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Supplement to 60-Day Response to Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors"

On June 9, 2003, the Nuclear Regulatory Commission (NRC) transmitted Bulletin (BL) 2003-01. By letter dated August 6, 2003, Nuclear Management Company, LLC (NMC) provided the 60-day response for the Prairie Island Nuclear Generating Plant. In that response, the following commitment was made:

3. NMC will submit an implementation schedule for revising plant emergency operating procedures, where appropriate, to stop or throttle redundant pumps that are not necessary to provide required flows to cool containment and the reactor core within 30 days of the issuance of the generic guidance by the Westinghouse Owners Group, currently expected by March 31, 2004.

On April 16, 2004, the Westinghouse Owners Group (WOG) formally transmitted WCAP-16204, "Evaluation of Potential ERG and EPG Changes to Address NRC Bulletin 2003-01 Recommendations." The WCAP evaluated 11 Candidate Operator Actions (COAs). Enclosure 1 provides the NMC response to each of the COAs and the implementation schedule for the Prairie Island Nuclear Generating Plant. These COAs are interim measures that are being implemented while NMC conducts evaluations to verify compliance with applicable regulatory requirements.

Summary of Commitments

This letter contains two new commitments and no revisions to existing commitments:

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1. NMC will complete implementation of COA #7 by including emphasis on aggressive cooldown and depressurization in future periodic operator training. This will be incorporated into the operator training materials by July 31, 2004.

2. NMC will complete implementation of COA #9 by implementing the WOG Sump Blockage Control Room Guidance (SBCRG) into plant procedures by April 30, 2005.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on MAY 14 2004
Richard Graham for

Joseph M. Solymossy
Site Vice President, Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosure (1)

CC Administrator, Region III, USNRC
Project Manager, Prairie Island, USNRC
Resident Inspector, Prairie Island, USNRC

ENCLOSURE 1
SUPPLEMENT TO 60- DAY RESPONSE TO BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS"

Introduction

On April 16, 2004, the Westinghouse Owners Group (WOG) formally transmitted WCAP-16204, "Evaluation of Potential ERG and EPG Changes to Address NRC Bulletin 2003-01 Recommendations." The WCAP provides an evaluation of potential changes to the Emergency Response Guideline (ERG) and the Emergency Procedure Guideline (EPG) as required by the Nuclear Regulatory Commission (NRC) Bulletin (BL) 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors."

The WCAP evaluated 11 Candidate Operator Actions (COAs). This enclosure addresses each of the 11 COAs. Information provided for each COA includes: the intent and strategy of the COA, whether the COA will or will not be implemented at Prairie Island Nuclear Generating Plant, the bases for implementing or not implementing the COA, and the appropriate implementation schedule for the COA.

WOG Recommended Candidate Operator Actions

COA #1 **Secure one or both containment spray pump(s) before recirculation alignment**

The intent of this COA is to reduce the flow rate to the sump when containment recirculation begins, to reduce the pressure differential across the sump screens if there is a buildup of debris, and to provide a modest time delay to the start of containment recirculation during a small break loss of coolant accident (SBLOCA).

The overall strategy of this COA is to secure one or both containment spray pumps during the injection phase of the accident mitigation, based on containment pressure and other considerations such as radiation levels and sump pH.

As discussed in the response to Bulletin 2003-01, Prairie Island Emergency Operating Procedures (EOPs) secure containment spray during the injection phase providing that specific criteria for containment pressure are met. As committed to in the response to Bulletin 2003-01, Nuclear Management Company, LLC, (NMC) performed additional evaluations to determine an appropriate refueling water storage tank (RWST) level to secure containment spray accounting for the various design functions provided by the containment spray system (containment cooling, iodine scrubbing and pH control). The results from these

additional evaluations have been completed and the results factored into the EOPs. The procedures still allow securing both spray pumps during the injection phase before completing the sump recirculation alignment.

Therefore, NMC has implemented procedural guidance that satisfies COA #1 and no further actions are required.

Implementation Date: Complete

COA #2 Manually initiate one train of containment sump recirculation earlier

The intent of this COA is to start containment sump recirculation while usable inventory remains available in the RWST and stop suction from the RWST to preserve this volume of water and maintain one train of injection and spray pumps as a backup source.

The overall strategy of this action is to manually transfer the suction of one safety injection train to the containment sump prior to automatic transfer to recirculation, based on acceptable conditions.

Transfer to recirculation is performed manually at Prairie Island. The first train is secured from injection and the alignment for recirculation is initiated at 33% level in the RWST. While the first train is aligned for sump recirculation, the second train continues to inject from the RWST. When the RWST level decreases to 8%, the second train is secured from injection and aligned for sump recirculation. Staggering the alignment of the two trains for recirculation provides a time period for the operator to determine if sump recirculation is affected by debris sources in the sump liquid. NMC will continue to maintain the current procedures where both trains (if available) are aligned for recirculation. Securing one train at this point in time in the procedure may establish single failure vulnerabilities that have limited response time for manual operator actions to restore recirculation flow. As discussed in response to COA #3 (below), Prairie Island procedures do allow for securing one train of recirculation subsequent to establishing both trains on recirculation based on indications of adequate inventory control and decay heat removal.

Therefore, based on procedural guidance and the potential disadvantages of implementing this change, the current procedural guidance is considered acceptable.

Implementation Date: NA

COA #3 **Terminate one train of HPSI/high-head injection after recirculation alignment**

The intent of this COA is to reduce the total flow through the sump screens to reduce the rate of debris transport and reduce the risk of screen blockage, to reduce the risk of screen failure due to structural loading, to preserve one train of safety injection by not subjecting it to damage by debris ingestion or loss of NPSH and to preserve one sump screen enclosure (applicability based on plant design).

The overall strategy of this COA is to secure one train of emergency core cooling system (ECCS) after both trains have been aligned for recirculation, based on acceptable conditions.

Procedures for transferring to recirculation only start the High Head Safety Injection (SI) Pumps for high head recirculation if reactor coolant system (RCS) pressure precludes low head recirculation. SI pumps are then secured as part of SI Termination Criteria in ES 1.1, Post-LOCA Cooldown and Depressurization. Additionally, as part of follow-up actions in response to Bulletin 2003-01, NMC provided guidance to operators and Emergency Response Organization (ERO) staff (primarily in the Technical Support Center (TSC)) for monitoring long term core cooling. This guidance includes instructions for adjusting total recirculation flow commensurate with the reduction in decay heat generation rate. Based on specific criteria specified in the procedure, one train of recirculation flow can be stopped, the flow rate adjusted or the RHR system aligned for shutdown cooling. The criteria in the procedure for reducing flow, securing one train of recirculation flow or aligning for shutdown cooling are based on indications of adequate inventory control and decay heat removal. The current procedural guidance for reducing recirculation flow rates satisfies the intent of COA #3. Furthermore, aligning for shutdown cooling in lieu of recirculation operation would preclude the sump debris concerns.

Therefore, NMC has implemented procedural guidance that satisfies COA #3 and no further actions are required.

Implementation Date: Complete

COA #4 **Terminate LPSI/RHR pump prior to recirculation alignment**

The intent of this COA is to delay ECCS suction switchover from the RWST to containment sump suction mode.

The overall strategy of this COA is to delay switchover to containment sump recirculation by securing one low pressure safety injection (LPSI) pump prior to recirculation.

Based on the analysis presented in WCAP-16204, securing one low pressure safety injection/residual heat removal (LPSI/RHR) pump during the injection phase prior to recirculation was deemed not risk beneficial due to the risk of core damage for potential single failure consideration. The WCAP notes that this COA is evaluated for Combustion Engineering (CE) plants only, however, the rationale in the WCAP is applicable to Prairie Island (Westinghouse plant) prior to initiating recirculation. Therefore, COA #4 will not be implemented at Prairie Island.

Implementation Date: NA

COA #5 Make preparations to refill refueling water storage tank

The intent of this COA is to provide inventory for re-establishing RCS injection and containment spray in the event the containment sump source is not available.

The overall strategy of this COA is to refill the RWST following initiation of recirculation or line up an alternate makeup source bypassing the RWST in anticipation of possible sump blockage.

As committed to in the response to Bulletin 2003-01, NMC implemented procedural actions to initiate RWST refill following transfer to recirculation. COA #5 recommends that plants consider starting the line-up for refilling the RWST during the injection phase but not actually refilling until the injection phase is complete. For Prairie Island, the operators have actions during this time frame and imposing an additional action to start lining up for RWST refill is not recommended. In addition, the time frame between the injection and recirculation mode can be relatively short and implementing this part of the recommendation will have a very small effect.

Therefore, the current procedural guidance adopted as a commitment in the response to Bulletin 2003-01 meets the intent of COA #5 and no further action is required.

Implementation Date: Complete

COA #6 Inject more than one RWST volume from refilled/diluted RWST or by bypassing RWST

The intent of this COA is to provide procedural guidance for re-establishing injection to the RCS from either the refilled RWST or an alternate makeup source.

The overall strategy of this COA is to secure recirculation and align equipment to re-establish injection from a refilled RWST or from an alternate source bypassing the RWST.

As part of follow-up actions in response to Bulletin 2003-01, NMC provided guidance to operators and ERO staff (primarily in the TSC) for monitoring long term core cooling. As discussed in response to COA #5, this guidance includes instructions for refilling the RWST. If the conditions of the recirculation systems indicate that degradation is occurring due to debris blockage of the sump screen, the operator is directed to re-establish the injection mode. Prairie Island currently has procedural direction for re-initiating the injection mode, if required, in ECA 1.1, Loss of Emergency Coolant Recirculation.

Therefore, the current procedural guidance meets the intent of COA #6 and no further action is required.

Implementation Date: Complete

COA #7 **Provide more aggressive cooldown and depressurization following a small break LOCA**

The intent of this COA is to limit inventory loss during a SBLOCA by performing an aggressive cooldown of the RCS. Performing an aggressive cooldown may allow the operators to establish shutdown cooling in lieu of aligning for containment sump recirculation.

The overall strategy of this COA is to cooldown the plant as aggressively as possible, within Technical Specification limits, using plant EOPs and, if possible, establish shutdown cooling.

Subsequent to aligning for sump recirculation following a loss of coolant accident, the operators will transition to ES 1.1, Post-LOCA cooldown and depressurization. Current direction in ES 1.1 allows cooldown at up to 100°F per hour, the maximum allowable cooldown rate in Technical Specifications. As discussed in the response to Bulletin 2003-01, Prairie Island staff recognizes the importance of aggressively cooling the RCS during post-LOCA cooldown and depressurization in order to transition to shut down cooling (if possible) to avoid the need to establish recirculation operation.

To ensure continuing awareness of the importance to perform an aggressive cooldown, NMC has revised the Bases for the applicable step in ES 1.1 to emphasize the importance of an aggressive cooldown and depressurization. Emphasis on aggressive cooldown and depressurization will be included in future periodic operator training.

Implementation Date: July 31, 2004

COA #8 **Provide guidance on symptoms and identification of containment sump blockage**

The intent of this COA is to provide procedural guidance on recognition of sump clogging.

The overall strategy of this COA is to continuously monitor system parameters for early detection of sump blockage.

As part of follow-up actions in response to Bulletin 2003-01, NMC provided guidance to operators and ERO staff (primarily in the TSC) for monitoring long term core cooling. This guidance is primarily focused on monitoring long term recirculation conditions. The guidance provides information to the operators and TSC staff regarding indications and computer displays that can be used to monitor overall recirculation system performance in an integrated manner. The specific instrumentation available to the control room and TSC staff are identified in the response to Bulletin 2003-01.

In addition to identifying the indications and computer displays that can be used to monitor long-term recirculation operation, the guidance includes information to monitor these specific indications for blockage or degradation. Based on specific indications, the staff can detect potential blockage locations. Based on the potential blockage location, strategies are provided in the procedure to mitigate the blockage and continue to provide core cooling.

Therefore, the current procedural guidance meets the intent of COA #8 and no further action is required.

Implementation Date: Complete

COA #9 **Develop contingency actions in response to: containment sump blockage, loss of suction, and cavitation**

The intent of this COA is to provide guidance to respond to indications of sump blockage, loss of pump suction and pump cavitation.

The overall strategy of this COA is to reduce recirculation flow, as allowed, to minimize head loss across the clogged screen and re-establish injection if recirculation is lost.

As discussed under COA #8, in conjunction with identifying the indications that the operators and ERO staff can use to monitor long-term recirculation, guidance is provided for mitigating potential blockage or degradation based on the indications and trends. This procedure includes actions for sump screen blockage. The specific actions for indications of sump screen blockage in the current guidance are to reduce recirculation

flow rate (to the extent possible) to minimize debris transport inside of containment and head loss across the screen. If recirculation flow is lost due to sump screen blockage, the staff is directed to align for injection from the refilled RWST (refer to discussion under COA #5 and #6 for additional detail). Therefore, the current procedural guidance provides actions for sump blockage, loss of suction and cavitation.

Subsequent to NMC implementing this procedural guidance, the WOG has also developed a separate procedure to mitigate sump screen blockage (Sump Blockage Control Room Guidance, or SBCRG). Although the current Prairie Island guidance discussed in the preceding paragraph is considered adequate and consistent with the new WOG ERG, NMC will implement the new WOG SBCRG into the site procedures.

Implementation Date: April 30, 2005

COA #10 Terminate HPSI/high-head injection prior to recirculation alignment

WCAP-16204 indicates COA #10 was evaluated for Combustion Engineering designed plants. The intent of this COA was to delay the recirculation operation.

The strategy to accomplish this COA includes securing one high pressure safety injection (HPSI) pump prior to recirculation by revising the HPSI stop/throttle criteria.

Based on the analysis presented in WCAP-16204, securing one HPSI/high-head pump during the injection phase prior to recirculation was deemed not risk beneficial due to the risk of core damage for potential single failure consideration. The WCAP notes that this COA is evaluated for Combustion Engineering (CE) plants only, however, the rationale in the WCAP is applicable to Prairie Island (Westinghouse plant) prior to initiating recirculation. Therefore, COA #10 will not be implemented at Prairie Island.

Implementation Date: NA

COA #11 Delay containment spray actuation for small break LOCA in ice condenser plants

WCAP-16204 indicates COA #11 was evaluated for ice condenser plants. The intent of this action is prevent or delay containment spray for small break LOCAs less than one inch diameter.

This COA is not applicable to pressurized water reactor plants operated by the NMC.

Implementation Date: NA

Conclusion

NMC has addressed each of the eleven COAs from WCAP-16204. These COAs are interim measures that are being implemented while NMC conducts evaluations to verify compliance with applicable regulatory requirements. These interim measures, as well as the compensatory measures addressed in the response to BL 2003-01, will be re-evaluated during NMC's response to the upcoming Generic Letter on this issue.