



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NRC INSPECTION MANUAL

SRXB

TEMPORARY INSTRUCTION 2515/105

INSPECTION OF LICENSEE ACTIVITIES IN REFERENCE TO NRC BULLETIN 88-04 - POTENTIAL SAFETY-RELATED PUMP LOSS

2515/105-01 PURPOSE

To provide guidance for performing selective inspections of the licensee's implementation of NRC Bulletin 88-04, "Potential Safety-Related Pump Loss," dated May 5, 1988.

2515/105-02 OBJECTIVE

To ensure adequate licensee response to NRC Bulletin 88-04 and to verify the satisfactory implementation of the actions specified to ensure that safety-related pumps will not be damaged during operation in the miniflow recirculation mode.

2515/105-03 RESPONSIBILITIES AND AUTHORITIES

03.01 Director of Systems Technology, NRR

- a. Provide oversight of licensee compliance with NRC Bulletin 88-04.
- b. Provide Regional Offices with an identification of plants to be inspected under the requirements of this TI.
- c. Establish a lead technical contact for coordination with Regional Offices.
- d. Provide applicable site documentation to the Region prior to the start of inspection activities.

03.02 Regional Management

- a. Provide direct supervision of the conduct of the inspections.
- b. Apprise NRR of the status of completion of the plant inspections.
- c. Consult with the lead technical contact for MPA X804 for the resolution of unclear or inadequate utility responses.

2515/105-04 BACKGROUND

Westinghouse Electric Corporation has notified all utilities with Westinghouse-designed nuclear steam supply systems (NSSS) of two concerns related to operation in the miniflow mode. These concerns are: (1) the potential for dead-heading of one or more pumps in safety-related systems that have a miniflow line common to two or more pumps or other piping configurations that do not preclude pump-to-pump interaction, and (2) whether or not the installed miniflow capacity is adequate for even a single pump in operation. NRC Information Notice 87-59 forwarded a summary of these concerns to all licensees and indicated that further staff consideration may result in a request for specific licensee actions. The staff believes that these issues may be relevant to all water-cooled reactor designs, regardless of the pump application or the NSSS manufacturer. NRC Bulletin 88-04 is the result of the staff's considerations.

Bulletin 88-04 identifies a number of action items to be performed by licensees responding to the bulletin. A licensee had 60 days to provide the first written report to the Nuclear Regulatory Commission documenting its response to the bulletin action items. This report should be used by the inspector to review implementation and responses to the bulletin. The NRC Headquarters Technical Contact used the same information in selecting the plants to be inspected.

The NRR staff has tracked and reviewed the licensee's responses to the bulletin and identified those plants that will be subject to a field verification inspection under the basic requirements of this TI, as identified in Section 2515/105-05 below. Twelve facilities will be inspected in the initial inspection program. If the initial inspection program shows that satisfactory progress is being made in the implementation of the bulletin requirements, no additional plants will be audited.

The requirements of Bulletin 88-04 are to ensure that General Design Criteria 1, Quality standards and records, is met for all safety-related pumps. Pump to pump interaction and lack of sufficient miniflow capacity can lead to failure of the equipment to perform its safety-related functions. In addition, General Design Criteria 35, Emergency Core Cooling, and 10 CFR 50.46 are applicable to ECCS pumps to ensure that abundant emergency core cooling is provided. Pump damage from miniflow operation could result in insufficient core cooling for certain small break LOCA or loss of feedwater events.

2515/105-05 BASIC REQUIREMENTS

The NRC Inspector will verify the licensee's implementation of the identified areas of the NRC Bulletin related to pump test data and physical modifications as identified in this section.

05.01 Attachment 1 identifies the 12 plants to be inspected by this TI. The licensee should be notified by the region approximately 4 weeks in advance of the inspection, if possible, of the systems and components that will be inspected, and also be requested to have appropriate cognizant personnel and necessary information available during the inspection.

05.02 For the plants selected, verify the following:

- a. Confirmation of licensee documentation for the existence or non-existence at the facility of a pump and piping system configuration having a header in the flow path that is common to two or more pumps (Bulletin Action Item 1). Documentation should indicate that all safety-related systems have been examined for such a configuration. The inspector should independently verify a sample of the drawings involved. This may include a walkdown of the system.
- b. Documentation describing the evaluation of the systems identified in (a) above as having pump and piping system configuration having a header in the flow path that is common to two or more pumps. Bulletin Action Item 2 indicates that the evaluation should include consideration of (i) the actual line and component resistances for the as-built configuration of the identified systems; (ii) the head versus flow characteristics of the installed pumps, including actual test data for "strong" and "weak" pump flows; (iii) the effect of test instrument error and reading error; and (iv) the worst case allowances for deviation of pump test parameters as allowed by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, Paragraph IWP-3100. These factors should be combined by the licensee to conservatively evaluate the potential for safety-related pump loss. The inspector should assess the quality and validity of the evaluations.
- c. Documentation showing that pump vendors have been contacted for information on minimum flow capacities under conditions of extended operation. The documentation should indicate that the applications and miniflow modes of operation used by the licensee have been clearly communicated to the vendor(s), and that the vendor(s) concur that such operation will not result in significant pump damage. (Bulletin Action Item 3).
- d. The results of system tests demonstrating the pump's ability to operate continuously without damage in the low flow recirculation mode for the period of time required for accident conditions. The evaluation should also consider the effects of cumulative operating hours in the miniflow mode over the lifetime of the plant (Bulletin Action Item 3). Test results may be generic and based upon vendor tests, or may be plant specific. The bases for the time during reduced flow conditions should be identified in the documentation maintained at the site. Licensee conclusions based on plant specific tests should have vendor concurrence (Bulletin Action Item 6).
- e. For Bulletin Item 4(b), records identifying the short-term and long-term modifications to plant operating procedures or hardware that have been or are being implemented to ensure safe plant operations.
- f. That pump heat removal requirements are satisfied for long-term accident conditions, as specified by the vendor, especially for cases where piping modifications have been made. Heat removal re-

quirements should be addressed in the documentation maintained at the plant site.

- g. Review ASME XI test results and pump maintenance history to independently verify if minimum recirculation flow is affecting pump service life. If available, witness ASME Section XI pump testing for ECCS pumps during minimum recirculation flow conditions.

05.03 An individual plant inspection may be considered complete when the basic requirements in Section 2515/105-05 of this TI have:

- a. been completed, or
- b. progressed to the point that the staff can conclude that acceptable progress is being made toward resolution of the concerns identified in NRC Bulletin 88-04.

2515/105-06 REPORTING REQUIREMENTS

06.01 Document the inspection findings in a routine inspection report.

06.02 As they are issued, copies of the inspection reports should be provided to T. Alexion, Project Directorate IV, and M. McCoy, SRXB/DST, NRR, for coordination.

2515/105-07 COMPLETION SCHEDULE

The inspection effort identified by this TI should be completed by June 1, 1990.

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2515/105-08 EXPIRATION

This TI shall remain in effect until June 30, 1991.

2515/105-09 CONTACT

Technical questions regarding interpretations, acceptance criteria, and inspection technique and adequacy of corrective actions shall be addressed to the Lead Technical contact, M.A. McCoy at FTS 492-0880.

The Lead Project Manager is Tom Alexion FTS 492-3024.

2515/105-10 STATISTICAL DATA REPORTING

Record actual time spent to perform the inspection and the time spent on followup items identified in the inspection report against 2515/105 for the RITS and 2515/105 for the 766 system.

The SIMS MPA number for this TI is X804.

2515/105-11 ORIGINATING ORGANIZATION INFORMATION

11.01 Organization Responsibility. The Reactor Systems Branch, DST (NRR/SRXB) initiated this TI. SRXB is responsible for safety review of emergency core cooling systems. The Mechanical Engineering Branch, DET is responsible for inservice testing of pumps and with SRXB is responsible for the review of qualification testing of pumps. SRXB will coordinate with EMEB in the review of the inspection results.

11.02 Estimated Resources. The estimated inspection time for completion of the TI is 24 hours for a routine inspection of one plant.

2515/105-12 REFERENCES

Letter from D.N. Grace, BWR Owners' Group to USNRC, "Response to NRC Bulletin 88-04, Potential Safety Related Pump Loss," June 29, 1988. (Microfilm address 46118/270)

NRC Information Notice No. 87-59, "Potential RHR Pump Loss," November 17, 1987. (Microfilm address 69116/008)

NRC Bulletin 88-04, "Potential Safety-Related Pump Loss," dated May 5, 1988. (Microfilm address 69316/001)

END

Attachments: 1. Plants to be Inspected
 2. NRC Comments on BWR Owners' Group Response to Bulletin 88-04

ATTACHMENT 1

PLANTS TO BE INSPECTED

NRC BULLETIN 88-04 POTENTIAL SAFETY-RELATED PUMP LOSS

| PLANT NAME | PRODUCT LINE | REGIONAL OFFICE |
|----------------------|------------------|-----------------|
| R. E. Ginna | 2-Loop West | I |
| Maine Yankee | 3-Loop CE | I |
| Millstone 3 | 2-Loop West | I |
| Nine Mile Point 1 | BWR 2 | I |
| Farley 1 or 2 | 3-Loop West | II |
| Oconee 1, 2 or 3 | B&W Lowered Loop | II |
| St. Lucie 1 or 2 | 2-Loop CE | II |
| Davis-Besse 1 | B&W Raised Loop | III |
| Dresden 2 or 3 | BWR 3 | III |
| River Bend | BWR 6 | IV |
| Palo Verde 1, 2 or 3 | CE SYS 80 | V |
| Trojan | 4-Loop West | V |

Alternates (if first choice is not available on schedule)

| PLANT NAME | PRODUCT LINE | REGIONAL OFFICE |
|-----------------------|------------------|-----------------|
| Calvert Cliffs 1 or 2 | 2-Loop CE | I |
| Peach Bottom 2 or 3 | BWR 4 | I |
| Crystal River 3 | B&W Lowered Loop | II |
| Point Beach 1 or 2 | 2-Loop West | III |
| Prairie Island 1 or 2 | 2-Loop West | III |
| Ft Calhoun 1 | 2-Loop CE | IV |
| Waterford | 2-Loop CE | IV |
| Diablo Canyon 1 or 2 | 4-Loop West | V |

ATTACHMENT 2

NRC COMMENTS ON BWR OWNERS' GROUP RESPONSE TO BULLETIN 88-04

REFERENCE: Letter (BWROG-8836) from Donald N. Grace to U. S. Nuclear Regulatory Commission SUBJECT: RESPONSE TO NRC Bulletin 88-04, "POTENTIAL SAFETY-RELATED PUMP LOSS," June 19, 1988 (with attachment)

The NRC staff has reviewed the Boiling Water Reactor Owners' Group (BWROG) response to the subject NRC bulletin. The BWROG, in the attachment to its letter, provided generic comments on the required action items in the bulletin. The Owners' Group notes that long-term modifications to procedures or hardware and the schedule for such resolution are plant-specific items to be addressed by individual licensees. The BWROG has provided a summary of the problems and affected systems (Item 1 in the attachment to BWROG-8836) and a justification for continued operation (Item IV in the attachment to BWROG-8836) which are generic in nature.

The staff has the following comments on the Items in the Attachment to BWROG-8836 which may be useful in the conduct of audits of BWR facilities:

- (1) (Section I.A) The Owners' Group has correctly described certain configurations of affected piping systems and pump characteristic curves which contribute to adverse pump interaction.
- (2) (Section I.B) The Owners' Group has identified a comprehensive list of systems which may be affected by the concerns expressed in the bulletin. This list may be used as a check list for individual BWRs. Audit emphasis should be on safety-related systems.
- (3) (Section I.C) The BWROG noted the potential for dead-heading would be addressed on a plant-specific basis.
- (4) (Section I.D) The BWROG arguments are insufficient with regard to continuous low flow operation during accident conditions. Test data, either generic or plant specific, should be available to support extended operation during the postulated accident scenario involving the largest time spent in this mode. The generic time estimates identified may serve as general guidance, however, the adequacy of pump flow should be verified individually during each BWR facility audit.
- (5) (Section IV) The Owners' Group has provided adequate justification for continued operation while actions associated with Bulletin 88-04 are implemented. Individual licensees who wish to adopt the Owners' Group report need to verify the applicability of the Owners' Group discussions to their plant(s).

