

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8710090135 DOC. DATE: 87/10/02 NOTARIZED: NO DOCKET #
 FACIL: STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
 AUTH. NAME AUTHOR AFFILIATION
 SCHERER, A. E. Combustion Engineering, Inc.
 RECIP. NAME RECIPIENT AFFILIATION
 MURLEY, T. E. Office of Nuclear Reactor Regulation, Director (Post 870411)

SUBJECT: Part 21 rept re fasteners installed in motor operated valves. Initially reported on 870930. Valve yoke-to-yoke adapter fasteners replaced to meet allowable stress limits.

DISTRIBUTION CODE: IE19D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 6
 TITLE: Part 21 Rept (50 DKT)

NOTES: Standardized plant.

05000530

	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL		RECIPIENT ID CODE/NAME	COPIES LTTR ENCL
	PD5 LA	1 0		PD5 PD	1 1
	LICITRA, E	1 1		DAVIS, M	1 1
INTERNAL:	AEOD/DOA	1 1		AEOD/DSP/TPAB	1 1
	ARM TECH ADV	1 1		NRR CRUTCHFIELD	1 1
	NRR VARGA, S	1 1		NRR/DEST/ADE	1 1
	NRR/DEST/ADS	1 1		NRR/DLPQ/QAB	1 1
	NRR/DOEA/EAB	1 1		NRR/DOEA/GCB	1 1
	NRR/DRIS/VIB	1 1		NRR/PMAS/ILRB	1 1
	REG FILE 01	1 1		RES DEPY GI	1 1
	RES/DE/EIB	1 1		RGN1	1 1
	RGN2	1 1		RGN3	1 1
	RGN4	1 1		RGN5	1 1
EXTERNAL:	INPD RECORD CTR	1 1		LPDR	1 1
	NRC PDR	1 1		NSIC SILVER, E	1 1
NOTES:		1 1			

COMBUSTION ENGINEERING

October 2, 1987
LD-87-057

Dr. T. E. Murley, Director
Office of Nuclear Reactor Regulation
Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: 10 CFR 21 Report on Fasteners Installed in Motor Operated
Valves at PVNGS Unit 3

Dear Dr. Murley:

This letter confirms my September 30, 1987, verbal notification to Mr. Starostecki (NRC) in accordance with 10 CFR 21. In that notification, I reported a potential substantial safety hazard related to motor operated valves supplied by Combustion Engineering and installed in the Shutdown Cooling System (SCS) at Palo Verde Nuclear Generating Station (PVNGS) Unit 3.

Combustion Engineering procured the subject valves from the Nuclear Valve Division of Borg-Warner Corporation as original equipment at PVNGS. The valves (SI-651 and SI-652) are located in the SCS return lines from the Reactor Coolant System. The fasteners of interest are those between the valve yoke and the yoke adapter and are designated to take the entire thrust load of the stem, the torque of the operator as well as seismic loads. A test at the Palo Verde site has shown that, with the as-found fastener (studs and nuts) configuration on Palo Verde Unit 3, the normal closing stem thrust causes the studs to yield, separating the adapter from the yoke by approximately 1/32 inch. While the fasteners are not expected to fail upon a single closure, the expected number of cycles to failure is small and, therefore, both SI-651 and SI-652 could fail at the same time. Failure of the fasteners on both valves would result in an inability to open the valves, thus preventing entry into shutdown cooling.

Although Combustion Engineering has provided the same valves on all three Palo Verde Units, Units 1 and 2 were found to have a different size and/or quantity of the fasteners (bolts) in question. Evaluation of the bolting combinations on these two Units indicates that the bolts are not expected to be over-stressed during valve operation.

50-530

Power Systems
Combustion Engineering, Inc.

1000 Prospect Hill Road
Post Office Box 500
Windsor, Connecticut 06095-0500

(203) 688-1911
Telex: 99297

8710080135 871002
PDR . ADOCK 05000530
S PDR

IE 19
1/1

Dr. T. E. Murley
October 2, 1987

LD-87-057
Page 2

It is our understanding that the planned corrective action at Palo Verde is to replace the valve yoke to yoke adapter fasteners such that allowable stress limits are met. It is also our understanding that Unit 3 has already made the necessary modification.

Combustion Engineering does not have information indicating the type of bolting configurations that Borg-Warner may have provided on any other motor operator valves at any other nuclear units. The attachment to this letter provides the available information relative to the PVNGS valves pursuant to 10 CFR 21.

If you or your staff have any questions on this matter, please feel free to contact me or Mr. D. L. Sibiga of my staff at (203) 285-5216.

Very truly yours,

COMBUSTION ENGINEERING, INC.



A. E. Scherer
Director
Nuclear Licensing

AES:ss
Attachment

xc: Dr. S. T. Brewer, C-E

- (i) Name and address of the individual or individuals informing the Commission.

Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, CT 06095

- (ii) Identification of the facility, the activity, or the basic component supplied for such facility or such activity within the United States which fails to comply or contains a defect.

Borg-Warner Motor Operated Gate Valve
16 x 12 x 16 inch 1512 1b
Drawing No. 77850
C-E valve tag numbers SI-651 and SI-652

- (iii) Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.

Combustion Engineering (C-E) purchased the subject component from:

Nuclear Valve Division
Borg-Warner Corporation
7500 Tyrone Avenue
Van Nuys, CA 91409

The current name and address for the company responsible for the component is:

Borg-Warner Industrial Products, Inc.
2300 East Vernon Avenue
Vernon, CA 90058

- (iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

Two motor operated valves (SI-651 and SI-652) in the Shutdown Cooling System return line from the Reactor Coolant System at Palo Verde Nuclear Generating Station (PVNGS) Unit 3 have fasteners that do not comply with the approved drawing and, as a result, they are susceptible to early failure. The fasteners in question are located between the valve yoke and the yoke adapter, which is an intermediate piece between the yoke and the Limitorque operator. The valve drawing applicable at the time of shipment for SI-651 and SI-652 specified 16 stainless steel bolts, 7/8 in. diameter x 9 threads per inch. The as-found condition of the fasteners on Palo Verde Unit 3 indicated that there were 8 stainless steel studs and nuts, 5/8 in. diameter x 11 threads per inch.

The fasteners between the valve yoke and yoke adapter must take the entire thrust load of the stem (including normal torque switch loads, and stall torque), the torque of the operator, as well as seismic loads. A test at the Palo Verde site has shown that, with the as-found condition, the normal stem thrust (at normal operating torque switch setting) was sufficient to cause the studs to yield, separating the adapter from the yoke by approximately 1/32 inch. It should be noted that the critical loading of the fasteners occurs during valve closure and, therefore, failure would be expected during that operation.

The potential safety concern created by fastener (bolt or stud) failure is the inability of the operator to open these valves to initiate shutdown cooling. General Design Criteria 34 requires that shutdown cooling be available in spite of a single failure. Each of these valves, located in the Shutdown Cooling System return line, has the same deficiency in that the studs stretch upon each valve closure. While the fasteners are not expected to fail upon a single closure, the expected number of cycles to failure is small and, therefore, it is postulated that they could fail at the same time given that SI-651 and SI-652 are subjected to the same number of closure cycles. The operator, furthermore, will have no positive warning that the fasteners are becoming looser at each closing and no way of knowing of impending failure of the valves at the next closing. Although manual override of the Limitorque Motor Operators is provided, there is no assurance that the failure would not render the manual hand wheel operator ineffective since both the motor and the hand wheel operate through the same mechanism. Such a common failure of both SI-651 and SI-652 would render the operator unable to enter shutdown cooling.

Potential delays in post-accident Shutdown Cooling System availability would worsen the consequences of events which should be mitigated via timely Shutdown Cooling System operation as per Emergency Procedure Guidelines (i.e., small break LOCA's, SGTR's, and MSLB's). Under a worst case (small break LOCA) licensing scenario, inability to enter shutdown cooling prior to depletion of condensate sources (8 - 10 hours post-LOCA) would result in the inability to remove post-LOCA decay heat.

- (v) The date on which the information of such defect or failure to comply was obtained.

Initial C-E determination and notification to NRC - September 30, 1987.

- (vi) In the case of a basic component which contains a defect or fails to comply, the number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations in this part.

The suspect fasteners are 5/8 inch x 11 threads per inch stainless steel studs. Information presently available leads us to believe that PVNGS Unit 3 valves SI-651 and SI-652 are the only valves with the suspect fasteners. Units 1 and 2 at PVNGS have different size and/or quantities of fasteners (bolts) on SI-651 and SI-652. Evaluation of their bolting combinations indicates that the bolts are not expected to be overstressed during valve closing assuming that the torque switch is functioning properly. A malfunctioned torque switch on Units 1 and 2 would not be a limiting single failure in the Shutdown Cooling System and no single torque switch failure could prevent initiation of shutdown cooling. Combustion Engineering has no information as to the bolting configuration on Borg-Warner supplied valves on other nuclear units.

- (vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time has been or will be taken to complete the action.

It is our understanding that the studs connecting the valve yoke and the yoke adapter on Palo Verde Unit 3 have been replaced with bolts of a size and material that ensures that bolting stress limits are not exceeded during design basis valve operation. (8 each 7/8" carbon steel bolts are being employed as a suitable replacement for the 16 each 7/8" stainless steel bolts currently specified by the valve drawing).

- (viii) Any advice related to the defect or failure to comply about the facility activity, or basic component that has been, is being, or will be given to purchasers or licensees.

Both Borg-Warner and PVNGS have been made aware of the situation described herein. Combustion Engineering will also issue an Infobulletin on this subject to all utilities having a Combustion Engineering NSSS design.





11-11-11
11-11-11
11-11-11

2