

[7590-01]

NUCLEAR REGULATORY COMMISSION  
[Docket Nos. 50-269, 59-270, 50-287, 50-289, 50-302, 50-312, 50-313]

ARKANSAS POWER AND LIGHT COMPANY  
[Arkansas Nuclear One, Unit No. 1]

SACRAMENTO MUNICIPAL UTILITY DISTRICT  
[Rancho Seco Nuclear Generating Station]

FLORIDA POWER CORPORATION  
[Crystal River Unit No. 3 Nuclear Generating Plant]

DUKE POWER COMPANY  
[Oconee Nuclear Station, Unit Nos. 1, 2, and 3]

GENERAL PUBLIC UTILITIES NUCLEAR CORPORATION  
[Three Mile Island Nuclear Station, Unit No. 1]

Issuance of Director's Decision Under 10 CFR 2.206

Notice is hereby given that the Director, Office of Nuclear Reactor Regulation, has issued a modified decision concerning a petition dated June 11, 1985, submitted by John F. Doherty. The petition requested the issuance of an order under 10 CFR 2.202 to the licensees of the following Babcock and Wilcox facilities to show cause why the operating licenses for those facilities should not be suspended or revoked until the problem identified in IE Information Notice 85-38 is resolved: Arkansas Nuclear One, Unit No. 1; Rancho Seco Nuclear Generating Station; Crystal River Unit No. 3 Nuclear Generating Plant; Oconee Nuclear Station, Unit Nos. 1, 2 and 3; and Three Mile Island Nuclear Station, Unit 1. The IE Notice concerned loose parts which had been found to obstruct certain control rod drive mechanisms at the Davis-Besse facility of the Toledo Edison Company.

8602260039 860129  
PDR ADDCK 05000269  
Q PDR

The Director, Office of Nuclear Reactor Regulation, has determined to deny the petitioner's request to initiate such show cause orders. The reasons for this decision are explained in a "Director's Decision under 10 CFR 2.206" (DD-85-19) issued this date which is available for public inspection in the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C., and the local public document room for each affected facility as follows:

Arkansas Nuclear One, Unit No. 1  
Tomlinson Library  
Arkansas Tech University  
Russellville, Arkansas

Rancho Seco Nuclear Generating Station  
Sacramento City-County Library  
828 I Street  
Sacramento, California

Crystal River Unit No. 3 Nuclear Generating Plant  
Crystal River Public Library  
668 N.W. First Avenue  
Crystal River, Florida

Oconee Nuclear Station, Unit Nos. 1, 2 and 3  
Oconee County Library  
501 West Southbroad Street  
Walhalla, South Carolina

Three Mile Island Nuclear Station, Unit No. 1  
Government Publications Section  
State Library of Pennsylvania  
Education Building  
Commonwealth and Walnut Streets  
Harrisburg, Pennsylvania

An earlier Director's Decision in this matter dated December 4, 1985, is hereby withdrawn.

A copy of the Decision will be filed with the Secretary of the Commission for its review in accordance with 10 CFR 2.206(c) of the Commission's regulations. As provided by this regulation, the Decision will constitute the final action of the Commission 25 days after the date of issuance of the Decision unless the Commission, on its own motion, institutes a review of the Decision within that time.

Dated at Bethesda, Maryland, this 29th day of January, 1986.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in cursive script, appearing to read "HR Denton".

Harold R. Denton, Director  
Office of Nuclear Reactor Regulation

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION  
Harold R. Denton, Director

In the Matter of	)	
ARKANSA POWER AND LIGHT CO.	)	Docket Nos. 50-313
(Arkansas Nuclear One, Unit No. 1)	)	
SACRAMENTO MUNICIPAL UTILITY DISTRICT	)	50-312
(Rancho Seco Nuclear Generating Station)	)	
FLORIDA POWER CORPORATION	)	50-302
(Crystal River Unit No. 3 Nuclear Generating Plant)	)	
DUKE POWER CORPORATION	)	50-269
(Oconee Nuclear Station, Units Nos. 1, 2, & 3)	)	50-270
	)	50-287
GENERAL PUBLIC UTILITIES NUCLEAR CORPORATION	)	50-289
(Three Mile Island Nuclear Station, Unit No. 1)	)	
	)	(10 CFR 2.206)

DIRECTOR'S DECISION PURSUANT TO 10 CFR 2.206

Introduction

On June 11, 1985, Mr. John Doherty (Petitioner) filed his Petition/Request for Show Cause Order (Petition) requesting issuance of an order under 10 CFR 2.202 to the licensees of Arkansas Nuclear One, Unit No. 1; Rancho Seco Nuclear Generating Station; Crystal River Unit No. 3 Nuclear Generating Plant; Oconee Nuclear Station, Unit Nos. 1, 2 and 3; and Three Mile Island Nuclear Station, Unit No. 1 to show cause why the operating licenses for

57

~~8602190419~~

those facilities should not be suspended or revoked until the problem identified in IE Information Notice No. 85-38 is resolved. 1/ The IE Notice concerned loose parts which had been found to obstruct certain control rod drive mechanisms (CRDMs) at the Davis-Besse facility of the Toledo Edison Company. The CRDMs at Davis-Besse are manufactured by the Babcock and Wilcox Co. (B&W) as are those at the other facilities identified above.

On July 17, 1985, I acknowledged receipt of Mr. Doherty's Petition. I informed him that his Petition would be treated under 10 CFR 2.206 of the Commission's regulations and that I would issue a decision within a reasonable amount of time. My decision in this matter follows. I have also considered in my decision the Response of the Arkansas Power and Light Co. dated September 10, 1985.

#### Discussion

The events which prompted the IE Notice occurred at Davis-Besse. On June 25, 1981, CRDM C-7 failed to withdraw. It was found that a leaf spring which is used to hold an anti-rotation key for the central screw shaft in place had broken. A piece of the spring became jammed in the CRDM after several cycles of raising and lowering and prevented the raising of the rod from the fully inserted position. It has since been discovered that the leaf spring can break if the anti-rotation key is not inserted in its slot and if

---

1/ IE Information Notice No. 85-38, "Loose Parts Obstruct Control Rod Drive Mechanism" dated May 24, 1985 (hereinafter referred to as the IE Notice).

all dimensional tolerances are stacked in the most adverse direction. In that circumstance, the tip of the spring will hit the torque tube cap when the CRDM is fully withdrawn (see Enclosure). If the leaf spring then breaks and if the right size of debris is generated, i.e., not too large or too small, either immediately or due to exercising the CRDM, then such a loose part can cause either improper functioning of the CRDM, or prevent the rod from being inserted, or prevent the rod from being withdrawn.

On March 16, 1985, CRDM E-3 at Davis-Besse did not drop into the core on demand. The rod was inserted using the roller nuts. 2/ It was discovered that the cause of the failure to drop was the presence of a piece of a set screw from an inspection tool. In addition, it was discovered that the leaf spring for CRDM E-3 had broken due to the mechanism described above and part of it was in the CRDM mechanism. The leaf spring part did not cause the failure of the CRDM to drop. It is evident that a potential common mode

---

2/ The control rod drive mechanisms at B&W plants all utilize a similar design. Essentially it consists of a central screw shaft which does not rotate. A motorized rotor mechanism with four roller nuts engages the shaft and, when this rotor mechanism turns, the central screw shaft, to which the control rods are attached, is lifted or lowered for normal plant operation. In the event of a reactor scram, or if power is lost, the roller nuts, which are held in place against the central screw shaft by a magnetic clutch, disengage from the central screw shaft and the control rod bundle drops by gravity into the core. The system is fail-safe because loss of power disengages the magnetic clutch. In the accident scenarios, no credit is taken for the ability to lower the control rod into the core against an opposing force by use of the roller nuts. The ability of the roller nuts to disengage from the central screw shaft and thus cause the rod to drop by gravity is the only safety-related function of the roller nut mechanism. As demonstrated at Davis-Besse, the roller nut mechanism is capable of being used to drive the control rods into the core against an opposing force.

failure mechanism exists for B&W CRDMs if the anti-rotation keys are not properly placed in their slots in the lead screws. <sup>3/</sup> However, if the anti-rotation keys are positively verified to be properly in place, there is no physical mechanism or procedure which will displace the leaf springs and thus no common mode failure potential. All B&W plants now use a procedure for removal of CRDM components which allows the springs to remain in place during disassembly or installation.

In summary, the only identified cause of leaf spring failure is improper installation of the spring. There is no identified mechanism by which a properly installed spring will back out to the position where it could be broken. Therefore, a completed inspection of leaf spring installation adequately resolves this issue.

At Davis-Besse, Crystal River, Oconee 2, and Rancho Seco, the CRDM leaf springs were positively verified to be in place during recent outages. Oconee 3 will be entering an outage imminently and will verify the position of its CRDM leaf springs during the outage. Oconee 1, TMI-1 and Arkansas will verify the position of their leaf springs at the next refueling outage for each plant. This will take place within the next six and ten months at Oconee 1 and Arkansas respectively and within about six months after startup at TMI-1. This is acceptable for the following reasons:

---

<sup>3/</sup> The introduction of a loose part into the CRDM from a handling tool as also occurred at Davis-Besse is considered a unique occurrence and not a common mode failure.

1. Rod drop times have been verified to be within acceptable limits for the plants which have not inspected leaf springs during recent outages. Thus, there is no present indication that CRDMs at these facilities would fail.
  
2. By Technical Specifications, control rods which are not fully inserted are exercised periodically during operation by moving each rod slightly (2 to 3%) to be sure that they respond to control and are free to move. If any one control rod were to be found inoperable as the result of excessive friction or mechanical interference, the plant would have to be shut down to hot-standby within 6 hours. In no case would a plant continue to operate with even one control rod inoperable due to excessive friction or mechanical interference.
  
3. The presence of loose parts would likely give warning of potential interference during either rod drop tests, periodic rod motion tests, or, for rods in the control group, during normal operation. Only a loose part of a very specific size can cause an interference. If the part is too large or too small, it will not interfere with dropping or insertion of the rods. If the part is too large, it will remain above the roller nuts and will not interfere with them disengaging. If the part is too small, it will drop to the bottom of the CRDM tube and cause no interference. If the part is of a size which might cause interference, it is likely to slow down the drop time before causing the rod to jam. This will be detected during the testing prior to starting



up in most cases. Further, if the failure occurred during operation, it is likely that the mechanism would not function properly during periodic rod motion tests or, for rods in the control group, during normal rod motion. If an inoperable rod is detected during operation, the plant is required to shut down. Though it is theoretically possible for the fragment to lodge in the mechanism in such a way that it would not interfere with normal operation yet would prevent the mechanism from unlatching, a careful analysis of the mechanism design shows this to be extremely unlikely.

With the procedural controls now in place to assure proper positioning of the leaf springs, CRDMs which have been inspected and verified are assured to operate properly. As for those plants operating now without having completed the inspection, the risk from short-time operation is considered adequately low. First, from the rod drop tests run at startup, there is a reasonable basis for believing the mechanism was not jammed at that time. Second, periodic rod motion tests are likely to identify any mechanism failure occurring since startup. Third, there is a general requirement that all reactors be designed such that no fuel damage occurs for any scram event if the single most reactive rod fails to insert. Therefore, in order for any damage of the core to occur, at least two, and in most situations considerably more than two, rods must fail to insert. Given the improbability of a mechanism failure occurring and not being detected by rod drop or rod motion tests, it is considered extraordinarily unlikely that, in the relatively short period of operation prior to the inspection of the leaf

springs, two rods would fail to drop or to be inserted into the core when required because of previously undetected failures. Therefore, continued operation until the inspection of the leaf springs is acceptable.

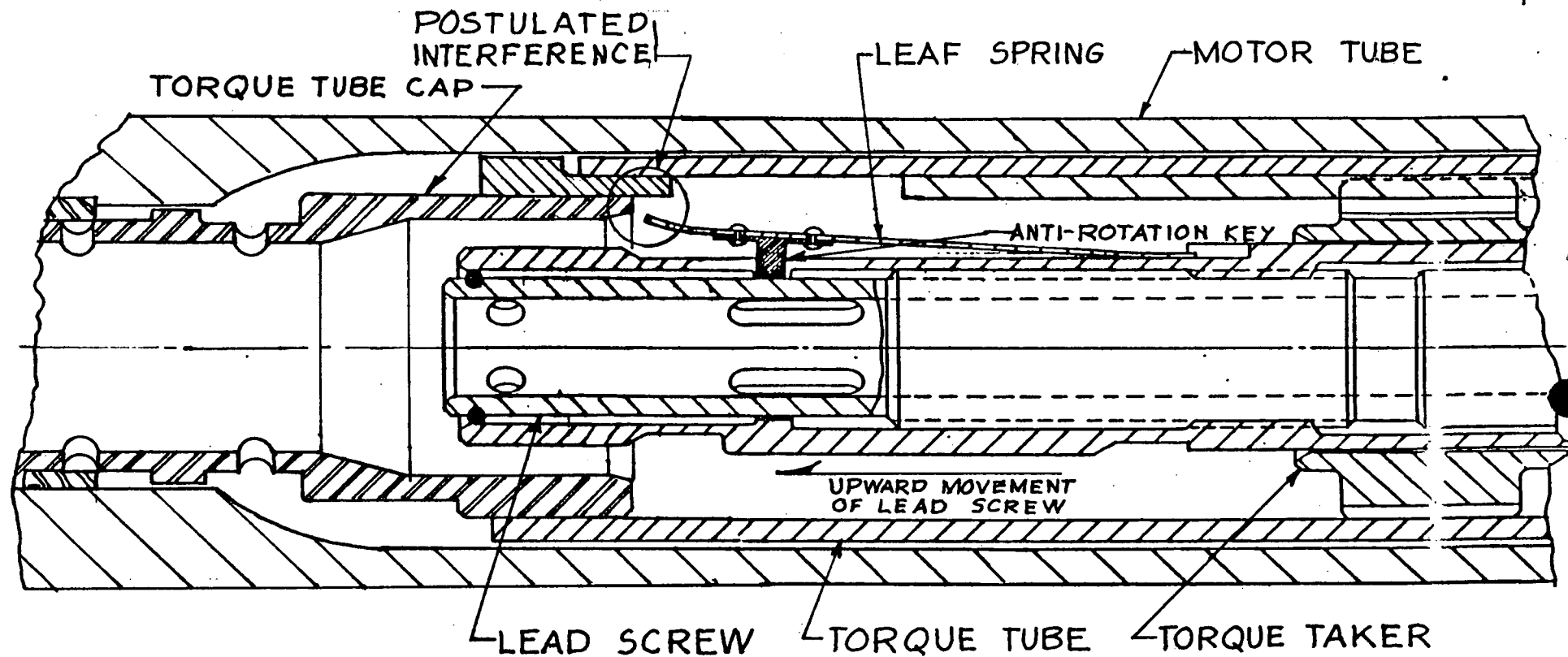
Conclusion

For the reasons stated above, there is adequate assurance that CRDMs at B&W facilities will operate properly when needed. Consequently, initiation of show cause proceedings as requested by Petitioner is not appropriate. Accordingly, Petitioner's request for action pursuant to 10 CFR 2.206 is denied. As provided in 10 CFR 2.206(c), a copy of this decision will be filed with the Secretary for the Commission's review.



Harold R. Denton, Director  
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland  
this 29th day of January, 1986.

**NOTE**

INTERFERENCE OF THE LEAF SPRING AT THE TORQUE TUBE CAP WAS THE RESULT OF THE ANTI-ROTATION KEY ON THE LEAF SPRING NOT PROPERLY BEING POSITIONED IN THE SLOT ON THE LEAD SCREW.

CROSS SECTION OF LEAD SCREW ASSEMBLY WITH LEAF SPRING IN UNLATCHED POSITION