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U-602337
L30-94(09-02)LP
8G.120

JGC-255-94
September 2, 1994

Docket No. 50-461

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Illinois Power's (IP's) Response to Generic Letter (GL) 94-02, "Long-Term Solutions and Upgrade of Interim Operating Recommendations for Thermal Hydraulic Instabilities in Boiling Water Reactors"

Dear Sir:

The purpose of this letter is to respond to the Nuclear Regulatory Commission's (NRC's) requested actions regarding short and long-term solutions to thermal hydraulic instabilities in boiling water reactors. Listed below are the actions requested by the NRC in GL 94-02 and IP's responses to these actions in accordance with the reporting requirements of GL 94-02.

NRC Requested Action 1.a.: Ensuring that procedural requirements exist for initiation of a manual scram under all operating conditions when all recirculation pumps trip with the reactor in the RUN mode.

NRC Requested Action 1.b.: Ensuring that factors important to core stability characteristics are controlled within appropriate limits.

IP Response:

Procedures for action 1.a. and operator training for action 1.b. will be complete by October 1994.

NRC Requested Action 2: Submitting a plan for long-term stability corrective action.

IP Response:

The long-term stability corrective action will be accomplished at Clinton Power Station (CPS) by installing modification NR-010. This modification is to be installed during the sixth refueling outage (RF-6) which is scheduled to begin in

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October 1996. Thermal hydraulic instabilities will be detected and automatically suppressed by means of a reactor scram initiated by the new system (modification NR-010) without operator action.

Attachment 2 further elaborates on IP's response to the procedure and training requirements of Generic Letter 94-02 and on the modification scope and schedule for NR-010. The more detailed responses contained within Attachment 2 were prepared in accordance with guidance established by the Boiling Water Reactor Owners' Group (BWROG).

IP will notify the NRC when actions 1.a., 1.b. and 2 are completed in accordance with the reporting requirements of GL 94-02.

Attachment 1 provides an affidavit supporting the facts set forth in this letter and its attachments.

Sincerely yours,

J. G. Cook
Vice President

JSP/csm

Attachments

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety

Attachment 1
to U-602337

J. G. Cook, being first duly sworn, deposes and says: That he is Vice President of the Nuclear Program at Illinois Power (IP), Clinton Power Station (CPS); that this letter has been prepared under his supervision and direction; that he knows the contents thereof; and that to the best of his knowledge and belief said letter and the facts contained therein are true and correct.

Date: This 2nd day of September 1994.

Signed: _____
J. G. Cook

STATE OF ILLINOIS) SS
DeWitt COUNTY)

"OFFICIAL SEAL"
Jacqueline S. Matthias
Notary Public, State of Illinois
My Commission Expires 11/24/97

Subscribed and sworn to before me this 2nd day of September 1994.

Jacqueline S. Matthias
(Notary Public)

IP's Response to Generic Letter 94-02

This attachment provides detailed information regarding Illinois Power's (IP's) response to the Nuclear Regulatory Commission's (NRC's) requested actions for Generic Letter (GL) 94-02. Below is a list of references used in preparing IP's GL 94-02 response.

References:

1) Letter, L. A. England to M. J. Virgilio, "BWR Owners' Group Guidelines for Stability Interim Corrective Action", June 6, 1994

2) Letter, L. A. England to M. J. Virgilio, "BWR Owners' Group Improved Guidelines for Stability Interim Corrective Actions", April 4, 1994

3) Letter, A. Thadani (NRC) to L. A. England (BWROG), "Acceptance for Referencing of Topical Reports NEDO-31960 and NEDO-31960, Supplement 1, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology", dated July 12, 1993

Action Item 1 of GL 94-02 requests BWR licensees to review operating procedures and operator training programs and revise or modify them as appropriate. These revisions or modifications are to strengthen administrative provisions intended to avoid reactor power oscillations or detect and suppress oscillations if they do occur.

Illinois Power has implemented for Clinton Power Station (CPS) the Interim Corrective Actions (ICAs) specified in NRC Bulletin 88-07, Supplement 1, "Power Oscillations in Boiling Water Reactors (BWRs)." In addition, CPS supported the Boiling Water Reactor Owners' Group (BWROG) effort to develop improved guidelines for the ICAs to better address startup and low power maneuvering operations. A copy of the improved BWR Owners' Group Guidelines for Stability Interim Corrective Action was provided to the NRC in Reference 1. It is our understanding that, based on the NRC review of an advance copy of these guidelines (Reference 2), the NRC will accept the improved BWR Owners' Group guidelines as an acceptable response to requested actions 1.a. and 1.b. of Generic Letter 94-02.

It should be noted that the BWR Owners' Group Guidelines (Reference 1) are consistent with, but more restrictive than, the ICAs which were previously implemented and incorporated in CPS procedures as a result of Bulletin 88-07, Supplement 1. The original stability regions defined in the 1988 BWROG ICAs and included in the NRC Bulletin 88-07, Supplement 1, were based on instability testing and events known at that time. Subsequent to the 1988 BWROG ICAs, additional work identified a sensitivity to reactor power shape and/or feedwater temperature conditions. As a result, the BWROG published Reference 1 guidelines to incorporate an expanded instability region and power

distribution control definition to strengthen the oscillation prevention feature. This, in conjunction with the detection and suppression provisions of the guidelines, provides a higher degree of protection against unacceptable power oscillations.

CPS plans to modify operating procedures and operator training where necessary. These revisions will ensure that the procedures and training are consistent with, or more conservative than, the BWROG guidelines in Reference 1. CPS will continue to recognize the operating region of ≤ 45 percent core flow and ≥ 80 percent flow control line as the scram region and require a manual scram when entered per the guidelines in Reference 1 (see Figure 1). CPS will recognize the area of 45-50 percent core flow and 108-121 percent flow control line as the exit region and take the appropriate actions per the BWROG guidelines in Reference 1. Operation will be allowed in the controlled entry region provided the boiling boundary is maintained ≥ 4.0 feet per the BWROG Option 1 guidelines in Reference 1, Appendix A. The CPS procedure changes and training will be implemented by October 3, 1994. IP will report when the procedure revisions and training have been completed per the reporting requirements of this Generic Letter.

Because the guidelines are intended for use until replaced by a stability long-term solution, modification of the CPS Technical Specifications is not appropriate. The Reference 1 guidelines and resulting plant operating procedure and operator training changes are for interim use only until the long-term stability solution is implemented. Once implemented, all appropriate procedures and training will be in accordance with the long-term solution implemented at CPS.

Action Item 2 of GL 94-02 requests that IP submit to the NRC plans for implementing a long-term solution to the reactor coupled neutronic/thermal-hydraulic stability issue. These plans are discussed below.

The NRC requirement for stability long-term corrective actions to ensure compliance with General Design Criteria 10 and 12 of 10 CFR 50 was originally presented in NRC Bulletin 88-07, Supplement 1 (December 30, 1988). The Bulletin acknowledged that the NRC was working with the BWROG to develop generic approaches to resolve this issue. The resulting BWROG efforts have led to the long-term solution concepts and supporting methodology described in NEDO-31960 and NEDO-31960, Supplement 1, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology." NRC acceptance of the BWROG developed long-term solution concepts and supporting methodology is indicated in the Reference 3 letter.

Plans have been formulated for implementing a stability long-term solution at CPS on the basis of the technical progress made in the BWROG stability program and the degree of NRC acceptance as indicated in the Reference 3 letter. IP has elected to proceed with a solution that introduces new plant hardware and software (H&S) for the reactor

protection system. This H&S will provide early detection of oscillations and automatically initiate an appropriate mitigating action. The "Long-Term Solution Stability System" (LTSSS) at CPS features the Option III (OPRM) concept described in NEDO-31960 and NEDO-31960, Supplement 1. As stated in the cover letter, this LTSSS will be implemented with modification NR-010.

To complete NR-010, IP is participating with other utilities under a BWROG program and has contracted with ABB Combustion Engineering (CE) to develop the H&S design and deliver the final product. Recommendations for Technical Specification changes will be provided as part of the LTSSS program. These will be incorporated at CPS as appropriate. Implementation of the LTSSS is contingent upon NRC acceptance of the planned BWROG submittal on its methodology and the BWROG/ABB CE submittal on H&S.

The current schedule for completing the joint design and licensing activities is provided on the next page. The LTSSS hardware is scheduled for availability in the Fall of 1995. As discussed at the July 21, 1994, Option III Owners' meeting with the NRC, this schedule allows for installation of the LTSSS in the Fall of 1996. In addition, this schedule allows for engineering preparation and necessary licensing activities to be completed in order that modification NR-010 can be installed. The Owners' Group recommends that plants operate with the reactor protection system (RPS) trip function disabled for at least six months to evaluate the system performance, its potential for spurious trip signals, and familiarization with the system operation. The present ICAs will be used during the interim six-month period when the RPS trip is disabled. However, the alarm and trip alarm functions will be kept operational to increase operator awareness and recognition of instability events.

The near term plan is to use the existing Technical Specifications and present ICAs until NR-010 is installed and evaluated for six months. Upon successful completion of the six-month evaluation period, the RPS trip function will be enabled and the system declared operational. Prior to enabling the trip function, the CPS Technical Specifications will be modified to reflect the LTSSS as a new input to the RPS. In addition, the present ICAs will be replaced by appropriate operational procedures for long-term operation.

IP intends to have the LTSSS (modification NR-010) installed at CPS by the end of the sixth refuel outage that is scheduled for the fall of 1996. However, IP's schedule is contingent upon the joint implementation of licensing and design activities and NRC acceptance being completed as indicated on the next page. Once NR-010 is installed and acceptance tested, it will become operational following at least six months of plant operation.

DESIGN & LICENSING ACTIVITIES FOR ABB CE OPTION III

2nd Quarter, 1994	INITIATE DESIGN WORK (ABB CE)
3rd Quarter, 1994	MEET WITH NRC ON H&S DEVELOPMENT PROCESS
4th Quarter, 1994	OPTION III H&S TOPICAL REPORT COMPLETE (ABB)
1st Quarter, 1995	DETECT & SUPPRESS TOPICAL REPORT COMPLETE (FIRST TIME APPLICATION AND RELOAD REVIEW)
4th Quarter, 1995	SYSTEM DESIGN AND DEVELOPMENT COMPLETE
4th Quarter, 1996	OPTION III INITIAL PLANT INSTALLATION
4th Quarter, 1996	PLAN FOR OPTION III INSTALLATION AT CLINTON

Figure 1
to U-602337

CPS POWER-TO-FLOW MAP