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Early C. Ewing, III
Director
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Waterford 3

W3F1-98-0170
A4.05
PR

October 1, 1998

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

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Supplement to Request for Additional Information Response
to Generic Letter 97-04 for the Waterford Steam Electric
Station, Unit 3 (TAC NO. MA0060)

Gentlemen:

On January 5, 1998, Waterford 3 submitted the response to NRC Generic Letter (GL) 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps" by Letter Number W3F1-97-0287. A Request for Additional Information (RAI) regarding the original GL 97-04 response was requested via a NRC letter dated May 29, 1998. The response to the RAI was transmitted to the NRC on June 29, 1998, via Letter Number W3F1-98-0115. On July 23, 1998, the NRC Project Manager held a telephone conference call with Entergy personnel to discuss our commitment to provide an update to our original RAI response, which we proposed as March 2, 1999.

Although we committed to a March 2, 1999 response, in the telephone conference call, we agreed to expedite our evaluation of the recently revised NPSH calculations for High Pressure Safety Injection (HPSI) and Containment Spray (CS) systems and submit our updated response earlier than committed. The results of our evaluation, as detailed in Attachment 1, should provide the necessary information for you to assess the adequacy of the net positive suction head available for the HPSI and CS systems.

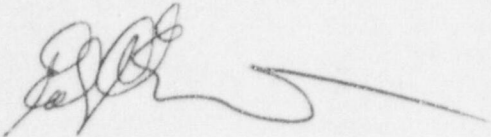
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If you have any questions regarding this updated response, please contact
Mr. C. C. Hayes at (504) 739-6662 or me at (504) 739-6242.

Very truly yours,

A handwritten signature in black ink, appearing to be 'E.C. Ewing', with a long horizontal flourish extending to the right.

E.C. Ewing
Director
Nuclear Safety & Regulatory Affairs

ECE/RLW/rtk
Attachments

cc: E.W. Merschoff, NRC Region IV
C.P. Patel, NRC-NRR
J. Smith
N.S. Reynolds
NRC Resident Inspectors Office

Supplement to Request for Additional Information
Response to Generic Letter 97- 04
(TAC NO. MA0060)

The NRC May 29, 1998 Request for Additional Information (RAI), requested further clarification of our response to GL-97-04 Question 2: Identify the required NPSH and the available NPSH. Specifically, the requested information was as follows:

- (1) Provide a description of the inconsistencies between the design basis calculations and other plant documents involving some of the parameters used in the NPSH calculations that were identified as part of Waterford's ongoing design basis verification program;
- (2) Provide the expected date of resolution of the NPSH calculations and the design basis; and
- (3) Provide an updated response to GL 97-04 after the resolution.

The supplemental responses are provided below.

ITEM 1 SUPPLEMENTAL RESPONSE

Our June 29, 1998 RAI response to item 1 detailed the inconsistencies between the design basis calculations and other plant documents involving the HPSI and CS pump maximum flowrates and minimum Safety Injection (SI) sump water levels during recirculation. The pump maximum flowrate and minimum Safety Injection sump water level values were inputs into the SI and CS Net Positive Suction Head (NPSH) calculations.

The corrective action plan to resolve these inconsistencies was developed and tracked by Condition Report (CR) 97-0806. The corrective action plan was described in the original RAI item 2 response, but the results will be described here under item 1.

The corrective action plan consisted of the following actions to resolve these inconsistencies:

1. Revise the design basis calculations to conservatively and consistently calculate the minimum SI sump water level during recirculation.
2. Identify the design basis pump runout flows for safeguards pumps (HPSI, LPSI, and CS) and revise all affected design calculations to consistently utilize these flows and the minimum SI sump water level value as design inputs.

3. Document the design basis maximum flowrates for HPSI and CS pumps and the minimum net positive suction head available (NPSHA) in the applicable design basis documents (DBD).
4. Revise the Updated Final Safety Analysis Report (UFSAR) as necessary, based on the design basis calculation changes.

Corrective Actions

Actions 1 & 2

The following calculations have been either revised or newly generated and represent the current design basis minimum SI sump water level and safeguards pump NPSHA values. In addition, the design basis pump runout flows for safeguards pumps (HPSI and CS) have been identified and the affected design calculations have been revised to ensure these flows and the minimum SI sump water level value are utilized as design inputs. The other design basis calculations, as discussed in CR 97-0806, have been superseded by the calculation revisions described below or revised to be consistent.

MN(Q)-6-4, "Water Levels Inside Containment"

This calculation determined the minimum water level in the SI sump at recirculation. The revision was a complete rewrite, using more accurate methodology. This calculation superseded calculations MN(Q)-6-19 and MN(Q)-6-49. The major design basis change involved the volume of water discharged into the containment. The original 11/2/78 design basis calculation determined the minimum containment sump water level to be (-)3.67 ft, based on a total volume of 446,500 gallons being discharged into the containment. The 446,500 gallons consisted of 383,000 gallons from the RWSP, 42,000 gallons or 75% from the Safety Injection Tanks, and 21,500 gallons or 25% from the Reactor Coolant System. This assumed total volume was consistent with the original Safety Analysis Report (SAR) assumptions for minimum SI sump water level. The 7/1/98 revised calculation determined two containment sump levels after discharging minimum volumes of water into the containment. The minimum SI sump water level calculation determined SI sump water level to be (-)5.34 ft, based on a maximum volume of 383,000 gallons from the RWSP. The TS volume of 383,000 gallons is ensured by the use of the plant main computer to monitor RWSP level versus using the RWSP level indicators. This was consistent with the current SAR. The SI sump level calculation, assuming a more conservative RWSP water volume ranging from the Technical Specification (TS) minimum level to the Recirculation Actuation Signal (RAS), including associated instrument uncertainties, was determined to be (-)5.47 ft. This conservative water volume bounded the licensing basis of 383,000 gallons in the RWSP.

The conservative SI sump level calculation that assumed a more conservative RWSP water volume ranging from the TS minimum level to the RAS, was used in the 7/29/98 SAR revision, License Document Change Request (LDCR) 97-0212. The following SI sump water level change was made in the UFSAR, revision 9:

<u>UFSAR</u>	<u>CHANGE DESCRIPTION</u>
(1) Page 6.3-8	<ul style="list-style-type: none">Section 6.3.2.2.3.d value for containment sump water level was changed from (-)3.67 ft. to (-)5.47 ft.

MN(Q)6-35, "Safety Injection System Sump and Screen"

This calculation revision was a complete rewrite. The original design basis calculation determined the water velocity at the SI sump screen with two HPSI Pumps and two Containment Spray Pumps running at both design and maximum pump flowrates. This calculation superseded calculations MN(Q)-6-10 and MN(Q)-6-12. The results of the 7/1/98 revised MN(Q)-6-35 calculation were the basis for the water velocity values used in the 7/29/98 SAR revision, License Document Change Request (LDCR) 97-0212. The following water velocity changes were made in the UFSAR, revision 9:

<u>UFSAR</u>	<u>CHANGE DESCRIPTION</u>
(1) Page 6.2-45	<ul style="list-style-type: none">The SI sump low approach velocity was changed from 0.125 ft/sec to 0.078 ft/sec at design flow rate.The velocity at the screen was changed from 0.13 ft/sec to 0.136 ft/sec
(2) Page 6.2-49(e)	<ul style="list-style-type: none">The velocity values contained in the sentence 'Water stream having a velocity of 0.131 ft. per second, which would be further reduced to 0.125 ft. per second while entering the sump' were changed to 0.136 ft. per second and 0.078 ft. per second, respectively.

MN(Q)-6-27, "NPSH Calculation"

This calculation revision was a complete rewrite. The calculation determined the minimum NPSH available for the CS and HPSI pumps during recirculation operation. The revision used a more accurate model of the system friction losses and used maximum flow instead of design flow for the pumps. The revised MN(Q)-6-27 calculation used the calculated minimum sump level of (-)5.47 ft from the revised MN(Q)-6-4 calculation. The HPSI pumps and Containment Spray pumps were verified to have sufficient NPSH available during RAS. As noted in

the MN(Q)-6-4 discussion, this minimum water level bounds the licensing basis of 383,000 gallons in the RWSP.

MN(Q)-6-27 utilized the following design basis maximum flowrates:

Pump	Maximum Flowrate	Reference
CS	2250 gpm	CS Specification 1564.116
HPSI	985 gpm	SI Pump Tech Manual 457000272

Note: Actual surveillance testing indicates that the above maximum flows are conservative.

The results from this calculation changed the original design basis NPSH available and NPSH required values as specified in our January 5, 1998 response to GL-97-04 and used in the 7/29/98 SAR revision, License Document Change Request (LDCR) 97-0212. These value changes were identified as part of Waterford's ongoing design basis discovery and corrective action program and confirms the operability determination stated in our January 5, 1998 response to GL 97-04. The following changes were made in the UFSAR, revision 9:

- (1) UFSAR changes to page 6.2-50 and page 6.3-8(f)

Pump	FLOW (GPM)	NPSH (Avail.) (ft)	NPSH (Req.) (ft)	Margin (%)	Pe (ft)	Pi (ft)
CS (old)	2250	27.27	14	94.8	28.83	1.56
CS (revised)	2250	24.62	18	36.78	27.03	2.41
HPSI (old)	890	25.35	18	40.8	26.95	1.60
HPSI (revised)	985	21.77	20	8.86	25.13	3.36

- (2) UFSAR changes to Table 6.2-22, (Sheet 1 of 3)

- Changed Containment Spray System 'NPSH avail calculated, Ft.' from 27.3 to 24.62 (At Runout Flow).
- Changed Containment Spray System 'NPSH required, ft.' from 14 to 'Minimum NPSH required, ft.' 18 (At Runout Flow).

- (3) UFSAR changes to page 6.3-8, section 6.3.2.2.2.3

- In item b), changed: total flow on one suction header value from 3140 gpm to 3235 gpm; HPSI pump flow from 890 gpm to 985 gpm; and maximum pump suction loss from 1.6 ft to 3.36 ft.

- In item 3), changed HPSI pump inlet nozzle location from (-)30.75 ft to (-)30.60 ft.

EC-M97-079, "LPSI Pump Minimum NPSH"

A new calculation, EC-M97-079, was performed to determine the minimum Low Pressure Safety Injection (LPSI) Pump NPSH available during injection, recirculation, and shutdown cooling modes of operation based on the maximum LPSI flowrate of 5650 gpm (Ref. Tech Manual 457000272). Surveillance testing indicated that this maximum flowrate value was conservative. Note that the use of a LPSI pump during recirculation from the containment sump is not a design basis mode of operation.

Action 3

The revised design basis maximum flowrates for HPSI and CS pumps and the minimum net positive suction head available (NPSHA) have been documented in the Safety Injection System and the Containment Spray System design basis documents (DBD). All NPSH related design basis calculations and DBDs are consistent.

Action 4

A revision to the UFSAR (Licensing Document Change Request 97-0212) was approved for implementation on 7/29/98. The SAR changes reflect the revised design basis HPSI and CS maximum flowrates, SI sump water level, NPSH values, and SI sump water velocities, as indicated in the calculation determinations described under actions 1 and 2 above.

ITEM 2 and 3 SUPPLEMENTAL RESPONSE

The June 29, 1998 response to the RAI stated an expected date for resolution of the NPSH calculations would be January 15, 1999 and an updated response to GL97-04 would be provided by March 2, 1999. The resolution date of January 15, 1999 for the NPSH calculations and the updated response to the RAI for GL 97-04 are satisfied by the response to item 1 above.