Response to Public Comments on Draft Regulatory Guide (DG) -1277, "Initial Test Program of Emergency Core Cooling Systems for New Boiling Water Reactors," Proposed Regulatory Guide (RG) 1.79.1

A notice that Draft Regulatory Guide, DG-1277 (Proposed Revision 0 of RG 1.79.1) was available for public comment and was published in the *Federal Register* on June 15, 2012 on page 77 of FR 36014. The Public Comment period ended on August 15, 2012. Comments were received from the organizations and individuals listed below. The NRC staff has combined the 45 public comments and NRC staff disposition of those comments in the table below. The public comments were received from the following organizations:

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Item	Comments	By	Staff Response
1	General Comment: Including BWR/2-6 design is confusing and these designs are not likely to be used in future plants.	GEH-1	The U.S. Nuclear Regulatory Commission (NRC) staff agrees with this comment. The NRC removed all references to preoperational, low-power and power ascension tests for BWR/2-6 plants in DG-1277, including design details in DG-1277, Appendix A. The NRC staff revised the title of RG 1.79.1 to state: INITIAL TEST PROGRAM OF EMERGENCY CORE COOLING SYSTEMS FOR NEW BOILING WATER REACTORS The NRC staff also deleted preoperational and power ascension tests in Staff Regulatory Guide C.1.b, "High Pressure Coolant Injection (HPCI) (BWR/3/4), High Pressure Feedwater Injection (HPFI) (BWR/2) since these tests are not applicable to the ABWR and the ESBWR. All references to BWR/2-6 were removed from DG-1277.
2	Page 3, C, 2nd to last sentence;	GEH-2	The NRC staff agrees with this comment. The staff revised the sentence to state: "If non condensable gases are vented through high-

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	A change is needed to reflect passive operation of ESBWR. Sentence: “If non condensable gases are vented through high-point vent valves, verify closure of the valves before starting the pumps.” The ESBWR design does not have a pump to start the ECCS system.		point vent valves, verify closure of the valves before starting the pumps (ABWR only). For the ESBWR design, verify closure of the vent valves before starting the ECCS system.”
3	Page 5, a.(1)(j)/line 2, Sentence: “Verify proper core spray sparger flooding patter in the reactor vessel.” Coe spray patter is not used in the ABWR HPCF. This statement needs to be clarified with a note. Remove this sentence if BWR/2-6 designs are removed from the guidance. Otherwise, note that this sentence is not applicable to ABWR HPCF. “Verify the proper core spray sparger flooding pattern is the reactor vessel (not applicable to the ABWR HPCF).”	GEH-3	The NRC staff agrees with this comment. Since BWR/2-6 plants were removed from DG-1277, the entire sentence as noted below was deleted. ~~Verify the proper core spray sparger flooding pattern is the reactor vessel.~~
4	Page 5, a.(2)/lines 1 – 3 Sentence: "Verify the HPCF/HPCS system shall initiate automatically, when low water levels (Level 1 and 2) during the initial transient following isolation." HPCF initiates at level 1.5. This requirement needs to be more general. Also, the use of “shall” in this sentence should be reconsidered. Suggested Change: Verify the HPCF/HPCS system ~~shall~~ initiate at the appropriate low water level set point. ~~at low water levels (Level 1 and 2).~~	GEH-4	The NRC staff agrees with this comment. The following sentence was revised to state: Verify HPCF/~~HPCS~~ system ~~shall~~ initiates automatically at the appropriate low water level set point ~~at low water levels (Level 1 and 2)~~.

RESPONSE TO PUBLIC COMMENTS RECEIVED ON DRAFT REGULATORY GUIDE DG-1277:
INITIAL TEST PROGRAM OF EMERGENCY CORE COOLING SYSEMS FOR NEW BOILING WATER REACTORS

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5	Page 5, a(2)/lines 3-6, Sentence: "The minimum capacity and maximum delay time between the time the vessel water level drops below the set point and makeup water enters the vessel shall meet safety analysis requirements." The use of "shall" in this sentence should be reconsidered. Replace with: "Verify the minimum capacity and maximum delay time between the time the vessel water level drops below the set point and makeup water enters the vessel meets safety analysis requirements."	GEH-5	The NRC staff agrees with the comment. The sentence was revised as noted below. "Verify the minimum capacity and maximum delay time between the time the vessel water level drops below the set point and makeup water enters the vessel ~~shall~~ meets ~~safety~~ safety analysis requirements."
6	Pages 5 and 6, C.1 .c.(1): This subsection does not recognize the DPV valves are also part of ADS for ESBWR, and, therefore, there are no DPV requirements shown. Appendix A correctly identifies that DPV is part of ADS but it is missing from Section C. To reflect the preoperational instrumentation and control testing in cold conditions, use information described in the ESBWR design control document (section 14.2.8.1.1), add the following to C(1): C.(1)(d) Verify proper operation of DPV and SRV position indication.	GEH-6	The NRC staff agrees with the comment. The following sentence was added to RG 1.79.1, Staff Regulatory Guide C.(1)(d): "Verify proper operation of the depressurization valves (DPVs) (ESBWR only) and SRV position indication."

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7	(1) Page 6, d (1)/line 3: Sentence" "The purpose of this preoperational test is to test the signals to the automatically start the reactor core isolation cooling (RCIC) system at low reactor water level or high drywell pressure and the signal for automatic isolation of the RCIC system at low steam pressure to the RCIC pump turbine." For BWR/3-6, RCIC system initiates only on low level, and not high drywell pressure. However, the ABWR initiates on low water level or high drywell pressure. Remove BWR/3-6 from the guidance or revise the sentence as follows: "The purpose of this preoperational test is to test the signals to automatically start the reactor core isolation cooling (RCIC) system at low reactor water level, or, for ABWR, high drywell pressure and the signal for automatic isolation of the RCIC system at low steam pressure to the RCIC pump turbine."	GEH-7	NRC staff agrees with this comment. The NRC staff made the recommended change to RG 1.79.1, Staff Regulatory Guide C.1.c, Reactor Core Isolation Cooling (~~BWR3/6 and~~ ABWR).
8	Page 6, d(1)(c)/line 1: This paragraph is based on the plant having a temporary steam supply (e.g., auxiliary boilers are included in the ABWR design. For BWR/3-6 designs have auxiliary boilers to generate steam to power the RCIC turbine when the RPV is not pressurized. This paragraph would not be applicable to all BWR/3-6 designs and a note should be added for clarification. If earlier BWR designs are removed from the guidance, then no change is needed. Otherwise, modify the sentence as follows: "For those plants with a temporary steam supply, verify alignment of RCIC system suction from the condensate storage pool…"	GEH-8	The NRC staff agrees with this comment. The NRC staff made the recommended change to Staff Regulatory Guide C.1.c, Reactor Core Isolation Cooling (~~BWR3/6 and~~ ABWR).
9	Page 6, d(1)(c)/line 1"…from the condensate storage pool and inject water …"	GEH-9	The NRC staff agrees with this comment. The sentence was revised to state:

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	Some designs refer to condensate storage “pool” while others refer to condensate storage “tank.” “…from the condensate storage pool (or tank) and…”		Verify alignment of RCIC system suction from the condensate storage pool (or tank) and inject water into the reactor through the reactor feedwater line with the reactor at atmospheric conditions.
10	Page 7, d(1)(d)/line 2 Sentence: “…Perform an RCIC pump …” Change "an" to "a" as an editorial change. “…Perform ~~an~~ a RCIC pump…”	GEH-10	The NRC staff agrees with this comment: The sentence was revised to state: Perform a~~n~~ RCIC pump turbine quick start under simulated automatic initiation signal with suction from the CST.
11	Page 7, (2)(a) This section discusses testing RCIC through a full flow test line to the suppression pool and by flow injection directly into the reactor vessel. This section is applicable only to the ABWR design. For earlier designs, testing of RCIC is a recirculation test from the condensate storage tank and returned to the condensate storage tank. If earlier BWR designs are removed from the guidance, then the section will be applicable to the ABWR design. Otherwise, the guidance for low power flow testing at hot conditions should be separated into earlier BWR designs and the ABWR.	GEH-11	The NRC staff agrees with this comment. The reference to earlier BWR designs was removed from RG 1.79.1.
12	Page 7, (2)(b)/last sentence This sentence discusses making small step changes in speed and flow demand. In addition, the guidance uses “shall” in regard to testing. The ABWR design certification (Section 14.2.12.2.22) states: “Proper controller adjustment is verified by introducing small step disturbances in speed and flow demand and then demonstrating satisfactory system response	GEH-12	The staff agrees with this comment; The sentence was revised to state: ~~This test shall v~~ Verify satisfactory RCIC system performance under the final set of controller settings after controller adjustment are made by ~~small step~~ changes in speed and flow demand and then verify system response at both low and near rated RCIC pump flow conditions.

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	at both low RCIC pump flow (but above minimum turbine speed) and near rated RCIC pump flow conditions, in order to span the RCIC operating range." However, the turbine pump set installed in ABWRs under construction do not use a flow controller. As such, small step changes cannot be directly made in speed and flow demand. The use of "shall" in this sentence should be reconsidered. "~~The test shall~~ Verify satisfactory RCIC system performance under the final set of controller settings after controller adjustment are made by ~~small step~~ changes in speed and flow demand and then verify system response at both low and near rated RCIC pump flow conditions."		
13	Page 8, (2)(c)/lines 1- 3 Sentence: "After completing RCIC system controller adjustments, test automatic initiation of the RCIC system from cold standby conditions (i.e., 72 hours without RCIC operation) to demonstrate RCIC system reliability." Section 14.2.12.2.22 of the ABWR design control document discusses automatic initiation from cold standby conditions and defines "cold" as "a minimum of 72 hours without any king of RCIC operation." This 72 hours was an arbitrary number chosen for cold quick start when the system was first designed. The concern was priming of the hydraulic governor system on the Woodward control system of the steam turbine driver. Subsequent changes to the control systems have made this restriction unnecessary. Decades of surveillance testing has shown negligible difference between a "cold" and "hot" start of the system. It is suggested that the guidance be modified based on ABWR lessons learned, as follows: "After completing RCIC system controller adjustments, test automatic initiation	GEH-13	The NRC staff agrees with this comment. The sentence was revised to state: After completing RCIC system controller adjustments, test automatic initiation of the RCIC system from standby conditions ~~(i.e., 72 hours without RCIC operation)~~ to demonstrate RCIC system reliability.

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	of the RCIC system from standby conditions ~~(i.e., 72 hours without RCIC operation)~~ to demonstrate RCIC system reliability." This change would suggest that cold or hot standby conditions for testing are acceptable, while removing an unnecessary restriction to cold standby conditions.		
14	Page 8, e.(1)/lines 7 and 8 Sentence: "To prevent actuation of single use squib valves during the logic portion of testing, the valves may be isolated." The GDCS Squib valves will need more than isolation. They will need to be replaced with a GDCS performance testing spool piece. If there is not an open flow path where the squib valves are located, there will be no GDCS flow to the RPV. "….To prevent actuation of single use squib valves during the logic portion of testing~~, the valves may be isolated~~.it may be necessary to remove the valves and install testing spool pieces."	GEH-14	The NRC staff partially agrees with this comment. The following revisions were also made to account for a license condition for sample testing of squib valve explosive charges: To prevent actuation of single-use squib valves during the logic portion of testing, it may be necessary to remove the valves and install test fixtures for the explosive charges and test spool pieces in the flow path. For additional details on squib valves testing, see Staff Regulatory Guidance C.2.b, Item (3).
15	Page 8, (2)(g) This paragraph includes another ABWR lessons learned item regarding flow control. Squib valves cannot be re-closed once actuated to the open position. Add "(not applicable to squib valves)" at the end of the first sentence, as follows: "Verify the operation of system valves, including time to open and close (not applicable to squib valves). The electrical power supplies should demonstrate their capability to actuate the "explosive chargers" used to open GDCS	GEH-15	The staff agrees with this comment. The NRC staff decided to simplify the sentence and now only states: "Verify proper operation of system valves." The staff agrees that "Verify the operation of system valves includes time to open and close" is not applicable to squib valves. However, the staff decided to move guidance for squib valve testing to one location in RG 1.79.1. Specifically, RG 1.79.1, Staff Regulatory Guide C.2.b, "Valves," Items (1) and (2) discusses testing for other valve types with open and close functions. Item (3) contains guidance for squib valve testing which only has a function to open once the explosive charge is initiated. This preoperational or pre-service test is a simulated test as noted in the guidance.

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	squib valves.”		(3) Verify the capability of squib valves by initiating the actuator control circuitry for each valve to demonstrate acceptable electrical parameters with the charge removed from the valve, by performing external and internal examinations for structural integrity and presence of foreign material and fluids, and by firing a sample of pyrotechnic charges from the valve population in a test fixture to demonstrate their design-basis capability. Verify that the squib valve receives a simulated signal at the valve electrical leads that is capable of actuating the valve. Verify, by analysis or other simulated test, that the squib valve flow resistance is consistent with the flow path resistance.
16	Page 9, C.1.e(c) Paragraph: “Verify the operation of system valves, including time to open and close. The electrical power supplies should demonstrate their capability to actuate the “explosive chargers” used to open GDCS squib valves.” Squib valves cannot be re-closed once actuated to the open position. Add “(not applicable to squib valves)” at the end of the first sentence, as follows: “Verify the operation of system valves, including time to open and close (not applicable to squib valves). The electrical power supplies should demonstrate their capability to actuate the “explosive chargers” used to open GDCS squib valves.”	GEH-16	The NRC staff agrees with this comment. See NRC response to GEH-15 for resolution of this issue above.
17	Page 9, C.1.f(1)(b) There is an error in this paragraph. The information shown in this item pertains to the isolation condenser (IC) system and not inside containment. “Verify that the steam flowpaths from the ~~inside~~	GEH-17	The NRC staff agrees with this comment. The staff revised the two sentences to state: Verify that the steam flow paths from the ~~inside containment~~ isolation condenser (IC)/passive containment cooling system (PCCS) pools to the atmosphere are not obstructed. Verify that ~~isolation condenser~~ IC steam and condensate-return piping flow passages are not obstructed.

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	~~containment~~ isolation condenser (IC)/passive containment cooling system (PCCS) pools to the atmosphere are not obstructed. Verify that isolation condenser steam and condensate-return piping flow passages are not obstructed."		
	Page 9, e.(1)(b)/line 1 Sentence: "Verify instrumentation and alarms functions used to monitor system operation and availability." Change "alarms" to "alarm," as "functions" is plural and "alarms" is not in the possessive. "Verify instrumentation and alarm~~s~~ functions…"	GEH-18	The NRC staff agrees with this comment. The revised sentence is shown below with the deleted letter in highlight (b) Verify instrumentation and alarm~~s~~ functions used to monitor system operation and availability.
19	Page 10, C.1.f.(2)(b) This paragraph related to performing a heat removal capacity test on one train of ICS refers to "ICS heat exchanger, piping, and tubing." A change is suggested to be consistent with ESBWR terminology. Replace "heat exchanger" with "condenser" as follows: Determine proper operation to verify measurement of vibration, displacement, and strain on the ICS condenser~~heat exchanger~~, piping, and tubing.	GEH-19	The NRC staff agrees with this comment. The sentence was revised to state: Determine proper operation to verify measurement of vibration, displacement, and strain on the ICS ~~heat exchanger~~ condenser, piping, and tubing.
20	Page 11, C.1.i The title of this section includes ESBWR. The RHR (RWCU) system for ESBWR is not a safety related system and no testing of this system is included for pre-operational or startup testing in Chapter 14 of the ESBWR design control document.	GEH-20	The NRC staff agrees with this comment. The title was revised to state: RG 1.79.1, Staff Regulatory Guide C.1.~~i~~h, Residual Heat Removal Systems (~~BWR/2-6,~~ ABWR~~, ESBWR~~)

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	Delete “ESBWR” from the title.		
21	Page 12, (i)(2) Low-Power Test—Hot Conditions ¶ (a) Paragraph: “(a) Verify that the RHR system is capable of operating in the suppression pool cooling and shutdown cooling modes at the heat exchanger capacity as determined by flow rates and temperature differentials indicated on the RHR system process flow diagram.” Paragraph (a) should be deleted because it is an unnecessary detail for Section (i)(2) and is not consistent with RHR startup testing description in Section 14.2.12.2.20 of the ABWR design control document. Deleted ¶ (a) while maintaining Section (i)(2) in its current form.	GEH-21	The NRC staff agrees with this comment. The staff deleted the following from RG 1.79.1, sentence (a) from C.1.h.(2): ~~(a) Verify that the RHR system is capable of operating in the suppression pool cooling and shutdown cooling modes at the heat exchanger capacity as determined by flow rates and temperature differentials indicated on the RHR system process flow diagram.~~
22	Page 12, Section 2, Component Testing Paragraph: “The components of the systems involved in the system tests described in Regulatory Position C.1 should be tested, either in conjunction with the system tests at the appropriate test phase or by independent component tests. Components that are common to the ECCS and other systems should be tested to the more stringent criteria.” Clarify the sentence for a more clear understanding of “more stringent criteria” for testing. Suggested changes: “The components of the systems involved in the system tests described in Regulatory Position C.1 should be tested, either in conjunction with the system tests at the appropriate test phase or by independent component tests. Components that are common to the ECCS and other systems should be tested according to whichever of these systems has the more	GEH-22	The staff agrees with this comment: The sentence was revised to state: Components that are common to the ECCS and other systems should be tested according to whichever systems have the more stringent criteria.

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	stringent testing criteria.” Or: The components of the systems involved in the system tests described in Regulatory Position C.1 should be tested, either in conjunction with the system tests at the appropriate test phase or by independent component tests. Components that are common to the ECCS and other systems should be tested to the most stringent testing criteria of any of these systems to ensure that such component is capable of performing acceptably each applicable system function.”		
23	Page 13, Section 2 b. (2) and (3) Items: (2) Verify valve operation under maximum expected differential pressure conditions (consistent with system test limitations). (3) Verify operability at maximum expected pressure and temperature (consistent with system test limitations). It is not clear if there is a difference between “verify valve operation” and “verify operability” in these two items. Suggested Change: (2) Verify valve operation under maximum expected differential pressure conditions (consistent with system test limitations). (3) Verify ~~operability at~~ valve operation under maximum expected pressure and temperature (consistent with system test limitations).	GEH-23	The staff agrees with this comment. However, the staff decided to combine Items (2) and (3) into one sentence and further modify the guidance per agency subject matter experts on valve testing: Item (2) now states: With the exception of pyrotechnic-actuated (squib) valves that are addressed in (3) below, verify valve operation under maximum pressure, differential pressure, temperature and flow conditions (consistent with system test limitations) with evaluation of sufficient valve-specific diagnostic data to demonstrate that each safety-related valve is capable of performing its safety function under design-basis conditions. In addition, a new Item (3) for squib valve testing was added to RG 1.79.1. Item (3) now states: Verify the capability of squib valves by initiating the actuator control circuitry for each valve to demonstrate acceptable electrical parameters with the charge removed from the valve, by performing external and internal examinations for structural integrity and presence of foreign material and fluids, and by firing a sample of pyrotechnic charges from the valve population in a test fixture to demonstrate their design-basis capability. Verify that the squib valve receives a simulated signal at the valve electrical leads that is capable of actuating the valve. Verify,

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			by analysis or other simulated test, that the squib valve flow resistance is consistent with the flow path resistance.
24	Page 13 Section 2 c.(2) This section discusses verifying that no foreign material has entered into the pump being tested. Generally, a temporary strainer will be installed to prevent debris from entering the pump. Verify by inspection that no foreign material has entered into the pump" implies that at some point following pre-operational testing the pump must be disassembled. A check to verify that permanent or temporary strainers are not clogged (or are installed or removed, as appropriate) and adequate pump operation should be an acceptable verification that debris is not in the pump. This section should clarify that disassembly is not necessary for this verification. "Verify that design acceptance criteria are met for NPSH performance under maximum system flow and temperature conditions. The test should also verify, by inspection, that no foreign material has entered into the pump, to ensure that performance degradation does not occur, and it should verify that the pump suction strainer is not clogged with debris, so that pump failures or other system degradation does not occur. This inspection and verification may involve inspecting and removing a temporary test strainer or inspecting and cleaning of a permanent pump suction strainer (if one is installed), and need not necessitate a pump disassembly."	GEH-24	The NRC staff agrees with this comment. The following sentence was added to RG 1.79.1, Staff Regulatory Guide C.2.c.(2) at the end of the paragraph to address this comment: This inspection and verification may involve inspecting and removing a temporary test strainer or inspecting and cleaning of a permanent pump suction strainer (if one is installed) and need not necessitate a pump disassembly.
25	Page 18, Glossary of Acronyms There is a term listed that is not used (based on a comment above). There are no applications in this DG that pertain to "inside	GEH-25	The staff agrees with this comment. IC-Inside Containment was deleted from the acronym list.

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	containment” (the correct terminology in the guidance is in relation to the isolation condenser). Delete “IC – inside containment.”		
26	Page 18, Glossary of Acronyms There is a term listed that is not used (based on a comment above). The applications of this acronym in this guidance pertain to the IC system and not “inside containment.” Revise “IC/PCCS – inside containment/passive containment cooling system” to “IC/PCCS – isolation condenser/passive containment cooling system”	GEH-26	The staff agrees with this comment. The acronym was revised as follows: IC/PCCS – ~~in containment~~ isolation condenser/passive containment cooling system
27	Appendix A General Comments (note that specific comments are provided below that would not apply if Appendix A is deleted). It is not clear that including Appendix A, “Design Descriptions of Emergency Core Cooling Systems,” is necessary or appropriate. There is no reference to Appendix A in the body of the draft guidance and the descriptions in the appendix could result in confusing the different BWR designs. Specific design descriptions are available in design certification information or other public documents that would not result in confusing the designs. Consider deleting Appendix A from the guidance. This would also necessitate deleting a portion of the acronyms included in the glossary that are “used in Appendix A of this guide” on pages 19 and 20.	GEH-27	The NRC staff partially agrees with this comment. Specifically, the NRC staff deleted all design information related to BWR/2-6 in DG-1277 including DG-1277, Appendix A. The staff concluded that DG-1277, Appendix A, contained background information for stakeholders not familiar with the ABWR active ECCS and ESBWR passive ECCS designs. GEH also provided the staff with 11 comments on DG-1277, Appendix A, which helped ensure ECCS design descriptions are technically accurate. The ECCS design descriptions also support ECCS regulatory guidance in C.1, C.2 and C.3; therefore, the staff chose to keep RG 1.79.1, Appendix A. The staff also added the following to RG 1.79.1, Section A, “Introduction,” 3rd paragraph, 2nd sentence: Regulatory Guide (RG) 1.79.1, Appendix A, “Design Descriptions of ECCS for New BWRs,” also provides design information to support the ITP staff regulatory guidance in Section C below.
28	Appendix A, Page A-5	GEH-28	The NRC staff agrees with this comment. The RHR paragraphs were moved to the first section of A.2, Page A-1.

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	At the top of Page A-5, there are a number of paragraphs that discuss the RHR system. However, the title of the subsection is "High-Pressure Core Flooder." These RHR paragraphs should be relocated or an appropriate heading should be added to reflect that the discussion relates to the RHR system. There is a section entitled "Low-Pressure Core Flooder (LPCF) Mode of Residual Heat Removal" that precedes the "High-Pressure Core Flooder" subsection for the ABWR. Move the RHR paragraphs to a section entitled "Residual Heat Removal" as the first section of A.2, "Advanced Boiling-Water Reactor," and add it to the introduction of A.2 on Page A-1.		
29	Appendix A, Page A-5, RCIC Subsection in Section A.2 Appendix A, Section A.2, applies to the ABWR design. However, the description in the Reactor Core Isolation Cooling subsection describes earlier BWR designs. Information related to these earlier designs should be removed. One important distinction, for example, are statements in this subsection regarding control rod drop accident. For the ABWR, the control rod drop accident is not considered a credible event (see ABWR design control document, Section 15.4.10). Because this Section applies to the ABWR, and the second paragraph mentions earlier BWR designs, most of the second paragraph should be removed to avoid confusion. Retain the first two sentences of the second paragraph and deleted the remainder of that paragraph.	GEH-29	The NRC staff agrees with this comment. The following information was removed from the RCIC section: ~~For earlier BWR designs, RCIC was not considered to be part of the ECCS. However, the RCIC system is considered an ESF system because of its role in mitigating the consequences of a control rod drop accident. If a rod drop accident occurs, it is possible that the main steamlines might isolate on a high radiation signal. The RCIC system then performs its normal isolation cooling function.~~
30	Appendix A, Page A-5, RCIC Subsection ¶ 2	GEH-30	

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	An additional item of potential confusion in the second paragraph of the ABWR RCIC subsection is that main steam isolation on a high radiation signal has been deleted from earlier BWR plants (except for two plants). This information may be out-of-date and including it could create confusion. Based on the comment above, the discussion in the second paragraph that relates to earlier BWR designs should be removed.		The NRC staff agrees with this comment. The following changes were made to the sentence below: The RCIC system function is completely backed up by HPCF~~, HPCS, or HPCI, depending on the BWR design (BWR 3-6,~~ (ABWR only).
31	Another item of potential confusion is the first sentence that is related to the ABWR design: "The functional classification of the RCIC system is as a safety-related and engineered safety feature (ESF) system." This information is correct for the ABWR, but not for earlier designs. Based on the comment above, the discussion in the second paragraph that relates to earlier BWR designs should be removed. By removing the earlier designs, the information retained is correct for the ABWR design.	GEH-31	The NRC staff agrees with this comment. The earlier BWR RCIC design references were removed from this section.
32	Appendix A, Page A-5, RCIC Section, ¶ 4 This paragraph discusses using the RCIC system in conjunction with the RHR system in the steam condensing mode. This mode is not used in the ABWR and have been abandoned by most (if not all) operating BWRs. It also discusses other design features that are not necessarily correct for the ABWR design: "The RCIC system is also used in conjunction with the RHR system in the steam condensing mode to pump condensate from the RHR heat exchangers back to the RPV. The RCIC system also has alternate paths to allow recirculation back to the CST for testing purposes, discharge to the suppression	GEH-32	The NRC staff agrees with this comment. The following paragraph was added to this Section: "During RCIC operation, the suppression pool acts as the heat sink for steam generated by reactor decay heat. This will result in a rise in pool water temperature. Heat exchangers in the RHR System are used to maintain pool water temperature within acceptable limits by cooling the pool water directly during normal plant operation. A design flow functional test of the RCIC System may be performed during normal plant operation by drawing suction from the suppression pool and discharging through a full flow test return line back to the suppression pool. During the test, the discharge valve to the vessel remains closed and reactor operation remains undisturbed. Should an initiation signal occur during test mode operation, flow will be automatically directed

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	pool to ensure minimum flow through the pump, and recirculation for turbine lube oil cooling." This is not applicable to the ABWR design, which is the subjection of Section A.2 and the RCIC Subsection. Information from the ABWR design control document that covers the points in the fourth paragraph would be more representative of the ABWR design. Regarding turbine lube oil cooling, not all RCIC turbine pump sets use a lube oil cooler (this should be removed from the content). Replace this paragraph with the following information, which is from the ABWR design control document, Section 6.3.2.2.3: "During RCIC operation, the suppression pool acts as the heat sink for steam generated by reactor decay heat. This will result in a rise in pool water temperature. Heat exchangers in the RHR System are used to maintain pool water temperature within acceptable limits by cooling the pool water directly during normal plant operation. A design flow functional test of the RCIC System may be performed during normal plant operation by drawing suction from the suppression pool and discharging through a full flow test return line back to the suppression pool. The discharge valve to the vessel remains closed during the test, and reactor operation remains undisturbed. Should an initiation signal occur during test mode operation, flow will be automatically directed to the vessel."		to the vessel."
33	Appendix A, Page A-6, Figure A-5. The title of this figure includes "BWR3-6." Section A.2 is entitled "Advanced Boiling Water Reactor."	GEH-33	The NRC staff agrees with this comment. The title to Figure A-5 was revised to delete BWR/3-6.

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	This would imply that the earlier designs should not be discussed in Section A.2. Figure A-5: ~~BWR3-6,~~ ABWR reactror core isolation cooling"		
34	Appendix A, Page A-6, ADS, ¶ 1/line 4 This paragraph refers to "nuclear SRVs" as follows: "The ADS employs nuclear SRVs to relieve high-pressure steam to the suppression pool. It is not necessary to include "nuclear" in this sentence and tends to imply that there are components referred to as "nuclear SRVs." The ADS employs ~~nuclear~~ SRVs to relieve high-pressure steam to the suppression pool."	GEH-34	The NRC staff agrees with this comment. The sentence was revised as noted below: The ADS employs ~~nuclear~~ SRVs to relieve high-pressure steam to the suppression pool."
35	Appendix A, Page A-7, ¶¶ 1 and 2 Paragraphs 1 and 2 need to be combined and edited. Paragraphs 1 and 2 contain duplicate information. Consider combining these two paragraphs.	GEH-35	The NRC staff agrees with this comment. The NRC staff also noted some confusing language related to testing of actuation signal trains and divisions. The paragraphs were combined with some changes to clarify testing of actuation signals as noted below. "There are four trains with two divisions of actuation signals for low reactor water level and high drywell pressure. Division I control logic signal actuate one set of pilots, and sensors from all four trains for low reactor water and high drywell pressure and the division II control logic signal actuate the second set of pilots, either of which initiates the opening of the ADS SRVs. Redundant trip channels arranged in two divisionally separated logics that control two separate solenoid-operated pneumatic pilots on each ADS SRV accomplish ADS initiation. Either pilot can operate the ADS valve. These pilots control the pneumatic pressure applied by the accumulators and the high-pressure nitrogen gas supply system. The direct-current power for the logic is obtained from SSLC divisions I and II."

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36	Appendix A, Page A-7, ¶ 5/line 2 This section on automatic depressurization system, which is applicable to ABWR, includes information that is related to ESBWR and not ABWR. Specifically, depressurization valves (DPVs) are not included in ABWR. The ADS DPV valve is a specific squib valve that was designed for and is used exclusively on the ESBWR as a passive plant. "…used to activate the SRVs and ~~depressurization valves (DPVs)~~ ADS valves."	GEH-36	The NRC staff agrees with this comment. The following sentence was revised to state: The ADS automatically actuates in response to the ECCS initiation signals. A two-out-of-four-level initiation logic is used to activate the SRVs and ~~depressurization valves (DPVs)~~ ADS valves.
37	Page A-8, ICS description/line 1 Section A.3 applies to the ESBWR design. Under "Isolation Condenser System," the first sentence makes a comparison of the ICS to the BWR RCIC system. This is not a useful comparison and is unnecessary, as reflected in the second sentence, which notes that natural circulation differs significantly from the BWR RCIC, which is an active system. The passive ICS removes decay heat by transferring it to the condensate pool, maintaining inventory by preventing the SRVs from opening. The active RCIC provides high pressure injection to makeup water lost through the SRVs and requires RHR cooling to remove the RPV decay heat. Delete the following sentence: "The ESBWR ICS (Figure A-7) is the system most comparable to the BWR RCIC system."	GEH-37	The NRC staff agrees with this comment. The NRC staff deleted the following sentence from Appendix A to DG-1277, Page A-8: ~~The ESBWR ICS (Figure A-7) is the system most comparable to the BWR RCIC system.~~

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38	App A, Page A-9, ¶ 4 under GDCS/line 4 There is reference to the "loss of GDCS" providing short-term makeup water. The sentence makes no sense as written and is apparently in error. GDCS provides short term post-LOCA water makeup upon initiation. "~~The loss of the GDCS~~ The initiation of GDCS provides…."	GEH-38	The NRC staff agrees with this comment. The sentence was revised as follows: The initiation ~~loss~~ of GDCS provides short-term post-LOCA water makeup to the annulus region of the reactor through eight injection line nozzles, and by gravity-driven flow from three separate water pools in the drywell at an elevation above the active core region.
39	When testing valves in DG-1253 and DG-1277, Staff Regulatory Guide C-2, it does not state what condition the plant should be in (operating temp/pres or no fluid in system or some status in between). The Component Testing is ambiguous as not all components may necessarily be fully tested in the system test.	NRC-1 P. Prescott	The NRC staff agrees with this comment. To address this issue, the NRC staff added the following sentences to RG 1.79, Staff Regulatory Guide C.2, "Component Testing," 1st paragraph, starting with the 3rd sentence: For the preoperational systems tests noted above, the components tests (e.g., pumps, valves, piping, etc) are normally performed at the operating temperature and pressure conditions noted for each system test (e.g., flow tests - cold or hot conditions). If the component test is not fully tested in the preoperational system test phase, then separate component or systems tests at the low power or power ascension test phase may be performed to fully test the component to its design and test acceptance criteria. For additional details on low power and power ascension tests, see RG 1.68. The NRC staff also added the following sentences to RG 1.79.1, Staff Regulatory Guide C.2, Component Testing, 1st paragraph, starting with the 3rd sentence: For the preoperational, low power and power ascension systems tests noted above, the components tests (e.g., pumps, valves, piping, etc) are normally performed at the operating temperature and pressure conditions noted for each system test (e.g., preoperational flow tests - cold or hot conditions, low power or power ascension tests – hot conditions). If the component test is not fully tested in the preoperational system test phase, then separate component or systems

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			tests at the low power or power ascension test phase may be performed to fully test the component to its design and test acceptance criteria. For additional details on low power and power ascension tests, see RG 1.68.
40	In DG-1253 and DG-21277, Staff Regulatory Guide C.2.b, the valve testing does not designate requirements for valves that throttle, or valves that must shut and not leak or have a set minimal leakage requirement.	NRC-2 P. Prescott	The NRC staff agrees with this comment. To address this issue, the NRC staff revised the RG 1.79 and RG 1.79.1, Staff Regulatory Guide C.2.b, Item (1), 4th sentence to state: Verify valves open, close and throttle to their correct valve position and meet design, leak rate and test acceptance criteria.
41	In DG-1253 and DG-1277, Staff Regulatory Guide C.2.c, “Pumps and Motors,” system flow and temperature is discussed; but, system pressure plays a major role on what the pump can put out. In other words a bad pump could meet system flow at a lower system pressure, but not at a higher system pressure.	NRC-3 P. Prescott	The NRC staff agrees with this comment: To address this issue, the NRC revised RG 1.79 and RG 1.79.1, Staff Regulatory Guide C.2.c, Item (2), 1st sentence, to state: Verify that design acceptance criteria are met for NPSH performance under maximum system flow, pressure and temperature conditions.
42	In DG-1253, Staff Regulatory Guide C.3, “Documentation,” the RG limits the systems requiring complete comparisons against design requirements. Why are not all the systems listed included?	NRC-4 P. Prescott	The NRC staff agrees with this comment. To address this issue, the NRC staff revised RG 1.79, Staff Regulatory Guide C.3, Item (d) to state: complete comparisons and evaluations against design predictions or system performance requirements for the HPSI flow tests, the MPSI flow tests, the LPSI flow and recirculation tests, the core flooding tests, the ELS flow and isolation tests, and the AP1000 ~~passive ECCS~~ PCCS safety injection tests, emergency makeup and boration tests, and emergency core decay heat removal tests; The NRC staff also checked DG-1277 (RG 1.79.1), Staff Regulatory Guide C.3, “Documentation,” to verify if this issue also existed. The staff found that all of the BWR ECCS systems were properly identified; therefore no change was needed in DG-1277 (RG 1.79.1).
43	In DG-1253 and DG-1277, Staff Regulatory Guide C.2.b, add valve operational testing requirements, include opening, closing, position indication and travel times.	NRC-5 T. Scarbrough	The NRC staff agrees with this comment. To address this issue, the NRC staff revised RG 1.79 and RG 1.79.1, Staff Regulatory Guide C.2.b, Item (1), 2nd and 3rd sentence to state the following:

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			Valve operation testing will include opening and closing valves with operating switches, valve status indication, and travel timing, if applicable. Verification of valve position will include a method that ensures the valve disk is in its proper position as well as proper control room indication.
44	In DG-1253 and DG-1277, Staff Regulatory Guide C.2.b, add information related to the special first of a kind (FOAK) license condition tests to perform preoperational or pre-service testing of explosive squib valves:	NRC-6 T. Scarbrough	The NRC staff agrees with this comment. To address this issue, the NRC revised RG 1.79 and RG 1.79.1, Staff Regulatory Position, C.2.b, Item (3) to state: Verify the capability of squib valves by initiating the actuator control circuitry for each valve to demonstrate acceptable electrical parameters with the charge removed from the valve, by performing external and internal examinations for structural integrity and presence of foreign material and fluids, and by firing a sample of pyrotechnic charges from the valve population in a test fixture to demonstrate their design-basis capability. Verify that the squib valve receives a simulated signal at the valve electrical leads that is capable of actuating the valve. Verify, by analysis or other simulated test, that the squib valve flow resistance is consistent with the flow path resistance.
45	In DG-1277, Appendix A, Section A.3, ESBWR ECCS, Isolation Condenser System, add a sentence related to a safety related function where pneumatic and squib valves are used to cross connect the equipment storage pool to the isolation condense/passive containment cooling system pools.	NRC-6 T. Scarbrough	The NRC staff agrees with this comment. The NRC staff revised RG 1.79.1, Section A, 4th paragraph, Page A-8 as noted below: To ensure that an adequate inventory of cooling water is available for at least 72 hours after an accident, the ICS uses automatically opening connections between the equipment storage pool and isolation condenser/passive containment cooling system pools. The ICS uses parallel pneumatic and squib valves to cross connect the equipment storage pool to the isolation condenser/passive containment cooling system pools.