Chapter 5 Changes From Revision 2 to Revision 3

Item	Location	Description of Change
1	S5.1, 5.2, 5.3 and 5.4	Added US Customary units as necessary throughout Chapter 5 to ensure that dual dimensioning is included, i.e. SI units (metric) and US Customary units.
2	F5.1-2	Deleted swing check valves immediately downstream of motor operated isolation valves outside containment. Changed containment outboard isolation valve from lift check valve to piston check valve with process-medium piston actuator. Changed feedwater line isolation valves from motor operated gate valves to process-medium (pilot operated) gate valves. Valve configuration changed to reflect feedwater line isolation valve design changes.
3	S5.2.1.2.a, 1st sent.	Changed from "Code Case Acceptability in ASME Section III –Design and Fabrication" to "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III" to be consistent with title of Regulatory Guide 1.84.
4	S5.2.2.2.2, 1st para., 4th sent.	Changed from "The remaining eight SRVs are designated as Non-ADS SRVs and are arranged into two groups of four" to "The remaining eight SRVs are designated as Non-ADS SRVs", due to SRV discharge configuration design change.
5	S5.2.2.2.2, 1st para., 5th sent.	Changed from "Each group discharges to a horizontal header that has a rupture disc at each end" to "Each Non-ADS SRV discharges through its individual discharge stack that has a rupture disc at the end", due to SRV discharge configuration design change.
6	S5.2.2.2.2, 1st para., 6th sent.	Changed from "Each header has a discharge line that is routed to a quencher in the suppression pool" to "Each discharge stack has a drain line that drains condensed steam leakage to the suppression pool", due to SRV discharge configuration design change.
7	S5.2.2.2.2, 1st para., 7th sent.	Changed from "The Non-ADS SRVs discharge through the rupture discs to the drywell or through the discharge line to the suppression pool" to "The Non-ADS SRVs discharge through the rupture discs to the drywell", due to SRV discharge configuration design change.
8	S5.2.2.3.2, Operating Conditions, 1st bullet.	Changed from "4500 MWt" to "4590 MWt" and from "100%" to "102%" due to performance of overpressure analysis at 102% power.
9	S5.2.2.3.3, 4th para., last sent.	Deleted "the discharge manifold for", due to SRV discharge configuration design change.

10	S5.2.2.4, 2nd para., 5th bullet, 1st sent.	Changed from "feasible" to "practical" and changed from "valves are in place" to "reactor is at power". Added new sentence, "Steam or other pressure-lift testing is only performed with a valve removed from containment and installed on an appropriate test facility" to clarify that setpoint testing is performed at a test facility removed from the containment.
11	S5.2.3.4.2, 8th para., 4th bullet.	Deleted 4th bullet, "Socket welds with a 50A nominal pipe size and under are excluded from the above requirements" in response to RAI 5.2-45 S01.
12	S5.2.4.2, 1st para., 4th sent.	Changed from ". . . . as necessary on these items . . ." to "as necessary to achieve the required examination volume on these items . . . ." in response to RAI 5.2-55.
13	S5.2.4.2, 1st para.	Added new sentence, "Access is sufficient for the inservice examination of the volume described in Code Case N-613-1", in response to RAI 5.2-55.
14	S5.2.4.6, 2nd para., 2nd sent.	Changed from "Class 2 or 3" to "Class 1" in response to RAI 5.2-59.
15	S5.2.5, 6th para., last bullet	Changed from "Main Steamline Low Vacuum monitoring" to Main Condenser Low Vacuum monitoring" due to error correction.
16	S5.2.5.2.2, "Intersystem Leakage Monitoring", 2nd sent.	Deleted "the upper and lower drywell coolers," to be consistent with Tier 2 Subsection 9.4.8.2.
17	S5.2.5.8, 8th para.	Changed from "Procedures are provided to the operator to convert the identified and unidentified leakages into a common leakage rate equivalent to determine that the total leakage rate is within the technical specification limit" to "Procedures are provided to the operators to determine identified and unidentified leakage to establish whether the leakage rates are within the allowable Technical Specifications", in response to RAI 5.2-4 S01.
18	S5.2.6, 1st para., 1st sent.	Added "(Subsection 5.2.4)" at end of sentence as a reference to where this COL item is described.
19	S5.2.6	Added new heading and paragraphs as follows in response to RAI 5.2-4 S01: **COL Holder Procedures** Operators will be provided with a procedure to determine the identified and unidentified leakage in order to establish whether the leakage rates are within the allowable Technical Specifications.

		Operators will be provided with procedures to assist in monitoring, recording, trending, determining the source of leakage, and evaluating potential corrective action.
20	T5.2-1	Deleted Code Case N-71-17 and all applicable information in response to RAI 3.12-2. Note: "N-71-17" was previously changed to "N-71-18" in accordance with response to RAI 5.2-33. However, according to response to RAI 3.12-2, Code Case N-71-18 is not applicable.
21	T5.2-2, 3rd column	Changed column heading from "Spring Setpoint Maximum Safety Analytical Limit" to "SRV Maximum Analytical Pressure Limit" to address design changes in reactor vessel relief capacity.
22	T5.2-2, 4th column	Changed column heading from "ASME Rated Capacity at 103% of Safety Analytical Limit Spring Setpoint Pressure" to "ASME Rated Capacity at Setpoint with 3% Accumulation Equivalent to Analytical Pressure Limit" to address design changes in reactor vessel relief capacity. Changed capacity from "124" to "138.0 minimum" and from "126" to "140.2 minimum".
23	T5.2-2	Added "(3)" at "ADS SRV" and added footnote "(3) Nominal Trip Setpoint is 8.366 ± 0.251 MPa gauge (1213 ± 36.39 psig) for surveillance test as-found result. Following rework, setpoint adjustment and testing, lift settings shall be within ± 1%". Added "(4)" at "Non-ADS SRV" and added footnote "(4) Nominal Trip Setpoint is 8.503 ± 0.255 MPa gauge (1233 ± 36.99 psig) for surveillance test as-found result. Following rework, setpoint adjustment and testing, lift settings shall be within ± 1%". Changes are made to clarify the SRV setpoints and tolerances.
24	T5.2-4	Changed the heading from "Weld Filler Metals" to "Welding Filler Metals", added new sub-headings "Base Material", "Filler Metal Type", SFA Number" and "AWS Classification" and provided general update of the information in these columns for carbon steel, low alloy steel, stainless steel and nickel alloy in accordance with telecon between GE and NRC on December 18, 2007.
25	T5.2-6	Replaced "RCCWS" with "CWS" to be consistent with Tier 2 Subsection 9.4.8.2.
26	T5.2-7	Replaced "RCCWS" with "CWS" to be consistent with Tier 2 Subsection 9.4.8.2.
27	S5.3.3, 1st para., item 1, 1st sent.	Deleted first use of "Subsection". Changed title of Subsection 5.2.4 from "Reactor Coolant Pressure Boundary

		Inservice Inspection and Testing" to "Preservice and Inservice Inspection and Testing of Reactor Coolant Pressure Boundary" to be consistent with Table of Contents and Subsection 5.2.4.
28	S5.3.3.3, 1st para., last sent.	Deleted "and 5.3.1.8" because subsection 5.3.1.8 does not exist.
29	S5.4.5.2, 1st para., 2nd sent.	Changed the 2nd sentence to read as follows for clarity: "The system consists of eight MSIV assemblies mounted in four tandem pairs in the main steam lines with one valve of each pair mounted inboard of the primary containment penetration and one valve of each pair mounted outboard of the primary containment penetration. A detailed description of the system, based on one approved valve pattern, and including appurtenances such as pneumatic accumulators, connecting piping, and associated instrument and control devices, is provided below."
30	S5.4.5.2, 1st para.	Added new sentences as follows for clarity: "The detailed description includes all of the functional details required to satisfy the isolation design objectives. Other valve patterns may be used based on meeting the same design objectives and satisfying the same design qualifications (refer to Sections 3.9, 3.10 and 3.11 for discussion of component qualification)." Deleted the following sentence because it is redundant: "The MSIVs are welded in horizontal runs of the steamline, with one valve inside the drywell and the other outside the containment on each line."
31	S5.4.5.2, 2nd para., 2nd sent.	Replaced "installed" with "in welded installation" for clarity.
32	S5.4.5.2, 2nd para., 3rd sent.	Deleted "also". Changed from "…..helping prevent….." to "…..helping to prevent…." for clarity.
33	S5.4.5.2, 2nd para., 4th sent.	Replaced "to" with "at" for clarity.
34	S5.4.6, Item C.	Deleted Item C, which pertains to GDC 29, because GDC 29 is not applicable in accordance with response to RAI 5.4-25 and re-labeled the remaining items.
35	S5.4.6.1.1, Functions, 1st para., 1st sent.	Replaced 1st sentence with the following in response to RAI 5.4-51: "An ICS function is to avoid unnecessary use of other ESFs for residual heat removal and in the event of a Loss of Coolant Accident (LOCA) and the ICS provides additional liquid inventory upon opening of the condensate return

		valves to initiate the system. The ICS also provides reactor with initial depressurization of the reactor before ADS in event of loss of feed water, such that the ADS can take place from a lower water level."
36	S5.4.6.1.1, General System Requirements, 1st para., 1st sent.	Replaced 1st sentence, before "(see Table 5.4-1).", with the following in response to RAI 5.4-51: "The ICS is designed to remove post-reactor isolation decay heat with 3 out of 4 IC heat exchangers operating and to reduce Nuclear Steam Supply System (NSSS) temperature to safe shutdown conditions of 204°C (400°F) in 36 hours (and NSSS pressure below containment design conditions of 0.31 MPaG (45 psig.) in 72 hours) with occasional venting to the suppression pool of radiolytically generated noncondensable gases beginning four hours after isolation".
37	S5.4.6.2.2, 2nd para. ,2nd sent.; 3rd para. ,8th bullet; and 10th para. ,1st sent.	Replaced "IC/PCC pool" with "IC/PCC expansion pool", to clarify correct name of the structure.
38	S5.4.6.2.2, 2nd para., 2nd sent.	Added "subcompartments adjacent to", to clarify location.
39	S5.4.6.2.2, 3rd para., 5th bullet.	Added new sentence, "Therefore, the condensate return valves are single failure proof for each unit", to clarify that the condensate return valve use two different actuator types.
40	S5.4.6.2.2, 2nd para. 1st sent.	Added "unit", for clarification.
41	S5.4.6.2.2, Detailed Design Description, 5th para.	Added new 5th paragraph as follows in response to RAI 5.4-37: "The cross-tie between IC steam line and DPVs in the ESBWR produces no significant negative impact on the loads and safety margins. The key details are as follow: • During a LOCA event, the peak operation of ICS occurs during the early part of the depressurization and before the DPV openings; • At the time of first DPV opening, there is no subcooled water inside the IC drain line and in the downcomer region. The total dynamic head (DPV flow + IC steam flow) inside the stub tube is small and will not induce back flow into the IC tubes; • Failure of one IC drain valve or one DPV valve will not prevent the operation of the other system connecting to the common stub line; • Based on first and third bullets above, the common-tie

		between the ICS and DPVs on the stub line has no significant impact on the safety margins [refer to fifth bullet below]. Therefore, the physical separation of these two systems is not necessary; and • Parametric studies were performed with and without the function of the IC heat transfer (i.e., no IC condensation). The results indicate that the long-term containment pressure is slightly higher for the case without the function of IC heat transfer."
42	S5.4.6.2.3, Isolation Condenser Operation, 3rd para.	Added new 3rd, 4th and 5th paragraphs as follows in response to RAI 5.4-37: "In the early stages of reactor coolant system (RCS) depressurization (0 ~ 500 seconds, before the opening of DPVs), the ICS are in operation and condense significant amount of steam flow (~ 36 kg/s (79.4 lbm/s) per IC, MSL break case) from the RPV. The steam flow to the ICS reduces as the RPV pressure decreases and the downcomer water level drops. The first group of ADS valves open after the downcomer level drops below the Level 1.0 setpoint (11.5 m (37.7 ft.) from the RPV bottom, Table 6.3-1, DCD Rev. 2). Consequently, both the RPV pressure and the steam flow to the ICS reduce further after the first ADS valve opening. The first group of DPV valves opens at 50 seconds after the first ADS valve opening. At this time, the RPV pressure decreases to about 700 kPa (100 psia), the DPV flow is about 7.5 kg/s (16.5 lbm/s) per DPV and the IC steam flow reduces to about 4 kg/s (8.8 lbm/s) per IC. The total velocity inside the stub tube is in the range of 35 m/s (114.8 ft/s). The dynamic head is in the range of 2.2 kPa (0.3 psia), which is small compared to the static head of two-phase mixture in the vertical portion of the IC drain line. At the time of DPV opening, the RPV downcomer as well as the IC drain lines are filled with saturated two-phase mixture due to the fast depressurization resulting from the opening of ADS valves. As the result of additional depressurization from the DPV opening, the downcomer two-phase level could swell up a few meters from the Level 1.0 position, and get closer to or below the stub line elevation. However, there is no subcooled water inside the IC drain line, or inside the downcomer near by the nozzle elevations of the IC drain line or the stub line. In addition, there are loop seals at the lowest elevation of

		the IC drain lines, near by the injection nozzles. The loop seal provides extra static head; in addition to the 15 meters (49.2 feet) of static head of the two-phase mixture inside the vertical portion of the IC drain line, to prevent any flow reversal in the IC drain line and steam inlet line due to the DPV opening."
43	S5.4.8, 1st para., 1st sent.	Added "and Regulatory Guide 1.56" in accordance with response to RAI 5.4-19.
44	S5.4.8, 1st para.	Added new GDC items in accordance with response to RAI 5.4-19 as follows: "GDC 15 as it relates to reactor coolant associated auxiliary system design with sufficient margin." "GDC 31 as it relates to fracture prevention of reactor coolant pressure boundary design with sufficient margin."
45	S5.4.8.1.2, 1st para., 3rd sent.	Moved "Adjustable Speed Drive (ASD)" before "pumps" and deleted "with an" for clarity.
46	S5.4.8.1.2, 1st para., 4th sent.	Replaced "divisions" with "busses" for clarity.
47	S5.4.8.1.2, 19th para., 2nd sent.	Replaced "ac" with "AC" for clarity.
48	S5.4.8.1.2, 20th para., 1st sent.	Changed from "……reactor water and to reduce the recycle heat loss……" to "……..reactor water to reduce and recycle the heat loss……." for clarity.
49	S5.4.8.1.2, 22nd para., 3ed sent.	Replaced third sentence with the following for clarity: "Shell side relief valves are also provided and sized on the basis of a tube leakage equivalent to 10% of the tube side flow. These valves can relieve shell side pressure in the event that shell side valves are closed and the tube side flow continues."
50	S5.4.8.1.2, 26th para., 1st sent.	Added "and the" between "RHXs" and "tube" for clarity.
51	S5.4.8.1.5, 1st para.	Added new sentences in accordance with response to RAI 7.7-1 S01 as follows: "This instrumentation conforms with GDC 13. Refer to Subsection 3.1.2 for a general discussion of the GDC."
52	S5.4.8.1.5, 3rd para., 1st sent.	Replaced "by a switch with status indicator" with "and status is indicated" for clarity.
53	S5.4.8.1.5, 6th para.	Replaced "both" with "either" and replaced "and" with "or" for clarity.
54	S5.4.8.1.5, 9th para., 2nd	Replaced "will bypass the demineralizer" with "will initiate

	sent.	the opening of the demineralizer bypass valve" for clarity.
55	S5.4.8.1.5, 10th para., 1st sent.	Replaced "manually operable" with "controlled" and replaced "with indication of position status" with "and position is indicated" for clarity.
56	S5.4.8.2.2, 16th para., 1st sent.	Changed from "In conjunction with the isolation condensers, the system has the capability of removing the core decay heat, plus drain excess makeup due to the CRD purge flow, after one-half hour following control rod insertion" to "In conjunction with the isolation condensers, one-half hour after control rod insertion, the RWCU/SDC system has the capability of removing core decay heat and overboarding excess makeup due to the CRD purge flow" for clarity.
57	S5.4.8.2.2, 17th para., 1st sent.	Replaced entire sentence with "If the reactor is in the "run" mode of operation, a shutdown caused by an isolation event will cause the Isolation Condensers (ICS) to activate. Assuming the most restrictive single active failure, any number of the Isolation Condensers can be valved-out by the operator in order to provide easier pressure and water regulation of the RWCU/SDC system" for clarity.
58	S5.4.8.2.5, 3rd para.	Added new paragraph as follows to be consistent with DCD Chapter 15A.3.7 analysis requirements: "The RWCU/SDC Shutdown Cooling function modes are interlocked with Reactor Power operation to prevent increase in reactivity. During reactor Power operation, the operator cannot start or select the RWCU/SDC Shutdown Cooling function modes. Interlocks are also provided to prevent inadvertent operation of pumps at higher speed and higher flow, and opening of RHX bypass valves during Reactor Power operation. An alarm is initiated if flow is higher than normal and the reactor is at power".
59	S5.4.9.2, 3rd para., 1st sent.	Changed from "…… through the motor-operated isolation valves; and Quality Group D, ANSI B31.1 thereafter" to "……..through the isolation shutoff valves to the seismic interface restraint" for consistency with the response to RAI 3.2-15, which changed the Quality Group classification of feedwater piping, and the feedwater line isolation valve design changes.
60	S5.4.9.2, 3rd para., 2nd sent.	Changed from "motor-operated isolation valve" to "isolation shutoff valve" to reflect feedwater line isolation valve design changes.
61	T5.4-2	In "Failure" column for "Lower Header Bypass Vent" valves and "Purge" valve: Changed from "AI" to "FC" to

		reflect the correct valve position upon loss of power.
62	F5.4-3	Deleted check valves immediately downstream of feedwater isolation valves outside containment to reflect feedwater line isolation valve design changes and removed the surrounding detail about door, hatch and stairway locations, which are not relevant to the arrangement of the main steam and feedwater lines and their associated major components.