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ACCESSION NBR: 9610230156 DOC. DATE: 96/10/16 NOTARIZED: NO DOCKET #
 FACIL: 50-397 WPPSS Nuclear Project, Unit 2, Washington Public Power 05000397
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 Document Control Branch (Document Control Desk)

SUBJECT: Responds to addl request by staff that plants w/Spring 1997
 refueling outages make plant specific submittals justifying
 not meeting Bulletin 96-003 implementation schedule. Summary
 of significant barriers to Spring 1997 & justification, encl.

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 TITLE: NRC Bulletin 96-03, "Potential Plugging of ECCS Strainers by Debris i

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • 3000 George Washington Way • Richland, Washington 99352-0968 • (509) 372-5000

October 16, 1996
GO2-96-202

Docket No. 50-397

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: WNP-2, OPERATING LICENSE NPF-21, REQUEST FOR EXTENSION IN IMPLEMENTATION OF EMERGENCY CORE COOLING SYSTEM SUCTION STRAINER MODIFICATION ACTIVITIES ASSOCIATED WITH NRC BULLETIN 96-03

Reference: NRC Bulletin 96-03, dated May 6, 1996, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling Water Reactors"

On May 6, 1996, the staff issued NRC Bulletin 96-03 (see Reference) which requested that all Boiling Water Reactor (BWR) licensees take the following actions:

- 1) Implement appropriate procedural measures and plant modifications to minimize the potential for clogging of emergency core cooling system (ECCS) suppression pool suction strainers by debris generated during a loss-of-coolant-accident (LOCA), and
- 2) Provide by November 2, 1996, a report indicating whether the licensee intends to comply with the requested actions, including a description of planned actions and mitigative strategies, a schedule for implementation, and proposed Technical Specification changes if appropriate. An additional report is required confirming completion and summarizing any actions taken.

Bulletin 96-03 also requests that licensees implement the appropriate procedural measures and plant modifications by the end of the first refueling outage starting after January 1, 1997. This letter is in response to an additional request by the staff that plants with Spring 1997 refueling outages make plant specific submittals justifying not meeting the Bulletin 96-03

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implementation schedule. In response, the Supply System hereby informs the staff that implementation of final resolution of Bulletin 96-03 will be extended to the Spring 1998 refueling outage. Implementation of required modifications necessary to address Bulletin 96-03 concerns by the Spring 1997 refueling outage, which is scheduled to commence April 12, is not practical based on schedule limitations. Implementation of final resolution by Spring 1998 is still within the timeframe and intent of Bulletin 96-03. This timeframe is considered appropriate by the staff, as noted in Bulletin 96-03, owing to "the interim actions already taken by licensees and the low probability of the initiating event."

The attachment provides a summary of the significant barriers to a Spring 1997 resolution of Bulletin 96-03 issues, a summary of Supply System efforts taken, to date, to resolve Bulletin 96-03 issues, and additional implementation schedule information. The attachment also provides additional justification for a Spring 1998 resolution of Bulletin 96-03 issues, and addresses compensatory measures that will be implemented to ensure WNP-2 will be operated safely in the interim prior to final resolution of this issue.

By November 2, 1996, the Supply System will submit a response addressing the additional scope of Bulletin 96-03 requested actions.

Should you have any questions or desire additional information regarding this matter, please call me or Ms. L. C. Fernandez (509) 377-4147.

Respectfully,



J. V. Parrish
Chief Executive Officer
Mail Drop 1023

REB

Attachment

cc: LJ Callan - NRC RIV
KE Perkins, Jr. - NRC RIV, WCFO
NS Reynolds - Winston & Strawn


TG Colburn - NRR
DL Williams - BPA/399
NRC Sr. Resident Inspector - 927N

STATE OF WASHINGTON)
)
COUNTY OF BENTON)

Subject: NRC Bulletin 96-03, Request for
Extension in Implementation

I, G. O. SMITH, being duly sworn, subscribe to and say that I am Acting for the Chief Executive Officer for the WASHINGTON PUBLIC POWER SUPPLY SYSTEM, the applicant herein; that I have the full authority to execute this oath; that I have reviewed the foregoing; and that to the best of my knowledge, information, and belief the statements made in it are true.


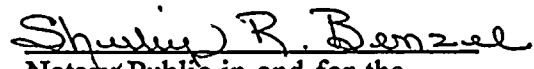
DATE 10-16-96, 1996



G. O. Smith
Acting, Chief Executive Officer

On this date personally appeared before me G. O. SMITH, to me known to be the individual who executed the foregoing instrument, and acknowledged that he signed the same as his free act and deed for the uses and purposes herein mentioned.

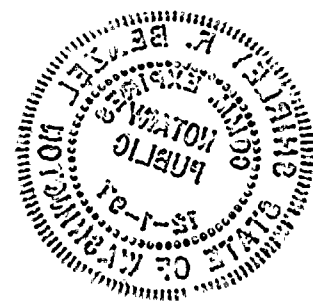
GIVEN under my hand and seal this 16th day of October 1996.

Notary Public in and for the
STATE OF WASHINGTON

Residing at Richland, WA

My Commission Expires 12/97



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Barriers to a Spring 1997 resolution of Bulletin 96-03 issues:

The following are significant barriers to Spring 1997 resolution of Bulletin 96-03 issues:

- 1) Design and procurement activities are proceeding based on preliminary information developed by the Boiling Water Reactor Owners Group (BWROG) and information contained in Regulatory Guide (RG) 1.82, Rev. 2. The formal draft of the Utility Resolution Guidance (URG) Document prepared by the BWROG and referenced in Bulletin 96-03 will not be available until October 1996. The URG document will provide utilities with technical guidance for resolving the strainer clogging issue that is consistent with the requested actions in Bulletin 96-03, and that will demonstrate compliance with the Emergency Core Cooling Systems (EECS) design criteria of 10 CFR 50.46. A final approved version of the URG will not be transmitted to the staff until November, 1996.
- 2) It is expected that the staff will issue a Safety Evaluation Report (SER) which will approve the URG calculational methodology. It would not be prudent to complete plant-specific design analysis, or to fabricate replacement strainers until the staff approves the URG documented design methodology. The Supply System will assume, for planning purposes, that the staff will issue the SER within 60 to 90 days after receipt of the final URG in November, 1996. A purchase order for new strainers could then be issued, but their fabrication is expected to take 4 to 5 months.
- 3) The WNP-2 safety analysis to support changes in plant design will rely on the final URG and the approving SER. The WNP-2 safety analysis may also conclude that staff approval is necessary prior to implementation due to an unreviewed safety question. Dependence on staff approval would add additional time to the implementation schedule.
- 4) Design work will require detailed stress analyses of the strainer piping penetrations and anchors. This work is expected to start in October, 1996, and may require approximately 4 months for final approval. Fabrication of new strainers, which could take 5 months as noted above, can not start until these analyses are completed and approved.

Additionally, the Supply System would also be concerned, in reference to NRC proposed rule 59 Federal Register 52707 regarding shutdown operations at nuclear power plants, that an aggressive schedule to qualify, fabricate, and install strainers within a short timeframe could unduly challenge plant outage safety due to the short period of time available. The Supply System desires to address suction strainer clogging in a thorough and appropriate manner, and

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allow adequate time for design, fabrication, receipt, planning, scheduling, procedure generation, installation, training, and testing. A Spring 1998 timeframe for resolution of Bulletin 96-03 concerns affords a greater opportunity to ensure new strainers are installed in a safe and efficient manner.

Supply System efforts to date, and implementation schedule information:

Bulletin 96-03 requested BWR licensees to implement appropriate procedural measures and plant modifications to minimize the potential for clogging of the ECCS suppression pool suction strainers by debris generated during a postulated Loss of Coolant Accident (LOCA). The Bulletin identified different options that licensees could use to satisfactorily resolve this issue. The options are:

- 1) Installation of large capacity passive strainers.
- 2) Installation of self-cleaning strainers.
- 3) Installation of a backflush system.
- 4) Licensee proposed alternative that will provide an equivalent level of assurance that the ECCS will perform its design function following a LOCA.

The Supply system has considered the options identified in the Bulletin and, based on the information available at this time, determined that the installation of large capacity passive strainers is the most viable option for WNP-2. The replacement suction strainers will be installed in each of the three loops of the Residual Heat Removal (RHR) System, in the Low Pressure Core Spray (LPCS) System, and in the High Pressure Core Spray (HPCS) System. A preliminary strainer sizing evaluation indicates that replacement passive strainers that are 36" in diameter by approximately 24" long may be large enough to withstand the debris postulated to be transported to the suppression pool and still ensure adequate Net Positive Suction Head (NPSH) to the available ECCS pumps. The preliminary evaluation was prepared using methodology currently being developed by the BWROG and conservative criteria contained in Regulatory Guide 1.82, revision 2, dated May 1996.

The preliminary strainer sizing evaluation considered the following inputs.

- 1) Only three of five ECCS pumps are available following the start of the LOCA event. Two ECCS pumps are unavailable due to the postulated single failure of an electrical division. A second case where the postulated break occurs in an ECCS system line is also considered. In this second case, only two ECCS pumps are available.

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- 2) Essentially 100% of the debris generated is transported to the suppression pool. The quantity of fibrous debris generated is based on a sphere (or half sphere if the flow is only in one direction) with a radius equal to seven (7) diameters of the broken pipe. An additional margin, to account for operational debris that may be present inside containment, has also been included.
- 3) The suppression pool is assumed to be cleaned by underwater vacuuming on a 3 year interval. The preliminary evaluation assumes that a 3 year accumulation of corrosion products and sediment is present at the start of a LOCA.
- 4) The suppression pool is a homogenous mixture of all debris constituents present and no credit for debris settling is allowed. All of the debris is assumed to be in the suppression pool at the start of the event.

Several conclusions are drawn from the preliminary strainer sizing evaluation:

- 1) New alternate design suction strainers 36" in diameter and approximately 24" long may be able to provide adequate NPSH margins depending on the pipe break zone of influence used to determine the quantity of debris generated. The resolution of this issue for WNP-2 will necessitate a specific evaluation of postulated break locations and their zone of influence to determine quantity of debris generated. If the conservative bounding assumption were to be made that all of the existing fiber in containment is transported to the suppression pool, very large strainers requiring additional structural modifications would be needed.
- 2) A preliminary evaluation of hydrodynamic loads indicates it is possible to qualify (within the existing hydrodynamic loading analysis) new replacement strainers that are 36" in diameter by 18" long and weigh 800 pounds. There appears to be margin available to accommodate slightly larger strainers. A final stress analysis will have to be completed to qualify the actual strainers selected.
- 3) To complete the final plant specific strainer sizing evaluation and determine the optimum resolution for Bulletin 96-03, it will be necessary to use a methodology that has been reviewed and approved by the staff. The BWROG recommended strainer design methodology as documented in the "Utility Resolution Guidance (URG) for Resolution of ECCS Suction Strainer Blockage," is scheduled to be submitted to the staff in November, 1996. Staff approval of the URG will be documented via an SER. To determine the optimum resolution for WNP-2, guidance from the URG will be used to define and approve the following evaluation parameters:

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- Break zone of influence for debris generation.
- Destruction factors for debris generation.
- Drywell to wetwell debris transport fractions.
- Drywell and suppression pool debris sources.
- Calculation methods for sizing suction strainers.
- Performance of new alternate design strainers.

Following staff approval of the URG, the WNP-2 strainer sizing evaluation can be finalized. Based on information developed by the BWROG, along with current Supply System activities, the following estimated schedule milestones are projected.

- | | |
|--|----------------|
| ● Complete BWROG URG document and submit for staff approval. | November 1996 |
| ● Obtain staff approval and SER for URG document. | Jan/Feb 1997 |
| ● Complete Strainer Sizing Evaluation and final design change package. | March 1997 |
| ● Issue purchase order for strainers. | March 1997 |
| ● WNP-2 Spring 97 Outage Begins. | April 12, 1997 |
| ● WNP-2 Spring 97 Outage Ends. | May 24, 1997 |
| ● Receive new strainers on site. | August 1997 |

Based on this projected schedule, the Supply System believes that delivery of new alternate strainers, representing an optimum solution to this issue will not be achieved until after the Spring 1997 refueling outage. The estimated time frame for staff review and issuance of a generic SER for the URG calculational methodology may also be optimistic given the amount of time and resources required by the BWROG to develop the methodology and provide the required data.

Additional large capacity passive strainer designs are being developed and tested by several manufacturers. Performance information on these strainers is anticipated to be available in the Fall of 1996. The potential exists that one of these new strainer designs may promote a lower pressure drop across the strainer for the same volume of debris than was considered in the preliminary evaluation. This could provide additional margin in resolving the issue for WNP-2.

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A 12 month extension in the implementation date of a final resolution for WNP-2 is justified based on compensatory actions implemented in response to previous NRC Bulletins, the "Interim Report of the BWR Owners' Group ECCS Suction Strainer Committee" dated December, 1994, existing plant design conservatism, and the implementation of additional compensatory measures. Additional detail is provided as follows:

Responses to Previous NRC Bulletins

NRC Bulletin 93-02, "Debris Plugging of Emergency Core Cooling Suction Strainers," Bulletin 93-02, Supplement 1, and Bulletin 95-02, "Unexpected Clogging of Residual Heat Removal (RHR) Pump Strainer While Operating in Suppression Pool Cooling Mode," were issued to address staff concerns related to the potential loss of emergency core cooling systems due to suction strainer blockage. The Supply System has responded to the issues addressed by these Bulletins by taking the following actions:

- 1) Verified that the Primary Containment Ventilation System uses no fibrous filters, and that temporary ventilation units brought into the drywell are designed with enclosed filtration cartridges. Verified that the Supply System does not store fibrous materials in the drywell during normal operation.
- 2) Provided training to plant operators and emergency response personnel to recognize the indications of potential strainer plugging and the appropriate mitigating and compensating actions.
- 3) Changed system operating procedures to include precautions relative to the indications of potential strainer plugging.
- 4) Reviewed the Emergency Operating Procedures (EOP) and determined that they provide adequate compensatory actions to mitigate a loss of ECCS NPSH.
- 5) Determined that inspections performed in 1986, 1989, 1993, 1994, and 1995 demonstrate that RHR, LPCS, and HPCS suction strainers have been, and continue to be, unobstructed and capable of supporting ECCS safety functions. Inspections performed in 1996 also determined that the strainers were unobstructed.
- 6) Determined that suppression pool cleanliness is monitored and improved through monthly operation of the Fuel Pool Cooling System. Also noted that suppression pool cleanliness is monitored by periodic surveillance testing of the LPCS and RHR systems.

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- 7) Reviewed and confirmed the adequacy of the Supply System's Foreign Material Control Program for the primary containment drywell and wetwell areas.

Furthermore, as noted in Bulletin 96-03, the staff concluded that licensee responses to Bulletin 93-02, and its supplement, ensure adequate protection of public health and safety and allow continued plant operation until the final actions requested by Bulletin 96-03 are implemented.

Interim Report of the BWR Owners' Group ECCS Suction Strainer Committee.

This report was written by the BWROG in response to a staff request for industry input to resolve the strainer blockage issue. The report concluded that a LOCA (followed by strainer blockage) scenario was one of low probability, that significant safety margins exist in the design of BWR Emergency Core Cooling Systems, and that existing operating procedures and operator training provides a high confidence that effective actions will be taken to prevent core damage.

Existing Plant Design Conservatism

There is a very low potential that a pipe would fail in an instantaneous double ended guillotine break. It is much more probable that the pipe would leak for a period of time prior to complete separation of the pipe ends. The following is a summary of actions taken to detect and prevent potential pipe breaks inside containment.

- 1) Intergranular stress corrosion cracking (IGSCC) has been experienced in some BWRs. The staff discussed the issue in Generic Letter (GL) 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping." The Supply System has responded to GL 88-01, and is taking the measures needed to achieve adequate levels of piping integrity and reliability. Implementation of the recommendations in GL 88-01 includes stress improvement, augmented inspections, improved water chemistry and enhanced leak detection requirements.
- 2) Design improvements to preclude failures in socket welded small bore vent, drain and test valve connections.
- 3) Implementation of a program for monitoring wall thickness of large bore piping in the drywell in response to NRC GL 89-08, "Erosion/Corrosion Induced Pipe Wall Thinning."

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- 4) Periodic inservice examinations (ISI) in accordance with 10 CFR 50.55a and an approved ISI program.

As stated above, it is expected that the catastrophic failure of a pipe would be preceded by a period of leakage through a crack prior to the complete separation of the pipe ends. The volume of fibrous debris generated by a small through-wall pipe crack is anticipated to be minimal. This volume of debris would not be expected to challenge the ECCS suction strainers. The WNP-2 Technical Specifications limit the unidentified drywell leakage to 5 gpm, or a 2 gpm increase within a 24 hour period. These limits were established to ensure early identification of pressure boundary leaks and require the plant to be shut down if relatively small leaks are identified. The Technical Specifications also include requirements for the operability of the Reactor Coolant System leakage detection systems. These systems monitor primary containment atmospheric gaseous radioactivity, sump flow rates, and atmospheric particulate radioactivity in order to identify coolant pressure boundary leakage.

Operability of the ECCS pumps depends in part on the NPSH required to support operation in an accident. The available NPSH for the LPCS, HPCS and three RHR Pumps is approximately 40 feet, assuming a 50% strainer blockage at design flow rates, with the suppression pool water conditions per Regulatory Guide 1.1. The required NPSH for these pumps is approximately 14 feet, as depicted in the FSAR. Consequently, the design provides adequate NPSH margin for the ECCS pumps with 50% suction strainer blockage.

Additional Compensatory Measures

Safe interim operation of WNP-2 prior to the installation of the ECCS suction strainers during the Spring outage in 1998 is based on: 1) Supply System actions taken in response to the previous NRC Bulletins regarding ECCS suction strainer blockage; 2) The BWROG's assessment that the potential for ECCS suction strainer blockage is of low safety significance; and 3) The existing conservatism in plant design. The Supply System believes that the following additional compensatory actions are reasonable and provide added assurance that the plant will operate safely until new strainers are installed during the Spring 1998 refueling outage:

- 1) Sediment in the suppression pool when combined with fibrous material on strainer surfaces can promote unacceptable head losses across the strainers. To reduce the quantity of sediment available, WNP-2 will clean the suppression pool using an underwater vacuuming process during the Spring 97 outage. The suppression pool and the suction strainers will also be given a final inspection to ensure an adequate level of cleanliness exists for the next operating cycle.

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- 2) During the Spring 97 outage, prior to the suppression pool cleaning, samples of suppression pool water and sediment will be obtained and analyzed to determine whether significant quantities of fibrous materials are present. An inspection of the ECCS strainers will also be completed. Debris found on the strainers during this inspection will be removed and identified as to its probable source. Based on the strainer inspection results, foreign material control procedures will be revised as necessary to ensure their effectiveness in minimizing debris that can be transferred to the suppression pool.
- 3) Drywell and wetwell closeout inspections will be completed near the end of the refueling outage to minimize the quantity of operational debris that may have resulted from outage activities. As a part of these inspections, personnel will clean and remove any debris found in the drywell. As stated above, the wetwell will be cleaned by underwater vacuuming. The closeout inspections are to ensure the containment is relatively free of debris that has the potential to be transported to the suppression pool during the operating cycle and during a LOCA.
- 4) During the Spring 97 outage, insulation in the drywell will be inspected for damage and/or proper installation. Damaged insulation will be evaluated and repaired or replaced as necessary, prior to plant startup, to reduce the potential for the generation of operational debris.

In addition, the Supply System will proceed with design and engineering activities necessary to implement the final resolution for Bulletin 96-03 during the Spring 1998 refueling outage.

