December 27, 2005

Mr. Joseph E. Venable
Vice President Operations
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

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. Venable:

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 this bulletin, taking into account the recent research findings described in the Discussion section, and are in compliance with all existing applicable regulatory requirements.

Option 2: Describe any interim compensatory measures (ICMs) 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 ICMs 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 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 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; and (6) ensuring sump screens are free of adverse gaps and breaches.

You stated in your August 7, 2003, response 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 plant 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 includes ECCS sump clogging indications and responses (implemented, as appropriate, by March 31, 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 ICM (2) procedural modifications, if appropriate, that would delay the switchover to containment pump recirculation.

In your 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);

(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 Steam Electric Station, Unit 3 (Waterford 3), EOPs, with training to be performed in the 2005 Cycle 2 License 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 [Emergency Response Guideline] and EPG [Emergency Procedure Guideline] Changes to Address NRC Bulletin 2003-01 Recommendations (PA-SEE-0085)") candidate operator actions (COAs) for your plant, stating that for:

(1) COA A1a, "Secure One Spray Pump," for reasons of increased human failure probability (risk of operator error in diagnosing a sump clogging event or responding to a loss-of-coolant accident (LOCA) or sump clogging event), and because early termination of a Containment Spray (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 A1b, "Secure Both Spray Pumps," 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 A2, "Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Actuation," 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 will not be implemented at Waterford 3;

(4) COA A3, “Terminate One Train of HPSI [High-Pressure Safety Injection]/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 will not be implemented at Waterford 3;

(5) COA A4, “Early Termination of One LPSI [Low-Pressure Safety Injection]/RHR [Residual Heat Removal] Pump Prior To Recirculation Alignment,” since securing one train of LPSI/Shutdown Cooling (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 will not be implemented at Waterford 3;

(6) COA A5, “Refill of RWST,” “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 Combustion Engineering 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 A6, “Inject More Than One RWSP Volume From a Refilled RWSP or by Bypassing the RWSP,” “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 A7, “Provide More Aggressive Cooldown and Depressurization Following a SBLOCA [Small Break LOCA],” 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 A8, “Provide Guidance on Symptoms and Identification of Containment Sump Blockage,” 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 A9, "Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation," 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 A10, "Early Termination of One Train of HPSI/High-Head Injection Prior to Recirculation Alignment," 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 A11, "Prevent or Delay Containment Spray for Small Break LOCAs (<1 Inch Diameter) in Ice Condenser Plants," 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 301-415-3062 or the lead PM for this issue, Alan Wang at 301-415-1445.

Sincerely,

/RA/

Mel B. Fields, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

cc: See next page

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 A9, "Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation," 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 A10, "Early Termination of One Train of HPSI/High-Head Injection Prior to Recirculation Alignment," 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 A11, "Prevent or Delay Containment Spray for Small Break LOCAs (<1 Inch Diameter) in Ice Condenser Plants," 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 301-415-3062 or the lead PM for this issue, Alan Wang at 301-415-1445.

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ACCESSION NO: **ML060050477** **NRR-106** *No substantial change from SE input

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