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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
WASHINGTON, D.C. 20555

May 28, 1980

IE Circular No. 80-13

GRID STRAP DAMAGE IN WESTINGHOUSE FUEL ASSEMBLIES

Description of Circumstances:

During the refueling operation at Salem Unit 1, it was noted by the licensee that some of the assemblies that were removed had suffered grid strap mechanical damage. This was reported to the NRC in LER 79-44. Subsequent to this discovery all fuel assemblies were removed from the core for examination. The degree of the damage to the grid straps was classified in three categories: small pieces missing (15 assemblies), grid material ripped and laid over (5 assemblies), larger sections missing and fuel pins exposed (11 assemblies). No damage to the fuel pins was observed. A total of 31 assemblies suffered some grid damage.

The damage appeared to be the result of corner to corner interaction of the grid straps of diagonally adjacent fuel assemblies during the vertical loading and unloading movements. No correlation of the damage to core location, grid strap elevation, or manufacturing and shipping batches has been identified.

The licensee and the fuel manufacturer established the following guidelines for reloading damaged assemblies: (1) those assemblies with full width pieces missing will not be reloaded for cycle 2, (2) those assemblies with deformed edges and those with small pieces missing will be reloaded with special procedures to prevent further damage.

Salem Unit 1 is fueled with 17X17 Westinghouse assemblies. Similar grid problems have occurred at other facilities fueled with 14X14 and 15X15 Westinghouse assemblies; however, fewer assemblies were damaged in those instances.

Recommended Actions:

All licensees using 14X14, 15X15, or 17X17 Westinghouse assemblies are advised to:

- (1) Visually inspect grid straps of those fuel assemblies which are discharged from the core as well as those assemblies which are moved to the spent fuel pool for control rod replacement and are subsequently returned to the core.

- (2) Review the fuel handling precautions recommended by Westinghouse at a meeting on May 25, 1979, with NRC and the licensee for Salem (Attachment 1). Adopt those recommendations which are pertinent.

No written response to this Circular is required. If you required additional information regarding these matters, contact the Director of the appropriate NRC Regional Office.

Attachment:  
Summary of Meeting Notice  
dated 5/30/79

IE Circular No. 80-13  
May 28, 1980

Enclosure

RECENTLY ISSUED  
IE CIRCULARS

Circular No.	Subject	Date of Issue	Issued to
80-12	Valve-Shaft-To-Actuator Key May Fall Out of Place When Mounted Below Horizontal Axis	5/14/80	All holders of Reactor OLs and CPs
80-11	Emergency Diesel Generator Lube Oil Cooler Failures	5/13/80	All holders of a power reactor OL or CP
80-10	Failure to Maintain Environmental Qualification of Equipment	4/29/80	All holders of Reactor OLs and CPs
80-09	Problems With Plant Internal Communications Systems	4/28/80	All holders of a power reactor OL or CP
80-08	BWR Technical Specification Inconsistency - RPS Response Time	4/18/80	All General Electric BWR's holding a power reactor OL
80-07	Problems with HPCI Turbine Oil System	4/3/80	All holders of a power reactor OL or CP
80-06	Control and Accountability Systems for Implant Therapy Sources	4/14/80	Medical licensees in Categories G and G1
80-05	Emergency Diesel-Generator Lubricating Oil Addition and Onsite Supply	4/1/80	All holders of a power reactor OL or CP
80-04	Securing of Threaded Locking Devices on Safety-Related Equipment	3/14/80	All holders of a power reactor OL or CP
80-03	Protection from Toxic Gas Hazards	3/6/80	All holders of a power reactor OL
80-02	Nuclear Power Plant Staff Work Hours	2/1/80	All holders of Reactor OLs, including research and test reactors, and CPs



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

Docket No. 50-272

MAY 30 1979

LICENSEE: PUBLIC SERVICE ELECTRIC & GAS COMPANY (PSE&G)

FACILITY: SALEM UNIT NO. 1

SUBJECT: SUMMARY OF MEETING HELD ON MAY 25, 1979, TO DISCUSS  
DAMAGE OBSERVED TO FUEL GRID ASSEMBLIES DURING THE  
SALEM UNIT NO. 1 REFUELING OUTAGE

On May 25, 1979, we met with representatives of Public Service Electric & Gas Company (PSE&G) and Westinghouse to discuss the cause and extent of damage observed to the Salem Unit No. 1 fuel grid assemblies during the current refueling outage for cycle 2.

A list of attendees is enclosed.

Significant discussions are summarized below.

The licensee and Westinghouse provided a detailed discussion of the damage observed to the Salem fuel grid assemblies during the cycle 2 refueling outage which commenced in April 1979. Due to the indications observed during the initial stages of the outage, the decision was made to unload all fuel assemblies from the core. Of the fuel assemblies (193) inspected, 28 assemblies were determined to have varying degrees of damage to one or more of the eight grid assemblies per fuel assembly. The grid assemblies provide lateral support to the fuel rods. In no case was damage observed to the fuel rods themselves. The grid assembly damage observed, which was generally located at the corners of the grid assemblies, was categorized as follows:

<u>Category</u>	<u>Type of Damage</u>	<u>No. of Grid Assemblies</u>
1	small pieces missing	15
2	grid material ripped and laid over	4
3	larger sections missing and fuel pins exposed	9

Of the above, fuel assemblies with categories 1 and 2 damage were determined by the licensee to be acceptable for use and will be reloaded for cycle 2; as a precautionary measure assemblies with category 3 damage will not be reloaded. The basis for this determination was that assemblies with category 1 and 2 damage can be used without any loss of function of the damaged grids. Fuel assemblies with category 3 damage, however, no longer fully restrain all fuel rods in the manner provided for in the design. Their reuse should be based on further analysis.

Of the data collected and the reload films reviewed, no pattern has been established for the observed damage. Also, it has not been determined whether the damage occurred during fuel insertion for cycle 1, or during removal or readjustments for cycle 2, or both. It is believed that corner-to-corner interaction may have occurred between grid assemblies of adjacent fuel assemblies especially when diagonal fuel assemblies have been removed and some degree of lateral movement is possible. Under these conditions the grid assemblies may have been aligned such that the corners interacted during vertical movement.

Of the pieces missing (about 61), a total area of about 25in<sup>2</sup> is involved. These pieces range from about .3in<sup>2</sup> up to about 5.5in<sup>2</sup>. Approximately 12in<sup>2</sup> of material has been recovered from the core or the fuel assemblies during the unloading of the core. In addition, the core was inspected with a TV camera. With regard to the potential for flow blockage from the missing material, Westinghouse indicated that if all the pieces originally missing were to be located such as to partially block the inlet nozzle area of the one fuel assembly, analyses similar to that described in Section 3.4 of the Salem FSAR indicate that no problem would exist. The smaller pieces still missing are expected to easily pass up through the fuel assemblies during operation and not present any problems to the control rod drive mechanisms. The largest that any of the missing pieces could be, based on the base areas on grid assemblies, is slightly greater than 2in<sup>2</sup>.

Westinghouse has recommended additional fuel assembly handling precautions to minimize the potential for corner-to-corner interaction between grid assemblies. Included among these recommendations are, 1) a revised loading sequence which would load fuel assemblies from the sides of the core toward the center, 2) a slight offset in position as corner fuel assemblies are lowered into the core until they are about 10" above the base plate and then making a lateral adjustment into final position, 3) the conditionally accepted assemblies in categories 1 and 2 would be loaded in a special sequence to minimize relative motion with adjacent assemblies, 4) those assemblies in category 2 would be loaded against the core baffle, where possible and 5) revised load cell limits on the manipulator crane in an attempt to more easily detect increased loads during fuel handling.

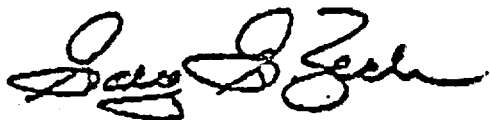
Meeting Summary for  
Salem Unit 1

-3-

Westinghouse acknowledged and summarized similar grid assembly problems that have occurred at other facilities. Although these other occurrences did not involve as many fuel assemblies as in this Salem situation, similar damage has been observed to 14x14, 15x15 and 17x17 fuel assemblies. In some instances the fuel was removed, and in others, the fuel was re-loaded with no known adverse effects.

With regard to the Salem Unit 1 refueling analysis, the licensee indicated preliminarily, that the core parameters are expected to be essentially unchanged due to the revised core loading that will result.

The licensee agreed to address the potential effects that the unaccounted for pieces of grid material might have on the core thermal hydraulic analysis and on control rod operation. This information will be included prior to restart of Salem 1 in a supplement to the licensee's reload application for cycle 2.



Gary G. Zech, Project Manager  
Operating Reactors Branch #1  
Division of Operating Reactors

Enclosure:  
List of Attendees

cc: w/enclosure  
See next page