7590-01 (P)

NUCLEAR REGULATORY COMMISSION

Proposed Generic Communication

MANAGING GAS INTRUSION IN EMERGENCY CORE COOLING, DECAY HEAT REMOVAL, AND CONTAINMENT SPRAY SYSTEMS

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of opportunity for public comment.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is proposing to issue a generic letter (GL) to address the issue of gas intrusion into the emergency core cooling, decay heat removal, and containment spray systems (hereinafter referred to as the “subject systems”). Specifically, the NRC is issuing this GL for the following two purposes:

(1) to request addressees to submit information demonstrating that the subject systems are in compliance with the current licensing and design bases, and applicable regulatory requirements, and that suitable design, operational, and testing control measures are in place for maintaining this compliance, and

(2) to collect the requested information to determine if additional regulatory action is required.

This *Federal Register* notice is available through the NRC’s Agencywide Documents Access and Management System (ADAMS) under accession number ML07040103.

DATES: Comment period expires [60 days after FRN is published]. Comments submitted after this date will be considered if it is practical to do so, but assurance of consideration cannot be given except for comments received on or before this date.

ADDRESSEES: Submit written comments to the Chief, Rules and Directives Branch, Division of Administrative Services, Office of Administration, U.S. Nuclear Regulatory Commission, Mail Stop T6-D59, Washington, DC 20555-0001, and cite the publication date and page number of

this *Federal Register* notice. Written comments may also be delivered to NRC Headquarters, 11545 Rockville Pike (Room T-6D59), Rockville, Maryland, between 7:30 am and 4:15 pm on Federal workdays.

FOR FURTHER INFORMATION, CONTACT: Warren C. Lyon, NRR, at 301-415-2897 or by e-mail: wcl@nrc.gov or David P. Beaulieu, NRR, at 301-415-3243 or by e-mail: dpb@nrc.gov.

SUPPLEMENTARY INFORMATION:

NRC GENERIC LETTER 2007-XX

MANAGING GAS INTRUSION IN EMERGENCY CORE COOLING, DECAY HEAT REMOVAL, AND CONTAINMENT SPRAY SYSTEMS

ADDRESSEES

All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this generic letter (GL) to address the issue of gas[1] intrusion into the emergency core cooling, decay heat removal[2], and containment spray systems (hereinafter referred to as the "subject systems"). Specifically, the NRC is issuing this GL:

(1) to request addressees to submit information to demonstrate that the subject systems are in compliance with the current licensing and design bases and applicable regulatory requirements, and that suitable design, operational, and testing control measures are in

[1] Gas as used here includes, air, nitrogen, hydrogen, water vapor, or any other void that is not filled with liquid water.

[2] Decay heat removal (DHR), residual heat removal (RHR), and shutdown cooling (SDC) are common names for systems used to cool the reactor coolant system (RCS) during some phases of shutdown operation. The NRC staff generally uses DHR here.

place for maintaining this compliance, and

(2) to collect the requested information to determine if additional regulatory action is required.

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(f), addressees are required to submit a written response to this GL.

BACKGROUND

Instances of gas intrusion into the subject systems have occurred since the beginning of commercial nuclear power plant operation. The NRC has published 20 information notices (INs), two GLs, and a NUREG[3] that are related to this issue and has interacted with the nuclear industry many times in relation to these publications and in response to gas intrusion events. The following paragraphs summarize a few events to illustrate some of the technical and regulatory requirements issues.

In May 1997, at Oconee Nuclear Station Unit 3, hydrogen ingestion during plant cooldown damaged and rendered nonfunctional two high-pressure injection (HPI) pumps. If the operators had started the remaining HPI pump, it too would have been damaged. The NRC responded with an augmented inspection team (IN 97-38, "Level-Sensing System Initiates Common-Mode Failure of High-Pressure-Injection Pumps," Agencywide Documents Access and Management System (ADAMS) Accession No. ML031050514, June 24, 1997). The NRC team reported that there had been a total lack of HPI capability during power operation, a failure to meet technical specification (TS) HPI operability requirements, design deficiencies, inadequate maintenance practices, operators that were less than attentive to plant parameters, a failure to adequately

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[3]GL 88-17, "Loss of Decay Heat Removal," October 17, 1988 (ML031200496); GL 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps," October 7, 1997 (ML031110062); and NUREG-0897, Revision 1, "Containment Emergency Sump Performance—Technical Findings Related to USI A-43," October 1985.

assess operating experience, and a violation of 10 CFR 50 Appendix B, Criterion III ("Notice of Violation and Proposed Imposition of Civil Penalties -$330,000," August 27, 1997, http://www.nrc.gov/reading-rm/doc-collections/enforcement/actions/reactors/ea97297.html).

As a result of this Oconee Unit 3 event, the industry initiated an industry-wide improvement activity to address the gas issue. Based on the industry actions, the NRC concluded that no generic action was necessary. However, significant gas events that jeopardized the operability of the subject systems continued to occur, as illustrated in the following paragraphs.

Dresden Nuclear Power Station Unit 3 experienced a reactor scram on July 5, 2001, that was accompanied by a water hammer as a result of high pressure coolant injection (HPCI) system voids due to inadequate pipe venting. The licensee discovered a damaged pipe support that rendered the HPCI system inoperable on July 19, 2001. On September 28, 2001, NRC inspectors discovered discrepancies in another HPCI hanger that may have been caused by the water hammer. The licensee repaired the hangers on September 30, 2001, and vented the system. An NRC inspector identified a high point that had not been vented and air was removed when the licensee vented that location. The HPCI system was inoperable from July 5, 2001, to September 30, 2001 (NRC Supplemental Inspection Report 50-237, 50-239/2003-012, ML033530204, December 18, 2003). The NRC found violations of 10 CFR 50.9, a TS, and 10 CFR Part 50, Appendix B, Criterion XVI ("Notice of Violation and Proposed Imposition of Civil Penalty - $60,000, and Final Significance Determination for a White Finding," ML031740755, June 23, 2003).

On August 14, 2003, the Perry Nuclear Power Plant scrammed from 100 percent power due to a loss of offsite power. This caused a momentary loss of common water leg pumps[4] and a

[4]These are 40 gpm pumps used to compensate for back-leakage through check valves in RHR and LPSI piping into the suppression pool. The purpose is to keep piping full of water where the pipe elevation is higher than the suppression pool. The system is often referred to as a "keep-full" system.

discharge pressure decrease from 44 psig to 7 psig allowed accumulated gas to completely void a water leg pump and the associated feedwater leakage control system piping. Pump operation was restored by venting the pump casing but a piping high point that was not included in fill and vent procedures was not vented. On September 10, 2003, the licensee vented enough gas from the high point that would have caused the pump to be non-functional if another loss of offsite power would occur. If the RHR and/or the LPCS pumps had started while the leakage control system piping was voided, the resulting water hammer could have caused the system piping to rupture. The NRC characterized the inspection finding as white; the finding resulted in a TS violation, escalated enforcement action, and a supplemental inspection (NRC Inspection Report 50-440/2003-009, ML032880107, October 10, 2003, and ML040330980, January 30, 2004).

On July 28, 2004, the Palo Verde licensee identified that emergency core cooling system (ECCS) suction piping voids in all three Palo Verde units could have resulted in a loss of the ECCS during transfer to the recirculation mode for some loss-of-coolant accident (LOCA) conditions. The condition had existed since plant startups in 1986, was contrary to the Palo Verde final safety analysis reports (FSARs), and would not be identified during testing because water is not drawn from the containment emergency sumps. The NRC inspectors identified multiple violations of 10 CFR Part 50, Appendix B, Criteria III and V, and violations of 10 CFR Part 50.59. The NRC responded with a special inspection, issued a yellow finding, and imposed a civil penalty of $50,000 (NRC Special Inspection Report 50-328, 50-329, 50-330/2004-014, ML050050287, January 5, 2005). The Palo Verde licensee identified the ECCS piping suction voids after being contacted by engineer from another plant where an NRC inspector identified the same problem.

In February 2005, an HPI pump at Indian Point Energy Center Unit 2 was found inoperable because the pump casing was filled with gas. The licensee then found numerous locations in

the ECCS piping with gas accumulation. The licensee did not initially understand the implications of the gas condition, and the licensee's early assessments were inadequate, particularly with respect to assessing the operability of the other two HPI pumps. The NRC conducted a special inspection that found one HPI pump was not functional and the other two HPI pumps had a 75 percent failure probability. The NRC found several violations of 10 CFR 50, Appendix B, Criterion XVI, and issued a white finding (NRC Inspection Report 50-247/2005-006, ML051680119, June 17, 2005).

In March 2005, the NRC reported that Diablo Canyon had a sustained history of gas voiding in piping that could possibly result in gas binding or damage to the centrifugal charging pumps or the HPSI pumps during switchover from cold-leg to hot-leg injection.[5] The NRC inspectors concluded that the licensee focused on managing the symptom of the problem rather than finding and eliminating the cause, which is contrary to 10 CFR 50, Appendix B, Criterion XVI (NRC Inspection Report 50-275, 50-323/2005-006, ML050910120, March 31, 2005).

In September 2005, operators discovered a void in the HPCI pump discharge piping at the Duane Arnold Energy Center due to "turbulent penetration" that caused hot water from the feedwater pipe to penetrate downward into the HPCI discharge pipe. This heated the HPCI pipe on the low pressure side of a closed valve to greater than the saturation temperature and caused steam to be generated in the low pressure pipe as fast as it was vented. The condition had existed since plant startup (Licensee Event Report 50-331/2005-004, ML053360261, November 28, 2005). The NRC opened an unresolved item (URI 05000331/2006002-03) for further NRC review of the licensee's piping analysis that evaluated HPSI system operability with

[5]A similar gas accumulation problem under closed valves in the recirculation piping from the DHR discharge to the HPSI and charging pump suctions has occurred at several plants. This has the potential to cause loss of all high pressure RCS makeup capability when shifting suction to the emergency containment sump from the refueling water or borated water storage tank following a LOCA.

the voided piping (NRC Inspection Report 50-331/2006-002, ML061210448, April 27, 2006, and NRC Inspection Report 50-331/2006-008, ML070640515, March 2, 2007).

In October 2005, an NRC inspection team at the Palo Verde Nuclear Generating Station identified that, following a postulated accident when refueling water tank (RWT) level reached the setpoint for containment sump recirculation, the licensee's design basis credited containment pressure for preventing the ECCS pumps from continuing to reduce RWT level and drawing air into the ECCS. However, a recent licensee analysis showed that the minimum containment pressure would be less than needed. The licensee declared the ECCS inoperable at all three units, requiring a shutdown of Units 2 and 3 (Unit 1 was already shut down). The NRC found multiple violations of 10 CFR 50, Appendix B, Criteria III and V (NRC Supplemental Inspection Report 50-528, 50-529, 50-530/2005-012, ML060300193, January 27, 2006).

These are a few of the more than 60 gas intrusion events reported during recent years involving the subject systems. The number is larger if other similar events at the same plant are counted. Further, many events do not have to be reported to the NRC, and many of them have not been addressed during the NRC's inspections. For example, at least 40 RHR water hammer events have occurred at the Sequoyah Nuclear Plant, although none of them rendered the RHR system inoperable. Additionally, if an ECCS pump has been damaged because of gas but is repaired and tested operable within the TS completion time (typically, 72 hours), the licensee is not required to report the occurrence to the NRC. The frequency and the significance of these events and the likelihood that unidentified gas issues exist require licensee action to ensure compliance with regulatory requirements that will maintain operability of the subject systems.

APPLICABLE REGULATORY REQUIREMENTS

10 CFR Part 50 Appendix A or similar plant-specific principal design criteria[6] provide design requirements, and 10 CFR Part 50 Appendix B, TSs, and licensee quality assurance programs provide operating requirements. Appendix A requirements applicable to gas management in the subject systems include the following:

- General Design Criterion (GDC) 1 requires that the subject systems be designed, fabricated, erected, and tested to quality standards.
- GDC 34 requires an RHR system designed to maintain specified acceptable fuel design limits and to meet design conditions that are not exceeded if a single failure occurs and specified electrical power systems fail.
- GDC 35, 36, and 37 require an ECCS design that meets performance, inspection, and testing requirements. Specified performance criteria are provided in 10 CFR 50.46.
- GDC 38, 39, and 40 require a containment heat removal system design that meets performance, inspection, and testing requirements.

Quality assurance criteria provided in Appendix B that apply to gas management in the subject systems include the following:

- Criteria III and V require measures to assure that applicable regulatory requirements and the design basis, as defined in 10 CFR 50.2, “Definitions,” and as specified in the license application, are correctly translated into controlled specifications, drawings, procedures, and instructions.
- Criterion XI requires a test program to assure that the subject systems will perform satisfactorily in service. Test results shall be documented and evaluated to assure that test requirements have been satisfied.
- Criterion XVI requires measures to assure that conditions adverse to quality, such as

[6]For facilities with a construction permit issued prior to May 21, 1972, that are not licensed to Appendix A.

failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified, corrected, documented, and reported to management.

- Criterion XVII requires maintenance of records of activities affecting quality.

Further, as part of the licensing basis, licensees have committed to certain quality assurance provisions that are identified in both their TSs and quality assurance programs. Licensees have committed to use the guidance of Regulatory Guide (RG) 1.33, "Quality Assurance Requirements (Operation)," which endorses American National Standards Institute (ANSI) N18.7-1976/American Nuclear Society 3.2, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants," or equivalent licensee-specific guidance. Section 5.3.4.4, "Process Monitoring Procedures," of ANSI N18.7 that states that procedures for monitoring performance of plant systems shall be required to assure that engineered safety features and emergency equipment are in a state of readiness to maintain the plant in a safe condition if needed. The limits (maximum and minimum) for significant process parameters shall be identified. Operating procedures shall address the nature and frequency of this monitoring, as appropriate.

10 CFR 50.36 (c)(3) defines TS surveillance requirements (SRs) as "relating to test, calibration, or inspection to assure" maintenance of quality, operation within safety limits, and operability. Typically, TS Section 5 or 6 requires that licensees establish, implement, and maintain written procedures covering the applicable procedures recommended in Appendix A to RG 1.33, Revision 2 (February 1978). Appendix A to RG 1.33 identifies instructions for filling and venting the ECCS and DHR system, as well as for draining and refilling heat exchangers. Surveillance requirements to verify that at least some of the subject system piping is filled are provided in standard technical specifications (STSs) and in most licensee TSs.

DISCUSSION

The events discussed in the BACKGROUND section illustrate that many of the regulatory requirements identified in the APPLICABLE REGULATORY REQUIREMENTS section are not being met. The NRC inspectors often find that the 10 CFR Part 50 Appendix B criteria identified above are not adequately addressed in plant venting procedures. In some cases, venting procedures were almost nonexistent, there were no records of gas quantities that were vented and licensees unsuccessfully attempted to recreate the history by asking operators for their recollections. Consequently, there was no foundation for establishing that the subject systems were operable prior to venting. In addition, the venting processes sometimes did not ensure that all gas was removed from the venting location and often did not adequately establish the quantity of vented gas. Further, examination of ultrasonic test (UT) processes at several licensee sites established that one licensee initially did not know how to acceptably determine liquid level via UT. Additional issues include TSs, which often do not require venting of suction piping despite voids in suction pipes generally being of more concern than in discharge piping, and do not adequately address operability of the subject systems prior to surveillance and for the time span until the next surveillance. This GL and the anticipated NRC followup to this GL are intended to correct such conditions.

It is important that the subject systems are sufficiently filled with water to ensure that they can reliably perform their intended functions under all LOCA and non-LOCA conditions that require makeup to the RCS. Portions of these systems and some of the associated pumps are normally in a standby condition while other pumps provide both ECCS and operational functions. For example, some high-pressure pumps are used for normal RCS makeup, and some low-pressure pumps provide a normal DHR capability.

The following safety issues are associated with gas intrusion into the subject systems:

(1) The introduction of gas into a pump can cause the pump to become air-bound with little or no flow, rendering the pump inoperable. Air-binding can render more than one pump inoperable when pumps share common discharge or suction headers, or when the gas accumulation process affects more than one train, greatly increasing the risk significance. Such a common-mode failure would result in the inability of the ECCS or the DHR system to provide adequate core cooling and the inability of the containment spray system to maintain the containment pressure and temperature below design limits. An air-bound pump can become damaged quickly, eliminating the possibility of recovering the pump during an event by simply subsequently venting the pump and suction piping.

(2) Gas introduced into a pump can render the pump inoperable, even if the gas does not air bind the pump, because the gas can reduce the pump discharge pressure and flow capacity to the point that the pump cannot perform its design function. For example, an HPI pump that is pumping air-entrained water may not develop sufficient discharge pressure to inject under certain small break LOCA scenarios.

(3) Gas accumulation can result in water hammer or a system pressure transient, particularly in pump discharge piping following a pump start, which can cause piping and component damage or failure. Gas accumulation in the DHR system has resulted in pressure transients that have caused DHR system relief valves to open. In some plants, the relief valve reseating pressure is less than the existing RCS pressure, a condition that complicates recovery.

(4) Pump cavitation caused by entrained gas results in additional stresses that can lead to premature failure of pump components that can render the pump inoperable.

(5) Gas intrusion can result in pumping noncondensible gas into the reactor vessel that may affect core cooling flow.

(6) The time needed to fill voided discharge piping can delay delivery of water beyond the time frame assumed in the accident analysis.

The scope and number of identified gas intrusion problems at some facilities raise concerns about whether similar unrecognized design, configuration, and operability problems exist at other reactor facilities.

A review of the operating experience has identified the following concerns, which are the focus of this GL:

(1) TS SRs, as implemented by associated surveillance procedures, have not reliably precluded gas problems. Operating experience shows many instances in which substantive gas voiding in the system piping has not been identified. The surveillance procedures may not reliably reveal as-found conditions in which the system may be inoperable or degraded because of gas. Additionally, some plants have no TS SR to verify that the subject systems' piping is sufficiently full of water. Still other plants have incomplete TS SRs that cover only portions of the system. For example, the TS may require verifying that ECCS discharge piping is full of water but may not include verification of the suction piping or containment spray piping. Although the TS and FSAR at many facilities indicate that the subject systems are full of water, in practice it is not uncommon for licensees to vent some gas during periodic surveillances. Further, there may be some parts of these systems where it is not possible or practical to verify them to be full of water. Hence, the current TS and FSAR may establish a standard that may not be realistic to establish system operability. A realistic standard should bound the volume of gas that may impact pump operability and the volume for which water-hammer-induced stress limits may be exceeded.

Criterion XI of Appendix B to 10 CFR Part 50 requires licensees to perform testing using written test procedures, which include but are not limited to procedures for TS SRs, that

incorporate the requirements and acceptance limits contained in applicable design documents. TSs often require surveillance of discharge piping but do not mention suction piping. Consequently, suction piping surveillances may not be performed. However, since the subject systems may be rendered inoperable or degraded because of gas in suction piping, the regulations require that presence of gas in all piping be assessed to establish operability.

(2) Typically the FSAR describes that the subject systems are filled with water. The wording of TS SRs further confirms that the design-basis configuration calls for the specified piping to be filled with water. Operating experience provides many examples of licensees treating the accumulation of gas as an expected condition (rather than a nonconforming condition) that was not documented even when it involved a substantial volume of gas that clearly constituted a significant condition adverse to quality. In such cases, Criterion XVI of Appendix B to 10 CFR Part 50 requires that the cause of the condition be determined and corrective action taken to preclude repetition. Based on the as-found volume and location of gas, corrective actions beyond simply refilling a system may be necessary to provide reasonable assurance that the affected system will remain operable until the next surveillance.

(3) Although the subject systems are often susceptible to gas intrusion, not all plants have vent valves at one or more system high points. Some licensees have installed additional vent valves at system high points after operational events. For example, one licensee installed an additional 21 high-point vent valves. Another licensee, who installed an additional 17 vent valves, determined that the primary cause of the gas voiding problem was that the original design specification did not call for a sufficient number of vent valves. No specific NRC requirement mandates the installation of vent valves on the subject systems. However, failure to translate the design basis of

assuring the system is maintained sufficiently full of water to maintain operability into drawings, specifications, procedures, and instructions is a violation of Criterion III in Appendix B of 10 CFR Part 50.

Further, Criterion V requires documented instructions, procedures, or drawings that include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. This means that each addressee must have suitable documentation and records, including acceptance criteria, to establish that the subject systems have been and are maintained sufficiently full of water to ensure system operability. Vent valves and their use are often a key ingredient for satisfying these requirements.

The NRC staff is initiating a Technical Specifications Task Force (TSTF) activity to address the recognized TS weaknesses associated with gas intrusion concerns. In the interim, until new TSs are developed, the NRC staff will treat a SR that the piping be full of water as satisfied if the piping and pumps of the subject systems are maintained sufficiently full of water to ensure system operability when operability is required. This condition must be shown to be satisfied during the time between surveillances, and either venting or UT surveillances are acceptable means of obtaining void data. Further, the NRC staff will consider justification for not conducting a periodic surveillance or for extending the time between surveillances of certain sections of piping if an addressee considers surveillance to be unnecessary. For example, some three loop plants designed by Westinghouse maintain HPSI discharge lines at a pressure greater than the RCS operating pressure. This eliminates the potential for leakage from the accumulators or the RCS as a possible means to introduce gas into the discharge lines. An assessment for such plants that (1) acceptably eliminates other means of introducing gas, (2) establishes acceptable verification that the lines are essentially full following a condition that reduces the discharge line pressure, and (3) establishes an operating history confirming that gas has not accumulated will be adequate justification for not conducting surveillances inside

containment or at locations that constitute a hazard to personnel performing the assessment. The NRC memorandum, “Technical Considerations for Reasonably Assuring Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems Operability,” ML071030382, April 17, 2007, provides some operating experience insights. The NRC staff plans to use this information during inspection activities that are planned as a followup to this GL and for guidance in the TSTF program to develop improved TSs.

REQUESTED ACTIONS

Each addressee is requested to evaluate their ECCS, DHR system, and containment spray system designs, operation, and test procedures to assure that gas intrusion is minimized and monitored in order to maintain system operability and compliance with the requirements of Appendix B to 10 CFR 50.

REQUESTED INFORMATION

Each addressee is requested to provide a summary description of how the REQUESTED ACTIONS have been addressed within 6 months of the date of this GL. This summary description should specifically address the quality assurance criteria in 10 CFR 50, Appendix B, Sections III, V, XI, XVI, and XVII and the TSs that apply to the subject systems. This summary should include a general description of: (1) the design, (2) the operating procedures, and (3) the test procedures to assure that gas intrusion does not affect the ability of the subject systems to perform their intended functions.

If an addressee determines that system or procedure modifications are necessary based on the review of the requested actions and these changes cannot be accomplished within 6 months of the date of this GL, then the addressee should also provide a plan and schedule for completion of these actions.

REQUIRED RESPONSE

In accordance with 10 CFR 50.54(f), in order to determine whether a facility license should be modified, suspended, or revoked, or whether other action should be taken, an addressee is required to respond as described below.

Within 6 months of the date of this generic letter, an addressee is required to submit a written response if they are unable to provide the information or they can not meet the requested completion date. The addressee must address in its response any alternative course of action that it proposes to take, including the basis for the acceptability of the proposed alternative course of action.

The required written response should be addressed to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, 11555 Rockville Pike, Rockville, MD 20852, under oath or affirmation under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). In addition, submit a copy of the response to the appropriate regional administrator.

REASONS FOR INFORMATION REQUEST

The NRC is requesting this information because a review of operating experience shows numerous instances of gas intrusion events involving the subject systems that have rendered or potentially rendered these risk-significant systems inoperable.

RELATED GENERIC COMMUNICATIONS

Document Number	Document Name	ADAMS Accession No.
GL 88-17	Loss of Decay Heat Removal	ML031200496
GL 97-04	Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps	ML031110062
IN 86-63	Loss of Safety Injection Capability	ML031250058

Document Number	Document Name	ADAMS Accession No.
IN 86-80	Unit Startup with Degraded High Pressure Safety Injection System	ML031250214
IN 87-63	Inadequate Net Positive Suction Head in Low Pressure Safety Systems	ML031180034
IN 88-23 IN 88-23, Supp. 1 IN 88-23, Supp. 2 IN 88-23, Supp. 3 IN 88-23, Supp. 4	Potential for Gas Binding of High-Pressure Safety Injection Pumps During a Loss-of-Coolant Accident	ML031150208 ML881230018 ML900125002 ML901204023 ML921215001
IN 88-74	Potentially Inadequate Performance of ECCS in PWRs during Recirculation Operation Following a LOCA	ML031150118
IN 89-67	Loss of Residual Heat Removal Caused by Accumulator Nitrogen Injection	ML031180745
IN 89-80	Potential for Water Hammer, Thermal Stratification, and Steam Binding in High-Pressure Coolant Injection Piping	ML031190089
IN 90-64	Potential for Common-Mode Failure of High Pressure Safety Injection Pumps or Release of Reactor Coolant Outside Containment During a Loss-of-Coolant Accident	ML031103251
IN 91-50	A Review of Water Hammer Events after 1985	ML031190397
IN 94-36	Undetected Accumulation of Gas in Reactor System	ML031060539
IN 94-76	Recent Failures of Charging/Safety Injection Pump Shafts	ML031060430
IN 95-03	Loss of Reactor Coolant Inventory and Potential Loss of Emergency Mitigation Functions While in a Shutdown Condition	ML031060404

Document Number	Document Name	ADAMS Accession No.
IN 96-55	Inadequate Net Positive Suction Head of Emergency Core Cooling and Containment Heat Removal Pumps under Design Basis Accident Conditions	ML031050598
IN 96-65	Undetected Accumulation of Gas in Reactor Coolant System and Inaccurate Reactor Water Level Indication During Shutdown	ML031050500
IN 97-38	Level-Sensing System Initiates Common-Mode Failure of High Pressure Injection Pumps	ML031050514
IN 97-40	Potential Nitrogen Accumulation Resulting from Back-Leakage from Safety Injection Tanks	ML031050497
IN 98-40	Design Deficiencies Can Lead to Reduced ECCS Pump Net Positive Suction Head During Design-Basis Accidents	ML031040547
IN 02-15 IN 02-15, Supp. 1	Potential Hydrogen Combustion Events in BWR Piping	ML020980466 ML031210054
IN 02-18	Effect of Adding Gas Into Water Storage Tanks on the Net Positive Suction Head for Pumps	ML021570158
IN 06-21	Operating Experience Regarding Entrainment of Air Into Emergency Core Cooling and Containment Spray Systems	ML062570468

BACKFIT DISCUSSION

Under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, this GL requests a review and appropriate resulting actions for the purpose of assuring compliance with applicable existing requirements. No backfit is either intended or approved by the issuance of this GL. Therefore, the NRC staff has not performed a backfit analysis.

FEDERAL REGISTER NOTIFICATION

To be done after the public comment period.

CONGRESSIONAL REVIEW ACT

In accordance with the Congressional Review Act, the NRC has determined that this GL is not a major rule and the Office of Information and Regulatory Affairs of the Office of Management and Budget has confirmed this determination.

PAPERWORK REDUCTION ACT STATEMENT

This GL contains an information collection that is subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq*.). The Office of Management and Budget approved this information collection under clearance number 3150-0011.

The burden to the public for this mandatory information collection is estimated to average 300 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. The NRC is seeking public comment on the potential impact of the information collection contained in the GL and on the following issues:

1. Is the proposed information collection necessary for the proper performance of the functions of the NRC, including whether the information will have practical utility?
2. Is the estimate of burden accurate?
3. Is there a way to enhance the quality, utility, and clarity of the information collected?
4. How can the burden of the information collection be minimized, including the use of automated collection techniques?

Send comments on any aspect of this information collection, including suggestions for reducing the burden, to the Records and FOIA/Privacy Services Branch (T5-F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet electronic mail to

infocollects@nrc.gov; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0011), Office of Management and Budget, Washington, DC 20503.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, an information collection unless the requesting document displays a currently valid OMB control number.

CONTACT

Please direct any questions about this matter to the technical contact or the Lead Project Manager listed below, or to the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Michael J. Case, Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Technical Contact: Warren C. Lyon, NRR
301-415-2897
e-mail: wcl@nrc.gov

Lead Project Manager: David P. Beaulieu, NRR
301-415-3243
e-mail: dpb@nrc.gov

Note: NRC generic communications may be found on the NRC public Web site, http://www.nrc.gov, under Electronic Reading Room/Document Collections.

END OF DRAFT GENERIC LETTER

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Dated at Rockville, Maryland, this 16th day of May 2007.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Jennifer Golder, Acting Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation