

Washington Public Power Supply System

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Docket No. 50-508

February 8, 1983
G03-83-114

U. S. Nuclear Regulatory Commission, Region V
Office of Inspection and Enforcement
1450 Maria Lane, Suite 260
Walnut Creek, California 94596-5368

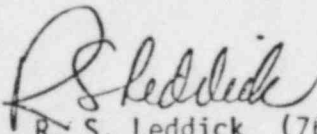
Attention: Mr. D. M. Sternberg, Chief
Reactor Projects Branch No. 1

Subject: POTENTIAL 10CFR50.55(e) DEFICIENCY
DIFFUSER RETAINING CAP SCREWS -
REACTOR COOLANT PUMPS (D/N #46)

Reference: Letter, G03-82-1137, Docket No. 50-508, Mr. R. S. Leddick
to Mr. D. M. Sternberg, same subject, dated November 5, 1982.

The referenced letter provided your office with an interim report for the subject condition. The report noted that the engineering evaluation of the deficiency had not been completed and, hence, a final determination of the safety significance could not be made at that time. Combustion Engineering has since completed their analysis of the deficiency. Based on an evaluation by CE, Ebasco and the Supply System, it has been determined that the subject condition is not reportable per 10CFR50.55(e).

Attached is the Supply System approved final report for the subject deficiency. The report details a description of the deficiency, corrective actions taken and analysis of the safety implications. Should you have any questions or require further information, please contact me directly.



R. S. Leddick (760)
Program Director, WNP-3

DRC:nj

Attachments

cc: J. Adams - NESCO
D. Smithpeter - BPA
Ebasco - New York
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WASHINGTON NUCLEAR PROJECT NO. 3
DOCKET 50-508

POTENTIAL 10CFR50.55(e) DEFICIENCY
FINAL REPORT

DIFFUSER RETAINING CAP SCREWS OF THE REACTOR COOLANT PUMPS

Description of the Deficiency

When the System 80 Reactor Coolant Pumps (RCP) were disassembled for inspection after the test runs in the CE-KSB test loop, diffuser retaining cap screws were found to have failed. The screws failed either under the head or at the first thread. CE has determined that the failure was caused by hydrogen embrittlement/stress corrosion cracking as a result of the heat treatment condition of the screw material (ASTM-A193-81A Gr. B6).

The cap screws support the diffuser-suction ring assembly when the pump is idle. With the pump running, hydraulic forces are sufficient to support the diffuser-suction ring assembly. Two cap screws secure each retaining ring segment and locking devices retain the cap screws.

Evaluation of Safety Implications

The failure of the cap screws has been determined to be not significant and not reportable under the criteria of 10CFR50.55(e). If the deficiency were to have remained uncorrected, it would not have adversely affected the safety of operations of the plant at any time throughout the lifetime of the plant.

CE has reviewed the potential failure mechanisms and their consequences, including a locked rotor, degraded pump coast down and core flow blockage and has determined that:

- a) During full power operation hydraulic forces alone can maintain the diffuser in place. Only during startup or coast down is there any potential for binding of the impeller.
- b) The assessment of the effects on the coast down show the RCP maintains sufficient flow to satisfy the criteria of the safety analysis.
- c) The potential for core flow blockage has been examined and it has been concluded that the gap between the impeller and the diffuser is small enough to prevent the escape of particles that are large enough to cause local core flow blockage.

Description of Corrective Actions Taken

Three modifications will be implemented to correct the diffuser retaining cap screw failures observed as a result of the pump testing at CE-KSB.

1. The cap screw material heat treatment will be changed to a condition so that the material is not susceptible to hydrogen embrittlement/stress corrosion cracking.
2. The diffuser assembly is a two piece arrangement to allow ease of installation. One side of the diffuser has six vanes and the other side has five vanes. Test results show that there is a preferred orientation of the six vane half versus the five vane half. The preferred orientation will be implemented on the WPPSS Unit 3 pumps.
3. Wedging devices between the two diffuser halves will be added. These devices improve the seating of the diffuser within the pump case.

The adequacy of these modifications will be verified by tests, including testing of production pumps at CE-KSB, before the modifications are installed in the WPPSS pumps. CE expects to complete their tests and issue a final report by March 31, 1983.