December 6, 2005

MEMORANDUM TO: David Terao, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: David L. Solorio, Chief ***/RA/***
Safety Issue Resolution 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 Safety Issue Resolution Branch (SSIB) has reviewed and evaluated the information provided in responses to Bulletin 2003-01 by the licensee for Waterford 3. SSIB 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 Nos: 50-382

Attachment: As stated

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

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Entergy Nuclear South
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED WATER REACTORS (TAC NO. MB9629)

Dear Mr. Dodds:

This letter acknowledges receipt of your response dated August 7, 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 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; (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 7, 2003, that you had implemented the following ICMs:

(1) procedural operator direction to throttle or stop safety injection flow if certain conditions were satisfied - ICM category #1;

(2) Severe Accident Management Guideline (SAMG) procedures to replenish the refueling water storage pool (RWSP) from all available sources or bypass the RWSP with an alternate source - ICM category #3;

(3) a proceduralized containment building closeout process which ensures that no loose debris is present in containment following an outage or at-power entry, and that items authorized to remain in containment during power operations are in their evaluated locations - ICM category #4;

(4) a foreign materials exclusion (FME) program to prevent introduction of foreign materials into plants systems and components, including the logging of materials in and out of the ECCS sump and refueling cavity - ICM category #4;

(5) inspection and repair of coatings on the concrete floors and walls and structural steel members surrounding the ECCS sump - ICM category #4;

(6) the verification that refueling cavity drain valves are locked open at the end of each refueling outage - ICM category #5; and

(7) an ECCS sump closeout inspection to ensure that there are no openings in the ECCS sump screen, or around the screen penetrations, which are larger than the screen mesh size - ICM category #6.

You also stated in your response that you would be implementing the following ICMs:

(1) licensed operator training on indications of and responses to ECCS sump clogging, to include the identification of indications, possible responses, and emergency operating procedure (EOP) and SAMG instructions for responding to ECCS sump clogging - ICM category #1;

(2) a simulator scenario which included ECCS sump clogging indications and responses (implemented, as appropriate, by March 1, 2004) - ICM category #1;

(3) enhancement to the monitoring of operating ECCS and CSS pumps for indications of pump distress or loss of net positive suction head (such as erratic current, flow, or discharge pressure) - ICM category #1; and

(4) inspection during each outage of refueling cavity drain lines and other ECCS sump drain lines to ensure that they are unobstructed - ICM category #5.

You further stated in your response, including justifications, that you would not be implementing the following ICMs: procedural modifications, if appropriate, that would delay the switchover to containment pump recirculation.

In an October 27, 2004, response to a September 2, 2004, NRC request for additional information (RAI) you:

(1) provided a detailed discussion of the operating procedures to be implemented to identify and address sump clogging, noting that these procedures address the availability of a variety of alternate water sources to supplement the RWSP in the event of ECCS sump clogging, and specify the parameters which operators are directed to monitor for abnormal conditions - ICM category #1; and

(2) noted that the response action the operators are instructed to take following indications of sump clogging is to secure redundant high pressure safety injection pumps and containment spray pumps - ICM category #1; and

(3) stated that the recommended actions in CEN-152 Revision 5.3 will be implemented in Waterford 3 EOPs, with training to be performed in the 2005 Cycle 2 Licensed Operator requalification training, with one exception related to Alternate RCS injection (Waterford 3 plant lineup can not inject water directly into the RCS bypassing the RWSP) - ICM category #1.

In a letter dated October 20, 2005, you described the technical analysis resulting from your review of the eleven WCAP-16204 (“Evaluation of Potential ERG and EPG Changes to Address NRC Bulletin 2003-01 Recommendations (PA-SEE-0085)”) candidate operator actions (COAs) for your plant, stating that for:

(1) COA 1a, “Operator Action to Secure One Spray Pump,” concluding that, for reasons of increased human failure probability (risk of operator error in diagnosing a sump clogging event or responding to a LOCA or sump clogging event), and because early termination of a CS pump may result in the containment heat removal safety function not being completed through single failure, this COA will not be implemented at Waterford 3 (“Waterford 3's position is to ensure these actions are taken when necessary rather than preemptively, as described in the EOPs”);

(2) COA 1b, “Operator Action to Secure Both Spray Pumps,” concluding that, for reasons of increased human failure probability (risk of operator error in diagnosing a sump clogging event or responding to a LOCA or sump clogging event), and because early termination of a CS pump may result in the containment heat removal safety function not being completed through single failure, this COA will not be implemented at Waterford 3 (“Waterford 3's position is to ensure these actions are taken when necessary rather than preemptively, as described in the EOPs”);

(3) COA 2, “Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Actuation,” you concluded that, for reasons of small available NPSH margin at Waterford 3, not injecting a full RWSP inventory is inadvisable. Further, operator burden from this evolution could create a greater opportunity for operator error which could negatively affect accident mitigation. Therefore, this COA would not be implemented at Waterford 3;

(4) COA 3, “Terminate One Train of HPSI/High-head Injection After Recirculation Alignment,” standard HPSI stop/throttle criteria are available before and after recirculation alignment (RAS), and considering that securing one train of HPSI is not considered a single failure, there would be a potential for total interruption of core flow until the operator could start the standby HPSI pump. This could potentially result in an increase in fuel peak cladding temperature and consequently a significant increase in radiological dose to the public. Therefore, this COA would not be implemented at Waterford 3;

(5) COA 4, “Early Termination of One LPSI/RHR Pump Prior To Recirculation Alignment,” you concluded that, since securing one train of LPSI/SDC is not considered a single failure, there would be a potential total interruption of core flow until the operator could start the standby LPSI/SDC pump. This could result potentially in an increase in fuel peak cladding temperature and consequently a significant increase in radiological dose to the public. Therefore, this COA would not be implemented at Waterford 3;

(6) COA 5, “Refill of Refueling Water Storage Tank,” you concluded that “this is currently covered under the SAMGs.” Since the intent of this COA, as stated in WCAP-16204, Appendix A, is to include guidance in the EPGs/ERGs to ensure that “starting the prerequisites and line up for refill will occur as soon as circumstances allow,” and further, that for CE plants this guidance would be contained in the “LOCA Optimal Recovery Guidelines (ORG (after step 21, LPSI Restart Criteria) and in a similar location in the Functional Recovery Guideline,” in a letter dated December 5, 2005, you stated that Waterford 3 will put in procedures OP-902-002, “Loss of Coolant Accident Recovery” and OP-902-008, “Functional Recovery Procedure,” the requirement to line up and refill the RWSP as soon as critical operator actions are completed after a LOCA, but not until after switchover to recirculation - ICM category #3;

(7) COA 6, “Inject More Than One RWST Volume From a Refilled RWST or By Bypassing the RWST,” you concluded that “injection of more than one volume of RWSP would result in more water introduced into containment than assumed in Waterford 3's design basis. This injected volume of water would increase the flooding level which will adversely impact vital equipment in the containment building. However, injecting more than one RWSP volume from a refilled RWSP is currently addressed in Waterford 3 SAMGs” - ICM category #3;

(8) COA 7, “Provide More Aggressive Cooldown and Depressurization Following a Small Break LOCA,” you concluded that the primary strategy of the SBLOCA EOP (OP-902-002) is to minimize primary break flow while performing a controlled cooldown (i.e., performed as rapidly as possible within Technical Specifications requirements) - ICM category #2;

(9) COA 8, “Provide Guidance on Symptoms and Identification of Containment Sump Blockage,” you concluded that monitoring for sump blockage is initiated by both receipt of a RAS pre-trip annunciator and independently from within EOP-902-002. You further explained that HPSI pump suction pressure, discharge pressure, flow, motor amperage and pump noise

are all monitored. You noted that LPSI parameters are not monitored because LPSI pumps are secured upon RAS - ICM category #1;

(10) COA 9, “Develop Contingency Actions in Response to: Containment Sump Blockage, Loss of Suction, and Cavitation,” you concluded that, if sump blockage is detected, early termination of one train of HPSI is performed under the EOPs as described in CEN-152, Revision 5.3 - ICM category #1;

(11) COA 10, “Early Termination of One Train of HPSI/High Head Injection Prior to Recirculation Alignment,” you concluded that, since securing one train of HPSI is not considered a single failure, there would be a potential for total interruption of core flow until the operator could start the standby HPSI pump. This could result potentially in an increase in fuel peak cladding temperature and consequently a significant increase in radiological dose to the public. Therefore, this COA would not be implemented at Waterford 3; and

(12) COA 11, “Prevent or Delay Containment Spray for Small Break LOCAs (<1 Inch Diameter) in Ice Condenser Plants,” you concluded that since Waterford 3 does not have an ice condenser, this COA was not applicable.

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: AWED, RArchitzel, DSolorio, MKowal, LWhitney