

[7590-01]

NUCLEAR REGULATORY COMMISSION
[Docket Nos. 50-269, 50-270, 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, Units Nos. 1, 2 and 3]

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

REQUEST FOR ACTION UNDER 10 CFR 2.206

Notice is hereby given that, by a Petition dated June 11, 1985, John F. Doherty requested 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, Units 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.

The Petition is being treated pursuant to 10 CFR 2.206 of the Commission's regulations and, accordingly, appropriate action will be taken on the request within a reasonable time. A copy of the Petition is available for inspection in the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C. 20555 and at the local public document room for each

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affected facility as follows:

Arkansas Nuclear One, Unit No. 1
Tomlinson Library
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Russellville, Arkansas 72801

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, Units 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 17126

Dated at Bethesda, Maryland, this 17th day of July 1985.

FOR THE NUCLEAR REGULATORY COMMISSION



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Three Mile Island, Unit 1

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June 11, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Director of Nuclear Reactor Regulation

In the Matter of:

ARKANSAS POWER & LIGHT CO. (Arkansas Nuclear One Station, Unit 1)	Docket No. 50-313
SACRAMENTO MUNICIPAL UTILITY DIST. (Rancho Seco Station, Unit 1)	Docket No. 50-312
FLORIDA POWER CORP. (Crystal River Station, Unit 3)	Docket No. 50-302
DUKE POWER CORPORATION (Oconee Station, Units 1, 2, & 3)	Docket Nos. 50-269, 50-270, 50-287
GENERAL PUBLIC UTILITIES NUCLEAR CORP. (Three Mile Island Station, Unit 1)	Docket No. 50-289

JOHN F. DOHERTY'S PETITION/REQUEST FOR SHOW CAUSE ORDER

Pursuant to 10 CFR 2.206 of the Commission's Rules of Practice, John F. Doherty, of 318 Summit Ave., Apt. #3, Brighton, Massachusetts 02135, (617) 232-3853, now files this Petition/Request for Show Cause Order under 10 CFR 2.202, to the Director of Nuclear Reactor Regulation, seeking that the Director institute a consolidated proceeding or proceedings to suspend or revoke the operating license for the Arkansas Nuclear One Station, Unit 1; Rancho Seco Station, Unit 1; Crystal River Station, Unit 3; Oconee Stations, Units 1, 2, & 3; and Three Mile Island Station, Unit 1, by serving the respective Licensees, Arkansas Power & Light Co., Sacramento Municipal Utility District, Florida Power Corporation, Duke Power Corporation, and General Public Utilities Nuclear Corporation, an Order to Show Cause why the said operating Licensee should not have its Operating License suspended or revoked until such time that it inspects

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and (based on the result of the inspection) corrects its facilities for the hazardous condition explained below.

Basis for the Petition/ Request:

The basis for this request for action is from Inspection and Enforcement Notice No. 85-38^{1/}, dated May 21, 1985, and received by Petitioner on June 1, 1985, and addressed to all utilities holding an operating license for nuclear power facilities designed by the Babcock & Wilcox Corporation (B & W). All such facilities are pressurized water reactors (PWRs) having control rods above the fuel zone in the reactor pressure vessel. As described in Notice No. 85-38, the Davis-Besse Nuclear Plant, a B. & W. PWR, on inspection following the failure on two occasions (March 16, 1985 and March 21, 1985) for its control rod E-3, revealed a broken locking spring in the control rod drive mechanism (CRDM) at core location M-5, and four locking springs not in their normal and correct locking position. The CRDM at location E-3 had shown a broken locking spring and not all pieces of the spring were believed recovered. In addition, pieces described as from a maintenance tool used the previous year were found in the CRDM. It thus appears the CRDMS at locations E-3 and M-5 at Davis-Besse had broken locking springs in them and that the CRDM's at E-3 and C-7 (also noted in Notice No. 85-38) have both been blocked (at different times) by a common mode phenomena.

^{1/} Titled, "Loose Parts Obstruct Control Rod Drive Mechanism" (Attached)

From these facts, it is clear the Davis-Besse plant might well have had a SCRAM in which two control rods could not have been driven into the core due to jamming of the CRDMs by loose parts such as those described in the notice. The usual technical specifications or Commission Regulatory Guides require that it be possible to bring the reactor core sub-critical with a single control rod stuck fully out. However, in the case where two control rods are stuck out it appears it may not be possible to bring the core to sub-criticality without the use of a back up system such as one designed to introduce boron into the circulating coolant in greater quantity than in normal operation.

Notice No. 85-38 states that the, "spring failures are considered to be a potential common mode failure that could affect the reactor trip function because . . . (of) (2) the likelihood for out-of-position springs to be broken when the control rod is fully withdrawn; and (3) the potential for a broken spring to cause the control rod to jam."^{2/} This point (3) evidently includes jamming when a rod is signaled to drop or enter the fuel zone in response to an anticipated operating transient such as a turbine stop, high steam generator water level, loss of feedwater heater, recirculation pump trip, high flux signal, or main steam isolation valve closure.

^{2/} Notice No. 85-38, page 2.

Common mode failures are of great concern if they may compromise the automatic reactor protection system of a PWR. A common mode failure in an automatic reactor protection system was found at the Kahl (VAK) reactor, a Boiling Water Reactor, in July of 1965. There a bonding agent on scram relays became sticky after two weeks of use and a "routine test revealed that there had been a period of time in which SCRAM would not have been initiated if it had been required."^{3/} The concern here is that in the interval required to stop fissioning through the redundant means available, the transient excess reactivity in the core will result in local fuel melting. The possibility of two adjacent control rods failing to insert, while somewhat remote in a two rod insertion failure due to CRDM jamming, would cause the most severe fuel melting with ~~that~~ level of rod insertion failure.

It is evident from Notice No. 85-38, that the springs may break or relocate in an CRDM in any of the B. & W. plants subject in this Petition/Request, and evidently no inspections for broken or dislocated springs which might jam the descent of a control rod into a PWR core have been made in the current operating B. & W. plants other than the Davis-Besse Nuclear Plant. Nor is it, in view of the conditions found at that plant, an unreasonable suspicion that an upcoming SCRAM (one prior to the next scheduled outage) may well produce a more than one rod out of the

^{3/}"Technical note: The Kahl Relay Common Mode Failure", Nuclear Safety, Vol. 20(5), Sept-Oct. 1979, pp. 579-81.

core situation. It is a sensible caution to realize two or more rods stuck out of the core in a severe operating transient might well produce a local fuel melt particularly if the rods are contiguous or nearly so.

While true a boron introducing system may be expected available as a back up to the SCRAM system, General Design Criterion 26 (10 CFR 50, Appendix A, Criterion 26) would appear to require both these systems, (SCRAM and back-up) be fully available to protect against reactivity insertion. In addition, the Criterion certainly strongly suggests that operation with one system reasonably suspected to be not fully capable of performing its full task would violate that Criterion.

Moreover, permitting continued operation of these B. & W. plants despite the jamming problem described in Notice No. 85-38, would appear contrary to General Design Criterion 29 (10 CFR 50, Appendix A, Criterion 29). If these plants continue in operation the probability of the protection and reactivity control systems accomplishing their safety functions is decreased in the face of a more than one rod jammed out by CRDM parts situation as described in Notice No. 85-38. By requiring the utility owners (Licensees) of the aforementioned B. & W. plants to eliminate this cause of jamming would bring the plants in closer compliance with General Design Criterion 29.^{4/}

^{4/} Criterion 26 and 29 are used here in the sense that they show good practice. The subject plants were believed designed in compliance with the two criteria and it makes sense the plants should operate only while fully providing what the criteria call for for functioning plant hardware.

Conclusion

Based on the information provided in Information and Enforcement Notice No. 85-38 and other material in this Petition/Request, Petitioner hereby requests the Director of Nuclear Reactor Regulation to issue an order requiring these 5 Licensees to show cause why the nuclear plants under their control should not be shutdown until such time as an inspection (and repairs as indicated) of the Control Rod Drive Mechanisms is accomplished, be issued.

Respectfully,


John F. Doherty

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

May 21, 1985

IE INFORMATION NOTICE NO. 85-38: LOOSE PARTS OBSTRUCT CONTROL ROD DRIVE
MECHANISM

Addressees:

All utilities with pressurized water reactor (PWR) nuclear power facilities designed by Babcock & Wilcox (B&W) and holding an operating license (OL) or a construction permit (CP).

Purpose:

This information notice is provided to alert recipients of a potentially significant problem pertaining to loose parts that can obstruct and prevent motion inside of control rod drive mechanisms. It is expected that recipients will review the information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem occurring at their facilities. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

In 1981 at the Davis-Besse Nuclear Plant, a locking spring broke in a control rod drive mechanism (CRDM) in core location C-7 and became wedged against the control rod, preventing it from operating. The cause was not determined at that time. During the 1984 outage, the locking springs were inspected and none appeared broken or in the wrong position. On March 16, 1985, the control rod in core location B-3 would not drop into the core on demand and had to be driven downward by control room personnel. This control rod was tested during an outage on March 21, 1985, and jammed after three cycles of operation.

Inside of this CRDM were foreign objects and a broken locking spring. The foreign objects were pieces of a set screw from the handling tool used during the 1984 outage that had lodged in the CRDM and prevented the drive screws from being disengaged. The locking spring (a flat tee-shaped device with a riveted tab) was broken at the tee and the upper rivet hole. The upper portion of the broken spring was not found and is believed to be inside of the CRDM.

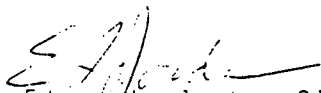
Further examination of all of the mechanisms revealed a broken locking spring in core location W-5. In addition, four springs were not in their normal locking position. During operation there is no means of detecting broken springs or foreign objects in the CRDM. Exercising the control rod will allow loose pieces to move.

The most likely cause of the spring failures is that the unit went into service with some of the locking springs not in their correct position. The present assembly procedure has the maintenance technician determining that the spring is in the correct position by "feel" through a long handling tool. If this process is not successful, the reactor will be placed in operation with the spring out of position. When the control rod is fully withdrawn, an out-of-position spring will hit the inside of the torque tube cap and snap when sufficiently loaded. This was confirmed by the appearance of the spring failures which were brittle, intergranular fractures. In addition, examination of the inside of the cap showed a gouge in the tapered portion near the bottom and an indentation on the bottom surface.

Spring failures are considered to be a potential common mode failure that could affect the reactor trip function because (1) four springs at Davis Besse were found not to be in their normal position and two others were broken; (2) the likelihood for out-of-position springs to be broken when the control rod is fully withdrawn; and (3) the potential for a broken spring to cause the control rod to jam.

The corrective action by Davis-Besse Nuclear Plant was to replace all of the out-of-position spring assemblies and to verify by visual examination that the springs were in their correct positions. Consideration is being given to adding this verification as a regular part of the maintenance procedures. The B&W Owners Group has notified their members that there were failed locking springs at Davis-Besse in the control rod drive mechanisms.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.


Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: P. Cortland, IE
301-492-4175

Attachment: List of Recently Issued IE Information Notices

Attachment 1
IN 85-38
May 21, 1985

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
85-37	Chemical Cleaning Of Steam Generator At Milestone 2	5/14/85	All pressure water reactor facilities holding an OL or CP
84-55 Sup. 1	Seal Table Leaks At PWRs	5/14/85	All power reactor facilities holding an OL or CP
85-20 Sup. 1	Motor-Operated Valve Failures Due To Hammering Effect	5/14/85	All power reactor facilities holding an OL or CP
85-36	Malfunction Of A Dry-Storage, Panoramic, Gamma Exposure Irradiator	5/9/85	All licensees possessing gamma irradiators
84-52 Sup. 1	Inadequate Material Procurement Controls On The Part Of Licensees And Vendors	5/8/85	All power reactor facilities holding an OL or CP
85-35	Failure Of Air Check Valves To Seat	4/30/85	All power reactor facilities holding an OL or CP
85-34	Heat Tracing Contributes To Corrosion Failure Of Stainless Steel Piping	4/30/85	All power reactor facilities holding an OL or CP
84-84 Rev. 1	Deficiencies In Ferro- Resonant Transformers	4/24/85	All power reactor facilities holding an OL or CP
85-33	Undersized Nozzle-To-Shell Welded Joints In Tanks And Heat Exchangers Constructed Under The Rules Of The ASME Boiler And Pressure Vessel Code	4/22/85	All power reactor facilities holding an OL or CP
85-32	Recent Engine Failures Of Emergency Diesel Generators	4/22/85	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit