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U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **GE Response to NRC, *"Request For Additional Information Related To Advanced Boiling-Water Reactor Licensing Topical Report* (TAC NO. MD4025)," Regarding Alternate RCIC Turbine-Pump Design**

References: NRC to GE Letter, G. Wunder to T. O'Neill, dated July 24, 2007, *"Request For Additional Information Related To Advanced Boiling-Water Reactor Licensing Topical Report (TAC NO. MD4025)"*

GE Letter MFN 06-525, T. O'Neill to Document Control Desk, dated December 20, 2006, "Submittal of Licensing Topical Report NEDE-33329P, *"Advanced Boiling Water Reactor (ABWR) With Alternate RCIC Turbine-Pump Design"*

Enclosure 1 in this letter contains General Electric-Hitachi Nuclear Energy (GEH) response to the subject NRC RAIs. GE requests closure of the RAIs based on the supplemental information and approval of the requested amendment to the ABWR certified design material.

If you have any questions about the information provided here, or during the course of your reviews, please contact me at 910-602-1885.

Add: G F Wunder
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NRO

Sincerely,

Joseph A. Savage
Project Manager, ABWR Licensing

Enclosure 1: Response to NRC Request for Additional Information Related to ABWR Design Certification Application Licensing Topical Report NEDE-33329P, "Advanced Boiling Water Reactor (ABWR) With Alternate RCIC Turbine-Pump Design" - RAIs -1 through -5

cc:	JA Savage	GEH (Wilmington w/ enclosure)
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	GF Wunder	NRC (w/ enclosure)
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ENCLOSURE 1

MFN 07-482

Response to NRC Request for

Additional Information

Related to ABWR Design Certification Application

Licensing Topical Report NEDE-33329P
"Advanced Boiling Water Reactor (ABWR) With Alternate RCIC Turbine-Pump Design"

RAIs 1 through 5

NRC RAI-1

The current Reactor Core Isolation Cooling (RCIC)/High Pressure Coolant Injection (HPCI) Terry turbine design used in the operating plants was tested with water for durability and reliability. Were similar tests already performed for the proposed design? If not, does GE plan to perform similar tests?

GEH Response

Vendor testing has been performed on the alternate pump assembly to demonstrate operational performance and resistance to conditions the assembly might experience. For example, the alternate RCIC turbine-pump was designed and proven by testing to be capable of surviving water slugs in the steam inlet. During vendor contract at the Sizewell B facility, a variety of testing including water slug ingestion tests were carried out to demonstrate the unit could survive undamaged and function correctly following a water slug both on start up and during running at full rated speed. Volumes of liquid water were injected into the turbine inlet under full steam pressure; the unit performance was checked before & after each slug test and remained unchanged. Post test-trip examination confirmed that no damage had been sustained. The alternate design is a highly reliable assembly.

LTR Impact

No changes to the LTR will be made as a result of this RAI response.

NRC RAI-2

On Page 7 of NEDE-33299, it is stated that "The RCIC system has been shown to comply with General Design Criteria (GDC) 2,17, 35, 36, and 37 in Tier 2 Section 5.4.6.1." It is further stated that the changes proposed in this LTR will have no effect on GE's evaluation of GDC compliance. However, in Standard Review Plan (SRP) and Final SE Section 5.4.6, the RCIC is evaluated for conformance with the GDC 4, 5, 29, 33, 34, and 54. Has the RCIC system been evaluated against these criteria?

GEH Response

The proposed changes to the RCIC system design are in full compliance with applicable GDC requirements. The bases for compliance with the following GDC referenced in the RAI is as follows:

GDC 4: NUREG-1503, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design" discussed how the original Terry-Turbine is protected against pipe whip inside and outside of containment as required in GDC 4. GEH review of system intended functions determined the alternate RCIC turbine-pump system design meets the same criteria.

GDC 5: Although STP 3&4 is a dual unit BWR site; Reactor Core Isolation Cooling (RCIC) equipment will not be shared between units. Each unit will have it's own dedicated equipment. Therefore, GEH review of system intended functions determined GDC 5 does not apply

GDC 29 and 34: The RCIC System meets GDC 29 and 34 because it is designed to perform its function without any AC power and, in conjunction with the high-pressure core flooder system, is designed to ensure an extremely high probability of accomplishing its safety function. NUREG-1503 discussed how the original Terry-Turbine met these GDCs. GEH review of system intended functions determined the alternate RCIC turbine-pump system design meets the same criteria.

GDC 33: The RCIC System is used to supply reactor coolant makeup for small leaks. Therefore, GDC 33 is satisfied. NUREG-1503 discussed how the original Terry-Turbine met GDC 33. GEH review of system intended functions determined the alternate RCIC turbine-pump design meets the same criteria.

GDC 54: The containment leakage requirements are discussed in subsection 6.2.6 of NUREG-1503; containment isolation criteria is discussed in subsection 6.2.4 of NUREG-1503; and functional design and heat removal requirements of the containment are discussed in subsections 6.2.1 through 6.2.3 of NUREG-1503. GEH review of system intended functions determined the proposed departures for the RCIC System are consistent with GDC 54.

LTR Impact

No changes to the LTR will be made as a result of this RAI response.

NRC RAI-3

Design Control Document (DCD) Tier 1, Page 2.4.4-2 (at the second paragraph) stated that the RCIC flow rate is achieved within 29 seconds of receipt of the system initial signal. This statement was not marked for the change in NEDE-33299. Confirm this statement is still applicable to the new design. If it is not applicable, the DCD Tier 1 needs to be modified. Provide the impact due to this difference on the safety analysis.

GEH Response

The 29 seconds response time for achieving the flow rating of the RCIC system is a design basis requirement for the US ABWR. This requirement remains valid for the alternate turbine-pump design. The alternate RCIC turbine-pump design will actually meet the full rated flow in approximately 10 seconds. DCD Tier 1 performance requirements for the RCIC system remain applicable.

LTR Impact

No changes to the LTR will be made as a result of this RAI response.

NRC RAI-4

Are there any changes in the RCIC preoperational testing and initial startup test program? If there are testing changes, provide the detail.

GEH Response

The alternate RCIC turbine-pump design is a factory built self contained unitized assembly, that is ready as a 'plug in' unit for the certified design and steam connections. The preoperational and initial startup test scope will be similar to the previous design, except for some reduced test scopes due to the simplified design features of the alternate design. Since the alternate turbine-pump design will not have any vacuum tank, barometric condenser or bypass steam injection, the test scope will be reduced accordingly.

LTR Impact

No changes to the LTR will be made as a result of this RAI response.

NRC RAI-5

Please provide a flow pressure curve similar to the Tier 2 in Figure 6.3-5 for the proposed design.

GEH Response

Figure 6.3-5 is an analytical curve of the RCIC system pressure versus RCIC system flow, developed for the purpose of reactor coolant system loss of coolant accident (LOCA) analysis. Since the alternate RCIC system design performance requirements are not revised, Figure 6.3-5 remains applicable to the alternate turbine-pump design and performance requirements. The alternate turbine-pump design easily meets the flow pressure curve requirement.

LTR Impact

No changes to the LTR will be made as a result of this RAI response.