(7-77)

LICENSEE EVENT REPORT

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

01 LICENSEE CODE: N C B E P 2 ② LICENSE NUMBER: 0 0 - 0 0 0 0 0 - 0 0 ③ LICENSE TYPE: 4 1 1 1 1 ④ CAT ⑤

01 CON'T REPORT SOURCE: L ⑥ DOCKET NUMBER: 0 5 0 - 0 3 2 4 ⑦ EVENT DATE: 0 5 0 6 8 1 ⑧ REPORT DATE: 0 5 1 9 8 1 ⑨

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES ⑩

02 As a result of problems discovered with the Unit No. 1 RHR heat exchangers, reported in

03 LER 1-81-32, a special inspection of the Unit No. 2 RHR heat exchangers, type CEU,

04 size 52-8-144, was performed to determine if similar problems existed. This inspection

05 revealed a partial displacement of the 2B heat exchanger divider plate. In addition,

06 testing and analysis of the 2A heat exchanger determined that a higher than design dif-

07 ferential pressure across its divider plate would exist at the design flow rate. This

08 did not affect public health or safety. Technical Specifications 3.7.1.1b, 6.9.1.8i

09 SYSTEM CODE: W B ⑪ CAUSE CODE: E ⑫ CAUSE SUBCODE: X ⑬ COMPONENT CODE: H T E X C H ⑭ COMP. SUBCODE: C ⑮ VALVE SUBCODE: Z ⑯

⑰ LER/RO REPORT NUMBER: EVENT YEAR: 8 1 — SEQUENTIAL REPORT NO.: 0 4 9 / OCCURRENCE CODE: 0 1 REPORT TYPE: T — REVISION NO.: 0

ACTION TAKEN: X ⑱ FUTURE ACTION: X ⑲ EFFECT ON PLANT: A ⑳ SHUTDOWN METHOD: A ㉑ HOURS ㉒: 0 4 5 6 ATTACHMENT SUBMITTED: Y ㉓ NPRD-4 FORM SUB.: Y ㉔ PRIME COMP. SUPPLIER: N ㉕ COMPONENT MANUFACTURER: P 1 6 0 ㉖

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS ㉗

10 A blockage of the heat exchanger water box tubes caused by an accumulation of shells in

11 both heat exchangers resulted in the 2B divider plate displacement and the calculated

12 reduced capability in 2A. The shells were removed from each heat exchanger which en-

13 abled the return of 2A to normal. The damaged divider plate in 2B is presently under-

14 going repairs to return it to normal.

15 FACILITY STATUS: F ㉘ % POWER: 0 7 6 ㉙ OTHER STATUS ㉚: NA METHOD OF DISCOVERY: C ㉛ DISCOVERY DESCRIPTION ㉜: Special Testing

16 ACTIVITY RELEASED: Z ㉝ CONTENT OF RELEASE: Z ㉞ AMOUNT OF ACTIVITY ㉟: NA LOCATION OF RELEASE ㊱: NA

17 PERSONNEL EXPOSURES NUMBER: 0 0 0 ㊲ TYPE: Z ㊳ DESCRIPTION ㊴: NA

18 PERSONNEL INJURIES NUMBER: 0 0 0 ㊵ DESCRIPTION ㊶: NA

19 LOSS OF OR DAMAGE TO FACILITY ㊸ TYPE: Z ㊷ DESCRIPTION: NA

20 PUBLICITY ISSUED: N ㊹ DESCRIPTION ㊺: NA NRC USE ONLY

NAME OF PREPARER: R. M. Poulk, Jr. PHONE: 919-457-9521

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With the unit at power, an evaluation, based on indications of heat exchanger tube obstructions found during inspections of the Unit No. 1 RHR heat exchangers, was performed on the Unit No. 2 RHR heat exchangers to ascertain their operability. Information concerning the condition of the RHR 2B heat exchanger was obtained using two techniques, ultrasonic and differential pressure testing. Both methods gave indications of divider plate damage. The lower head was then removed to obtain verification of the damage.

The divider plate separates the service water effluent from effluent in the RHR heat exchanger below the tube sheet. The top of the divider plate is welded to the tube sheet, both sides are welded to the water box walls, and the bottom fits into a groove in the water box cover. The divider plate is 1" thick x 44 3/4" high x 54" wide and is made of SB-402, Alloy 715 (70-30 Cu-Ni) material.

The divider plate was found buckled in the center at the bottom where it fits in the groove in the water box cover, and was displaced approximately 3 inches at the bottom center of the divider plate. The deflection started approximately 3 inches from one side and 9 inches from the other. The welds along the top and sides of the plate remained intact (the plate was replaced in April of 1980, reference LER 2-80-30).

Shells of various sizes were found on the inlet side and formed a layer averaging 2 inches in thickness with areas as much as 5 inches thick. Additional shell blockage was also found inside approximately 50% of the tubes.

Examination of RHR heat exchanger 2A using the ultrasonic test technique determined that the divider plate was intact with no displacement. Differential pressure tests, however, detected excessive dp's at design flow rates, and so RHR service water subsystem 2A was also declared inoperable. The bottom head of the 2A heat exchanger was removed and the baffle plate was found to be intact as indicated by the ultrasonic test. Shells of various sizes were found on the inlet side of the heat exchanger, and formed a layer approximately 1/4" to 1/2" thick. Additional shell blockage was also found inside affecting approximately 60% of the tubes.

An evaluation of design and operating data determined that shells found in the 2B heat exchanger had blocked and obstructed tubes, producing excessive differential pressures across the divider plate during the operation of an RHR service water pump. These differential pressures produced stresses greater than the divider plate could withstand, causing it to bow to the as found condition.

The presence of shells in the heat exchanger resulted from a buildup of oyster shells on the walls of the main service water piping. As the oysters died, their shells fell off and slowly collected in the heat exchanger. The oyster buildup resulted from the chlorination system being out of service for an extended period due to operating difficulties.

The high dp on the 2A RHR heat exchanger was the result of shells found in the heat exchanger that had blocked and obstructed tubes (as in the 2B heat exchanger). The shell buildup was not as extensive as in the 2B heat exchanger due to its more infrequent use. With fewer shells, the differential pressures during pump operation were not sufficient to cause divider plate deformation. The shells were removed from the water box and the tubes were cleaned to remove all obstructions in both heat exchangers. The divider plate of 2B is currently being repaired.

A review was made of the service water venting procedure, vent location, and piping arrangement to determine if problem areas existed, the result of which could lead to a water hammer. None were found. The piping itself was also inspected for evidence of water hammer damage or movement, and none was found.

An evaluation and inspection was performed on all other safety related loads cooled by service water to verify that the necessary cooling capability existed. All the D/G heat exchangers were inspected as they see frequent service. While a limited amount of shells were found, the volume had no impact on the cooling capability.

Random inspections or reviews of recent inspections were performed on the other safety related heat exchangers. All of these see infrequent service, and so there would not have been the opportunity for a gradual buildup of shells. No shell buildup problems were identified.

ACTIONS TO PREVENT RECURRENCE:

1. PT 8.1.4 will be revised to include as a prerequisite that the RHR service water headers have been verified full by venting.

2. The tubes in all the heat exchangers will be cleaned to remove obstructions.

3. A design review of the divider plate adequacy will be made.

4. Service water piping will be cleaned as necessary to ensure that shell blockage from existing growth on the piping will not endanger the performance of safety related heat exchangers.

5. The chlorination of service water will be reinitiated to prevent future shell growth.

6. The RHR heat exchangers will be monitored for shell buildup to ensure that divider plate stresses are maintained acceptably low.

7. Existing periodic inspection procedures for safety related service water cooled exchangers will be reviewed to assure that they are adequate.