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 FACIL: 50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana & 05000315  
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 ALEXICH, M.P. Indiana & Michigan Electric Co.  
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 EISENHUT, D.G. Division of Licensing

SUBJECT: Responds to 830208 Generic Ltr 83-10D on plans & schedule  
 for resolving NUREG-0737, Item II.K.3.5 re trip criteria for  
 reactor coolant pumps. Util will follow guidance provided by  
 Westinghouse & Westinghouse Owners Group.

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# INDIANA & MICHIGAN ELECTRIC COMPANY

P. O. BOX 18  
BOWLING GREEN STATION  
NEW YORK, N. Y. 10004

June 2, 1983  
AEP:NRC:0785

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2  
Docket Nos. 50-315 and 50-316  
License Nos. DPR-58 and DPR-74  
TRIP CRITERIA FOR REACTOR COOLANT PUMPS  
(GENERIC LETTER NO. 83-10d)

Mr. Darrell G. Eisenhut, Director  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Dear Mr. Eisenhut:

This letter responds to Generic Letter No. 83-10d, dated February 8, 1983, which requested information regarding the plans and schedule for resolution of the Reactor Coolant Pump (RCP) trip criteria issue (NUREG-0737, Item II.K.3.5) for the Donald C. Cook Nuclear Plant.

Attachment 1 to this letter presents an overview of a two-part program, undertaken by Westinghouse (W) and the Westinghouse Owners Group (WOG), which will address the requirements of NRC Generic Letter No. 83-10d for the purpose of providing more uniform RCP trip criteria and methods for determining those criteria. The organization of Attachment 1 parallels that of the attachment to Generic Letter No. 83-10d.

Indiana & Michigan Electric Co. (I&MECo) currently plans to follow the guidance to be provided by W and WOG in resolving the RCP trip criteria issue for the Donald C. Cook Nuclear Plant. Our proposed schedule for resolution has been incorporated into Attachment 1 to this letter.


It is also noted that the W/WOG small break Loss of Coolant Accident (LOCA) analyses will assume standard W fuel for both the limiting plant study and in the plant applicability studies. Since

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Exxon fuel is presently used in the Donald C. Cook Nuclear Plant (in addition to W fuel), we have contacted Exxon to determine the effect that their fuel would have upon the applicability of the W analyses to our Plant. The Exxon response, which is presented in Attachment 2 to this letter, indicates that RCP trip criteria identified by W/WOG will still be applicable with Exxon fuel in the reactor cores.

As requested by Generic Letter No. 83-10d, the information in this letter and its Attachments is affirmed pursuant to 10 CFR 50.54(f).

Very truly yours,



M. P. Alexich  
Vice President

MPA/dam

cc: John E. Dolan - Columbus

R. S. Hunter

R. W. Jurgensen

W. G. Smith, Jr. - Bridgman

R. C. Callen

G. Charnoff

NRC Resident Inspector at Cook Plant - Bridgman

STATE OF NEW YORK     )  
                                   )  
COUNTY OF NEW YORK    )

M. P. Alexich, being duly sworn, deposes and says that he is a Vice President of Licensee Indiana & Michigan Electric Company, that he has read the foregoing response to Generic Letter No. 83-10d, AEP:NRC:0785, and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

*M. P. Alexich*

Subscribed and sworn to before me this 2<sup>nd</sup> day of June, 1983

*Kathleen Barry*

(Notary Public)

NOTARY PUBLIC, State of New York  
E.O. No. 56782  
Qualified in Queens County  
Certificate filed in New York County  
Commission Expires March 30, 1985

Attachment 1 to AEP:NRC:0785  
Plans and Schedule for Resolution of the  
Reactor Coolant Pump Trip Criteria Issue  
Donald C. Cook Nuclear Plant Unit Nos. 1 and 2

INTRODUCTION

The criteria for resolution of NUREG-0737 Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps," were stated in a letter dated February 8, 1983 (Generic Letter No. 83-10d), from Mr. Darrell G. Eisenhut of the Nuclear Regulatory Commission to all licensees with W-designed Nuclear Steam Supply Systems. This Attachment presents the plans and schedule for demonstrating compliance with those criteria for the Donald C. Cook Nuclear Plant.

OVERALL PLAN

W and WOG will undertake a two-part program to address the requirements of NRC Generic Letter No. 83-10d for the purpose of providing more uniform RCP trip criteria and methods of determining those criteria. In the first part of the program, revised RCP trip criteria will be developed which will provide an indication to the operator to trip the RCPs for small break LOCAs requiring such action, but will allow continued RCP operation for Steam Generator Tube Ruptures (SGTRs) less than or equal to a double-ended SGTR. The revised RCP trip criteria will also be evaluated against other non-LOCA transients and accidents where continued RCP operation is desirable in order to demonstrate that a need to trip RCPs will not be indicated to the operator for the more likely cases. Since this study is to be utilized for emergency response guideline development, better estimate assumptions will be applied in the consideration of the more likely scenarios. The first part of the program will be completed and incorporated into Revision 1 of the Emergency Response Guidelines (ERGs) scheduled to be completed by W, for the WOG, by July 31, 1983.

The second part of the program is intended to provide the required justification for manual RCP trip. This part of the program must necessarily be done after the completion of the first part of the program. The schedule for completion of the second part of the program is the end of 1983.

The preferred and safest method of pump operation following a small break LOCA is to manually trip the RCPs before significant system voiding occurs. No attempt will be made in the W/WOG program to demonstrate the acceptability of continued RCP operation during a small break LOCA. Furthermore, no request for an exemption to 10 CFR 50.46 will be made to allow continued RCP operation during a small break LOCA.

DETAILED RESPONSE TO GENERIC LETTER NO. 83-10d

Each of the requirements identified in the attachment to Generic Letter No. 83-10d are discussed below. The organization of this section parallels that of the attachment to the Generic Letter.

I. Pump Operation Criteria Which Can Result in RCP Trip During Transients and Accidents.

1. Setpoints for RCP Trip

The WOG response to this section of the requirements will be contained in Revision 1 to the Emergency Response Guidelines scheduled for July 31, 1983. The plans for implementation of Revision 1 to the ERGs in the Donald C. Cook Nuclear Plant Emergency Operating Procedures were previously reported to the NRC via letter No. AEP:NRC:0773, dated April 15, 1983.

- a) W and the WOG are developing revised RCP trip criteria which will assure that the need to trip the RCPs will be indicated to the operator for LOCAs where RCP trip is considered necessary. The criteria will also ensure continued forced RCS flow for:

- 1) Steam Generator Tube Rupture (up to a double-ended SGTR).
- 2) Other more likely non-LOCA transients where forced circulation is desirable (e.g., steam line breaks equal to or smaller than 1 stuck open PORV).

NOTE: Event diagnosis will not be used. The criteria developed will be symptom based.

The criteria being considered for RCP trip are:

- 1) RCS wide range pressure  $<$  constant.
- 2) RCS subcooling  $<$  constant.

- 3) Wide range RCS pressure < function of secondary pressure.

Instrument uncertainties will be accounted for. Environmental uncertainty will be included if appropriate. No partial or staggered RCP trip schemes will be considered. Such schemes are unnecessary and increase the requirements for training, procedures and decision making by the operator during transients and accidents.

- b) The RCP trip criteria selected will be such that the operator will be instructed to trip the RCPs before voiding occurs at the RCPs.
- c) The criteria developed in Item 1a above are not expected to lead to RCP trip for the more likely non-LOCA and SGTR transients. However, since continued RCP operation cannot be guaranteed, the Emergency Response Guidelines provide guidance for the use of alternate methods for depressurization.
- d) The Emergency Response Guidelines contain specific guidance for detecting, managing and removing coolant voids that result from flashing. The symptoms of such situation are described in the guidelines and in detail in the background document for the guidelines. Additionally, explicit guidance for operating the plant with a vaporous void in the reactor vessel head is provided in certain cases where such operation is needed. System voiding training has been conducted during D. C. Cook Nuclear Plant Licensed Operator Requalification (1982, 1983) and during a W course on Mitigating Core Damage.

New D. C. Cook Plant systems have been installed to deal with voids in the reactor vessel head. These are the Reactor Vessel Level Instrumentation System (RVLIS) and the Reactor Head/Pressurizer vent systems. Use of these systems, however, has not been approved pending the issuance of approved procedures. As noted above, our plans for implementation of Plant-specific procedures is given in letter No. AEP:NRC:0773.

- e) The D. C. Cook Nuclear Plant has two levels of containment isolation, designated Phases A and B. Phase A isolation is initiated by Safety Injection actuation

(which is produced by redundant signals, including containment pressure high (1.2 psig)) or by manual initiation. Phase B isolation is automatically initiated by containment pressure high-high (3 psig) or by manual actuation.

As stated in our letter AEP:NRC:0185B, dated July 25, 1979, the RCPs can be operated after Phase A isolation has taken place without damage to the pumps or seals. The RCP seal water supply line, the Component Cooling Water (CCW) supply and return to the RCP thermal barrier heat exchanger and motor oil coolers, and service water to the ventilation units are not isolated under Phase A containment isolation. Although the RCP No. 1 seal water discharge line is isolated by Phase A containment isolation, a safety valve set at 150 psig in that line discharges to the pressurizer relief tank to prevent the line from overpressurizing, thereby providing a flow path for the seal water.

During Phase B containment isolation, the CCW supply and return lines to the RCP thermal barrier and motor oil coolers and the service water to the ventilation units are isolated. To operate a RCP during Phase B containment isolation, without causing seal or pump failure, would require resetting of the Phase B signal, operating the CCW isolation valve control switches to restore CCW service to the RCPs, and then restarting the RCP. Actuation of containment spray during Phase B isolation can, however, result in damage to the pumping units.

The question arises as to whether any small primary system break or any other transient would require operation of the RCPs and simultaneously cause a Phase B isolation signal. We believe that such is not the case from our preliminary review of the the FSAR and pertinent WOG correspondence. In particular, a SGTR is expected to lead to Phase A containment isolation only.

f) Discussed in 1a and 1c.

2. Guidance for Justification of Manual RCP Trip

The WOG response to this section of requirements will be reported by December 31, 1983. The WOG report will be reviewed for applicability to the Donald C. Cook Nuclear

Plant by April 30, 1984. Indiana & Michigan Electric Co. will submit to the NRC technical justification for treatment of RCPs during accidents and transients of concern based on the results of the review of the WOG report.

- a) A significant number of analyses have been performed by W for the WOG using the currently approved W Appendix K Evaluation Model for small break LOCA. This Evaluation Model uses the WFLASH Code. These analyses demonstrate for small break LOCAs of concern, that if the RCPs are tripped 2 minutes following the onset of reactor conditions corresponding to the RCP trip setpoint, the predicted transient is nearly identical to those presented in the Safety Analysis Reports for all Westinghouse plants. Thus, the Safety Analysis Reports for all plants demonstrate compliance with requirement 2a. The analyses performed for the Westinghouse Owners Group will be used to demonstrate the validity of this approach.
- b) Better estimate analyses will be performed for a limiting Westinghouse-designed plant using the WFLASH computer code with better estimate assumptions. These analyses will be used to determine the minimum time available for operator action for a range of break sizes such that the ECCS acceptance criteria of 10 CFR 50.46 are not exceeded. It is expected that the minimum time available for manual RCP trip will exceed the guidance contained in N660. This will justify manual RCP trip for all plants.

### 3. Other Considerations

- a) Our response regarding the level of quality for the instrumentation that will signal the need for RCP trip will be included in the April 30, 1984, submittal. This information cannot be transmitted to the NRC until such time as the complete list of involved instrumentation is identified as a result of review of the WOG report.
- b) The Emergency Response Guidelines contain guidance for the timely restart of the RCPs when conditions which will support safe pump start-up and operation are established. Our plans for implementation of Revision 1 to the ERGs have been noted above.
- c) Our response to this section of the Generic Letter

will be provided by April 30, 1984, after additional guidance is provided by W/WOG with regard to manual trip of RCPs.

II. Pump Operation Criteria Which Will Not Result in RCP Trip During Transient and Accidents.

The preferred and safest method of operation following a small break LOCA is to manually trip the RCPs. Therefore, there is no need to address the criteria contained in this section.



Attachment 2 to AEP:NRC:0785  
Applicability of W/WOG RCP Trip Criteria to Exxon Fuel  
Donald C. Cook Nuclear Plant Unit Nos. 1 and 2

**EXXON NUCLEAR COMPANY, Inc.**

600 - 108th Avenue N.E., C-00777, Bellevue, Washington 98009, Telephone (206) 453-4300

May 9, 1983  
HGS:124:83

Dr. J. J. Weiss, Section Mgr.  
Nuclear Materials & Fuel Mgmt.  
American Electric Power Service Corp.  
Two Broadway  
New York, New York 10004

Dear John:

Reference: AEP Letter dated May 4, 1983, Dr. John J. Weiss to H. G. Shaw

In response to your referenced letter, differences in fuel designs supplied by different fuel vendors have a negligible effect on the results of a small break LOCA. Reactor coolant pump trip criteria identified by the Westinghouse Owner's group are, therefore, applicable with Exxon Nuclear fuel in the core. The primary reasons for this are as follows:

- All fuel designs contain  $UO_2$  fuel and zircaloy clad, which are the controlling materials in the Small Break LOCA.
- The dimensions of the fuels from various vendors are similar, which ensure that the nuclear characteristics are similar. The important item here is that the water-to-fuel ratio for each design is similar.
- To be thermal-hydraulically compatible, the pressure drop across the core must be nearly the same for new fuel designs in the core.
- The critical time of potential fuel uncover occurs relatively late in a Small Break LOCA, when fuel related parameters such as cladding-to-fuel gap, clad thickness, and stored energy play an insignificant role in the core uncover time, or the clad heatup rate following uncover.

Very truly yours,



H. G. Shaw  
Contract Administrator

HGS:tlm

cc: H. L. Sobel (AEP)  
S. L. Garrett (ENC)

AFFILIATE OF EXXON CORPORATION