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Region 2, Atlanta, Office of the Director

SUBJECT: LER 80-015/01T-0:on 800523,util discovered four assemblies w/broken holddown springs.Probably caused by high cycle fatigue.B&W continuing efforts to resolve concern.Adequate monitoring of loose parts monitoring sys verified.

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JUN 16 1980

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DUKE POWER COMPANY
OCONEE NUCLEAR STATION

Report No.: 50-269/80-15

Report Date: June 6, 1980

Occurrence Date: May 23, 1980

Facility: Oconee Units 1, 2, and 3, Seneca, South Carolina

Identification of Occurrence: Four Broken Holddown Springs Discovered in Spent Fuel Pool

Description of Occurrence:

After being notified on May 16, 1980 that Toledo Edison had discovered several broken holddown springs at Davis-Besse I, (a Babcock & Wilcox 177FA plant), Duke Power began inspecting all spent fuel assemblies and core verification films to identify any problems at Oconee. Of 686 assemblies inspected in the pools, only four were identified as having broken springs. None of the 531 incore assemblies showed broken springs on the core verification videotapes. The four affected assemblies are 1D47, 1D17, 1C43, and 3C33.

Apparent Cause of Occurrence:

No cause of the broken spring has been conclusively defined. The phenomena are thought to be involved in the spring failure in general: low stress high cycle fatigue and stress corrosion cracking. It is considered that stress corrosion is limited to certain heats of inconel material used in some of the springs. None of the springs from that heat at Oconee, however, exhibited any failures. It is presumed, therefore, that the four Oconee springs failed due to high cycle fatigue. Babcock & Wilcox is continuing extensive efforts to resolve this concern.

Analysis of Occurrence:

The spring failures pose three potential concerns: (1) loss of holddown 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 holddown force, B&W 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 holddown force slightly allowing the assembly to remain in place and two breaks reduces 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.

Corrective Actions:

At B&W's request, Duke instituted the following actions on May 23, 1980:

1. Increasedfrequency of control rod movement test.

2. Verified that adequate monitoring of loose parts monitoring system was being performed.

3. Verified that normal chemical sampling would identify increases in silver, indium or cadmium (or their daughters) in the RCS thereby indicating substantial control rod degradation.

B&W is continuing to evaluate the problem.

NRC FORM 366
(7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

EXHIBIT A

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

Line	Field	Value
0 1	Licensee Code (2)	S C N E 1
	License Number (3)	0 0 - 0 0 0 0 0 - 0 0
	License Type (4)	4 1 1 1 1
	CAT (5)	
0 1 (CON'T)	Report Source (6)	X
	Docket Number (7)	0 5 0 0 0 2 6 9
	Event Date (8)	0 5 2 3 8 0
	Report Date (9)	0 6 0 6 8 0

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 On May 16, 1980 Duke Power was notified that Toledo Edison had discovered
0 3 several broken holddown springs at Davis-Besse I. Inspection of all spent
0 4 fuel assemblies and core verification films revealed that 4 of 686 assemblies
0 5 had broken springs. Analyses performed by B&W have shown that the major
0 6 problems that may result from the broken springs (loss of holddown force;
0 7 loose parts; interference with normal CRA movement) do not pose a threat to
0 8 safe operation, and the health and safety of the public are not affected.

Line	System Code (11)	Cause Code (12)	Cause Subcode (13)	Component Code (14)	Comp. Subcode (15)	Valve Subcode (16)
0 9	R C	E	B	F U E L X X	Z	Z

LER/RO Report Number (17)	Event Year		Sequential Report No.		Occurrence Code	Report Type		Revision No.
	8 0	—	0 1 5	/	0 1	T	—	0

Action Taken (18)	Future Action (19)	Effect on Plant (20)	Shutdown Method (21)	Hours (22)	Attachment Submitted (23)	NPRD-4 Form Sub. (24)	Prime Comp. Supplier (25)	Component Manufacturer (26)
G	G	Z	Z	0 0 0 0	Y	N	N	X 9 9 9

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 No cause of the broken springs has been conclusively defined. It is presumed
1 1 that the four Oconee springs failed due to high cycle fatigue. B&W is
1 2 continuing efforts to resolve this concern. On May 23, 1980, Duke increased
1 3 the frequency of CRA movement testing, verified adequate monitoring of loose
1 4 parts monitoring system, and verified that normal chemical sampling would identify increases in elements resulting from CR degradation.

Line	Facility Status (28)	% Power (29)	Other Status (30)	Method of Discovery (31)	Discovery Description (32)
1 5	E	1 0 0	NA	D	Inspection of Spent Fuel

Line	Activity Released (33)	Content of Release (34)	Amount of Activity (35)	Location of Release (36)
1 6	Z	Z	NA	NA

PERSONNEL EXPOSURES

Line	Number (37)	Type (38)	Description (39)
1 7	0 0 0	Z	NA

PERSONNEL INJURIES

Line	Number (40)	Description (41)
1 8	0 0 0	NA

LOSS OF OR DAMAGE TO FACILITY (43)

Line	Type (42)	Description
1 9	Z	NA

PUBLICITY

Line	Issued (44)	Description (45)	NRC USE ONLY
2 0	N	NA	

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