

U.S. NUCLEAR REGULATORY COMMISSION

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) /1/2/0/3/8/2/ (8) /1/2/2/1/8/2/ (9)
SOURCE DOCKET NUMBER EVENT DATE REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

/0/2/ / On December 3, 1982 with Unit 1 in Mode 2 and Unit 2 at 100 percent power, the /
/0/3/ / "A" Service Water Supply Header to the Unit 1 and 2 Charging Pump Lube Oil Cool- /
/0/4/ / ers and Air Compressors was isolated to repair a pinhole leak. The header was /
/0/5/ / restored to operable status in less than 72 hours; therefore, the health and /
/0/6/ / safety of the general public were not affected. This event is within the Action /
/0/7/ / Statement of T.S. 3.7.4.1 and reportable pursuant to T.S. 6.9.1.9.b. /
/0/8/ /

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

/0/9/ /W/A/ (11) /E/ (12) /D/ (13) /P/I/P/E/X/X/ (14) /A/ (15) /Z/ (16)
LER/RO EVENT YEAR SEQUENTIAL OCCURRENCE REPORT REVISION
REPORT NO. NO.
(17) NUMBER /8/2/ /-/ /0/8/1/ / / /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) /A/ (25) /G/3/4/4/
(26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

/1/0/ / A study completed by Lehigh University determined the cause of the pinhole leaks /
/1/1/ / to be aggressive water and, to a lesser degree, bacterial reduction of the mild /
/1/2/ / steel piping. On December 3, 1982 the piping was isolated and a temporary patch /
/1/3/ / was installed. On December 8, 1982, the affected piping was cut out and replac- /
/1/4/ / ed. /

FACILITY METHOD OF
STATUS %POWER OTHER STATUS DISCOVERY DISCOVERY DESCRIPTION (32)
/1/5/ /C/ (28) /0/0/0/ (29) / NA / (30) /A/ (31) / Operator Observation /

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) 8212300177 821221
TYPE DESCRIPTION PDR ADOCK 05000338
/1/9/ /Z/ (42) / NA / S PDR /

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

NAME OF PREPARER W. R. CARTWRIGHT PHONE (703) 894-5151

Description of Event

On December 3, 1982, with Unit 1 in Mode 2 and Unit 2 at 100 percent power, the "A" Service Water Supply Header to the Charging Pump Lube Oil Coolers and Air Compressors for both units (Line 3"-WS-73-151-Q3) was isolated to temporarily repair a pinhole leak. The header was removed from service again on December 8, 1982 with Unit 1 in cold shutdown and Unit 2 at 100 percent power to permanently repair the pinhole leak.

Probable Consequences of Occurrence

The integrity of the Service Water Piping was not jeopardized by this pinhole leak as the failure mechanism is localized corrosion and not generalized thinning of the pipe wall. Since the leak did not affect the operability of the system, the system operability was only affected when one header was isolated to repair the leak on the two separate occasions.

The redundant Service Water Loop was operable throughout the repair work and the affected loop was returned to service well within the 72 hour action statement on both occasions; therefore, the health and safety of the general public were not affected.

Cause of Event

A study has been completed by Lehigh University to determine the cause of the pin holes occurring on service water piping. This study indicated that the corrosion was caused by a combination of "aggressive water" and bacterial reduction of the mild steel piping. Lake Anna water analysis shows that there is a very low dissolved solids content and the water has a high affinity to dissolve whatever it contacts. In addition, the total alkalinity and hardness levels are very low. All of this contributes to the water being very aggressive or corrosive to metal piping. This corrosive activity is further increased by aerating the service water through the spray system. This provides oxygen to the system which aids the corrosion process. This study estimated that 80 percent of the corrosion present in the Service Water System is attributed to the aggressive water process.

The biological investigation provided positive indication of three types of bacteria in service water which cause corrosion. These are sulfate reducers (sulfide producers), ensheathed iron bacteria and filamentous iron bacteria. The study indicated that 20 percent of the corrosion present is attributed to this bacteria.

Immediate Corrective Action

On December 3, 1982, the affected Section of pipe was isolated and a temporary patch was installed to reduce the volume of water that was draining into the auxiliary building sump.

On December 8, 1982, the affected piping section was cut out and a new section was welded into place in the service water system using approved procedures. The replaced welds were liquid penetrant and hydrostatically tested prior to returning the header to service.

Scheduled Corrective Action

Further chemical treatments are scheduled to provide corrosion inhibition against further degradation of the service water system. Equipment and piping which has been degraded beyond acceptable limits will be replaced during major plant outages.

Action Taken To Prevent Recurrence

A chemical treatment program has commenced based on recommendations made by the consultants to inhibit further corrosion of the Service Water System.

Generic Implications

Similar events have been reported previously. This failure is generic to both units at North Anna Power Station. Plans are now being formulated to arrest further degradation of the system and restore or replace damaged material. Meanwhile, it is felt that no gross failures will occur since failures of this nature produce small pinhole leaks which are randomly located in the piping.