

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

June 15, 1988

NRC BULLETIN NO. 88-07: POWER OSCILLATIONS IN BOILING WATER REACTORS (BWRs)

Addressees:

All holders of operating licenses or construction permits for boiling water reactors (BWRs).

Purpose:

The purpose of this bulletin is to request that holders of operating licenses or construction permits for boiling water reactors ensure that adequate operating procedures and instrumentation are available and adequate operator training is provided to prevent the occurrence of uncontrolled power oscillations during all modes of BWR operation.

Description of Circumstances:

On March 9, 1988, LaSalle Unit 2 underwent a dual recirculation pump trip event. After the pump trip, the unit experienced an excessive neutron flux oscillation while it was on natural circulation. The event is described in NRC Information Notice No. 88-39, "LaSalle Unit 2 Loss of Recirculation Pumps With Power Oscillation Event" dated June 15, 1988. Additional details of the event have been documented by the NRC augmented inspection team (AIT) in Inspection Report Nos. 50-373/88008 and 50-374/88008.

After investigation of the event by the licensee and further review by the NRC, the staff concluded that this event has significant generic safety implications because (1) past licensing calculations are not a reliable indicator that a core will be stable under all operating conditions during a fuel cycle; (2) instrumentation for detection and suppression of neutron flux oscillations and recording instrumentation for evaluation of limit cycle flux oscillations may not be adequate; (3) operating procedures and training may not be adequate to respond to this kind of transient; (4) the magnitude and power peaking of the resultant neutron flux oscillations may be greater than previously experienced for in-phase limit cycle oscillations during special stability tests and foreign operating reactor events; and (5) there is a question of compliance with General Design Criterion 12, "Suppression of Reactor Power Oscillations," 10 CFR Part 50, Appendix A.

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Foreign reactor experience has indicated that there are conditions other than the natural circulation condition that existed during the LaSalle event, such as loss of feedwater heaters, which can lead to power oscillations. Furthermore, the power oscillations may be asymmetric and lead to high local neutron flux levels without detection and automatic scram. Therefore, power oscillations are of safety concern because they may result in fuel damage.

Some characteristics of the LaSalle neutron flux oscillation have led to concerns about the applicability of previous safety analyses. The magnitude of in-phase limit cycle oscillations previously observed on the APRMs during special stability tests and operating reactor events were typically in the range of 5% to 15% (peak-to-peak) of rated power, and as high as 25%. This compares to peak-to-peak values of about 100% at the time of the 118% neutron flux trip for LaSalle. The implications, if any, on the bounds for neutron flux oscillations considered in previous safety analyses, including peak power resulting from asymmetric oscillations and the effects of recirculation pump trip actions for ATWS events, require further study. The NRC will pursue these issues with the BWR Owners Group in parallel with utilities taking the actions specified below.

Requested Actions:

Operating Reactors:

- 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.
- 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.

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

It is expected that all BWRs will have procedures and operator training programs to address uncontrolled power oscillations regardless of calculated decay ratios.

Construction Permit Holders:

Prior to scheduled fuel load date, construction permit holders should complete actions 1 and 2, above.

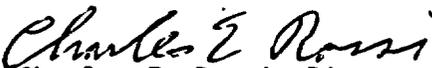
Reporting Requirements:

Within 30 days of completion of the actions requested above, all holders of operating licenses and construction permits shall confirm by letter that the requested actions have been completed and implemented. Licensees and permit holders shall document and maintain at the plant site for a period of at least two years an evaluation of the adequacy of their procedures, training programs and the instrumentation relied upon within their procedures.

The written reports required above shall be addressed to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555, under oath or affirmation under the provisions of Section 182a, Atomic Energy Act of 1954, as amended. In addition, a copy shall be submitted to the appropriate Regional Administrator.

This requirement for information was approved by the Office of Management and Budget under blanket clearance number 3150-0011. Comments on burden and duplication should be directed to the Office of Management and Budget, Reports Management, Room 3208, New Executive Office Building, Washington, D.C. 20503.

If you have any questions about this matter, please contact one of the technical contacts listed below or the Regional Administrator of the appropriate regional office.


Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: L. Phillips, NRR
(301) 492-3235

P. C. Wen, NRR
(301) 492-1172

Attachment: List of Recently Issued NRC Bulletins

LIST OF RECENTLY ISSUED
 NRC BULLETINS

Bulletin No.	Subject	Date of Issuance	Issued to
88-06	Actions to be Taken for the Transportation of Model No. Spec 2-T Radiographic Exposure Device	6/14/88	All NRC licensees authorized to manufacture, distribute, or operate radiographic exposure devices or source changers.
87-02, Supplement 2	Fastener Testing to Determine Conformance with Applicable Material Specifications	6/10/88	All holders of OLs or CPs for nuclear power reactors.
88-05	Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey	5/6/88	All holders of OLs or CPs for nuclear power reactors.
88-04	Potential Safety-Related Pump Loss	5/5/88	All holders of OLs or CPs for nuclear power reactors.
85-03, Supplement 1	Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings	4/27/88	All holders of OLs or CPs for BWRs.
87-02, Supplement 1	Fastener Testing to Determine Conformance with Applicable Material Specifications	4/22/88	All holders of OLs or CPs for nuclear power reactors.
88-03	Inadequate Latch Engagement in HFA Type Latching Relays Manufactured by General Electric (GE) Company	3/10/88	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
 CP = Construction Permit

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OGCB:DOEA:NRR
PCWen
06/ /88

SPXB
DEST:NRR
LPhillips
06/15/88

AT
SAD:DEST
ATHadani
06/15/88

C/OGCB:DOEA:NRR
CHBerlinger
06/15/88

CR
D/DOEA:NRR
CERossi
06/15/88

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In a telephone conversation with Jim Conran of the CRGR staff on 6/15/88, Mr. Conran confirmed that CRGR meeting provided in the CRGR meeting on 6/14/88 had been adequately addressed in the final bulletin. C. Rossi

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CHBerlinger
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