September 21, 2005

MEMORANDUM TO: Michael L. Marshall, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: David L. Solorio, Chief ***/RA/***
Balance of Plant Section
Plant Systems Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

SUBJECT: CLOSEOUT LETTER FOR BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS"

The Plant Systems Branch (SPLB) has reviewed and evaluated the information provided in responses to Bulletin 2003-01 by the licensee for H.B. Robinson Unit 2. SPLB has determined that the licensee's actions have been responsive to and meet the intent of Bulletin 2003-01. Attached to this letter is the proposed close-out letter for the above plant. If you have any questions, please contact Leon Whitney or Alan Wang. Please include Alan Wang and Leon Whitney on the distribution list.

Docket No: 50-261

Attachment: As stated

CONTACTS: Leon Whitney, SPLB/DSSA
415-3081
Alan B. Wang, DLPM, PD IV
415-1445

September 21, 2005

MEMORANDUM TO: Michael L. Marshall, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: David L. Solorio, Chief ***/RA/***
Balance of Plant Section
Plant Systems Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

SUBJECT: CLOSEOUT LETTER FOR BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS"

The Plant Systems Branch (SPLB) has reviewed and evaluated the information provided in responses to Bulletin 2003-01 by the licensee for H.B. Robinson Unit 2. SPLB has determined that the licensee's actions have been responsive to and meet the intent of Bulletin 2003-01. Attached to this letter is the proposed close-out letter for the above plant. If you have any questions, please contact Leon Whitney or Alan Wang. Please include Alan Wang and Leon Whitney on the distribution list.

Docket No: 50-261

Attachment: As stated

DISTRIBUTION:
LWhitney
CPatel
Wang

ADAMS Accession#ML052440038 NRR-106

OFFICE	DLPM/PDIV-2/PM	DSSA/SPLB	DSSA/SPLB
NAME	AWang	LWhitney	DSolorio
DATE	09 / 21 /05	09 / 13 /05	09 / 20 /05

OFFICIAL RECORD COPY

Progress Energy Carolinas, Inc.
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville,

SUBJECT: H. B. ROBINSON UNIT 2 - RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED WATER REACTORS (TAC NO. MB9604)

Dear Mr. Lucas:

This letter acknowledges receipt of your response dated August 8, 2003, to Nuclear Regulatory Commission (NRC) Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors," dated June 9, 2003. The NRC issued Bulletin 2003-01 to all pressurized-water reactor (PWR) licensees requesting that they provide a response, within 60 days of the date of Bulletin 2003-01, that contains either the information requested in following Option 1 or Option 2 stated in Bulletin 2003-01:

Option 1: State that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified 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.

You provided an Option 2 response.

Bulletin 2003-01 discussed six categories of interim compensatory measures (ICMs):

(1) operator training on indications of and responses to sump clogging; (2) 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); (3) ensuring that

ATTACHMENT

alternative water sources are available to refill the refueling water storage tank (RWST) or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere; (4) more aggressive containment cleaning and increased foreign material controls; (5) ensuring containment drainage paths are unblocked; (6) ensuring sump screens are free of adverse gaps and breaches.

You stated in your bulletin response of August 8, 2003, that you had implemented the following interim compensatory measures:

(1) licensed operator sump clogging issue overview training, including simulator training to demonstrate indications of Containment Vessel (CV) ECCS sump blockage - ICM category #1;

(2) procedure revisions for actions that may be accomplished prior to indications of sump blockage (e.g., starting only one train of safeguards pumps when aligning for long-term recirculation after sufficient time has elapsed, monitoring indications for signs of sump blockage, and refilling the RWST after changeover to recirculation mode) - ICM category #1 and ICM category #3;

(3) procedure revisions for actions which take place after sump blockage has been diagnosed, a beyond-design basis condition at Robinson (e.g., stop CSS pumps under allowable conditions, raise CV pressure to improve ECCS net-postive suction head (NPSH), realignment to the injection mode from a refilled RWST, and intermittent operation of the LHSI pumps) - ICM category #1;

(4) an aggressive containment cleaning, material control/storage, surface/coatings maintenance and floor drain clearance verifcation program - ICM category #4;

(5) increased containment cleanliness training and pre-job briefings for maintenance and radiological control personnel who must enter containment during outages, and new procedures for removal of temporary signs and postings in containment prior to the reactor coolant system (RCS) temperature reaching 200 degrees F - ICM category #4;

(6) a general review of potential inventory hold-up locations in containment, including review of five LERs pertaining to holdup or diversion conditions, resulting in no identified conditions which could impair ECCS recirculation, and confirmation that valve WD-1757 (normally locked open and checked locked open prior to power operation) drains the lower cavity to the lower levels of the CV - ICM category #5;

(7) an engineering surveillance test procedure containment closeout sump inspections of the ECCS coarse filtration screens, ECCS sump inlet structure and hood, and ECCS sump screens - ICM category #6.

You further stated in your response, including justifications, that you would not be implementing the following interim compensatory measure: procedural modifications 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 CSS intermittently).

In an October 26, 2004, response to a September 14, 2004, NRC request for additional information (RAI) you:

(1) elaborated on changes to and associated training for three specific emergency procedures relating to the sump blockage issue, discussing specific steps taken to avoid sump blockage conditions, specific steps for monitoring potential indications of sump blockage, and steps taken in the event of sump blockage and loss of ECCS recirculation capability - ICM category #1; and

(2) provided an analyses and conclusions regarding implementation of Candidate Operator Actions (COAs) described in Westinghouse Owners Group (WOG) report WCAP-16204, Revision 1, "Evaluation of Potential ERG and EPG Changes to address NRC Bulletin 2003-01 Recommendations."

In your October 26, 2004, discussion of changes to three specific emergency procedures relating to the sump blockage issue you, in part, stated that:

(1) operators were now directed to start only one train of SI when switching to sump recirculation - ICM category #1;

(2) operators now verify that the sump screen is indicated as clear before switching to the dual (hot and cold leg) injection mode - ICM category #1;

(3) operators are directed to stop the CSS pumps if sump blockage is indicated and specified containment pressure conditions and RCS cooling conditions permit - ICM category #1; and

(4) operators are now directed to alternate safety injection (SI)/residual heat removal (RHR) train operations every six minutes if pump distress is detected - ICM category #1.

In your October 26, 2004, review of the WOG COAs you discussed:

(1) COA -1A "Secure One Containment Spray Pump Before Recirculation Alignment," concluding that implementing this COA would provide the potential for only a modest increase in time to initiate containment recirculation for a small break LOCA, and would have negligible impact on the plant response to a large break LOCA, and therefore would not be implemented;

(2) COA-1B "Secure Both Containment Spray Pumps Before Recirculation Alignment, " concluding that the rationale for COA-1A also applies to this COA, and that this COA was intended for plants which do not use containment spray for sump pH control as does H. B. Robinson, Unit 2, and therefore would not be implemented;

(3) COA-2 "Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Recirculation Switchover," concluding that this COA is not applicable to H. B. Robinson Unit 2 due to the absence of an automatic recirculation switchover feature, and therefore would not be implemented;

(4) COA-3 "Terminate One Train of SI after Recirculation Alignment," concluding that the intent of this COA has been met through procedure revisions to start only one train of SI during manual switchover to recirculation - ICM category #1;

(5) COA 4, “Early Termination of One RHR Pump Prior to Recirculation Alignment,” concluding that such an action would be inconsistent with the H. B. Robinson Unit 2 thermal-hydraulic analysis, and that re-analysis was likely not to meet LOCA thermal-hydraulic acceptance criteria, and therefore would not be implemented;

(6) COA 5 “Refill of RWST,” concluding that this COA has been procedurally implemented - ICM category #3;

(7) COA 6 “Inject More Than One RWST Volume From a Refilled RWST or by bypassing the RWST,” concluding that this COA, which results in beyond design basis containment flooding level, has been implemented as a last resort if sump recirculation has been lost and other compensatory measures have been unsuccessful - ICM category #1;

(8) COA 7 “More Aggressive Cooldown and Depressurization Guidance Following a Small Break LOCA,” concluding that the current Robinson emergency procedures already address maximizing cooldown rate up to the Technical Specifications limit -ICM category #2;

(9) COA 8 “Provide Guidance on Symptoms and Identification of Containment Sump Blockage,” concluding that this COA has been implemented (see discussion of above of changes to three specific emergency procedures) - ICM category #1;

(10) COA 9 “Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation,” concluding that six specific actions have been implemented, and one is a current capability which the Emergency Response Organization could recommend - ICM category #1;

(11) COA 10 “Early Termination of One Train of High Head Injection Prior to Recirculation Alignment,” concluding that such an action would be inconsistent with the H. B. Robinson Unit 2 thermal-hydraulic analysis, and that re-analysis was likely not to meet LOCA thermal-hydraulic acceptance criteria, and therefore would not be implemented; and

(12) COA 11 “Prevent or Delay Containment Spray for Small Break LOCAs in Ice Condenser Plants,” concluding that this COA is not applicable to the H. B. Robinson design.

In an April 1, 2005, response to a March 8, 2005, supplemental RAI you stated that Robinson procedures EPP-9, "Transfer to Cold Leg Recirculation," and EPP-10, "Transfer to Long Term Recirculation," contain caution statements prior to entry into the sections of the procedures that discuss beyond design basis actions. The cautions state "The Operator should be sure that cavitation is taking place prior to transitioning to steps that attempt to mitigate screen blockage. The actions taken are beyond design basis AND should NOT be taken unless warranted." You stated that these sections are used only in situations outside of the Robinson Unit 2 accident analyses. You also stated that these beyond design basis sections utilize existing systems, structures and components in a manner consistent with their intended purposes, and that they had been screened under a 10 CFR 50.59 review.

Relative to one such beyond design basis operator action, you stated that there had been a judgement that the use of air systems to increase containment pressure by 2 psig to attempt to recover adequate NPSH for the low-head safety injection pumps (also referred to as the residual heat removal pumps), and that this action was expected to result in equal or less

significant consequences than those associated with a loss of containment sump recirculation. You also stated that since the action to increase containment pressure by 2 psig is limited to containment pressures of 30 psig or less, containment pressure would continue to remain substantially below the containment design pressure of 42 psig.

Relative to another such beyond design basis operator action, in your October 26, 2004, RAI response you stated that you had added new steps to EPP-9 and EPP-10 to operate SI and RHR pumps in an intermittent mode to clear screen blockage. If both SI/RHR trains are available, the operating SI and RHR pumps would be stopped and then restarted in the opposite train with six minute intervals of no pump operation. In your April 1, 2005, response to a March 8, 2005, supplemental RAI you stated that there is an existing plant-specific calculation which shows no fuel damage from a six minute interruption of flow to the core after the 73 minute hold point for a large break LOCA assuming seven minutes of [free flowing] run time before stopping the pump [a pre-condition that the NRC staff notes would not exist in a sump clogging event scenario]. You indicated that this existing calculation had been reviewed and accepted by the NRC staff previously.

You stated that you had not provided a complete technical rationale for the 6 minute interval for stopping/starting ECCS pumps during a sump clogging event, but that this information does provide sufficient justification for the six-minute alternating pump stop/start actions being placed in H.B. Robinson emergency operating procedures for the beyond design basis situation of sump clogging. You stated that your judgement was based on an assessment that the intermittent delay period would provide more cooling than complete stoppage of the system, and would be short enough to minimize the potential for core overheating, yet long enough to allow debris to clear from the screen, thereby reducing voiding in the RHR suction path.

With respect to your plans for six-minute alternating RHR pump start/stop actions, it is inappropriate for H.B. Robinson to specify these actions in emergency operating procedures due to the absence of specifically applicable calculational bases supporting their application. However, please note that the NRC staff is not stating that such actions would necessarily be inappropriate, for example, should they be taken in response to a severe post-LOCA sump blockage event under the provisions of 10 CFR 50.54(x).

The NRC staff has considered your Option 2 response for compensatory measures that were or were to have been implemented to reduce the interim risk associated with potentially degraded or nonconforming ECCS and CSS recirculation functions. Based on your response, the NRC staff considers your actions to be responsive to and meet the intent of Bulletin 2003-01. Please retain any records of your actions in response to Bulletin 2003-01, as the NRC staff may conduct subsequent inspection activities regarding this issue.

Should you have any questions, please contact me at 301-415-[xxxx] or the lead PM for this issue, Alan Wang at 301-415-1445.

Sincerely,

[Name], Project Manager, Section [1 or 2]
Project Directorate [I, II, III, or IV]
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

cc: See next page [Plant Mailing List]

ADD TO DISTRIBUTION: AWang, RArchitzel, DSolorio, Mkowal, THafera, LWhitney