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September 9, 1994

Mr. William T. Russell, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Document Control Desk

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
LaSalle County Station Units 1 and 2
Response to Generic Letter 94-02 (BWR Stability)
NRC Dockets 50-237 and 50-249
NRC Dockets 50-254 and 50-265
NRC Dockets 50-373 and 50-374

- References:
- 1) NRC Generic Letter 94-02, "Long-Term Solutions and Upgrade of Interim Operating Recommendations for Thermal-Hydraulic Instabilities in Boiling Water Reactors", dated July 11, 1994
 - 2) Letter, L. A. England to M. J. Virgilio, "BWR Owners' Group Guidelines for Stability Interim Corrective Action", dated June 6, 1994. Guidelines identical to those in BWROG-94078 letter to all BWR owners dated June 6, 1994
 - 3) Letter, L. A. England to M. J. Virgilio, "BWR Owners' Group Improved Guidelines for Stability Interim Corrective Actions", dated April 4, 1994
 - 4) Letter, A. Thadani to L. A. England, "Acceptance for Referencing of Topical Reports NEDO-31960, Supplement 1, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology", dated July 12, 1994

Mr. Russell:

The purpose of this letter is to provide the Dresden, Quad Cities, and LaSalle station response to NRC Generic Letter 94-02 concerning BWR stability. Commonwealth Edison (ComEd) has been a leader in the BWR Owners' Group (BWROG) effort to resolve issues associated with BWR Stability. This response is consistent with BWROG interim and long-term actions that have been discussed with the NRC staff.

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Mr. Russell

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September 9, 1994

Dresden, Quad Cities, and LaSalle stations have implemented the Interim Corrective Actions (ICAs) described in NRC Bulletin 88-07, Supplement 1 (December 30, 1988), and have supported the subsequent BWROG effort to develop improved guidelines for the ICAs to better address startup and low power maneuvering conditions. A copy of the improved BWROG ICA guidelines was provided to the NRC in Reference 2. It is our understanding that, based on a review of an advanced copy of these guidelines (provided in Reference 3), the NRC will consider the improved BWROG guidelines to be an acceptable response to requested actions 1.a and 1.b of Reference 1. The Dresden, Quad Cities, and LaSalle stations plans for implementing the Reference 2 improved BWROG ICA guidelines are described in the attached responses. Because the guidelines are intended for use until replaced by a long-term solution, interim technical specification modifications are not appropriate.

Reference 1 acknowledges that the NRC has been working with the BWROG to develop generic approaches to provide a long term resolution to this issue. The resulting BWROG efforts have led to solution concepts and supporting methodology which were accepted by the NRC in Reference 4. Dresden, Quad Cities, and LaSalle stations will be implementing the Option III concept discussed in Reference 4, and ComEd is participating with other utilities in a BWROG program to develop and design a final product with ABB Combustion Engineering. The planned implementation schedules, provided in the attached responses, are contingent upon NRC acceptance of the upcoming BWROG submittal on methodology and the BWROG/ABB Combustion Engineering submittal on hardware and software design. The current milestone schedule for these BWROG activities is provided in Enclosure 1.

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects these statements are not based on my personal knowledge, but on information furnished by other ComEd employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Mr. Russell

(3)

September 9, 1994

If there are any questions or comments, please contact Tom Rausch of my staff at (708) 663-6645.

Sincerely,



Ruth A. Dillon

John C. Brons
John C. Brons
Vice President
Nuclear Services

Enclosure: 1) BWROG Design and Licensing Activities Milestones
(ABB CE OPTION III)

Attachments: 1) Attachment A; Dresden Station Submittal
2) Attachment B; Quad Cities Station Submittal
3) Attachment C; LaSalle Station Submittal

cc: J. Martin, Regional Administrator-RIII
R. Pulsifer, Quad Cities Project Manager-NRR/PDIII-2
J. Stang, Dresden Project Manager-NRR/PDIII-2
W. Reckley, LaSalle Project Manager-NRR/PDIII-2
M. Leach, Senior Resident Inspector (Dresden)
P. Brochman, Senior Resident Inspector (LaSalle)
C. Miller, Senior Resident Inspector (Quad Cities)
Office of Nuclear Facility Safety-IDNS

ENCLOSURE 1

BWROG DESIGN AND LICENSING ACTIVITIES MILESTONES
(ABB CE OPTION III)

2Q/94	INITIATE DESIGN WORK (ABB CE)
3Q/94	MEET WITH NRC ON HARDWARE/SOFTWARE DEVELOPMENT PROCESS
4Q/94	OPTION III HARDWARE/SOFTWARE TOPICAL REPORT SUBMITTAL (BWROG/ABB)
1Q/95	DETECT AND SUPPRESS METHODOLOGY TOPICAL SUBMITTAL (FIRST TIME APPLICATION AND RELOAD REVIEW - BWROG/GE)
3Q/95	NRC APPROVAL OF OPTION III LICENSING TOPICAL AND GENERIC TECHNICAL SPECIFICATION
4Q/95	SYSTEM DESIGN AND DEVELOPMENT COMPLETE
3Q/95	START OPTION III INITIAL PLANT INSTALLATION ENGINEERING PREPARATION
4Q/96	OPTION III INITIAL PLANT INSTALLATION

Attachment A

Dresden Station Response to NRC Generic Letter 94-02

Requested Action 1:

All licensees of BWRs, except for Big Rock Point which does not have the capability for operation under variable flow conditions, are requested to review their current procedures and training programs and modify them as appropriate to strengthen the administrative provisions intended to avoid power oscillations or to detect and suppress them if they occur prior to implementation of the long-term solutions. The experience gained at WNP-2 should be a primary guide in this review. In doing this, each licensee of a BWR (except for Big Rock Point) should:

- a. Ensure that procedural requirements exist for initiation of a manual scram under all operating conditions when all recirculation pumps trip (or there are no pumps operating) with the reactor in the RUN mode, and ensure that operators are aware of the potential for very large power oscillations and the potential for exceeding core thermal safety limits before automatic protection systems function following the trip of all recirculation pumps (the procedural manual scram is not necessary after long-term solutions are approved and implemented for individual plants); and
- b. Ensure that factors important to core stability characteristics (e.g. radial and axial peaking, feedwater temperature, and thermal-hydraulic compatibility of mixed fuel types) are controlled within appropriate limits consistent with the core design, power/flow exclusion boundaries, and core monitoring capabilities of the reactor in question, and that these factors are controlled through procedures governing changes in reactor power, including startup and shutdown, particularly at low-flow operating conditions. Each licensee should review its procedures and determine if instability can be avoided by these procedures and if the procedures can be carried out using existing instrument information. If it is concluded that a near-term upgrade of core monitoring capability is called for to ease the burden on operators, determine the need to incorporate on-line stability monitoring or monitors for stability sensitive parameters and inform the NRC of the schedule and technical evaluation for such upgrades found to be necessary. (These procedural operation controls will no longer be necessary for licensees which implement fully automatic long-term solutions, such as Options III or IIIa of Reference 2 (Reference 2 of GL 94-02). Licensees should propose for plant-specific review the administrative controls to be retained in conjunction with other long-term solutions.)

Response to Requested Action #1

Dresden Station plans to modify, where necessary, its operator procedures and operator training such that they are consistent with or more conservative than the BWROG guidelines provided in Reference 2. The necessary procedure changes and training will be implemented by December 23, 1994.

The Reference 2 guidelines and resulting plant operating procedure and operator training modifications are intended for use only until the stability long-term solution described in the response to Requested Action 2 is implemented. At that time, appropriate procedure changes will be made which recognize the automatic protection and operator warning features of the long-term solution.

Requested Action 2:

All licensees of BWRs, except for Big Rock Point, are requested to develop and submit to the NRC a plan for long-term stability corrective actions, including design specifications for any hardware modifications or additions to facilitate manual or automatic protective response needed to ensure that the plant is in compliance with General Design Criteria 10 and 12. An acceptable plan could provide for implementing one of the long-term stability solution options proposed by the BWROG and approved by the NRC in Reference 3 (of GL 94-02) or in subsequent documentation. The plan should include a description of the action proposed and a schedule of any submittal requiring plant-specific design review and approval by the NRC and an installation schedule (if applicable). The plan should also address the need for near-term and long-term technical specification modifications. Generic BWROG documents or planned submittal may be referenced in the plan.

Response to Requested Action #2:

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 BWR Owners Group (BWROG) to develop generic approaches to resolve this issue. The resulting BWROG efforts have led to the solution concepts and supporting methodology described in NEDO-13960 and NEDO-13960 Supplement 1, "BWROG Long-Term Stability Solutions Licensing Methodology". NRC acceptance of the BWROG-developed solution concepts and supporting methodology was provided in Reference 4.

Dresden Station has elected to proceed with a solution which introduces new plant hardware/software to provide early detection of oscillations and to initiate an appropriate mitigating action. This Long-Term Solution Stability System (LTSSS) features the Option III (OPRM) described in NEDO-31960 and NEDO-31960 Supplement 1. To complete this activity, Dresden Station is participating with LaSalle County and Quad Cities Stations along with other utilities under a BWROG program and has contracted with ABB Combustion Engineering to develop the hardware/software design and deliver the final product. Recommendations for technical specification changes will be provided as part of the program. These changes will be incorporated at Dresden Station as appropriate. Implementation of the stability long-term solution plan is contingent upon NRC acceptance of the planned BWROG submittal on methodology and the BWROG/ABB Combustion Engineering topical report submittal on hardware and software.

The BWROG LTSSS hardware is scheduled to be available in Fall, 1995. The plan, as discussed at the July 21, 1994 Option III Owners' meeting with the NRC, is for the first installation of the LTSSS to be in fourth quarter of 1996 (4Q/96). This schedule allows appropriate time for engineering preparation for system installation. The BWROG recommendation is for all plants to operate with the RPS trip function disabled for at least six (6) months to evaluate the system performance, its potential for spurious trip signals, and to become familiar with system operation. The Interim Corrective Actions (ICAs) will be used during the interim period when the RPS trip is disabled. During this period, the alarm and trip alarm functions will be operational to increase the operator's ability to recognize an instability event. The near term plan is to not modify existing technical specifications for the interim period of operation. Upon successful completion of the evaluation period, the RPS trip function will be enabled and the system declared operational. The present ICAs will be replaced with appropriate operational procedures for long-term operation when the new system is declared operational.

The Dresden Technical Specifications will be modified to reflect the installation of the LTSSS, and become effective when the new system is declared operational.

Assuming that the joint development and NRC acceptance is completed as scheduled (see Enclosure 1), it is ComEd's objective to have the LTSSS installed in Dresden Station Unit 2 during the D2R15 refuel outage (presently scheduled for 1Q/97), and following successful acceptance testing, to have the trip enabled making the system fully operational six (6) months after unit start-up. For Unit 3, installation is planned to occur during the D3R15 refuel outage (presently scheduled for 1Q/98), and following successful acceptance testing, to have the trip enabled making the system fully operational six (6) months after unit start-up.

Attachment B

Quad Cities Station Response to NRC Generic Letter 94-02

Requested Action 1:

All licensees of BWRs, except for Big Rock Point which does not have the capability for operation under variable flow conditions, are requested to review their current procedures and training programs and modify them as appropriate to strengthen the administrative provisions intended to avoid power oscillations or to detect and suppress them if they occur prior to implementation of the long-term solutions. The experience gained at WNP-2 should be a primary guide in this review. In doing this, each licensee of a BWR (except for Big Rock Point) should:

- a. Ensure that procedural requirements exist for initiation of a manual scram under all operating conditions when all recirculation pumps trip (or there are no pumps operating) with the reactor in the RUN mode, and ensure that operators are aware of the potential for very large power oscillations and the potential for exceeding core thermal safety limits before automatic protection systems function following the trip of all recirculation pumps (the procedural manual scram is not necessary after long-term solutions are approved and implemented for individual plants); and
- b. Ensure that factors important to core stability characteristics (e.g. radial and axial peaking, feedwater temperature, and thermal-hydraulic compatibility of mixed fuel types) are controlled within appropriate limits consistent with the core design, power/flow exclusion boundaries, and core monitoring capabilities of the reactor in question, and that these factors are controlled through procedures governing changes in reactor power, including startup and shutdown, particularly at low-flow operating conditions. Each licensee should review its procedures and determine if instability can be avoided by these procedures and if the procedures can be carried out using existing instrument information. If it is concluded that a near-term upgrade of core monitoring capability is called for to ease the burden on operators, determine the need to incorporate on-line stability monitoring or monitors for stability sensitive parameters and inform the NRC of the schedule and technical evaluation for such upgrades found to be necessary. (These procedural operation controls will no longer be necessary for licensees which implement fully automatic long-term solutions, such as Options III or IIIa of Reference 2 (Reference 2 of GL 94-02). Licensees should propose for plant-specific review the administrative controls to be retained in conjunction with other long-term solutions.)

Response to Requested Action #1

In response to requested action number 1 of Generic Letter 94-02, Quad Cities Station plans to implement actions consistent with or more conservative than those described in Reference 2. Quad Cities plans to complete the procedure changes and training required to implement these guidelines by December 31, 1994.

These guidelines are intended to be used only until the long-term solution described in the response to requested action #2 is implemented. At that time, appropriate procedure changes will be made which recognize the automatic protection and operator warning features of the long-term solution.

Requested Action 2:

All licensees of BWRs, except for Big Rock Point, are requested to develop and submit to the NRC a plan for long-term stability corrective actions, including design specifications for any hardware modifications or additions to facilitate manual or automatic protective response needed to ensure that the plant is in compliance with General Design Criteria 10 and 12. An acceptable plan could provide for implementing one of the long-term stability solution options proposed by the BWROG and approved by the NRC in Reference 3 (of GL 94-02) or in subsequent documentation. The plan should include a description of the action proposed and a schedule of any submittal requiring plant-specific design review and approval by the NRC and an installation schedule (if applicable). The plan should also address the need for near-term and long-term technical specification modifications. Generic BWROG documents or planned submittal may be referenced in the plan.

Response to Requested Action #2:

In response to requested action number 2 of NRC Generic Letter 94-02, the Quad Cities Station plans for implementing a long-term solution to the reactor coupled neutronic/thermal-hydraulic stability issue are provided below.

The NRC requirement for stability long-term corrective actions to ensure compliance with General Design Criteria 10 and 12 of 10CFR50 was originally presented in NRC Bulletin 88-07, Supplement 1 (December 30, 1988). The Bulletin acknowledged that the NRC was working with the BWR Owners Group (BWROG) to develop generic approaches to resolve this issue. The resulting BWROG efforts have led to the solution concepts and supporting methodology described in NEDO-13960 and NEDO-13960 Supplement 1, "BWROG Long-Term Stability Solutions Licensing Methodology". NRC acceptance of the BWROG-developed solution concepts and supporting methodology was provided in Reference 4.

Quad Cities Station has elected to proceed with a solution which introduces new plant hardware/software to provide early detection of oscillations and to initiate an appropriate mitigating action. This Long-Term Solution Stability System (LTSSS) features the Option III (OPRM) described in NEDO-31960 and NEDO-31960 Supplement 1. To complete this activity, Quad Cities Station is participating with Dresden and LaSalle County Stations along with other utilities under a BWROG program and has contracted with ABB Combustion Engineering to develop the hardware/software design and deliver the final product. Recommendations for technical specification changes will be provided as part of the program. These changes will be incorporated at Quad Cities Station as appropriate. Implementation of the stability long-term solution plan is contingent upon NRC acceptance of the planned BWROG submittal on methodology and the BWROG/ABB Combustion Engineering topical report submittal on hardware and software.

The BWROG LTSSS hardware is scheduled to be available in Fall, 1995. The plan, as discussed at the July 21, 1994 Option III Owners' meeting with the NRC, is for the first installation of the LTSSS to be in fourth quarter of 1996 (4Q/96). This schedule allows appropriate time for engineering preparation for system installation. The BWROG recommendation is for all plants to operate with the RPS trip function disabled for at least six (6) months to evaluate the system performance, its potential for spurious trip signals, and to become familiar with system operation. The Interim Corrective Actions (ICAs) will be used during the interim period when the RPS trip is disabled. During this period, the alarm and trip alarm functions will be operational to increase the operator's ability to recognize an instability event. The near term plan is to not modify existing technical specifications for the interim period of operation. Upon successful completion of the evaluation period, the RPS trip function will be enabled and the system declared operational. The present ICAs will be replaced with appropriate operational procedures for long-term operation when the new system is declared operational.

The Quad Cities Technical Specifications will be modified to reflect the installation of the LTSSS, and become effective when the new system is declared operational.

Assuming that the joint development and NRC acceptance is completed as scheduled (see Enclosure 1), it is ComEd's objective to have the LTSSS installed at Quad Cities Station Unit 1 during the Q1R15 refuel outage (presently scheduled 2Q/97), and following successful acceptance testing, to have the trip enabled making the system fully operational six (6) months after unit start-up. For Unit 2, installation is planned to occur during the Q2R15 refuel outage (presently scheduled 2Q/98), and following successful acceptance testing, to have the trip enabled making the system fully operational six (6) months after unit start-up.

Attachment C

LaSalle County Station Response to NRC Generic Letter 94-02

Requested Action 1:

All licensees of BWRs, except for Big Rock Point which does not have the capability for operation under variable flow conditions, are requested to review their current procedures and training programs and modify them as appropriate to strengthen the administrative provisions intended to avoid power oscillations or to detect and suppress them if they occur prior to implementation of the long-term solutions. The experience gained at WNP-2 should be a primary guide in this review. In doing this, each licensee of a BWR (except for Big Rock Point) should:

- a. Ensure that procedural requirements exist for initiation of a manual scram under all operating conditions when all recirculation pumps trip (or there are no pumps operating) with the reactor in the RUN mode, and ensure that operators are aware of the potential for very large power oscillations and the potential for exceeding core thermal safety limits before automatic protection systems function following the trip of all recirculation pumps (the procedural manual scram is not necessary after long-term solutions are approved and implemented for individual plants); and
- b. Ensure that factors important to core stability characteristics (e.g. radial and axial peaking, feedwater temperature, and thermal-hydraulic compatibility of mixed fuel types) are controlled within appropriate limits consistent with the core design, power/flow exclusion boundaries, and core monitoring capabilities of the reactor in question, and that these factors are controlled through procedures governing changes in reactor power, including startup and shutdown, particularly at low-flow operating conditions. Each licensee should review its procedures and determine if instability can be avoided by these procedures and if the procedures can be carried out using existing instrument information. If it is concluded that a near-term upgrade of core monitoring capability is called for to ease the burden on operators, determine the need to incorporate on-line stability monitoring or monitors for stability sensitive parameters and inform the NRC of the schedule and technical evaluation for such upgrades found to be necessary. (These procedural operation controls will no longer be necessary for licensees which implement fully automatic long-term solutions, such as Options III or IIIa of Reference 2 (Reference 2 of GL 94-02). Licensees should propose for plant-specific review the administrative controls to be retained in conjunction with other long-term solutions.)

Response to Requested Action #1

In response to requested action number 1 of Generic Letter 94-02, LaSalle County Station plans to implement actions consistent with or more conservative than those described in Reference 2. LaSalle County plans to complete the procedure changes and training required to implement these guidelines by December 31, 1994.

These guidelines are intended to be used only until the long-term solution described in the response to requested action #2 is implemented. At that time, appropriate procedure changes will be made which recognize the automatic protection and operator warning features of the long-term solution.

Requested Action 2:

All licensees of BWRs, except for Big Rock Point, are requested to develop and submit to the NRC a plan for long-term stability corrective actions, including design specifications for any hardware modifications or additions to facilitate manual or automatic protective response needed to ensure that the plant is in compliance with General Design Criteria 10 and 12. An acceptable plan could provide for implementing one of the long-term stability solution options proposed by the BWROG and approved by the NRC in Reference 3 (of GL 94-02) or in subsequent documentation. The plan should include a description of the action proposed and a schedule of any submittal requiring plant-specific design review and approval by the NRC and an installation schedule (if applicable). The plan should also address the need for near-term and long-term technical specification modifications. Generic BWROG documents or planned submittal may be referenced in the plan.

Response to Requested Action #2:

In response to requested action number 2 of NRC Generic Letter 94-02, the LaSalle County Station plans for implementing a long-term solution to the reactor coupled neutronic/thermal-hydraulic stability issue are provided below.

The NRC requirement for stability long-term corrective actions to ensure compliance with General Design Criteria 10 and 12 of 10CFR50 was originally presented in NRC Bulletin 88-07, Supplement 1 (December 30, 1988). The Bulletin acknowledged that the NRC was working with the BWR Owners Group (BWROG) to develop generic approaches to resolve this issue. The resulting BWROG efforts have led to the solution concepts and supporting methodology described in NEDO-13960 and NEDO-13960 Supplement 1, "BWROG Long-Term Stability Solutions Licensing Methodology". NRC acceptance of the BWROG-developed solution concepts and supporting methodology was provided in Reference 4.

LaSalle County Station has elected to proceed with a solution which introduces new plant hardware/software to provide early detection of oscillations and to initiate an appropriate mitigating action. This Long-Term Solution Stability System (LTSSS) features the Option III (OPRM) described in NEDO-31960 and NEDO-31960 Supplement 1. To complete this activity, LaSalle County Station is participating with Dresden Station and Quad Cities Stations along with other utilities under a BWROG program and has contracted with ABB Combustion Engineering to develop the hardware/software design and deliver the final product. Recommendations for technical specification changes will be provided as part of the program. These changes will be incorporated at LaSalle County Station as appropriate. Implementation of the stability long-term solution plan is contingent upon NRC acceptance of the planned BWROG submittal on methodology and the BWROG/ABB Combustion Engineering topical report submittal on hardware and software.

The BWROG LTSSS hardware is scheduled to be available in Fall, 1995. The plan, as discussed at the July 21, 1994 Option III Owners' meeting with the NRC, is for the first installation of the LTSSS to be in fourth quarter of 1996 (4Q/96). This schedule allows appropriate time for engineering preparation for system installation. The BWROG recommendation is for all plants to operate with the RPS trip function disabled for at least six (6) months to evaluate the system performance, its potential for spurious trip signals, and to become familiar with system operation. The Interim Corrective Actions (ICAs) will be used during the interim period when the RPS trip is disabled. During this period, the alarm and trip alarm functions will be operational to increase the operator's ability to recognize an instability event. The near term plan is to not modify existing technical specifications for the interim period of operation. Upon successful completion of the evaluation period, the RPS trip function will be enabled and the system declared operational. The present ICAs will be replaced with appropriate operational procedures for long-term operation when the new system is declared operational.

The LaSalle County Technical Specifications will be modified to reflect the installation of the LTSSS, and become effective when the new system is declared operational.

Assuming that the joint development and NRC acceptance is completed as scheduled (see Enclosure 1), it is ComEd's objective to have the LTSSS installed at LaSalle County Station Unit 2 during the L2R07 refuel outage (presently scheduled 4Q/96), and following successful acceptance testing, to have the trip enabled making the system fully operational six (6) months after unit start-up. For Unit 1, installation is planned to occur during the L1R08 refuel outage (presently scheduled 2Q/97), and following successful acceptance testing, to have the trip enabled making the system fully operational six (6) months after unit start-up.