



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

February 4, 1992

TO: ALL LICENSEES OF OPERATING BOILING WATER REACTORS (BWRs) AND  
HOLDERS OF CONSTRUCTION PERMITS FOR BWRs

SUBJECT: "NRC POSITION ON INTERGRANULAR STRESS CORROSION CRACKING  
(IGSCC) IN BWR AUSTENITIC STAINLESS STEEL PIPING" (GENERIC  
LETTER 88-01, SUPPLEMENT 1)

The supplement provides acceptable alternative staff positions to some of those delineated in Generic Letter (GL) 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping," dated January 25, 1988. The alternatives are with regard to the inspection of reactor water cleanup (RWCU) system piping outboard of the containment isolation valves and the leak detection requirements pertaining to the operability of leakage measurement instruments and the frequency of monitoring leakage rates. The supplement also provides clarification or guidance on the staff's positions regarding the sample expansion for Category D welds, the effect of shrinkages resulting from weld overlay repairs or stress improvement (SI) on the piping system and its supports and pipe whip restraints and the technical specification (TS) amendments for incorporating the inservice inspection statement and leak detection requirements as delineated in GL 88-01.

GL 88-01 addressed IGSCC near weldments in BWR piping that had occurred for almost 20 years. Early cases of the cracking occurred in relatively small-diameter piping. In early 1982, cracking was found in large-diameter piping in a recirculation system of an operating BWR plant in this country. Since then extensive inspection programs have been implemented for BWR piping systems. These inspections resulted in the detection of significant numbers of cracked weldments in almost all operating BWRs.

A number of domestic and foreign BWR owners have replaced or plan to replace piping systems that experienced IGSCC with more resistant material. Other owners are implementing countermeasures such as stress improvement or hydrogen water chemistry to reduce the susceptibility of the piping to IGSCC. In many cases, cracked weldments were repaired by reinforcing them with weld overlay.

The BWR Owners' Group has sponsored substantial efforts pertaining to IGSCC research. The results of these efforts, along with other related work by vendors and consulting firms and confirmatory research sponsored by the NRC, were the basis for the development of the Staff Positions delineated in GL 88-01 regarding the IGSCC problem.

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The technical bases for these positions are given in NUREG-0313, Revision 2, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping." This revision was a major task in the staff's long-range plan to deal with BWR pipe cracking that was presented to the Commission in SECY 84-301. The revision includes the relevant recommendations of the Piping Review Committee Task Group on Pipe Cracking that were issued as NUREG-1061, Volume 1, "Report of USNRC Piping Review Committee," and consideration of public comments on that document, NUREG-0313, Revision 2, describes the technical bases for the staff's positions on materials, processes and primary coolant chemistry to minimize and control IGSCC problems. Inspection schedules and inspection sample sizes are based on the susceptibility of weldments to the initiation and propagation of IGSCC. Inspection schedules are comparable to those specified in Section XI of the ASME Boiler and Pressure Vessel Code for piping material that is IGSCC resistant. Varying amounts of augmented inspections are specified for piping that has a greater susceptibility to cracking, for cases where there is less certainty about the effectiveness of mitigation measures used, or for cases where repairs have been made.

The purpose of GL 88-01 was to seek information regarding the implementation of the 13 staff positions that cover the above technical areas. The GL 88-01 supersedes GL 84-11, "Inspection of BWR Stainless Steel Piping."

GL 88-01 applies to all BWR austenitic stainless steel piping that is 4 inches or larger in nominal diameter and that contains reactor coolant at a temperature above 200°F during power operation regardless of ASME Code classification. It also applies to reactor vessel attachments and appurtenances such as jet pump instrumentation penetration assemblies and head spray and vent components.

GL 88-01 does not apply to carbon steel piping classified as P-1 by the ASME Code.

The staff's positions in GL 88-01 cover the following topics:

- (1) materials
- (2) processes
- (3) water chemistry
- (4) weld overlay reinforcement
- (5) partial replacement
- (6) stress improvement of cracked weldments
- (7) clamping devices
- (8) crack characterization and repair criteria
- (9) inspection methods and personnel
- (10) inspection schedules
- (11) sample expansion
- (12) leakage detection
- (13) reporting requirements

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These staff positions are fully delineated in Attachment A of GL 88-01.

After GL 88-01 was issued, the staff discussed the generic letter with several BWR operators and owners' group and concluded that the staff positions on the following would create unnecessary hardship for plant operators: frequency of reactor coolant system leakage measurement, operability of leakage measurement instruments and inspection sample size of RWCU system welds outboard of the containment isolation valves.

On the basis of discussions with BWR operators, industry consultants and the BWR Owners' Group and a review of licensee's responses to GL 88-01, the staff determined that the following acceptable alternative staff positions and clarifications would facilitate the implementation of GL 88-01:

- (1) The staff found that monitoring reactor coolant system (RCS) leakage every 4 hours creates an unnecessary administrative hardship for plant operators. Thus, RCS leakage measurements should be taken at least once per shift, not to exceed 12 hours.
- (2) The staff found that the radiation level associated with the RWCU system piping outboard of the containment isolation valves is very high; and this portion of piping is designed to be isolable and is generally classified as nonsafety piping. Affected licensees requested that they be exempt from GL 88-01 with regard to the inspection of this piping. However, the service-sensitive stainless steel RWCU system piping is subject to the most aggressive environment with regard to IGSCC; therefore, until the actions associated with GL 89-10 on motor-operated valves (MOVs) are completed by licensees, the staff determined that an inspection of the subject piping on a sampling basis of at least 10 percent of the weld population should be performed during each refueling outage to ensure the structural integrity of the piping.
- (3) The staff's position on leak detection in GL 88-01 requires that for BWR plants operating with any IGSCC Category D, E, F, or G welds, at least one of the leakage measurement instruments associated with each sump be operable and the outage time for inoperable instruments be limited to 24 hours. If the outage time is longer than 24 hours, the licensee should immediately initiate an orderly shutdown. The intent of this requirement is to ensure that the capability to quantitatively measure leakage is not lost for more than 24 hours because this capability is essential for safe plant operation. After discussing this position with the BWR operators, the staff found that leakage can also be quantitatively measured by manually pumping the sump or measuring the differences in sump level. Therefore, the staff finds that manual leak rate measurements can be acceptable alternatives during the period (30 days) when the drain sump monitoring system is being restored, provided the licensee demonstrates their suitability with regard to accuracy and inspectability.

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- (4) GL 88-01 requested Category D welds to be 100% inspected every two refueling cycles. There is no need for sample expansion if all Category D welds are examined during each inspection. However, sample expansion is required if Category D welds are examined on a sampling basis during each inspection and cracking is identified during examination. With adequate justification the sample expansion for Category D welds may be limited to the piping system where cracking was found.
- (5) Consistent with Code requirements and the licensee's written commitments, when weld overlay repairs or stress improvement (SI) is applied, the licensee should assess the effect of shrinkages on the piping system and its supports and pipe whip restraints. In addition, the licensee should also assess the effect of the increase in dead-weight and stiffness resulting from weld overlay repairs on the piping systems.
- (6) GL 88-01 requested that a plant's technical specifications be amended to include a statement in the section on inservice inspection (ISI) that the ISI program for piping covered by GL 88-01 will conform to the staff's positions in the generic letter on schedules, methods, personnel, and sample expansion. It also stated that if the ISI section is removed from the TS as a result of the TS improvement program this statement will remain in the ISI section. However, in preparing the improved BWR Standard Technical Specifications, the staff determined that the ISI section including the ISI statement will remain in the TS and should not be incorporated in an administrative document.
- (7) GL 88-01 requested that the staff's position on leakage detection be incorporated into the TS of all affected licensees. The staff subsequently determined that incorporation of the leakage detection requirements in an administrative document is not acceptable.

#### Actions Requested

No specific action is requested beyond that contained in GL 88-01.

#### Reporting Requirements

No written response is required beyond that contained in GL 88-01.


#### Backfit Discussion

The backfit considerations of this supplement are unchanged from those provided with the original generic letter, in that conformance with the staff position is necessary to assure compliance with the stated regulations and general design criteria (10 CFR Part 50, Appendix B; GDCs 4, 14, 30, 31 and 32) as well as the plant Technical Specification. The clarifications and alternative staff positions presented in this supplement also assure such compliance.

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This request is covered by Office of Management and Budget Clearance Number 3150-0011, which expires on May 31, 1994. The estimated average burden hours is 160 man-hours per licensee response to GL 88-01, including assessing of the new recommendations, searching data sources, gathering and analyzing the data, and preparing the required letters. These estimated average burden hours pertain only to these identified response-related matters and do not include the time for actual implementation of the requested actions. Comments on the accuracy of this estimate and suggestions to reduce the burden may be directed to Ronald Minsk, Office of Information and Regulatory Affairs (3150-0011), NEOB-3019, Office of Management and Budget, Washington, DC 20503, and to the U.S. Nuclear Regulatory Commission, Information and Records Management Branch, Division of Information Support Services, Office of Information and Resources Management, Washington, DC 20555.

If you have any questions about this matter, please contact the technical contacts listed below or your NRR Project Manager.

  
James G. Partlow  
Associate Director for Projects  
Office of Nuclear Reactor Regulation

Enclosure:  
List of Recently Issued Generic Letters

Technical Contacts: William H. Koo  
(301) 504-2706

Marilee J. Banic  
(301) 504-2771

# LIST OF RECENTLY ISSUED GENERIC LETTERS

Generic Letter No.	Subject	Date of Issuance	Issued To
91-19	INFO TO LICENSEES RE: NEW TELEPHONE NOS. AT NRC WHITE FLINT NORTH BLDG.	12/19/91	ALL HOLDERS OF OP LICENSES OR CONST. PERMITS FOR NPRs
91-18	INFO TO LICENSEES RE TWO NRC INSP MANUAL SECTIONS ON RESOLUTION OF DEGRADED AND NONCONFORMING CONDITIONS AND ON OPERABILITY	11/07/91	ALL NUCLEAR PWR REACTOR LICENSEES AND APPLICANTS
91-17	GENERIC SAFETY ISSUE 29, "BOLTING DEGRADATION OR FAILURE IN NUCLEAR POWER PLANTS"	10/17/91	ALL HOLDERS OF OP LICENSES OR CONST PERMITS FOR NUCLEAR POWER PLANTS
91-16	LICENSED OPERATORS' AND OTHER NUCLEAR FACILITY PERSONNEL FITNESS FOR DUTY	10/03/91	HOLDERS OP LIC OR CONSTR. PERMITS FOR NUC PWR/NPRs AND ALL LICENSED OPERATORS & SENIOR OPERATORS
91-15	OPERATING EXPERIENCE FEEDBACK REPORT, SOLENOID-OPERATED VALVE PROBLEMS AT US REACTORS	09/23/91	ALL POWER REACTOR LICENSEES AND APPLICANTS
91-14	EMERGENCY TELECOMMUNICATIONS	09/23/91	ALL HOLDERS OF OP LICENSES OR CONST. PERMITS
91-13	REQUEST FOR INFO RELATED TO RESOLUTION OF GI130, "ESSENTIAL SERVICE WATER SYS FAILURES AT MUTLI-UNIT SITES," PURSUANT TO 10CFR50.54(f)	09/19/91	LICENSEES AND APPLICANTS Braidwood, Byron Catawba, Comanche Peak Cook, Diablo, McGuire
91-12	OPERATOR LICENSING NAT. EXAMINATION SCHEDULE	08/27/91	ALL PWR REACTOR AND APPLICANTS FOR AN OPERATING LICENSE
91-11	RESOLUTION OF GENERIC ISSUES 48, "LCOs FOR CLASS 1E VITAL INSTRUMENT BUSES," and 49, "INTERLOCKS AND LCOs FOR CLASS 1E TIE BREAKERS" PURSUANT TO 10CFR50.54(f)	07/18/91	ALL HOLDERS OF OPERATING LICENSES

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OCT 28 1991

MEMORANDUM FOR: Edward L. Jordan, Chairman  
Committee To Review Generic Requirements

FROM: Frank J. Miraglia, Deputy Director  
Office of Nuclear Reactor Regulation

SUBJECT: CLOSURE LETTER FOR SUPPLEMENT 1 TO GENERIC LETTER 88-01,  
"NRC POSITION ON IGSCC IN BWR AUSTENITIC STAINLESS  
STEEL PIPING"

The staff presented for the Committee to Review Generic Requirements (CRGR) review a proposed supplement to Generic letter 88-01 on August 27, 1991. The proposed supplement modified the staff positions with regard to the inspection of reactor water cleanup (RWCU) system piping outboard of the containment isolation valves, the requirements pertaining to the operability of leakage measurement instruments and the frequency of monitoring leakage rates. The proposed supplement also provided clarification or guidance on four other staff positions. The Committee endorsed issuance of the supplement subject to some minor revisions. The recommended revisions were identified in a CRGR meeting (No. 209) minutes dated September 23, 1991. The staff agrees with the CRGR recommendations. All the recommended changes were incorporated in the proposed supplement. The CRGR staff (James H. Conran) has reviewed the revised supplement and indicated that the CRGR comments have been satisfactorily included in the supplement. A copy of the supplement 1 to Generic Letter 88-01 is enclosed.

Original signed by  
Frank J. Miraglia

Frank J. Miraglia, Deputy Director  
Office of Nuclear Reactor Regulation

Enclosure:

1. Supplement 1 to Generic Letter 88-01

cc: T. Murley	B. Boger	E. Rossi	J. Zwolinski	R. Capra
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This request is covered by Office of Management and Budget Clearance Number 3150-0011, which expires on May 31, 1994. The estimated average burden hours is 160 man-hours per licensee response to GL 88-01, including assessing of the new recommendations, searching data sources, gathering and analyzing the data, and preparing the required letters. These estimated average burden hours pertain only to these identified response-related matters and do not include the time for actual implementation of the requested actions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Records and Reports Management Branch, Division of Information Support Services, Office of Information Resources Management, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, and to the Paperwork Reduction Project (3150-0011), Office of Management and Budget, Washington, D.C. 20503.

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The lead PM for this MPA is Richard J. Clark (504-1402). The technical contacts are Bill Koo (504-2706) and Lee Banic (504-2771).

James G. Partlow, Associate Director  
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