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September 15, 1988

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: Dresden Station Units 2&3
Quad Cities Station Units 1&2
LaSalle County Station Units 1&2
Response to NRC Bulletin No. 88-07
Docket Nos. 50-237/249, 50-254/265
50-373/374

Reference: (a) NRC Bulletin No. 88-07 Dated June 15, 1988

Dear Sir:

The above reference NRC Bulletin requested that holders of operating licenses for boiling water reactors ensure that adequate operating procedures and instrumentation are available and adequate operator training is provided to prevent the occurence of uncontrolled power oscillations during all modes of BWR operation.

Commonwealth Edison has completed its review pursuant to the request outlined in NRC Bulletin 88-07 for Dresden, Quad Cities and LaSalle County Stations. This information is attached in Enclosures 1-3.

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

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Please address any questions that you or your staff may have concerning this response to this office.

Respectfully,

Wayne E Morgan

W.E. Morgan
Nuclear Licensing Administrator

rf

Attachments:

cc: A.B. Davis
Resident Inspectors - D/QC/LSC

Subscribed and Sworn to
before me this 16th day
of September, 1988

Felis J. Mayo
Notary Public

ATTACHMENT 1

Dresden Station
Response To NRC Bulletin 88-07

The subject bulletin addresses the LaSalle Unit 2 dual recirculation pump trip event which occurred on March 9, 1988. After the pump trip, the unit experienced an excessive neutron flux oscillation while it was on natural circulation. The purpose of this letter is to document Dresden's compliance with Recommendation's 1 and 2 of the bulletin.

REQUESTED ACTION 1:

Within 15 days of receipt of this bulletin, all BWR licensees should ensure that any licensed reactor operator or Shift Technical Advisor performing shift duties has been thoroughly briefed regarding the March 9, 1988 LaSalle Unit 2 event.

RESPONSE:

The station received the bulletin on June 17, 1988. The following actions were completed on the dates indicated:

1. April 21, 1988 - the event was reviewed in a station tailgate.

2. June 24, 1988 - operator training on the event was completed. A lesson plan was written for the event and included in the May simulator requalification training, which began May 16, 1988 and ended June 24, 1988 (the event was not simulated). All licensed operators and Shift Technical Advisors attended the training.

In addition, Rapid Information Communication Services Information Letter 006, and Commonwealth Edison's Nuclear Fuel Services Department recommendations concerning the event were added to the required reading material for additional review.

REQUESTED ACTION 2:

Within 60 days of receipt of this bulletin, all BWR licensees should verify the adequacy of their procedures and operator training programs to ensure that all licensed operators and Shift Technical Advisors are cognizant of:

a. those plant conditions which may result in the initiation of uncontrolled power oscillations;

b. actions which can be taken to avoid plant conditions which may result in the initiation of uncontrolled power oscillations;

c. how to recognize the onset of uncontrolled power oscillations; and

d. actions which can be taken in response to uncontrolled power oscillations, including the need to scram the reactor if oscillations are not promptly terminated.

Addresses should also verify the adequacy of the instrumentation which is relied upon by operators within their procedures.

RESPONSE

The bulletin was received at Dresden Station on June 17, 1988.

The stability concern was previously addressed in response to General Electric Service Information Letter (SIL) 380 and Technical Specification 3.6.H.3.b. In response to SIL 380, Dresden General Procedures (DGP) 1-1, "Unit 2/3 Normal Unit Startup," 1-3, "Unit 2/3 Hot Standby to Power Operation," and 2-1, "Unit 2/3 Normal Unit Shutdown," were revised to require control rod insertions or flow adjustments as a means of suppressing power oscillations. A detection threshold of 15% was selected for the oscillations. This value is equivalent to 3 times the normal noise levels.

Dresden Operating Procedures (DOP) 202-2, "Reactor Recirculation System Hot Startup," and 202-10, "Recirculation System Shutdown of One Pump," Dresden Technical Staff Surveillance (DTS) 8157, "Baseline Data Acquisition for the Recirculation System and Jet Pump Operability," and DGP 3-3, "Single Recirculation Loop Operation," were revised, and Dresden Operating Surveillance (DOS) 202-4, "Operator's Single Loop Operation Surveillance," was created in response to Technical Specification 3.6.H.3.b. DOS 202-4 provides a method of verifying that any oscillations detected in the Single Loop Operating mode are within the prescribed limits. The other procedures were revised to require power reduction via control rod insertions when operating in certain power/flow conditions. Dresden Operating Abnormal Procedure (DOA) 202-1, "Recirculation Pump Trip - One or Both Pumps," was revised to require control rod insertions for both power reduction to get below the 80% FCL (under certain conditions), and the suppression of power oscillations to satisfy both SIL 380 and Technical Specification 3.6.H.3.b concerns.

The training that was described in the response to requested action 1 was planned in response to SIL 380, Revision 1 but was augmented to encompass the concerns created by the LaSalle event. As mentioned, the training involved review of a newly developed lesson plan addressing BWR instabilities. Additionally, both the plant conditions which may result in the initiation of uncontrolled power oscillations and the actions which can be taken to avoid these conditions were simulated. The actual oscillation condition could not be simulated due to simulator design limitations. However, as part of the simulator upgrade planned by GE, the simulator will be modified to model power oscillations in the future. As part of future training in this area, the recirculation system lesson plan is being revised to address stability.

Additional procedure changes were made in response to the LaSalle event. DOA 202-1, DOP 202-10 and DGP 3-3 were revised, and Dresden General Abnormal Procedure (DGA) 2 was created. These procedures have been approved and placed in the procedure books. DOA 202-1, however, will be revised further to satisfy Nuclear Fuel Services recommendations. In addition, the associated annunciator procedures (DOA - Dresden Operating Annunciator Procedures - 902(3)-5: D-7, E-7, C-6, and A-6) have been revised and approved, and are in the books.

1. DGA 2 (Revision 0), Reactor Core Instabilities: This procedure describes the symptoms of reactor core instability that can be detected in the control room and monitored. The following remedial actions are specified: a) insertion of specially selected control rods (CRAM arrays), b) insertion of control rods in the normal sequence, or c) manual scram if the normal rod insertions do not suppress the scram oscillations in a timely manner.

2. DOA 202-1 (Revision 5), Recirculation Pumps Trip-One or Both Pumps: The procedure was revised to require monitoring of the neutron flux (using the APRMs) when one or both pumps trip. In addition, the procedure reiterates the manual actions specified in DGA 2 and provides instructions for verifying that the reactor is not operating in the prohibited region of the power/flow map. The procedure will be further revised to require monitoring of the LPRM indications.

3. DOP 202-10 (Revision 7), Recirculation System Shutdown of One Pump: Step E.2 and the preceeding note reiterate the remedial actions specified in DGA 2. Step F.3 requires rod insertions if operating above the 80% FCL.

4. DPG 3-3 (Revision 4), Single Recirculation Loop Operation: Step E.3 and the accompanying note reiterate the remedial actions specified in DGA 2.

Currently, the recirculation system operating procedures are being updated and reorganized in conjunction with the Station procedure upgrade program. Therefore, some of the procedure numbers provided above may change, but the requirements added to address the oscillation concerns will remain in effect.

Regarding instrumentation, a General Electric (GE) study on the LaSalle event concluded that the LPRM and APRM meters in the standard design GE Neutron Monitoring System are capable of detecting and adequately displaying neutron flux oscillations with a frequency of approximately 0.5 hz, and the APRM strip chart recorders are adequate to detect a 10% threshold of instability. Since a detection threshold of 15% is being used, it is believed that the existing instrumentation is adequate; however, the response times for the APRM recorders will be adjusted. Testing conducted by Edison using a strip chart recorder with dual response times of 1 second and 5 seconds clearly demonstrated that, at the setting of 1 second, the entire magnitude of 10% oscillations is accurately reflected. Dresden uses GE recorders with a similar 1/5 second dual response time. Any recorders that are not currently set at the 1 second response time will be adjusted. The adjustments are expected to be completed by September 23, 1988.

Dresden's review of this bulletin is complete. In summary, the actions requested in the bulletin either have been completed or will be completed during the month of September 1988. The additional actions (simulator upgrade, further revision of DOA 202-1, and revision of the recirculation system lesson plan) will require more time to complete. These actions will be tracked to completion by Dresden Stations commitment tracking system.

ATTACHMENT 2

Quad Cities Station
Response To NRC Bulletin 88-07

The following discussion documents the actions taken at Quad Cities Station in response to NRC Bulletin 88-07, which describes the March 9, 1988 power oscillation event that occurred at LaSalle Unit 2.

The License Requalification Lecture series was used to brief all license holders on the LaSalle event. This training was performed between April 5 and May 13, 1988, and involved the following:

1. a description of the initial conditions prior to the power oscillations,

2. a description of the events which led to the plant status necessary for the power oscillations to occur,

3. a description of the indications that were available to the LaSalle operators which should have alerted him to the existence of power oscillations, and

4. a summary of the temporary procedure which was implemented to direct operator actions in dealing with power oscillations.

This training provided all license holders with a base of knowledge about the power oscillation event and is adequate for satisfying the 15 day briefing requirement listed in Requested Action 1.

With regard to the items specified in Requested Action 2 of the bulletin, reviews of procedures and operator training programs were performed and the following corrective actions have been taken.

The operator training program will be expanded to provide a lecture on power oscillations including a discussion of the plant conditions which may result in the initiation of uncontrolled power oscillations, actions which can be taken to avoid plant conditions which may result in the initiation of these oscillations, how to recognize the onset of uncontrolled oscillations, and actions to be taken in response to uncontrolled oscillations. This training will be presented to all license holders during the license Requalification Lecture series given between September 13 and October 14, 1988.

A review of procedures was performed and the following procedures were revised so that operation in areas of the power-flow map with plant conditions which may result in the initiation of uncontrolled power oscillations is avoided:

QGP 1-1	Normal Unit Startup
QGP 1-3	Unit Hot Standby to Power Operation
QGP 2-1	Normal Unit Shutdown
QGP 2-4	Shutdown from Power Operation to a Standby Hot Pressurized Condition
QGP 3-1	Power Changes

The following procedures were revised to include actions to be taken to avoid plant conditions which may result in the initiation of uncontrolled power oscillations:

QOP 202-1	Reactor Recirculation System Start-up After Maintenance
QOP 202-2	Reactor Recirculation System Start-up
QOP 202-5	Recirculation System Shutdown of One Pump to Hot Standby
QOA 202-4	Loss of Flow - Single Pump
QOA 202-5	Loss of Flow - Both Pumps

Procedures for APRM and LPRM high and downscale alarms have been revised to include a reference to a new procedure implemented for core instabilities. This new procedures gives guidance to the operator for monitoring APRM and LPRM readings for use in recognizing the onset of uncontrolled power oscillations.

A new procedure, QOA 400-2, Core Instabilities, has been implemented which describes actions to be taken in response to uncontrolled power oscillations, including the need to scram the reactor if oscillations are not promptly terminated.

All license holders will receive training on the above procedure changes during the License Requalification Lecture series given between September 13 and October 14, 1988.

A preliminary review of the APRM and LPRM instrumentation has been performed by the station to verify that no circuitry changes have been made to the instrumentation or alarm circuits which would add an additional time delay in the response of the instrumentation to neutron flux changes. General Electric, in conjunction with the BWR Owner's Group, is conducting further analyses as to the adequacy of current instrumentation. Based on the results of these analyses, additional review of instrumentation at Quad Cities Station will be performed if necessary. This additional review will be tracked under Quad Cities station commitment tracking system.

ATTACHMENT 3

LaSalle County Station
Response to NRC Bulletin 88-07

REQUESTED ACTION 1:

Within 15 days of receipt of this bulletin, all BWR licensees should ensure that any licensed reactor operator or Shift Technical Advisor performing shift duties has been thoroughly briefed regarding the March 9, 1988, LaSalle Unit 2 Event.

RESPONSE:

All licensed RO, SRO, and STA's have been thoroughly briefed on this event at LaSalle on March 9, 1988. The incident was first covered in shift briefings after the event. Then, the event was covered in both license requal (Module 3 of 1988) and in license requal required reading (L-RRR3-88).

REQUESTED ACTIONS 2:

Within 60 days of receipt of this bulletin all BWR licensees should verify the adequacy of their procedures and operator training programs to ensure that all licensed operators and Shift Technical Advisors are cognizant of:

1. Those plant conditions which may result in the initiation of uncontrolled power oscillations,

2. Actions which can be taken to avoid plant conditions which may result in the initiation of uncontrolled power oscillations,

3. How to recognize the onset of uncontrolled power oscillations, and

4. Actions which can be taken in response to uncontrolled power oscillations, including the need to scram the reactor if oscillations are not promptly terminated.

Addresses should also verify the adequacy of the instrumentation which is relied upon by operators within their procedures.

RESPONSE:

Following the scram of LaSalle Unit 2 on March 9, 1988, a review of all LaSalle procedures for normal and abnormal situations involving Reactor Recirculation (RR) pumps, core flow changes and/or core power changes was conducted. Procedure changes were instituted to ensure that Licensed Operating personnel are cognizant of:

1. Those plant conditions which may result in the initiation of uncontrolled power oscillations,

2. Actions which can be taken to avoid plant conditions which may result in the initiation of uncontrolled power oscillations,

3. How to recognize the onset of uncontrolled power oscillations, and

4. Actions which can be taken in response to uncontrolled power oscillations, including the need to scram the reactor if oscillations are not promptly terminated.

The following procedures were revised:

1	LOA-FW-01	"Loss of Feedwater Heater)s)"
2	LOA-RR-06	"Single RR Pump Trip"
3	LOA-RR-07	"Two RR Pump Trip"
4	LOA-RR-09	"Core Instabilities" (New Procedure)
5	LOP-RR-06	"Restart of Tripped RR Pump"
6	LOP-RR-08	"Changing RR Pumps from Fast to Slow Speed"
7	LOP-RR-09	"Reactor Recirculation Pump Shutdown"
8	LOS-AA-S1	"Unit Shiftly Surveillance"
9	LOS-RR-SR1	"Thermal Hydraulic Stability Surveillance"
10	LTS-1200-4	"Nuclear Engineers Daily Surveillance"
11	LAP-100-13	"Control Rod Sequence Preparation"
	Annunciator Response Procedures:	
12	H13-P603(A407)	"LPRM Downscale"
13	H13-P603(A108)	"APRM Hi"
14	H13-P603(A307)	"LPRM Hi"

The following procedures were reviewed and determined to give adequate guidance to operators to avoid plant conditions which may result in neutron flux oscillations during controlled plant evolutions:

15	LGP 1-1	"Normal Unit Startup"
16	LGP 1-3	"Unit Startup from Hot Standby to Power Operation"
17	LGP 2-1	"Normal Unit Shutdown"
18	LGP 2-2	"Unit Shutdown from Power Operation to Hot Standby"
19	LGP 3-1	"Power Changes"

The Abnormal condition procedures (1-4 above) were revised to require immediate isertion of control rods, especially pre-selected high worth ("CRAM") rods in the event of a RR pump trip or loss of Feedwater heaters. This is in compliance with GE SIL 380 Rev. 1. The new procedure LOA-RR-09 provides specific instructions to detect and/or terminate flux oscillations including the requirement to scram the reactor if actions do not successfully terminate the oscillations within 2 minutes.

The procedures by which controlled evolutions involving RR pumps and core power/flow changes are conducted (5-8) were revised to ensure that pump starts were performed from below the 80% rod line, and that operation in the stability surveillance region is avoided during controlled changes in RR pump status. Precautions regarding flux oscillations were provided and reference to LOA-RR-09 was given in the event that oscillations are detected.

The Annunciator procedures (12-14) were revised to provide better guidance for the recognition of flux oscillations and reference to LOA-RR-09 in the event that oscillations are detected. These revisions describe the actual indications received during the LaSalle 2 event.

The adequacy of instrumentation used by the operators during performance of their procedures has been verified. The review of the LaSalle event has shown that the operators had multiple indications of neutron flux oscillations and were cognizant of those oscillations. A more detailed review of the APRM chart recorder traces obtained from the event indicates that the recorders accurately tracked the APRM oscillations. Recorder response testing performed on an APRM recorder showed that the recorder pens when set in the "fast" response mode will accurately track square wave (step change) inputs of a 2 second period. This conservatively bounds the APRM signals during flux oscillations, which were seen to have approximately a 1 second rise time (i.e., significantly slower than the square wave tests). A procedure change has been initiated to LIP-GM-954 to ensure that the recorder pen response is set on "fast" whenever maintenance is performed on the recorders. Presently all APRM recorders on each unit are set on "fast".

GE has performed an evaluation to address the adequacy of instrumentation. This report was transmitted to the BWR Owners Group on July 26, 1988, and concludes that the GE Neutron Monitoring system design is adequate to detect neutron flux instabilities. With the low (10%) threshold level for determination of instabilities and the multiple indications available to the operators, the likelihood that abnormal neutron flux instabilities could exist undetected is minimal. The LaSalle event supports this conclusion in that prior to the current improved generation of procedural guidance, the operators were well aware of the instabilities, and lacked only direction regarding proper response.