

LICENSEE EVENT REPORT

CONTROL BLOCK / / / / / / (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

/0/1/ /V/A/N/A/S/1/ (2) /0/0/-/0/0/0/0/0/-/0/0/ (3) /4/1/1/1/1/ (4) / / / (5)
 LICENSEE CODE LICENSE NUMBER LICENSE TYPE CAT

/0/1/ REPORT /L/ (6) /0/5/0/0/0/3/3/8/ (7) /0/8/0/8/8/2/ (8) /0/9/0/7/8/2/ (9)
 SOURCE DOCKET NUMBER EVENT DATE REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

/0/2/ / On August 8, 1982, with Unit 1 defueled, the "1A" Reactor Coolant Pump (RCP) was /
 /0/3/ / removed from its casing. Inspection of the impeller end of the pump and pump /
 /0/4/ / casing revealed that seven of twelve socket head cap screws which hold the dif- /
 /0/5/ / fuser adapter in place had failed. A Westinghouse safety analysis shows that the /
 /0/6/ / failure is not a safety hazard. The public health and safety were not affected. /
 /0/7/ / This event is reportable pursuant to T.S. 6.9.1.9.d. /
 /0/8/ /

SYSTEM CAUSE CAUSE COMP. VALVE
 CODE CODE SUBCODE COMPONENT CODE SUBCODE SUBCODE

/0/9/ /C/B/ (11) /E/ (12) /X/ (13) /P/U/M/P/X/X/ (14) /B/ (15) /Z/ (16)
 LER/RO EVENT YEAR SEQUENTIAL OCCURRENCE REPORT REVISION
 REPORT NO. REPORT NO. NO.
 (17) NUMBER /8/2/ /-/ /0/5/6/ /-/ /0/3/ /L/ /-/ /0/

ACTION FUTURE EFFECT SHUTDOWN ATTACHMENT NPRD-4 PRIME COMP. COMPONENT
 TAKEN ACTION ON PLANT METHOD HOURS SUBMITTED FORM SUB. SUPPLIER MANUFACTURER

/A/ (18) /Z/ (19) /Z/ (20) /Z/ (21) /0/0/0/0/ (22) /Y/ (23) /N/ (24) /N/ (25) /W/1/2/0/ (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

/1/0/ / An investigation is being conducted to determine the specific factors which /
 /1/1/ / caused the failures. All diffuser adapter cap screws on the "1A" RCP have been /
 /1/2/ / replaced with higher strength cap screws. /
 /1/3/ /
 /1/4/ /

FACILITY METHOD OF
 STATUS %POWER OTHER STATUS DISCOVERY DISCOVERY DESCRIPTION (32)
 /1/5/ /H/ (28) /0/0/0/ (29) / NA / (30) /C/ (31) /OBSERVED DURING MAINTENANCE/

ACTIVITY CONTENT
 RELEASED OF RELEASE AMOUNT OF ACTIVITY (35) LOCATION OF RELEASE (36)
 /1/6/ /Z/ (33) /Z/ (34) / NA / / NA /

PERSONNEL EXPOSURES
 NUMBER TYPE DESCRIPTION (39)
 /1/7/ /0/0/0/ (37) /Z/ (38) / NA /

PERSONNEL INJURIES
 NUMBER DESCRIPTION (41)
 /1/8/ /0/0/0/ (40) / NA /

LOSS OF OR DAMAGE TO FACILITY (43)
 TYPE DESCRIPTION
 /1/9/ /Z/ (42) / NA /

PUBLICITY
 ISSUED DESCRIPTION (45)
 /2/0/ /N/ (44) / NA /

NRC USE ONLY

NAME OF PREPARER W. R. CARTWRIGHT

PHONE (703) 894-5151

Description of Event

On August 8, 1982, with Unit 1 defueled, the "1A" Reactor Coolant Pump was removed from its casing to gain access to a suction flow splitter plate. Inspection of the impeller end of the pump and the pump casing revealed that seven of twelve socket head cap screws which hold the diffuser adapter in place had failed. The cap screw heads had separated from the threaded portion of the cap screws. The threaded part of the failed cap screws had backed out completely from their taps in bottom of the diffuser.

The diffuser adapter socket head cap screws were located in a cavity formed by the diffuser adapter and pump casing. Due to the small clearances at the bottom of this cavity, the parts of the failed cap screws were trapped and could not enter the main reactor coolant flow. All of the failed cap screw parts were found on the bottom of the cavity, which is formed by a pump casing ledge. All cap screw parts were retrieved with the exception of the lock wires.

North Anna Unit 1 and Unit 2 reactor coolant pumps are Westinghouse Series 93A Reactor Coolant Pumps. Unit 1 reactor coolant pumps have accumulated approximately three and one half years of operating time. This event is reportable pursuant to T.S. 6.9.1.9.d.

Probable Consequences of Occurrence

The manufacturer of the pump, Westinghouse Electric Corporation, has evaluated the event and determined that even if all the adapter socket head cap screws had failed, significant operational degradation of the reactor coolant pump would not have resulted. A loose adapter would initially drop loop flow about 0.2% which is much less than the existing flow margin of approximately 5.0% above core thermal design flow. In addition, the automatic low flow reactor trip would prevent operation below core thermal design flow.

The motion of a loose diffuser adapter can be generally characterized as "rattling around". Because diffuser adapter cocking in the pump casing is possible, an impeller shroud to diffuser adapter rub could occur at the top end of the diffuser adapter. A loose diffuser adapter could potentially damage the impeller and turning vane/diffuser to the extent that all three parts would require replacement. The casing could be damaged and machining of the fit may be required. The damage, which could be caused by a loose diffuser adapter, is not expected to have safety consequences; the impact would be purely economic. Friction caused by impeller/adapter contact, based on Westinghouse experience, will not affect coastdown of the pump relative to its safety function.

Failed loose diffuser adapter socket head cap screws did not and could not present a loose part hazard because they are trapped in the cavity formed by the diffuser adapter and pump casing. A loose adapter is restrained by the pump casing. A locked reactor coolant pump rotor from a loose diffuser adapter is not expected.

Cause of Event

An investigation by Babcock & Wilcox and Westinghouse Electric Corporation is being conducted to determine the specific factors which caused the failure.

Immediate Corrective Action

Socket head cap screw samples were sent to both Babcock & Wilcox and Westinghouse for failure analysis.

All reactor coolant pump "1A" diffuser adapter socket head cap screws have been replaced with new cap screws. Although an analysis of the cap screw stresses shows that the original cap screw material specified is acceptable for known sources of loading, the new cap screws have been made from a higher strength material. Westinghouse recommended the cap screw material change as a prudent interim corrective action.

Scheduled Corrective Action

Additional corrective actions, other than those already taken, will be determined and taken, if necessary, after currently ongoing failure investigations are complete.

Action Taken To Prevent Recurrence

Replacement of all the reactor coolant pump "1A" diffuser adapter cap screws with higher strength cap screws is an extra precaution that is being taken to prevent recurrence of cap screw failures.

Generic Implications

Of ten known inspections of Westinghouse Series 93A Reactor Coolant Pumps with operating histories ranging from one to ten years, this is the first case of diffuser adapter cap screw failures. The Unit 1 "1C" reactor coolant pump was also removed from its casing during the current outage. An inspection of the "1C" reactor coolant pump diffuser adapter showed that no cap screw failures had occurred on the "1C" pump.

Available histories of Westinghouse Series 93A Reactor Coolant Pumps indicate the diffuser adapter cap screw failures experienced by the North Anna Unit 1 "1A" reactor coolant pump do not have generic implications.