NRC FORM 366 (12-81)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

APPROVED BY OMB 3150-0011 EXPIRES 4-30-82

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

01 | LICENSEE CODE: S C N E 1 (2) | LICENSE NUMBER: 0 0 - 0 0 0 0 0 - 0 0 (3) | LICENSE TYPE: 4 1 1 1 1 (4) | CAT: (5)

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

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 On June 23, 1983, video inspection of fuel assemblies found three, and a possible
03 fourth, broken hold-down springs on four Unit 1 fuel assemblies. The fourth spring
04 was positively identified as broken on July 1, 1983. Analysis of potential loss
05 of hold-down force, loose parts, or interference with CRA movement indicates that
06 operation with broken hold-down springs does not affect the health and safety of
07 the public.
08

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
09	R C (11)	E (12)	B (13)	F U E L X X (14)	Z (15)	Z (16)

(17) LER/RO REPORT NUMBER

EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
8 3	—	0 1 3	/	0 1	T	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER (26)
Z (18)	A (19)	Z (20)	Z (21)	0 0 0 0	N (23)	Y (24)	N (25)	X 9 9 9

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 The cause of this occurrence was component failure. The three Mark B6 spring
11 failures were caused by fatigue induced cracking at an existing surface flaw
12 which then propagated by fatigue. The fourth spring (Mark B7) failure cause is
13 not yet known. The springs will be replaced prior to reload, the fuel assembly
14 inspection program will continue, and the Mark B7 spring failure will be analyzed.

15 | FACILITY STATUS: H (28) | % POWER: 0 0 0 (29) | OTHER STATUS (30): NA | METHOD OF DISCOVERY: B (31) | DISCOVERY DESCRIPTION (32): Video inspection of fuel assemblies

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 TYPE: Z (42) | DESCRIPTION (43): NA

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PDR ADOCK 05000269
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20 | PUBLICITY ISSUED: N (44) | DESCRIPTION (45): NA | NRC USE ONLY

NAME OF PREPARER Jocelyn C. Petty PHONE: (704) 373-8270

IE 22

Duke Power Company
Oconee Nuclear Station

Report Number: RO-269/83-13

Report Date: July 21, 1983

Occurrence Date: June 23, 1983

Facility: Oconee Unit 1, Seneca, South Carolina

Identification of Occurrence: Four fuel assembly broken hold-down springs discovered on Unit 1.

Conditions Prior to Occurrence: Refueling shutdown

Description of Occurrence: On June 23, 1983, three broken hold-down springs, and a possible fourth, were discovered during a reactor core scan just prior to refueling operations. This scan was performed to identify any loose parts or other unusual condition such as broken springs. The fourth spring required further viewing and was positively identified as broken on July 1, 1983.

Apparent Cause of Occurrence: The apparent cause of this occurrence was component failure. The first three springs in question were Mark B6 springs and were part of the same batch of assemblies that had experienced similar failures (as documented in RO-269/80-15, RO-270/82-03, and RO-287/82-07). The mechanism of failure for these three springs was fatigue induced cracking at an existing surface flaw which then propagated by fatigue. The fourth spring was a Mark B7 spring. The fatigue mechanism for this spring is still being evaluated. That analysis will be summarized in a later revision of this incident report as soon as the information becomes available.

Analysis of Occurrence: The safety implications of operation with broken hold-down springs were adequately addressed in the RO reports referenced above, and are repeated here. The spring failures pose three potential concerns: (1) loss of hold-down force; (2) loose parts; and (3) interference with normal CRA movement. Analysis of these potential concerns has eliminated any reasonable safety questions.

With regard to loss of hold-down force, Babcock and Wilcox has confirmed analytically that reactivity increases due to reinsertion of a "lifted" assembly adds less than 0.01% $\Delta k/k$ per assembly. No lateral movement would result from lift since positive lateral restraint is provided through core internal structures. Lastly, no cyclic lifting/reinsertion is expected since one break in a spring reduces hold-down force slightly allowing the assembly to remain in place, and two breaks reduce the force to essentially zero, pinning the assembly in the lifted position.

Loose parts pose no additional safety hazard but are simply operational problems. All the spring breaks have occurred in one or both of the interface regions between the compressed and normal regions of the coil. Therefore, no more than three pieces, all of which exceed one complete circle, would be anticipated.

Such large pieces would not escape the upper end fitting. If they did, normal core flow would sweep the parts to the OTSG upper head where the piece would be reduced to a size small enough to move through the tubes before reentering the core. Pieces of such size do not cause sufficient flow blockage to be a safety concern.

Preliminary analysis of worse case positioning of broken springs indicates that no configuration will allow sufficient force to prevent CRA insertion or to substantially increase drop time. There is no way for a piece to completely block the CRA path since the fingers are partially inserted in the guide tubes at all times.

The results of the safety analysis indicate that operation with broken hold-down springs does not affect the health and safety of the public.

Corrective Action: The Fuel Assembly Inspection Program will continue until future analysis of hold-down spring results indicates that such a program is no longer necessary. The broken fuel assembly hold-down springs will be replaced with Mark B10 springs prior to reloading them into the core. The Mark B7 broken spring will be examined by B&W to determine the failure mode. This information will be provided when available.

DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

July 21, 1983

Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Re: Oconee Nuclear Station
Docket No. 50-269

Dear Mr. O'Reilly:

Please find attached Reportable Occurrence Report RO-269/83-13. This report is submitted pursuant to Oconee Nuclear Station Technical Specification 6.6.2.1.a(9), which concerns the discovery of conditions not specifically considered in the safety analysis report or Technical Specifications that require corrective measures to prevent the existence or development of an unsafe condition, and describes an incident which is considered to be of no significance with respect to its effect on the health and safety of the public. My letter of July 1, 1983 addressed the delay in preparation of this report.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

JCP/php

Attachment

cc: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

Mr. J. C. Bryant
NRC Resident Inspector
Oconee Nuclear Station

Mr. John F. Suermann
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555