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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, DC 20555

(Date to be issued)

NRC BULLETIN 2003-XX: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS

Addressees

All holders of operating licenses for pressurized-water nuclear power reactors, except those who have 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 bulletin to:

(1) Inform addressees of the results of NRC-sponsored research identifying the potential susceptibility of pressurized-water reactor (PWR) recirculation sump screens to debris blockage in the event of a high-energy line break (HELB) requiring recirculation operation of the emergency core cooling system (ECCS) or containment spray system (CSS).

(2) Inform addressees of the potential for additional adverse effects due to debris blockage of flowpaths necessary for ECCS and CSS recirculation and containment drainage.

(3) Request that, in light of these potentially adverse effects, addressees confirm their compliance with 10 CFR 50.46(b)(5) and other existing applicable regulatory requirements, or describe any compensatory measures implemented to reduce the potential risk due to post-accident debris blockage as evaluations to determine compliance proceed.

(4) Require addressees to provide the NRC a written response in accordance with 10 CFR 50.54(f).

Background

In 1979, as a result of evolving staff concerns related to the adequacy of PWR recirculation sump designs, the NRC opened Unresolved Safety Issue (USI) A-43, “Containment Emergency Sump Performance.” To support the resolution of USI A-43, the NRC undertook an extensive research program, the technical findings of which are summarized in NUREG-0897, “Containment Emergency Sump Performance,” dated October 1985. The resolution of

USI A-43 was subsequently documented in Generic Letter (GL) 85-22, "Potential for Loss of Post-LOCA Recirculation Capability Due to Insulation Debris Blockage," dated December 3, 1985. Although the staff's regulatory analysis concerning USI A-43 did not support imposing new sump performance requirements upon PWRs or boiling-water reactors (BWRs) that were then licensed or under construction, the staff's technical findings identified certain conditions that would inherently lead to these plants' design assumption of 50% sump blockage being nonconservative. Therefore, in GL 85-22 the NRC staff recommended that all reactor licensees replace the 50% blockage assumption with a comprehensive mechanistic assessment of plant-specific debris blockage potential for future modifications related to sump performance, such as thermal insulation changeouts. The staff also updated the NRC's regulatory guidance, including Section 6.2.2 of the Standard Review Plan (NUREG-0800) and Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," to reflect the USI A-43 technical findings documented in NUREG-0897.

Following the resolution of USI A-43 in 1985, several events challenged the staff's conclusion that no new requirements were necessary to prevent the clogging of ECCS strainers at operating BWRs:

- On July 28, 1992, at Barsebäck Unit 2, a Swedish BWR, the spurious opening of a pilot-operated relief valve led to the plugging of two containment vessel spray system suction strainers with mineral wool and required operators to shut down the spray pumps and backflush the strainers.

- In 1993, at Perry Unit 1, ECCS strainers twice became plugged with debris. On January 16, ECCS strainers were plugged with suppression pool particulate matter, and on April 14, an ECCS strainer was plugged with glass fiber from ventilation filters that had fallen into the suppression pool. On both occasions, the affected ECCS strainers were deformed by excessive differential pressure created by the debris plugging.

- On September 11, 1995, at Limerick Unit 1, following a manual scram due to a stuck-open safety/relief valve, operators observed fluctuating flow and pump motor current on the "A" loop of suppression pool cooling. The licensee later attributed these indications to a thin mat of fiber and sludge which had accumulated on the suction strainer.

In response to these ECCS suction strainer plugging events, the NRC issued several generic communications, including Bulletin 93-02, Supplement 1, "Debris Plugging of Emergency Core Cooling Suction Strainers," dated February 18, 1994; Bulletin 95-02, "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in Suppression Pool Cooling Mode," dated October 17, 1995; and Bulletin 96-03, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling-Water Reactors," dated May 6, 1996. These bulletins requested that BWR licensees implement appropriate procedural measures, maintenance practices, and plant modifications to minimize the potential for the clogging of ECCS suction strainers by debris accumulation following a loss-of-coolant accident (LOCA). The NRC staff has concluded that all BWR licensees have adequately addressed these bulletins.

However, the findings from research to resolve the BWR strainer plugging issue in the late 1990s raised questions concerning the adequacy of PWR sump designs by confirming what the aforementioned BWR strainer plugging events had earlier indicated: (1) that the amount of debris generated by a HELB could be greater than estimated by the USI A-43 research program, (2) that the debris could be finer (and, thus, more easily transportable), and (3) that certain combinations of debris (e.g., fibrous material plus particulate material) could result in a substantially greater head loss than an equivalent amount of either type of debris alone. These BWR research findings, which may also affect the performance of PWR sumps, prompted the NRC to open Generic Safety Issue (GSI) 191, "Assessment of Debris Accumulation on PWR Sump Performance." The objective of GSI-191 is to ensure that post-accident debris blockage would not impede or prevent the operation of the ECCS and CSS in the recirculation mode at PWRs in the event of a LOCA or other HELB accidents for which sump recirculation is required.

Discussion

In the event of a HELB within the containment of a PWR, energetic pressure waves and fluid jets would impinge upon materials in the vicinity of the break, such as thermal insulation, coatings, and concrete, causing damage and generating debris. Debris could also be generated through secondary mechanisms, such as severe post-accident temperature and humidity conditions, flooding of the lower containment, and the impact of containment spray droplets. Through transport methods such as entrainment in the steam/water flows issuing from the break and in containment spray washdown, a fraction of the generated debris and foreign material in the containment would be transported to the pool of water formed on the containment floor. If the ECCS or CSS pumps subsequently took suction from the recirculation sump, the debris suspended in the containment pool would begin to accumulate on the sump screen. The accumulation of this suspended debris on the sump screen could create a roughly uniform mat over the entire screen surface, referred to as a debris bed, which would tend to increase the head loss across the screen through a filtering action. If a sufficient amount of debris accumulated, the debris bed would reach a critical thickness at which the head loss across it would exceed the net positive suction head (NPSH) margin required to ensure the successful operation of the ECCS and CSS pumps in the recirculation mode. A loss of NPSH margin for the ECCS or CSS pumps as a result of the accumulation of debris on the recirculation sump screen, referred to as sump clogging, could result in degraded pump performance and eventual pump failure.

To assess the likelihood of the ECCS and CSS pumps at domestic PWRs experiencing a debris-induced loss of NPSH margin during sump recirculation, the NRC sponsored a GSI-191 research program, which culminated in a parametric study. The parametric study mechanistically treated phenomena associated with debris blockage using analytical models of domestic PWRs that were generated with a combination of generic and plant-specific data. As documented in Volume 1 of NUREG/CR-6762, "GSI-191 Technical Assessment: Parametric Evaluations for Pressurized Water Reactor Recirculation Sump Performance," dated August 2002, the GSI-191 parametric study concludes that recirculation sump clogging is a credible concern for the population of domestic PWRs. However, as a result of limitations with respect to plant-specific data and other modeling uncertainties, the parametric study does not definitively identify whether or not particular PWR plants are vulnerable to sump clogging when phenomena associated with debris blockage are modeled mechanistically.

The methodology employed by the GSI-191 parametric study is based upon the substantial body of test data and analysis documented in technical reports generated during the NRC's GSI-191 research program and earlier technical reports generated by the NRC and the industry during the resolution of the BWR strainer clogging issue and USI A-43. The following pertinent technical reports, which cover debris generation, transport, accumulation, and head loss, are incorporated by reference into the GSI-191 parametric study:

- NUREG/CR-6770, "GSI-191: Thermal-Hydraulic Response of PWR Reactor Coolant System and Containments to Selected Accident Sequences," dated August 2002.

- NUREG/CR-6762, Vol. 3, "GSI-191 Technical Assessment: Development of Debris Generation Quantities in Support of the Parametric Evaluation," dated August 2002.

- NUREG/CR-6762, Vol. 4, "GSI-191 Technical Assessment: Development of Debris Transport Fractions in Support of the Parametric Evaluation," dated August 2002.

- NUREG/CR-6224, "Parametric Study of the Potential for BWR ECCS Strainer Blockage Due to LOCA Generated Debris," dated October 1995.

In addition to demonstrating the potential for debris to clog containment recirculation sumps, operational experience and the NRC's technical assessment of GSI-191 have also identified three integrally related modes by which post-accident debris blockage could adversely affect the sump screen's design function of intercepting debris that could impede or prevent the operation of the ECCS and CSS in the recirculation mode.

First, as a result of the 50% blockage assumption, PWR sump screens were typically designed assuming that relatively small structural loadings would result from the differential pressure associated with debris blockage. Consequently, PWR sump screens may not be capable of accommodating the substantial structural loadings that would occur due to mechanistically determined debris beds that may cover essentially the entire screen surface. Inadequate structural reinforcement of a sump screen may result in its deformation, damage, or failure, which could allow large quantities of debris to be ingested into the ECCS and CSS piping, pumps, and other components, potentially leading to their clogging and failure. The ECCS strainer plugging and deformation events that occurred at Perry Unit 1— further described in Information Notice (IN) 93-34, "Potential for Loss of Emergency Cooling Function Due to a Combination of Operational and Post-LOCA Debris in Containment," dated April 26, 1993, and Licensee Event Report (LER) 50-440/93-011, "Excessive Strainer Differential Pressure Across the RHR [Residual Heat Removal] Suction Strainer Could Have Compromised Long Term Cooling During Post-LOCA Operation," submitted May 19, 1993—demonstrate the credibility of this concern for screens and strainers that have not been designed with adequate reinforcement.

Second, in some PWR containments, the flowpaths by which containment spray or break flows return to the recirculation sump may include "chokepoints," where the flowpath becomes so constricted that it could become blocked with debris following a HELB. For example, chokepoints may include drains for pools, cavities, or isolated containment compartments, and other constricted drainage paths between physically separated containment elevations. As a result of debris blockage at certain chokepoints, substantial amounts of water required for

adequate recirculation could be held up or diverted into containment volumes that do not drain to the recirculation sump. The holdup or diversion of water assumed to be available to support sump recirculation could result in an available NPSH for ECCS and CSS pumps that is lower than the analyzed value, thereby reducing assurance that recirculation would function successfully. A reduced available NPSH directly impacts sump screen design because the NPSH margin of the ECCS and CSS pumps must be conservatively calculated to determine correctly the required surface area of passive sump screens when mechanistically determined debris loadings are considered. The NRC's GSI-191 research identified the holdup or diversion of recirculation sump inventory as an important and potentially credible concern, and a number of LERs associated with this concern have also been generated, which further confirms both its credibility and potential significance. These LERs include:

- LER 50-369/90-012, "Loose Material Was Located in Upper Containment During Unit Operation Because of an Inappropriate Action," McGuire Unit 1, submitted August 30, 1990.

- LER 50-266/97-006, "Potential Refueling Cavity Drain Failure Could Affect Accident Mitigation," Point Beach Unit 1, submitted February 19, 1997.

- LER 50-455/97-001, "Unit 2 Containment Drain System Clogged Due to Debris," Byron Unit 2, submitted April 17, 1997.

- LER 50-269/97-010, "Inadequate Analysis of ECCS Sump Inventory Due to Inadequate Design Analysis," Oconee Unit 1, submitted January 8, 1998.

- LER 50-315/98-017, "Debris Recovered from Ice Condenser Represents Unanalyzed Condition," D. C. Cook Unit 1, submitted July 1, 1998.

Third, debris blockage at flow restrictions within the ECCS and CSS recirculation flowpaths downstream of the sump screen is of potential concern for PWRs. For this mode of debris blockage to occur, pieces of debris would need to have spatial dimensions that would allow them to pass through the sump screen's intended openings, or through screen defects such as gaps or breaches, and then become lodged at downstream flow restrictions such as pump internals, high-pressure safety injection (HPSI) throttle valves, fuel assembly inlet debris screens, or containment spray nozzles. In particular, conditions conducive to downstream debris blockage may be present at PWRs with adverse screen defects, and at PWRs where the maximum dimension of the sump screen's intended openings (e.g., the diagonal dimension of a rectangular mesh) is not the most restrictive point in the ECCS and CSS recirculation flowpaths. Downstream debris blockage at restrictions in the ECCS flowpath could impede or prevent the recirculation of coolant to the reactor core, thereby leading to inadequate core cooling. Similarly, downstream debris blockage at restrictions in the CSS flowpath could impede or prevent CSS recirculation, thereby leading to inadequate containment heat removal. Numerous operational events concerning the discovery of inadequate sump screen configurations that could have led to downstream blockage are cited in Attachment 2 to GL 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," dated July 14, 1998.

Three emergent items have increased the urgency of the NRC staff's efforts to ensure that PWR licensees are aware of and appropriately responding to the above concerns regarding the potential for debris blockage to impede or prevent the operation of the ECCS and CSS in the recirculation mode: (1) an LER submitted by the licensee for Davis-Besse Unit 1 that declared the recirculation sump inoperable, (2) a subsequent LER submitted by the Davis-Besse licensee that declared the high-pressure injection (HPI) pumps inoperable, and (2) an NRC-sponsored risk study concerning operator actions to mitigate sump clogging.

On December 11, 2002, the licensee for Davis-Besse Unit 1 submitted LER 50-346/02-005-01, "Potential Clogging of the Emergency Sump Due to Debris in Containment." In this LER, the licensee stated that the recirculation sump had been declared inoperable as a result of the potential for sump clogging due to unqualified coatings and other potential sources of post-accident debris (e.g., fibrous insulation and improperly applied qualified coatings) and the potential for downstream debris blockage to occur due to a 6-inch by 3/4-inch gap discovered in the screen. The information provided in this LER, and in a public meeting with the licensee on November 26, 2002, also showed that key information documented in NUREG/CR-6762, Vol. 2, "GSI-191 Technical Assessment: Summary and Analysis of U.S. Pressurized Water Reactor Industry Survey Responses and Responses to GL 97-04," dated August 2002, and other assumptions used in the parametric study to model Davis-Besse Unit 1 were not conservative with respect to design basis assumptions regarding sump screen surface area, minimum containment pool depth at switchover to recirculation, and particulate debris generation.

On May 5, 2003, the Davis-Besse licensee submitted LER 50-346/03-002-00, which stated that the HPI pumps had been declared inoperable as a result of the potential for debris to damage the pump internals during the recirculation phase of certain postulated LOCAs when the HPI pumps are required to take suction from the containment recirculation sump. This LER stated that, when an HPI pump takes suction from the recirculation sump, small particles of debris may result in localized erosion of the mating surfaces around rotating parts, and that the flow of sump water that lubricates the hydrostatic bearing (which is drawn from the volute of the HPI pump) could be blocked by entrained debris, resulting in bearing damage.

In February 2003, Los Alamos National Laboratory published the NRC-sponsored technical report LA-UR-02-7562, "The Impact of Recovery From Debris-Induced Loss of ECCS Recirculation on PWR Core Damage Frequency." The report analyzes the potential risk benefit of operator actions to recover from sump clogging events using a generic probabilistic model to demonstrate that the potential increase in risk due to sump clogging could be reduced by approximately one order of magnitude if PWR licensees have appropriate mitigative measures in place.

In response to these emergent items associated with the potential post-accident debris blockage concerns identified in this bulletin, the NRC is requesting that individual PWR licensees submit information on an expedited basis to document that they have either (1) analyzed the ECCS and CSS recirculation functions with respect to the identified post-accident debris blockage effects, taking into account the recent research findings described in the Discussion section, and determined that compliance exists with all applicable regulatory requirements, or (2) implemented appropriate interim compensatory measures to reduce the risk which may be associated with potentially degraded or nonconforming ECCS and CSS recirculation functions while evaluations to determine compliance proceed. The NRC staff

recognizes that it may be necessary for addressees to undertake complex evaluations to determine whether regulatory compliance exists in light of the concerns identified in this bulletin, and the staff is preparing a generic letter that would request this information.

To assist in determining whether the ECCS and CSS recirculation functions are in compliance with existing applicable regulatory requirements, addressees may use the guidance in Draft Regulatory Guide 1107 (DG-1107), "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," dated February 2003. The NRC has also published a technical report entitled NUREG/CR-6808, "Knowledge Base for the Effect of Debris on Pressurized Water Reactor Emergency Core Cooling Sump Performance," dated February 2003, which is designed to serve as a reference for plant-specific analyses with regard to whether a sump would perform its function without preventing the operation of the ECCS and CSS pumps. In addition, the NRC staff supports the development of generic industry guidance and the coordination of addressees' responses to this bulletin as a means of increasing efficiency and streamlining the regulatory verification process. Individual addressees may also develop alternative approaches to those mentioned in this paragraph for determining the status of their regulatory compliance; however, additional staff review may be required to assess the adequacy of alternative approaches.

Conditions at specific PWRs are expected to vary with respect to susceptibility to post-accident debris blockage and various options may be available to addressees for preventing or mitigating the effects of debris blockage. For these reasons, addressees that are unable to confirm compliance with all existing regulatory requirements within 60 days in light of the potential debris blockage effects identified in this bulletin may consider a range of possible interim compensatory measures and may elect to implement those which they deem appropriate, based upon the specific conditions associated with their plants. As stated above, the risk benefit of certain interim compensatory measures is demonstrated by the NRC-sponsored technical report LA-UR-02-7562. Possible interim compensatory measures may include, but are not limited to, the following:

- operator training on indications of and responses to sump clogging
- procedural modifications, if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently)
- ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere
- more aggressive containment cleaning and increased foreign material controls
- ensuring containment drainage paths are unblocked
- ensuring sump screens are free of adverse gaps and breaches

In addition to the measures listed above, addressees may also consider implementing unique or plant-specific compensatory measures, as applicable. Commensurate with the potential risk-significance of post-accident debris blockage effects, addressees electing to implement interim compensatory measures in response to this bulletin should ensure the interim measures are implemented as soon as practical. The NRC staff recognizes that the implementation of certain compensatory measures involving containment entry may not be feasible until the next outage.

Approximately two weeks after the issuance of this bulletin, the NRC plans to hold a public meeting to further clarify the intent of the bulletin and respond to any questions from addressees regarding the bulletin. The NRC plans to publish the notice for this public meeting promptly after the bulletin is issued.

Applicable Regulatory Requirements

NRC regulations in Title 10 of the *Code of Federal Regulations*, Section 50.46, (10 CFR 50.46) require that the ECCS satisfy five criteria, one of which is to provide the capability for long-term cooling of the reactor core. As set forth in 10 CFR 50.46(b)(5), the ECCS must have the capability to remove decay heat so that the core temperature is maintained at an acceptably low value for the extended period of time required by the long-lived radioactivity remaining in the core. For PWRs licensed to the General Design Criteria (GDCs) in Appendix A to 10 CFR Part 50, GDC 35 specifies additional ECCS requirements.

Similarly, for PWRs licensed to the GDCs in Appendix A to 10 CFR Part 50, GDC 38 provides requirements for containment heat removal systems, and GDC 41 provides requirements for containment atmosphere cleanup. Many PWR licensees credit a CSS, at least in part, with performing the safety functions to satisfy these requirements, and PWRs that are not licensed to the GDCs may credit a CSS to satisfy similar plant-specific licensing basis requirements. In addition, PWR licensees may credit a CSS with reducing the accident source term to meet the limits of 10 CFR Part 100 or 10 CFR 50.67.

Technical specifications pertain to the ECCS and CSS insofar as they require the operability of these systems for the mitigation of certain design basis accidents. Other plant-specific licensing commitments concerning the ECCS and CSS are also documented in the Final Safety Analysis Report (FSAR).

Applicable Regulatory Guidance

Draft Regulatory Guide 1107, “Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident,” dated February 2003.

Requested Information

All addressees are requested to provide a response within 60 days of the date of this bulletin that contains either the information requested in Option 1 or Option 2:

Option 1: State that the ECCS and CSS recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in this bulletin, taking into account the recent research findings described in the

Discussion section, and are in compliance with all existing applicable regulatory requirements.

Option 2: Describe any interim compensatory measures that have been implemented or that will be implemented to reduce the risk which may be associated with potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance is complete. If any of the interim compensatory measures listed in the Discussion section will not be implemented, provide a justification. Additionally, for any planned interim measures that will not be in place prior to your response to this bulletin, submit an implementation schedule and provide the basis for concluding that their implementation is not practical until a later date.

Required Response

In accordance with 10 CFR 50.54(f), the NRC requires each addressee to respond as described above. The NRC needs this information to verify addressees' compliance with NRC regulations and to ensure that any interim risks associated with post-accident debris blockage are minimized while evaluations to determine compliance proceed.

Within 60 days of the date of this bulletin, each addressee is required to submit a written response that includes the information requested above in the Requested Information section. Addressees who choose not to submit the requested information must describe in their responses any alternative course of action that they propose 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, Washington, DC 20555-0001, 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). A copy of the response should be sent to the appropriate regional administrator.

The NRC staff will review the responses to this bulletin and, if concerns are identified, will notify affected addressees. The staff may also conduct inspections to determine addressees' effectiveness in addressing this bulletin.

Reasons for Information Request

As discussed above, recent research and analysis suggests that (1) most PWR licensees' current safety analyses do not adequately address the potential for the failure of the ECCS and CSS recirculation functions as a result of debris blockage, and (2) the ECCS and CSS recirculation functions at a significant number of operating PWRs could become degraded as a result of the potential effects of debris blockage identified in this bulletin. An ECCS that is incapable of providing long-term reactor core cooling through recirculation operation would be in violation of 10 CFR 50.46. A CSS that is incapable of functioning in the recirculation mode may not comply with GDCs 38 and 41, or other plant-specific licensing requirements or safety analyses. Furthermore, to address the risk which may be associated with potentially degraded or nonconforming ECCS and CSS recirculation functions, addressees that are unable to

confirm regulatory compliance may find it appropriate to implement compensatory measures until a determination can be made. Therefore, the NRC needs the information requested in this bulletin to assess plant-specific compliance with NRC regulations and to ensure the safe operation of PWR facilities as addressees resolve the concerns identified in this bulletin.

Related Generic Communications

- Bulletin 96-03, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling-Water Reactors," May 6, 1996.
- Bulletin 95-02, "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in the Suppression Pool Cooling Mode," October 17, 1995.
- Bulletin 93-02, "Debris Plugging of Emergency Core Cooling Suction Strainers," May 11, 1993.
- Bulletin 93-02, Supplement 1, "Debris Plugging of Emergency Core Cooling Suction Strainers," February 18, 1994.
- Generic Letter 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," July 14, 1998.
- Generic Letter 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps," October 7, 1997.
- Generic Letter 85-22, "Potential For Loss of Post-LOCA Recirculation Capability Due to Insulation Debris Blockage," December 3, 1985.
- Information Notice 97-13, "Deficient Conditions Associated With Protective Coatings at Nuclear Power Plants," March 24, 1997.
- Information Notice 96-59, "Potential Degradation of Post Loss-of-Coolant Recirculation Capability as a Result of Debris," October 30, 1996.
- Information Notice 96-55, "Inadequate Net Positive Suction Head of Emergency Core Cooling and Containment Heat Removal Pumps Under Design Basis Accident Conditions," October 22, 1996.
- Information Notice 96-27, "Potential Clogging of High Pressure Safety Injection Throttle Valves During Recirculation," May 1, 1996.
- Information Notice 96-10, "Potential Blockage by Debris of Safety System Piping Which Is Not Used During Normal Operation or Tested During Surveillances," February 13, 1996.

- Information Notice 95-47, “Unexpected Opening of a Safety/Relief Valve and Complications Involving Suppression Pool Cooling Strainer Blockage,” October 4, 1995.

- Information Notice 95-47, Revision 1, “Unexpected Opening of a Safety/Relief Valve and Complications Involving Suppression Pool Cooling Strainer Blockage,” November 30, 1995.

- Information Notice 95-06, “Potential Blockage of Safety-Related Strainers by Material Brought Inside Containment,” January 25, 1995.

- Information Notice 94-57, “Debris in Containment and the Residual Heat Removal System,” August 12, 1994.

- Information Notice 93-34, “Potential for Loss of Emergency Cooling Function Due to a Combination of Operational and Post-LOCA Debris in Containment,” April 26, 1993.

- Information Notice 93-34, Supplement 1, “Potential for Loss of Emergency Cooling Function Due to a Combination of Operational and Post-LOCA Debris in Containment,” May 6, 1993.

- Information Notice 92-85, “Potential Failures of Emergency Core Cooling Systems Caused by Foreign Material Blockage,” December 23, 1992.

- Information Notice 92-71, “Partial Plugging of Suppression Pool Strainers at a Foreign BWR,” September 30, 1992.

- Information Notice 89-79, “Degraded Coatings and Corrosion of Steel Containment Vessels,” December 1, 1989.

- Information Notice 89-79, Supplement 1, “Degraded Coatings and Corrosion of Steel Containment Vessels,” June 29, 1990.

- Information Notice 89-77, “Debris in Containment Emergency Sumps and Incorrect Screen Configurations,” November 21, 1989.

- Information Notice 88-28, “Potential for Loss of Post-LOCA Recirculation Capability Due to Insulation Debris Blockage,” May 19, 1988.

Backfit Discussion

Under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f), this bulletin transmits an information request for the purpose of verifying compliance with existing applicable regulatory requirements. Specifically, the requested information will enable the NRC staff to determine whether PWR licensees are in compliance with plant-specific regulatory requirements concerning the ECCS and CSS recirculation functions and ensure the safe operation of their facilities as they resolve the concerns identified in this bulletin. No backfit is either intended or approved by the issuance of this bulletin and, therefore, the staff has not provided a backfit analysis.

Small Business Regulatory Enforcement Fairness Act

The NRC has determined that this bulletin is not subject to the Small Business Regulatory Enforcement Fairness Act of 1996.

Federal Register Notification

A notice of opportunity for public comment on this bulletin was not published in the *Federal Register* because the NRC is requesting information from PWR licensees on an expedited basis to assess compliance with existing applicable regulatory requirements and the necessity for interim compensatory measures. As the resolution of this matter progresses, the opportunity for public involvement will be provided. Nevertheless, comments on the information requested and the technical issues addressed by this bulletin may be sent to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC, 20555-0001.

Paperwork Reduction Act Statement

This bulletin contains an information collection that is subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). This information collection was approved by the Office of Management and Budget (OMB), clearance number 3150-0012, which expires on July 31, 2003. The burden to the public for this mandatory information collection is estimated to average 150 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. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing the burden, to the Records Management Branch, Mail Stop T-6 E6, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by electronic mail to INFOCOLLECTS@NRC.GOV; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0012), Office of Management and Budget, Washington, DC 20503.

Public Protection Notification

The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection unless the requesting document displays a currently valid OMB control number.

If you have any questions about this matter, please contact the technical contacts or lead project manager listed below.

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