

DEC 4 1975

H. D. Thornburg, Chief, Field Operation Support Branch, IE

TIPPING OF FUEL ASSEMBLY DURING INITIAL FUELING OF ZION 2 - DOCKET NO. 50-305 (AITS NO. H00974H1)

This is intended to deal with R. C. Knop's request for a review of the safety aspects of the subject event and a position statement on the use of potentially damaged fuel assemblies.

During the initial fueling of Zion 2 fuel assembly, B62P tipped over after it was put in position in the core and released by the fuel manipulator crane. The top of the fuel assembly came to rest against the core baffle two fuel assembly spaces away. The assembly was removed for inspection and, as no visible damage could be observed, it was reloaded into the core. Although the cause of the event was not definitely established, burrs on the assembly base indicated that the element may have been set in a flow hole instead of on a fuel alignment pin.

The licensee's action in this case appears to be appropriate. In the first place, there is little reason to expect that the assembly sustained any damage. The top of the assembly moved through water a distance of about 17" (two 8.426" wide assembly spaces) coming to rest against a smooth wall formed by the core baffle. The final tilt of the assembly, which is 160" long, would have been less than a 7° angle from the vertical.

The visual inspection showed no buckling of the tubes or over stressing at the top or bottom nozzles. The visible part of the grid were undamaged, with the grid springs remaining in contact with the fuel.

A tipped fuel assembly test was conducted by Westinghouse on a prototype assembly under conditions which were significantly more severe than the Zion 2 event. The test was done in air and at a greater tipping rate than occurred at Zion. Damage resulting from the test was confined to distortion of some of the grid springs. The effect of such distortion is that some grid springs press with less than normal force on the fuel rods, which, in turn, could result in vibration induced fretting of the fuel rods. Such fretting could wear away cladding and cause local breaching of the involved rods. A fretting analysis of the test assembly showed that three rods could be subject to the beginning of fretting at the end of one fuel cycle.

The possible effects of fuel assembly damage include:

1. Interference with control rod movement;

2. Distortion leading to fuel cladding failure; and

3. Distortion leading to interference with flow patterns and heat transfer rates.

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In this case the first effect was precluded by limiting the use of the assembly to non-rodded positions. As to fuel failure, a worst case assumption that three rods could be subject to fuel failure due to fretting would result in a fuel failure rate of .007%, which is small compared to the 1% rate allowed for by the safety analysis. Interference with flow and heat transfer is considered highly unlikely due to the absence of observable damage in the Zion assembly or significant damage in the prototype test assembly. For these reasons, it is concluded that the reuse of the tipped assembly was justified.

It is not considered feasible to establish a blanket position relative to the use of potentially damaged fuel assemblies. Obviously, some types of events, such as the dropping of a fuel assembly from a significant height, can cause fuel damage that would clearly preclude the use of an assembly in a core. However, minor bumps and scrapes can occur in which the possibility of fuel damage cannot be excluded, but the use of the fuel can be justified by careful examination and evaluation. NRC may also find it necessary to prohibit the use of fuel which the licensee considers useable. For these reasons, it is believed that each event involving potential fuel damage must be evaluated on its own merits.

Commonwealth Edison has made a commitment to inspect fuel assembly B62P prior to using it in cycle 2. It is suggested that this examination be verified by Region III during the first Zion 2 refueling scheduled for mid 1976.

Original signed by

K. V. Seyfrit

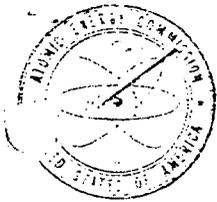
Karl V. Seyfrit, Chief

Reactor Technical Assistance Branch, IE

cc: B. H. Grier, IE  
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R. C. Knop, IE:III

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July 2, 1974

H. D. Thornburg, Chief, Field Support and Enforcement Branch,  
Regulatory Operations, Headquarters

THRU: <sup>K</sup> G. Fiorelli, Chief, Reactor Operations Branch

COMMONWEALTH EDISON COMPANY (ZION 2)  
DOCKET NUMBER 50-305  
TIPPED FUEL ASSEMBLY

A letter relating to the above subject from K. R. Baker is attached for your action. As noted additional information on this subject was included in R. O. Inquiry Report No. 50-304/73-01Q and RO Inspection Report No. 50-304/73-25.

The action we are requesting is a general technical review of the safety aspects and a position statement relative to the use of potentially damaged fuel assemblies (no visual damage noted), such as occurred in this situation.

*RC Knop*

R. C. Knop  
Senior Reactor Inspector

Enclosure:  
As Stated

cc: DR Central Files  
RO Files

*Wombach*  
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June 5, 1974

R. C. Knop, Senior Project Inspector, Projects Unit 1

COMMONWEALTH EDISON COMPANY (ZION 2)  
DOCKET NUMBER 50-304  
TIPPED FUEL ASSEMBLY

R. O. Inquiry Report No. 50-304/73-01Q and Inspection Report No. 50-304/73-25 contain information regarding the tipping of fuel assembly B62-P during initial core loading. The licensee inspected the assembly. Based upon inspection results and Westinghouse's evaluation that no failure of fuel rods was anticipated during first cycle it was loaded in the core.

Westinghouse conducted tests on another assembly. Discussions with the Zion Reactor Engineer indicated that analysis of test results indicate that if the tipped assembly has been subjected to the loading imposed during the test there was a probability of two pins failing by fretting during first cycle. The licensee believes the test loading to be more severe than the assembly experienced.

The licensee agreed to removal of the assembly if test results indicated unexpected behavior (Management Interview RO Report 50-304/73-25). I do not feel that this should be pushed until the matter has been forwarded to Headquarters for evaluation of the safety aspects and establishment of Regulatory position.

Unit 2 will be in cold shutdown for repairs to the electrical generator until September 1974. Reactor vessel head removal is not planned at this time.

  
K. R. Baker  
Reactor Inspector