UPDATED REPORT - PREVIOUS REPORT DATE 1[illegible]-09-81

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

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

/0/2/ / On September 17, 1981, while in Mode 1 operation, the boron concentration in 1C /
/0/3/ / Safety Injection accumulator exceeded the maximum limit specified by T.S. 3.5.1. /
/0/4/ / Since the proper concentration could not be attained, the unit was placed in Mode/
/0/5/ / 4 (Hot Shutdown) as required by the Action Statement. Therefore, the health and /
/0/6/ / safety of the public were not affected. This event is reportable pursuant to /
/0/7/ / T.S. 6.9.1.9.b. /
/0/8/ / /

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

/0/9/ /S/F/ (11) /E/ (12) /Z/ (13) /V/A/L/V/E/X/ (14) /D/ (15) /D/ (16)

(17) LER/RO REPORT NUMBER | EVENT YEAR | SEQUENTIAL REPORT NO. | OCCURRENCE CODE | REPORT TYPE | REVISION NO.
/8/1/ /-/ /0/6/6/ / \ / /0/3/ /X/ /-/ /1/

ACTION TAKEN | FUTURE ACTION | EFFECT ON PLANT | SHUTDOWN METHOD | HOURS | ATTACHMENT SUBMITTED | NPRD-4 FORM SUB. | PRIME COMP. SUPPLIER | COMPONENT MANUFACTURER
/X/ (18) /B/ (19) /A/ (20) /A/ (21) /0/0/7/5/ (22) /Y/ (23) /N/ (24) /A/ (25) /G/2/5/5/ (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

/1/0/ / The high boron concentration in the accumulators was due to inleakage into the /
/1/1/ / make-up supply header from the Spent Fuel Pit. The accumulator boron concentra- /
/1/2/ / tion was restored by partially draining the accumulator and refilling with /
/1/3/ / borated water from the RWST. /
/1/4/ / /

FACILITY STATUS %POWER OTHER STATUS METHOD OF DISCOVERY DISCOVERY DESCRIPTION (32)

/1/5/ /E/ (28) /1/0/0/ (29) / NA / (30) /B/ (31) / Routine Test /

ACTIVITY RELEASED CONTENT 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 /

8201120320 811230
PDR ADOCK 05000339
S PDR

NRC USE ONLY
/ / / / / / / / / / / / /

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

UPDATED REPORT: Previous Report Date 10-09-81

Virginia Electric and Power Company
North Anna Power Station, Unit No. 2 Attachment: Page 1 of 3
Docket No. 50-339
Report No. LER 81-066/03X-1

Description of Event

On September 17, 1981, at 1003, the Unit 2 Shift Supervisor was informed by the Station Chemist that the boron concentration in 1C Accumulator was 2146 ppm. This was above the T.S. 3.5.1.c maximum concentration of 2100 ppm. Therefore, the 1C accumulator was declared inoperable and the Action Statement of T.S. 3.5.1 implemented. The accumulator was recirculated with the Unit 2 RWST via the hydrostatic test pump (1-SI-P-2) at about 12 gpm. In addition the RWST was recirculated by running the Quench Spray Pump (2-QS-P-1B). After about 4 hours of recirculation, the boron concentration in the accumulator was still high (2113 ppm), so the inoperable accumulator was drained to approximately 7250 gal. (less than the T.S. 3.5.1.b minimum volume of 7580 gal.). When the accumulator was refilled, the boron concentration was 2081 ppm, i.e. less than the maximum T.S. 3.5.1.b limit. The action statement was cleared, upon refilling the accumulator, at 1438. The total time the accumulator was inoperable was 4 hours and 35 minutes.

At 1535 on September 17, 1981, the Shift Supervisor was again notified that the 1C accumulator boron concentration was above the maximum T.S. 3.5.1.c limit (2140 ppm). The accumulator was declared inoperable and the same corrective actions taken.

After about 4 hours of recirculation, it was apparent that the boron concentration was not decreasing. Therefore at 1935, a unit shutdown to Mode 4 (Hot Shutdown) was initiated. The actions of the Emergency Plan Implementing procedures were initated. The unit was in Mode 2 at 2058, Mode 3 at 2116 and was placed in Mode 4 at 0325 on September 18, 1981. The total time in the Action Statement of T.S. 3.5.1 was 11 hours and 50 minutes.

At 0305 on September 18, 1981, just before reaching Mode 4, the Unit 2 RWST contained borated water volume was decreased by draining the contents to the Spent Fuel Pit to allow a dilution of the tank. This was done in response to a slowly increasing boron concentration in the RWST while recirculating with the 1C accumulator. In the process of this dilution, the RWST level inadvertently dropped below the T.S. 3.1.2.8.b.1 minimum level of 475,058 (97.3%) to a level of 96.25%.

These events are reportable pursuant to T.S. 6.9.1.9.b.

Probable Consequences of Occurrence

The accumulators are installed to provide a large volume of cooling water onto the core following a postulated Loss of Coolant Accident. The maximum limit on boron concentration ensures that the chemical conditions (specifically pH) within the containment sump following this accident are met.

Since the concentration obtained was only slightly above the maximum limit and the unit was placed in Mode 4 as required by the Action Statement, the health and safety of the public were not affected.

Cause of Event

This event was caused by inleakage from the Spent Fuel Pit (SFP) via the Refueling Purification (RP) system into the normal fill suction header to the hydrostatic test pump.

The boron concentration in the spent fuel pit was in excess of 2300 ppm boron. When the refueling purification system was aligned to recirculate the Spent Fuel Pit, a leakage path was established through the discharge check valve of the idle RP pumps through the pump and into the intersystem connection to the large suction header of the hydrostatic test pump. The valves installed in this intersystem connection (1-RP-11 Unit 1, 1-RP-53 Unit 2) were leaking and since the pressure head at the point of this leakage was greater than the head of the RWST, the inleakage path was established.

The suction to the hydrostatic test pump is from the 10" Safety Injection header from the RWST to the charging pumps. This header contains in excess of 7000 gallons of normally stagnant fluid. When the inleakage occurred, the boron concentration of this volume of water went as high as 2190 ppm. Through normal additions via the hydrostatic test pump to the accumulators to maintain the contained water volume, the highly borated fluid in this header was added thereby driving the accumulator boron concentration above the maximum T.S. 3.5.1 limit.

In the process of verifying the cause of this event, a previously unrealized temperature effect on the boron samples was discovered. When numerous samples were taken on the suction header as part of the test to identify the cause of this event, it was noted that a colder sample would indicate a lower boron concentration than a warmer sample. This effect is attributed to the temperature effects of using a non-positive displacement pipette. The make-up supply from the RWST is normally maintained between 4.4°C and 10°C. The error resulting from the colder sample made the make-up supply concentration appear to be within the T.S. limit when in fact, the actual concentration was 20 to 30 ppm higher. The effect of these erroneous samples was that the recovery from an event of high boron concentration in an accumulator was complicated. It also accounts for several conditions wherein the accumulator was within the limit one month following recirculation and, without adding any make-up, the accumulator boron concentration was high on the following monthly sample.

The cause of the RWST being drained below the T.S. minimum was personnel error.

Immediate Corrective Action

When the accumulator boron concentration was found to be higher than the T.S. 3.5.1 limit, the accumulator was declared inoperable and the action statement implemented. The boron concentration was lowered by partially draining and refilling the accumulator.

Immediate Corrective Action (Cont.)

The boron concentration in accumulators has been reduced by the addition of water that contains no boron.

The intersystem connection between the RP system and the make-up header has been isolated by closing the discharge and suction valves on the idle RP pumps. A maintenance request has been submitted to repair the valves which were determined to be leaking.

The chemistry samples will be conducted at a standardized temperature. If there is insufficient time available to allow the sample to reach the required temperature, a positive displacement pipette has been tested and will be used.

The RWST was refilled to bring its volume above the T.S. minimum.

Scheduled Corrective Action

No further action required.

Actions Taken to Prevent Recurrence

The actions described above should preclude recurrence of these events.

Generic Implications

These events are generic to North Anna Units 1 and 2.