

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37403
400 Chestnut Street Tower II

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WBRD-50-390/83-60

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNIT 1 - TARGET ROCK PRESSURIZER PORVs FAIL TO OPEN
WBRD-50-390/83-60 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIP Inspector P. E. Fredrickson on September 22, 1983 in accordance with 10 CFR 50.55(e) as NCR WBN NEB 8324. Enclosed is our final report. We consider 10 CFR Part 21 applicable to this deficiency.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

DS Kammer

for L. M. Mills, Manager
Nuclear Licensing

Enclosure

cc: Mr. Richard C. DeYoung, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Records Center (Enclosure)
Institute of Nuclear Power Operations
100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNIT 1
TARGET ROCK PRESSURIZER PORVs FAIL TO OPEN
NCR WBN NEB 8324
WBRD-50-390/83-60
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency

During hot functional testing for Watts Bar unit 1, the pressurizer power operated relief valves (PORVs) failed to open upon demand. The two PORVs (PCV-68-334 and PCV-68-340A) were manufactured by Target Rock, East Farmingdale, New York, and are valve model 82UU-001. Results of testing showed that while the valves would close when required and would open when the PORV block valve was closed, they would not open when the block valve was also open (the normal operating configuration). The PORVs' respective pilot valves would open but the main disc remained closed because the piston rings for the main disc compressed and allowed leakage past the rings and into the pilot disc chamber. This leakage prevented the necessary pressure decrease in the pilot chamber when the pilot disc opened, preventing the valve from opening because the valve's solenoid cannot lift the main disc against the unbalanced force of a full pressure drop.

Both TVA and Target Rock have analyzed the failed rings, but have not been able to conclusively identify the reason(s) the rings did compress. Testing did show that the rings were manufactured to requirements and Target Rock had performed qualification testing of this model valve for another customer without any evidence of ring failure. This supports the use of 17-7 PH (precipitation hardened) stainless steel (SS) for the rings. The corrective action described below will allow for the 17-7 PH SS to compress without interfering with proper valve functioning; therefore, TVA believes further investigation is unwarranted.

Safety Implications

Failure of the pressurizer PORVs to open either automatically or upon manual initiation would mean loss of the capability for high-point venting of the reactor coolant system (RCS). This loss could allow condensible gases to collect in the pressurizer and inhibit the control of pressure transients in the RCS. Also, since these PORVs serve as backups to administrative procedures for mitigation of possible cold overpressurization events, the failure of the PORVs could subject the RCS (when the system is "water solid") to pressures exceeding 10 CFR 50 Appendix G limitations, and thereby, jeopardize the safe operation of the plant.

Corrective Action

The valves were returned to Target Rock for modification and testing. The piston ring grooves were machined deeper and a backup ring made of Inconel X750 was placed behind the piston rings to provide the spring force to expand the 17-7PH piston rings. After modification, the valve was cycled a total of 1500 times at different temperatures and pressures, including 500 times at the operating conditions of 2335 lb/in²g and 657^oF. The valve operation was normal throughout the test and no anomalies were experienced. This backup ring is considered a permanent design change for this type valve and will prevent a recurrence of the valve's failure to open. The modified unit 1 valves will be installed by January 31, 1984, and even though the valves were fully tested to operating conditions at Target Rock, they will be subjected to a "mini" hot functional test before fuel load. The unit 2 valves had not previously been installed; therefore, the corrected unit 2 valves will be installed and tested in the normal construction sequence.

The implications of this problem for similar valves at Bellefonte Nuclear Plant are presently being evaluated and any discrepancies found will be handled according to TVA procedures.