

a toll-free telephone call to Western Union at 1-(800) 248-5100 (in Missouri 1-(800) 342-6700). The Western Union operator should be given Datagram Identification Number N1023 and the following message addressed to Robert A. Capra: petitioner's name and telephone number, date petition was mailed, plant name, and publication date and page number of this Federal Register notice. A copy of the petition should also be sent to the Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to Michael I. Miller, Esquire; Sidley and Austin, One First National Plaza, Chicago, Illinois 60603, attorney for the licensee.

Nontimely filings of petitions for leave to intervene, amended petitions, supplemental petitions and/or requests for hearing will not be entertained absent a determination by the Commission, the presiding officer or the presiding Atomic Safety and Licensing Board that the petition and/or request should be granted based upon a balancing of the factors specified in 10 CFR 2.714(a)(1)(i)-(v) and 2.714(d).

For further details with respect to this action, see the application for amendments dated December 21, 1995, as supplemented on October 24, 1996, which are available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC, and at the local public document rooms located at: for Byron, the Byron Public Library District, 109 N. Franklin, P.O. Box 434, Byron, Illinois 61010; for Braidwood, the Wilmington Public Library, 201 S. Kankakee Street, Wilmington, Illinois 60481.

Dated at Rockville, Maryland, this 13th day of February 1997.

For the Nuclear Regulatory Commission.
George F. Dick, Jr.,

*Project Manager, Project Directorate III-2,
Division of Reactor Projects—III/IV Office of
Nuclear Reactor Regulation.*

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[Docket No. 50-348]

Southern Nuclear Operating Company, Inc. Alabama Power Company; Notice of Withdrawal of Application for Amendment to Facility Operating License

The U.S. Nuclear Regulatory Commission (the Commission) has granted the request of Southern Nuclear Operating Company, Inc. (Southern Nuclear), to withdraw its August 23, 1996, application for proposed

amendment to Facility Operating License No. NPF-2 for the Farley Nuclear Plant, Unit 1, located in Houston County, Alabama.

The proposed amendment would have revised the technical specifications by modifying the installation method for previously licensed steam generator tube elevated tubesheet laser welded sleeves in Farley Nuclear Plant, Unit 1.

The Commission had previously issued a Notice of Consideration of Issuance of Amendments published in the Federal Register on September 11, 1996 (61 FR 47982). However, by letter dated February 7, 1997, Southern Nuclear withdrew the proposed change.

For further details with respect to this action, see the application for amendment dated August 23, 1996, and the licensee's letter dated February 7, 1997, which withdrew the application for license amendment. The above documents are available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC, and at the local public document room located at the Houston-Love Memorial Library, 212 W. Burdeshaw Street, P.O. Box 1369, Dothan, Alabama.

Dated at Rockville, Md., this 13th day of February 1997.

For the Nuclear Regulatory Commission.
Jacob I. Zimmerman,
*Project Manager, Project Directorate II-2,
Division of Reactor Projects—I/II, Office of
Nuclear Reactor Regulation.*

[FR Doc. 97-4176 Filed 2-19-97; 8:45 am]

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Proposed Generic Communication; Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps (M96537)

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of opportunity for public comment.

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to issue a generic letter that will request addressees to submit the analysis and pertinent assumptions used to determine the net positive suction head (NPSH) available for emergency core cooling (including core spray and decay heat removal) and containment heat removal pumps. This information will enable the NRC to determine if the NPSH analyses for reactor facilities are consistent with their respective current licensing basis. The NRC is seeking comment from interested parties regarding both the technical and

regulatory aspects of the proposed generic letter presented under the Supplementary Information heading.

The proposed generic letter has been endorsed by the Committee to Review Generic Requirements (CRGR). The relevant information that was sent to the CRGR will be placed in the NRC Public Document Room. The NRC will consider comments received from interested parties in the final evaluation of the proposed generic letter. The NRC's final evaluation will include a review of the technical position and, as appropriate, an analysis of the value/impact on licensees. Should this generic letter be issued by the NRC, it will become available for public inspection in the NRC Public Document Room.

DATES: Comment period expires March 24, 1997. 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 Chief, Rules Review and Directives Branch, U.S. Nuclear Regulatory Commission, Mail Stop T-6D-69, Washington, DC 20555-0001. Written comments may also be delivered to 11545 Rockville Pike, Rockville, Maryland, from 7:30 am to 4:15 pm, Federal workdays. Copies of written comments received may be examined at the NRC Public Document Room, 2120 L Street, N.W., (Lower Level), Washington, DC.

FOR FURTHER INFORMATION CONTACT: Howard (Jack) Dawson, (301) 415-3138.

SUPPLEMENTARY INFORMATION:

NRC GENERIC LETTER 97-XX:
ASSURANCE OF SUFFICIENT NET
POSITIVE SUCTION HEAD FOR
EMERGENCY CORE COOLING
AND CONTAINMENT HEAT
REMOVAL PUMPS

Addressees

All holders of operating licenses for nuclear power plants, except those who have certified to a permanent cessation of operations.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this generic letter (GL) to request that addressees submit the analysis and pertinent assumptions used to determine the net positive suction head (NPSH) available for emergency core cooling (including core spray and decay heat removal) and containment heat removal pumps. This information will enable the NRC to determine if the NPSH analyses for reactor facilities are

consistent with their respective current licensing basis.

Background

As a result of recent NRC inspection activities, licensee notifications, and licensee event reports, a safety-significant issue has been identified that has generic implications and warrants action by the NRC to ensure that the issue has been adequately addressed and resolved. The issue is that the NPSH available for emergency core cooling system (ECCS) (including core spray and decay heat removal) and containment heat removal pumps may not be adequate under all design-basis accident scenarios. In some cases, this may be a result of changes in plant configuration, operating procedures, environmental conditions or other operating parameters that have taken place over the life of the plant.

In other cases, the licensing analysis may not bound all postulated events for a sufficient time, or assumptions used in the analysis may be non-conservative or inconsistent with those assumptions and methodologies traditionally considered acceptable by the staff. For example, some licensees have recently discovered that they must take credit for containment overpressure to meet ECCS (including core spray and decay heat removal) and containment heat removal pump NPSH requirements. In the examples the NRC staff is familiar with, the need for crediting this overpressure in ECCS analyses has arisen due to changes in plant configuration and operating conditions which have occurred over the life of the plant, and/or errors in prior NPSH calculations. The overpressure being credited by licensees may be inconsistent with the licensing basis of the plant.

The current NPSH analyses (including any corresponding containment pressure analysis) may not be available to the staff in docketed material (e.g., final safety analysis reports) because some licensees have changed their analyses. Consequently, this generic letter requests that addressees submit the analyses and pertinent assumptions used to determine the NPSH available for emergency core cooling (including core spray and decay heat removal) and containment heat removal pumps. This generic letter applies only to ECCS (including core spray and decay heat removal) and containment heat removal pumps that take suction from the containment sump or suppression pool following a loss-of-coolant accident (LOCA) or secondary line break.

New NPSH analyses are not required or requested to respond to this information request. However, new

NPSH analyses may be warranted if an addressee determines that a facility is not in compliance with the Commission's rules and regulations. In such cases, the affected addressees are expected to take corrective action, as appropriate, in accordance with the requirements stated in 10 CFR part 50, appendix B, to restore their facility to compliance.

The following is a sample of the NRC staff's recent findings concerning the NPSH issues addressed by this generic letter:

Haddam Neck

In 1986 and 1995, the licensee identified conditions where the NPSH available for the residual heat removal (RHR) pumps may be insufficient when the pumps are operating in the emergency core cooling mode. In 1986, the licensee determined that the only extant NPSH analysis, which was performed in 1979 as part of the Systematic Evaluation Program, did not properly account for hydraulic losses in suction piping, and as a result, erroneously indicated that containment overpressure was not needed to satisfy NPSH requirements for the pumps in the recirculation mode of operation. A new analysis showed that credit had to be taken for 6 psi of containment overpressure. In another reanalysis conducted in 1995 for increased service water temperature, the licensee found that additional containment overpressure, which constituted a significant fraction of the peak calculated containment accident pressure, was necessary to meet NPSH requirements for the same pumps. On August 30, 1996, the licensee reported in Licensee Event Report (LER) 96-016 that calculations recently performed to determine the NPSH available for the residual heat removal pumps may have been in error for the alternate, short-term recirculation flow path, due to insufficient containment overpressure for a period of pump operation. The licensee attributed this event to the failure to fully analyze the containment pressure and sump temperature responses under design-basis accident conditions.

Maine Yankee

During an inspection conducted in July and August 1996, to determine if Maine Yankee was in conformance with its design and licensing bases, an NRC Independent Safety Assessment Team (ISAT) identified potential weaknesses in the licensee's containment spray pump NPSH analysis. These potential weaknesses included concerns regarding the validity of the

containment sump temperature analysis, incorrect calculation of bounding pump suction head losses, and use of a hot fluid correction factor to reduce NPSH requirements. The licensee's calculation of record, performed in 1995 and which does not include the hot fluid correction factor, indicates a condition in which the available NPSH for the containment spray pumps would be below the required NPSH for the first 5 minutes after pump suction is switched from the refueling water storage tank to the recirculation sump. This analysis was performed for a power level of 2700 thermal megawatts (MWt). When the hot fluid correction factor was used, the NPSH available could only be shown to be slightly greater than the NPSH required for the same 5-minute period. For the remainder of the transient, the NPSH available to the containment spray pumps was shown to exceed the amount required.

The basis for the licensee's contention that the containment spray pumps were operable is that recent pump tests showed that the pumps could operate for a 15-minute period with NPSH below the required value without damage to the hydraulic performance or mechanical integrity of the pumps. The licensee performed another analysis for a power level of 2440 MWt which showed that adequate NPSH margin would exist for the containment spray pumps in the recirculation mode of operation. This analysis did not include use of the hot fluid correction factor. The ISAT concluded that it was appropriate to consider the containment spray pumps operable at a power level of 2440 MWt. Maine Yankee is currently prohibited by the NRC from operation above 2440 MWt. The NRC staff is currently reviewing the licensee's analysis and assumptions in greater detail.

Pilgrim

The NRC staff's safety evaluation for licensing of the Pilgrim plant, and documents referenced by the evaluation, indicate that containment overpressure was not necessary to satisfy RHR and core spray pump NPSH requirements. When a plant modification was made in 1984, the licensee's safety analysis of the modification stated that the NPSH available was determined assuming (1) maximum debris loading conditions on the sump strainers for the residual heat removal and core spray pumps and (2) no credit for containment over-pressure. On April 14, 1994, in its response to NRC Bulletin 93-02, "Debris Plugging of Emergency Core Cooling Suction Strainers" (March 23, 1993), the

licensee stated that the NPSH available to the residual heat removal and core spray pumps was analyzed assuming no overpressure condition in the torus.

However, in an analysis conducted by the licensee in 1996 in support of a strainer modification, credit is needed and taken for containment overpressure. At the time of this analysis, the licensee also indicated that the assumption of no overpressure in the torus, stated in its response to Bulletin 93-02, was incorrect. While the issue of whether or not credit for overpressure is part of Pilgrim's original licensing basis is currently under staff review, the potential exists that other licensees have made modifications to their plants that may be inconsistent with their licensing basis and could reduce the NPSH available to ECCS and core spray pumps.

Crystal River, Unit 3

As part of the NRC's Integrated Performance Assessment of Crystal River, Unit 3, conducted in July 1996, an NRC inspection team reviewed the licensee's calculation which established the minimum required post-LOCA reactor building water level for ensuring adequate NPSH available for the reactor building spray pumps. When the team compared this level with the minimum predicted level, they found that for one of the pumps, there was only a slight difference between the water level available and the water level required to ensure adequate NPSH during the post-accident recirculation phase of pump operation.

The team found that the licensee used non-conservative assumptions in calculating the available NPSH for the spray pump. For example, uncertainty in data regarding the required NPSH was not accounted for, a correction factor to reduce the NPSH required was used in the calculation without considering the effects of non-condensable gases in the pumped fluid, and uncertainties associated with the hydraulic resistance of check valves in the spray lines were not fully accounted for. Conservative assumptions that were included in the calculation were those detailed in Regulatory Guide (RG) 1.1, "Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps," dated November 2, 1970 (originally Safety Guide 1), regarding the use of maximum reactor building fluid temperature and no credit for containment overpressure.

The team concluded that the cavitation-free operation of building spray pump 1B during the recirculation phase of operation is questionable due

to the non-conservative assumptions used in the NPSH calculation. However, the team also concluded that this issue did not constitute an immediate safety concern since the licensee's calculations conservatively assumed no credit for containment overpressure and use of maximum expected reactor building water temperature. As a result of the teams findings, the NRC staff is reviewing the issue of adequate NPSH for the reactor building spray pumps at Crystal River, Unit 3, in greater detail.

Related Generic Communications

On October 22, 1996, the staff issued Information Notice (IN) 96-55, "Inadequate Net Positive Suction Head of Emergency Core Cooling and Containment Heat Removal Pumps Under Design Basis Accident Conditions," to alert addressees to recent discoveries by licensees that there may be scenarios for which the NPSH available for emergency core cooling system and containment heat removal pumps may not be sufficient. Earlier INs describing similar events include IN 87-63, "Inadequate Net Positive Suction Head in Low Pressure Safety Systems," dated December 9, 1987, and IN 88-74, "Potentially Inadequate Performance of ECCS in PWRs During Recirculation Operation Following a LOCA," issued on September 4, 1988.

Discussion

It is important that the emergency core cooling (including core spray and decay heat removal) and containment spray system pumps have adequate NPSH available for all design-basis LOCAs to ensure that the systems can reliably perform their intended functions under accident conditions. Inadequate NPSH could cause voiding in the pumped fluid, resulting in pump cavitation. While some ECCS (including core spray and decay heat removal) and containment heat removal pumps can operate for relatively short periods of time while cavitating, prolonged operation under cavitation conditions for any pump can cause vapor binding, resulting in reduced pump performance and potential common-mode failure of the pumps. Common-mode failure would result in the inability of the emergency core cooling system to provide adequate long-term core cooling and/or the inability of the containment spray system to maintain the containment pressure and temperature below design limits.

This generic letter addresses situations in which the NPSH available for ECCS (including core spray and decay heat removal) and containment

heat removal pumps may be inadequate as a result of changing plant conditions, and/or errors and non-conservative assumptions in NPSH calculations. In some cases, NPSH reanalyses conducted to support plant modifications may result in a substantial reduction of margin in NPSH available or a change in the original design basis of the plant. In particular, recent examples have indicated that containment overpressure has been credited by licensees to satisfy NPSH requirements in response to changing plant conditions and errors in prior NPSH calculations.

NRC Regulatory Guide 1.1 establishes the regulatory position that emergency core cooling and containment heat removal systems should be designed so that adequate NPSH is provided to system pumps assuming maximum expected temperatures of pumped fluids and no increase in containment pressure from that present before any postulated loss-of-coolant accidents. Standard Review Plan (SRP) 6.2.2, "Containment Heat Removal Systems" (NUREG-0800, Revision 3, July 1981) clarifies RG 1.1 by stating that the NPSH analysis should be based on the assumption that the containment pressure equals the vapor pressure of the sump water, to ensure that credit is not taken for containment pressurization during the transient. As part of licensing and Systematic Evaluation Plan reviews, the NRC staff has, in the past, selectively allowed limited credit for a containment pressure that is above the vapor pressure of the sump fluid (i.e., an overpressure) to satisfy NPSH requirements on a case-by-case basis.

Requested Information

Addressees are requested to review, for each of their reactor facilities, the *current* analyses that are used to determine the available NPSH for the emergency core cooling (including core spray and decay heat removal) and containment heat removal pumps which, at any time following a design-basis accident, take suction from the containment sump or the suppression pool. No new NPSH analysis is requested or required. Based on this review, within 60 days from the date of this generic letter, addressees are requested to provide the information outlined below for each of their facilities; to the extent practical, the use of a tabular format is acceptable in presenting the information.

(1) Provide the NPSH analysis and assumptions for each pump, and, in particular,

(a) Specify, as a function of time, the required NPSH and the available NPSH,

(b) Identify the postulated pipe breaks that were analyzed if a spectrum of primary and secondary system pipe break sizes and locations was considered in the NPSH analysis,

(c) Specify the emergency core cooling (including core spray and decay heat removal) and containment heat removal system configurations (and associated flow rates) that were considered in the NPSH analysis for each pump; identify and justify which configurations were not analyzed,

(d) Specify if the *current* licensing-basis NPSH analysis is different from the original licensing-basis analysis, and

(e) Specify any quality assurance procedures and engineering program controls in place when the current NPSH analysis was performed.

(2) For each pump, specify whether or not containment overpressure, i.e., containment pressure above the vapor pressure of the sump (or suppression pool) fluid, was credited in the calculation of available NPSH. Specify the amount of overpressure needed, and the *minimum* overpressure available. Indicate if the overpressure was determined from the containment pressure at a single point in time, or if the containment pressure profile over an extended period of time was considered. If an extended period of time was considered, state how long and give the rationale for choosing this time period; if only a single point in time was considered, state the point in time and give the rationale for selecting this point in time.

(3) When containment overpressure is credited in the calculation of available NPSH, specify the containment atmosphere heat removal assumptions that were used in the containment response analysis to determine the *minimum* containment overpressure available, and in particular,

(a) Identify the heat transfer correlations that were used, and specify whether or not multipliers were used, to calculate the transfer of energy to the heat sinks in the containment,

(b) Specify how many trains of containment spray were assumed to be operating, and whether a minimum, maximum, or intermediate value of spray flow was assumed,

(c) Specify how the service water temperatures for the heat exchangers that remove energy from the containment atmosphere were chosen for the NPSH analysis, and specify any special assumptions made concerning heat transfer across the heat exchangers (e.g., effect of fouling on heat transfer),

(d) Specify the total number of containment fan coolers at the plant,

and specify how many fan coolers were assumed to be operating.

Required Response

Within 30 days from the date of this generic letter, each addressee is required to submit a written response indicating (a) whether or not the requested information will be submitted, and (b) whether or not the requested information will be submitted within the requested time period. Addressees who choose not to submit the requested information, or are unable to satisfy the requested completion date, must describe in their response an alternative course of action that is proposed to be taken, including the basis for the acceptability of the proposed alternative course of action.

New NPSH analyses are not required or requested to respond to this information request. However, new NPSH analyses may be warranted if an addressee determines that a facility is not in compliance with the Commission's rules and regulations. In such cases, the affected addressees are expected to take corrective action, as appropriate, in accordance with the requirements stated in 10 CFR part 50, appendix B, to restore their facility to compliance.

NRC staff will review the responses to this generic letter and if concerns are identified, affected addressees will be notified.

Address the required written response 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, Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f).

Backfit Discussion

This generic letter only requests information from addressees under the provisions of section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). The information requested will enable the staff to determine whether addressees' NPSH analyses for the emergency core cooling (including the core spray and decay heat removal) and containment heat removal system pumps comply and conform with the current licensing basis for their respective facilities, including the licensing safety analyses and the principle design criteria which require and/or commit that safety-related components and systems be provided to mitigate the consequences of design-basis accidents.

With respect to the principle design criteria for nuclear power reactor facilities, which establish minimum

requirements for structures, systems, and components important to safety, General Design Criterion (GDC) 35 of appendix A to Title 10 of the Code of Federal Regulations (10 CFR part 50, appendix A) specifies that there be a system to provide abundant emergency core cooling. Furthermore, 10 CFR 50.46, which addresses the acceptance criteria for emergency core cooling systems for light water nuclear power reactors, requires, in part, that the emergency core cooling system be able to provide long-term cooling following any loss-of-coolant accident. The potential for the loss of adequate NPSH for emergency core cooling system pumps, and the cavitation that would result, raises the concern that the emergency core cooling system would not be capable of providing core cooling over the duration of postulated accident conditions as required by GDC 35 and 10 CFR 50.46.

Similarly, GDC 38 of appendix A to 10 CFR part 50 specifies that there be a system to rapidly remove heat from the reactor containment in order to reduce the containment pressure and temperature following any loss-of-coolant accident, and GDC 16 of appendix A to 10 CFR part 50 specifies that reactor containment and associated systems be provided to assure that the containment design conditions important to safety are not exceeded for the duration of the accident conditions. The potential for the loss of adequate NPSH in containment spray pumps, and the cavitation that would result, raises the concern that containment spray would not be capable of lowering and maintaining the containment pressure and temperature below design values as required by GDC 38 and GDC 16.

Considering the safety significance of removing heat from the containment atmosphere and cooling the reactor core following a design-basis accident, the requested information is needed to verify addressee compliance with licensing basis commitments regarding the performance of emergency core cooling (including core spray and decay heat removal) system and containment heat removal system pumps. The evaluation required by 10 CFR 50.54(f) to justify this information request is included in the preceding discussion.

Dated at Rockville, Md., this 11th day of February 1997.

For the Nuclear Regulatory Commission.
Thomas T. Martin,
Director, Division of Reactor Program
Management, Office of Nuclear Reactor
Regulation.

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