EOC-2 refueling outage, 2CA42B, 2CA46B, 2CA58A and 2CA62A were tested using valve signature analysis tests to determine the thrust required to seat these valves under D/P conditions of approximately 1800 psid. During this test, three of the four valves failed to completely isolate the flow during the test and all four failed to wedge completely closed. Valve signature analysis test data obtained during the portion of the test completed with the torque switches bypassed, yielded closing valve factors ranging from 0.38 to 0.74 which is considerably higher than the 0.3 valve factor supplied by the valve manufacturer.

As a result of the Unit 2 CA valve testing data, revision 2 of the Operability Evaluation for PIR 2-C88-0143 was issued on March 17, 1989. This evaluation stated that 1CA46B is operable based on the Unit 1 testing completed on November 28, 1988, where 1CA46B fully isolated flow. However, since D/P testing had not been completed on 1CA58A, its torque switch settings were changed to correspond to the worst case valve factors determined during the Unit 2 testing for the

valve to be considered operable. A Nuclear Station Modification was initiated and completed on March 17, 1989, to change the torque switch setpoints on 1CA58A to the values computed for the worst case valve factors. The torque switch setting was changed to the most conservative value because D/P testing could not be performed with the Unit on line. The new torque switch setting ensured the valve would close at the actual flow of 1425 psid, but did not meet the design flow of 1800 psid.

On April 6, 1989, 2CA62A was disassembled and inspected during the Unit 2 refueling outage. Inspection of 2CA62A did not reveal any significant damage that could be judged to have caused binding in the valve.

On May 12, 1989, revision 4 of the Operability Evaluation for PIR 2-C88-0143 was issued to address operability of valves 2CA46B and 2CA58A. This evaluation stated that 2CA46B is operable in that it successfully closed during a flow D/P test of 1800 psid. Valve 2CA58A did not close during the test and required a torque switch setting change to correspond to the worst case valve factors (same settings as 1CA58A). Likewise, this new torque switch setting ensured 2CA58A would close at the actual flow of 1425 psid, but not the design flow of 1800 psi.

CONCLUSION

The failure of 2CA62A to fully close with an 1800 psi differential pressure across the valve has been attributed to design deficiency. The actual valve factors obtained in field D/P testing of Borg-Warner 6J-219 valves are 27% to 147% greater than the manufacturers supplied valve factors which are used to calculate the required actuator thrust to close the valves. The valve factor is used by the manufacturer to size the actuator and to calculate the required thrust for the actuator torque switch settings.

Duke Power conducted further D/P testing of Borg-Warner valves of similar design as the 6J-219 valve to determine if design deficiencies exist in other Borg-Warner pinned guide ring, flex wedge gate valves. Results of this testing indicates higher than expected valve factors on valves of similar design to the 6J-219. From a Design Engineering operability evaluation, the other Borg-Warner safety related valve types onsite affected are as listed below:

Group A

1. Safety Injection [EIIS:BQ] Pump to Cold Leg Injection Isolation valves
2. Centrifugal Charging [EIIS:CB] Pump to Cold Leg Injection Isolation valves
3. Residual Heat Removal [EIIS:BP] System to Safety Injection Pump and Charging Pump Suction Supply (two different valve types)
4. Safety Injection Pump to Hot Leg Injection Isolation valves
5. Safety Injection Pump to Cold Leg Injection Header Isolation valve
6. Steam Supply [EIIS:SA] Isolation valves to the Auxiliary Feedwater Pump Turbine

Group B

1. Steam Generator Blowdown [EIIS:WI] Isolation valves
2. The Steam Generator Main Feedwater (CF) Bypass to CA Nozzle valves which are air operated.

Group A valves have been evaluated by Design Engineering and can perform their function in an accident condition even with the assumed higher valve factor. Valves in this group required no action to maintain operability.

The Group B valves could not be justified solely from an engineering calculation as to their ability to close fully under design D/P conditions. Testing was conducted on the Unit 2 CF to CA Nozzle valves at D/Ps greater than the required accident D/P and the valves isolated flow properly. Thus, they were considered fully operable. The Steam Generator Blowdown Isolation valves are considered conditionally operable with their torque switches unmodified, with compensatory action to be taken by the Operators in a seismic event to manually isolate blowdown flow. Unit 2's valves were modified prior to returning the Unit to power to provide sufficient closing torque, assuming the 0.74 valve factor for carbon steel valves. The compensatory action was being used to supplement the automatic function on Unit 1, until the torque switches were modified in June, 1989.

The torque switch adjustments to the CA Pump Discharge Motor Operated Isolation valves and the Steam Generator Blowdown (BB) Containment Isolation valves maintained valve operability in accordance with the actual flow D/P conditions. The CA valves had the potential of failing to close under a maximum system D/P, although torque switch adjustments assured the valves would close under accident flow D/P condition. The BB valves' torque switch settings were adjusted above the normal maximum setting to obtain the required operator torque to close under the maximum D/P condition. To further improve on system reliability, the Unit 1 CA valves and inside Containment BB valves were replaced during the End-of-Cycle 3 refueling outage. The Unit 2 valves are scheduled to be replaced during the End-of-Cycle 3 refueling outage. Replacements for the outside Containment BB valves are being procured.

Duke Power Company also completed a Valve Factor Analysis on the 6J-219 valve design to determine the cause of the higher than normal valve factor, and to propose design solutions to bring the valve factor to a more acceptable value. Borg-Warner has also been contacted to respond on the failure of the 6J-219 valve to operate as designed against a design D/P of 2000 psid. The results of this analysis were compiled by Kalsi Engineering, Inc. and presented to Duke Power in April 1990. Using mathematical modeling and Duke Power's test data analysis, a systematic investigation revealed that the coefficient of friction between the sliding gate and seat couple is the critical factor in the Borg-Warner Valve Actuator failures being experienced at Catawba. Analysis showed that degradation of the valve internals was the result of undesirable tilting of the gate in the mid-travel position. This degradation led to an increase in the coefficient of friction and eventually to failure of the valve

to close. The coefficient of friction associated with a closing motion was shown to increase 33% on a 4 inch Borg-Warner gate valve in 26 cycles of the valve. The coefficient of friction associated with opening the valve was shown to increase by 80% over 26 cycles, normally at a value less than the closing value due to the angle of seat contact. Although recommendations were made for possible retrofit modifications, the results of this analysis supported valve replacement as the most comprehensive resolution.

A review of the Operating Experience Program database indicates three previous problems with torque switch settings on motor operated valve actuators over the past three years (see LERs 413/86-18, 413/86-36, 413/86-57). The resolution to these licensee event reports would not have prevented the occurrence of this incident. Of the LERs reviewed, LER 413/86-57 was the only LER attributed to a design deficiency. This was because information supplied by the actuator supplier assumed that the torque switch settings verses actuator thrust was a linear relationship which was discovered to be in error by Duke Power personnel bench testing an actuator. All affected actuators were corrected. However, that resolution has no bearing on the problem addressed in this report. For this reason, this incident does not meet the Duke Power Company definition of a recurring problem.

Since the issuance of Bulletin 85-03, many problems have been identified and corrected and there seems to have been a decline in Problem Investigation Reports and LERs associated with motor actuator torque switches at Catawba Nuclear Station since 1987. This decline may be due to other factors. However, it appears that programmatic changes as a result of Bulletin 85-03 have improved the performance of motor operated valve actuators.

CORRECTIVE ACTION

IMMEDIATE

(1) CRO secured CA Pump 2A to attempt to prevent overfill of S/G 2A.

SUBSEQUENT

(1) PIR 2-C88-0143 was initiated to determine cause of 2CA62A not stroking fully closed.

(2) Work Request 6398 PRF was written to investigate/repair the actuator on 2CA62A and the valve was found to be setup within design tolerances.

(3) After 2CA62A was retested and failed to close under full D/P conditions, the valve was setup at the maximum design tolerances and closed when retested under full D/P conditions.

(4) Testing performed on a Borg-Warner 6J-219 valve at Riverbend Steam Station under D/P conditions found that the valve would not close at D/P greater than 1500 psid.

(5) Testing performed on the Unit 1 CA Pump Motor Operated Discharge Valves at 1800 psi D/P condition during EOC-3 found that 1 of the 4 valves tested would not fully stop flow.

(6) Testing performed on the Unit 2 CA Pump Motor Operated Discharge Isolation Valves during EOC-2 yielded valve factors 27% to 147% greater than those supplied by the valve manufacturer.

(7) As a result of the testing results on Unit 2, the torque switch settings on 1CA58A were increased to account for the worst case valve factor found on Unit 2. The torque switch setting on 1CA46B was not changed since it had previously been tested and closed at 1800 psid.

(8) Borg-Warner has been contacted to respond to the failure of the 6J-219 valve to not operate as designed against a design differential pressure of 2000 psid.

(9) Emergency Procedures have been revised to direct the CROs to close the CA flow regulating valves upstream of the Motor Operated CA pump discharge valves in the event that a Motor Operated CA Pump Discharge Valve fails to close. This is in order to reduce the differential pressure sufficiently to close the Motor Operated CA Pump Discharge Valve on a faulted S/G.

(10) 2CA58A, which failed to fully close during the Unit 2 stroke test at the beginning of the EOC-2 outage, was retested and adjusted prior to the completion of the EOC-2 refueling outage per Work Request 1015 MES.

11) An Operability Evaluation addressed valves of similar design and initiated appropriate actions to maintain plant/system operability.

12) A Valve Factor Analysis was performed on the Borg-Warner 6J-219 valve design and concluded that failure of the actuators to close under high D/P is attributed to an increase in the sliding gate and seat couple coefficient of friction. Also, the increased friction is occurring at an excessive rate over a relatively few number of valve cycles.

13) Unit 1 CA Pump Discharge Isolation valves and inside BB Containment Isolation valves were replaced (CN-11186 and CN-11214).

PLANNED

1) The Unit 2 CA Pump Discharge Isolation valves and inside BB Containment Isolation valves will be replaced (CN-20567 and CN-20566).

2) Both Units 1 and 2 outside BB Containment Isolation valves will be replaced (CN-11216 and CN-20597, waiting on available valve replacements).

SAFETY ANALYSIS

The failure of 2CA62A to fully close under high differential pressure conditions has been determined by Design Engineering not to be a safety concern for the following reasons.

* CA62A does not receive any automatic signal to close in any design basis event.

* The function of CA62A is to isolate Motor Driven CA Pump A from S/G A.

* If a design basis event occurs with a faulted S/G A and valve CA62A fails to isolate S/G A, Motor Driven CA Pump A will deliver its entire capacity to the faulted S/G. In this event, the failure of either of the remaining CA pumps will not result in a condition in which insufficient flow is delivered to the intact S/Gs. In addition, the CA flow through the faulted S/G is bounded by FSAR Chapter 6 analysis.

This analysis would also apply to CA38A, CA42B and CA66B. Valves CA58A and CA46B receive an automatic signal to close to provide runout protection for the CA pumps in the event of a faulted S/G. 1CA46B and 2CA46B were tested with a D/P of 1800 psid and fully isolated flow. Recent testing of 1CA58A revealed that the valve would pass 100 gpm when attempting to close at a differential pressure greater than the required 1425 psid design basis D/P. After reviewing the design basis calculation, CNC-1223.42-00-0004, Design Engineering concludes that a leakage of 100 gpm through valve 1CA58A will not prevent the Unit 1 CA System from providing the minimum required flow to the intact S/Gs and all postulated design basis events. Furthermore, minimal increase in flow to the faulted S/G is within allowable limits and does not impact system operability.

For the reason stated above, the health and safety of the public were unaffected by this problem.