ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9312270104 DOC.DATE: 93/12/10 NOTARIZED: NO DOCKET #
FACIL:50-250 Turkey Point Plant, Unit 3, Florida Power and Light C 05000250
50-311 Salem Nuclear Generating Station, Unit 2, Public Serv 05000311
50-334 Beaver Valley Power Station, Unit 1, Duquesne Light C 05000334
STN-50-482 Wolf Creek Generating Station, Wolf Creek Nuclear 05000482
AUTH.NAME AUTHOR AFFILIATION
LIPARULO,N.J. Westinghouse Electric Corp.
RECIP.NAME RECIPIENT AFFILIATION
GRIMES,B.K. Division of Operating Reactor Support (Post 921004)

SUBJECT: Forwards info Westinghouse recently transmitted to util customers on Info Notice 93-082 re fuel & core performance issues.

DISTRIBUTION CODE: YG01D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 7
TITLE: Generic Material with no Specific Distribution

NOTES:Standardized Plant. 05000482

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	GRIMES,B.K. ..	1	1			
INTERNAL:	ACRS	6	6	REG FILE 01	1	1
	RES/DSIR/EIB	1	1	RGN1	1	1
	RGN2	1	1	RGN3	1	1
	RGN4	1	1	RGN5	1	1
EXTERNAL:	NRC PDR	1	1	NSIC	1	1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 16 ENCL 16

RIDS/ADDS

RIDS/ADDS

RIDS/ADDS

Westinghouse Electric Corporation Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

December 10, 1993
ET-NRC-93-4028

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Attention: Brian K. Grimes, Director
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Subject: Information Notice 93-82

Dear Mr. Grimes:

Information Notice 93-82 was issued on October 12, 1993 to alert addressees of recent fuel and core performance issues. Enclosed for your information is a copy of material which Westinghouse has recently transmitted to our utility customers on this subject. The items in the enclosure have been discussed in a December 7th NRC/Westinghouse meeting held in Rockville, Maryland.

Should you have any questions, please do not hesitate to contact Mr. Earl H. Novendstern at 412-374-2219.

Very truly yours,

210036

Nicholas J. Liparulo, Manager
Nuclear Safety and Regulatory Activities

cc: R. C. Jones, Jr.
L. E. Phillips
S. Wu

Enclosure: Comments on NRC Information Notice 93-82 w/att.

A601

COMMENTS ON NRC INFORMATION NOTICE 93-82

The NRC recently issued Information Notice 93-82 to alert addressees of recent fuel and core performance issues. The Information Notice cited several cases involving fuel supplied by Westinghouse and two other vendors. The comments in this letter address only those situations which involve Westinghouse-supplied fuel. These cases are the mid-grid-rod fretting observations at Salem 2 and Beaver Valley 1, bottom grid-rod fretting observed at Wolf Creek, and a very small axial misalignment of a burnable absorber at Turkey Point 3.

None of the situations cited posed any threat to the public health and safety or caused any Technical Specification limits to be challenged. Although the Information Notice infers the cases cited above were attributable to mixed-core effects, Westinghouse evaluations showed that mixed-core effects did not have a significant hydraulic or neutronic impact on any of the cases. At the time of their occurrence, Westinghouse performed a detailed evaluation of the root cause of the observations and implemented appropriate corrective actions to eliminate the cause of the incidents.

The Information Notice also contains a number of statements which Westinghouse believes are incorrect or which could lead to an erroneous conclusion. A complete compilation of our technical clarifications on these statements is included in the Attachment. More specifically, we believe it is important to clarify the following three aspects of the Information Notice text.

First, the leaking rods in VANTAGE 5H fuel were the result of a flow-induced assembly vibration which led to fuel rod fretting at the Zircaloy mid-grids. This mechanism has been observed at two plants, but not at other plants which have similar operating histories with the same fuel design. The cause of the fuel assembly vibration was shown in testing to be independent of the design of the adjacent assemblies. Thus, these leakers were not the result of a mixed-core effect.

Second, the Wolf Creek leaking rods were the result of a fuel rod fluid-elastic vibrational instability resulting from crossflows present in the plant. As described in the Attachment, the Cycle 5 core consisted of all 17x17 Standard fuel, although some minor design changes were included in the region which was initially loaded into the Cycle 5 core. An evaluation showed that the plant-related crossflows are sufficient, by themselves, to cause the fuel rod to reach its instability threshold. Any additional crossflow due to the minor design changes would have been only a very small contributor to the instability. Since the Cycle 5 core contained only 17x17 Standard fuel, there is no basis for the Information Notice statements that VANTAGE 5H fuel contributed to the leakage mechanism.

The third issue discussed in the NRC Information Notice was a small axial mismatch between the burnable absorber rods and the fuel rods at Turkey Point 3, which the Information Notice inferred to be the result of purchase options offered by Westinghouse. The Turkey Point 3 fuel assembly involved a design which incorporated debris resistant features unique to this customer. Contrary to the Information Notice, the Debris Filter Bottom Nozzle (DFBN) is not incorporated in this design. There were no mixed-core effects involved in this situation and no adverse operational or licensing impacts occurred.

One of the implications in the Information Notice is that purchase options offered by Westinghouse are somehow connected to fuel and core performance problems. This implication is entirely unwarranted. Neither the facts of the incidents described nor any other fuel or core performance experience supports such a conclusion.

The Information Notice focused solely on fuel damage incidents relating to three vendors, and did not include information on fuel damage incidents involving others. This had the unfortunate effect of making it appear that only the vendors involved in the incidents described in the Information Notice experienced situations of the type which are discussed. General monitoring of utility fuel and core performance indicates that other vendors have experienced incidents of similar or greater magnitude. Inclusion of these additional incidents would make the discussion of the subject more comprehensive and more representative of total industry experience.

In the last paragraph of the Information Notice, the NRC questioned the effectiveness of the design quality assurance process and the interaction in this area between the vendors and the utilities. The information necessary to evaluate mixed-core behavior and systems for communicating this information for the reload design process are well established between Westinghouse and its customer utilities. Joint Westinghouse-Utility investigations of the root cause for each of the incidents contained in the Information Notice found no evidence that any changes to the design quality assurance process were appropriate or required. Consequently, the actions suggested by the NRC in the last paragraph do not appear to be necessary in the cases involving Westinghouse-supplied fuel.

ATTACHMENT

There are statements in the NRC Information Notice 93-82 which are incorrect. These are summarized below by topic, in their order of occurrence in the Notice. In addition, several items not described in the Notice which are relevant to the subject are also included. We recognize that several of these items are relatively minor in nature, but have included them for completeness.

VANTAGE 5H

Information Notice Statement

The fretting wear occurred at the zircaloy mid-grid spacers rather than at lower grid locations where debris-induced fretting wear typically occurs.

(W) Clarification
The statement implies a connection with debris-induced fretting, even though the leakage mechanism of concern is grid-rod fretting, in which debris has no role.

Information Notice Statement
This vibrational fretting involves the natural frequency and flow condition for fuel assemblies adjacent to the core baffle.

(W) Clarification
The fuel assembly vibration mechanism does not require the assembly to be located on the baffle. It can also occur at non-baffle locations, although this is less likely.

Wolf Creek

Information Notice Statement

During the Cycle 5 shutdown at Wolf Creek, the licensee discovered 44 failed fuel rods in three Westinghouse Batch F (standard) fuel assemblies that had completed two cycles of operation with accrued assembly average burnups of 24,000 MWd/MTU.

(W) Clarifications

There were 40 leaking rods identified at the end of Cycle 5 (EOC-5).
The EOC-5 burnup of the leaking assemblies was ~ 35 GWD/MTU.

Information Notice Statement

Inspection of the failed fuel rods revealed the failures to be grid-to-rod fretting wear at the lower three grid locations on in-core interior fuel assemblies.

(W) Clarification

All of the examined leaking rods showed grid-to-rod fretting defects at the bottom grid location. Only a few rods in one assembly showed fretting wear at the second and third grid elevations. The NRC summary seemed to imply that this was a more general condition.

Information Notice Statement

During Cycle 6 operation, additional fuel failures occurred in three Batch F assemblies in their third cycle of operation with assembly average burnups of 38,500 MWd/MTU.

(W) Clarification

The burnup of the EOC-6 leaking assemblies was ~ 45 GWD/MTU.

Information Notice Statement

The transition to VANTAGE 5H fuel had commenced with Cycle 5.

(W) Clarification

There were no VANTAGE 5H fuel assemblies in the Cycle 5 core. The entire core was the standard 17x17 design (all Inconel grids).

There were a few design changes to the standard 17x17 fuel introduced in Cycle 5, as follows:

The Debris Filter Bottom Nozzle (DFBN) design was introduced in Cycle 5. The DFBN was designed and verified by testing to have the same pressure drop between the bottom nozzle and the first grid as the standard non-DFBN design. There was a small difference in the height of the DFBN design (a fraction of an inch shorter than the standard design) and thus slight differences in axial positions of the bottom nozzle and grids between the old and new designs, which had no significant effect on crossflow.

The fresh fuel in Cycle 5 had a minor modification to the grid cell geometry. This may have resulted in a small pressure drop difference between the two grid designs. The effect, if present, would have had an extremely small effect on crossflow.

Information Notice Statement

For Wolf Creek, the fretting wear involved a mixed core of standard fuel and VANTAGE 5H fuel with inclusion of intermediate flow mixer grids and debris filter bottom nozzles.

(W) Clarification

Neither Cycle 5 or 6 contained IFM assemblies. The IFM was not introduced until Cycle 7. VANTAGE 5H fuel was introduced in Cycle 6.

Information Notice Statement

The failures were located at the lower grids, especially near debris filter bottom nozzles.

(W) Clarification

None of the leaking fuel rods were in assemblies with Debris Filter Bottom Nozzles (DFBN).

Information Notice Statement

Westinghouse performed a sensitivity study to analyze the flow condition near the debris filter bottom nozzle region for mixed cores. The analysis indicated that excessive vibration of the fuel rods of the standard fuel assembly may have been caused by cross flow from VANTAGE 5H fuel to the standard fuel and that the mixed core of different bottom nozzle designs may have contributed to such a cross flow phenomenon.

(W) Clarification

Since there were no VANTAGE 5H fuel assemblies in the reactor in Cycle 5, crossflow between VANTAGE 5H and Standard fuel could not have played a role.

Evaluation and analysis have indicated that the primary contributors to the fuel rod vibration were crossflows present in the Wolf Creek reactor which have no dependence on bottom nozzle design. The vibration analysis performed by Westinghouse addressed only plant-related crossflow conditions. The impact of crossflow effects due to a mixed-core was not analyzed since there was no mixed-core in Cycle 5 and there was no indication that the introduction of VANTAGE 5H fuel in Cycle 6 introduced any new mechanism.

Additional Points of Clarification

The assemblies adjacent to the assembly faces containing the leaking fuel rods in Cycle 5 were approximately evenly split between assemblies which had the minor design differences and those of identical design to the leaking assemblies (e.g. from the same region). This suggests that crossflows due to mixed-core effects did not have a significant role in the fuel rod vibration.

Turkey Point

Information Notice Statement

This has resulted in one known instance (at Turkey Point Unit 3) of an axial offset in power distribution as a result of a small axial mismatch between burnable poison rods and the active core. The mismatch occurred when debris filter bottom nozzles were included with the fuel type chosen by the licensee, but a corresponding revision of burnable poison rod specifications was overlooked.

(W) Clarification

The fuel assembly design where the axial mismatch between the fuel and the burnable absorber occurred did not include the DFBN.

General

Information Notice Statement

The mixing of fuel of different types is further complicated by design variations introduced by fuel reconstitution and by the purchase options offered by at least one fuel vendor (Westinghouse) to include design features such as intermediate flow mixer grids and debris filter bottom nozzles with the fuel type of customer choice.

(W) Clarification

We believe these comments are inappropriate. The discussions above demonstrate that these factors were not involved in the incidents described, nor have they ever been shown to adversely impact fuel performance.