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January 3, 2013
U7-C-NINA-NRC-130001

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

The Attachments provide supplemental or revised responses to NRC staff questions 02.03.01-24, 03.08.04-18, and 03.08.04-39 related to the Combined License Application (COLA) Part 2, Tier 2, Section 3.8. Following the audit performed during the week of December 10, 2012, the NRC staff requested that Nuclear Innovation North America, LLC provide additional information to support the review of the COLA. These submittal responses complete the actions requested by the NRC staff.

Where there are COLA markups, they will be made at the first routine COLA update following NRC acceptance of the RAI response. There are no commitments in this letter.

If you have any questions regarding these responses, please contact me at (979) 316-3011 or Bill Mookhoek at (979) 316-3014.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 1/3/13

Scott Head
Manager, Regulatory Affairs
NINA STP Units 3 & 4

jep
Attachments:

1. RAI 02.03.01-24, Supplement 5
2. RAI 03.08.04-18, Supplement 5
3. RAI 03.08.04-39, Revision 1

D091
NRO

STI 33637862

cc: w/o attachment except*
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RAI 02.03.01-24, Supplement 5

QUESTION:

10 CFR 52.79(a)(1)(iii) states, in part, that the COL FSAR should include the meteorological characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. 10 CFR 100.20(c)(2) states that the meteorological characteristics of the site that are necessary for safety analysis or that may have an impact upon plant design must be identified and characterized and 10 CFR 100.21(d) states, in part, that the meteorological characteristics of the site must be evaluated and site parameters established such that potential threats from such physical characteristics will pose no undue risk to the type of facility proposed to be located at the site.

10 CFR Part 50, Appendix A, GDC 2 requires that SSCs that are important to safety be designed to withstand the effects of natural phenomena, such as tornadoes and hurricanes, without loss of the ability to perform their safety functions. 10 CFR Part 50, Appendix A, GDC 4 requires that SSCs that are important to safety be appropriately protected against the effects of missiles that may result from events and conditions outside the nuclear power unit.

Nuclear power plants must be designed so that they remain in a safe condition under extreme meteorological events, including those that could result in the most extreme wind events (tornadoes and hurricanes) that could reasonably be predicted to occur at the site. Initially, the U.S. Atomic Energy Commission (predecessor to the NRC) considered tornadoes to be the bounding extreme wind events and issued RG 1.76, ''Design-Basis Tornado for Nuclear Power Plants,'' in April 1974. The design-basis tornado wind speeds were chosen so that the probability that a tornado exceeding the design basis would occur was on the order of 10^{-7} per year per nuclear power plant. In March 2007, the NRC issued Revision 1 of RG 1.76, ''Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants." Revision 1 of RG 1.76 relied on the Enhanced Fujita Scale, which was implemented by the National Weather Service in February 2007. The Enhanced Fujita Scale is a revised assessment relating tornado damage to wind speed, which resulted in a decrease in design-basis tornado wind speed criteria in Revision 1 of RG 1.76. Since design-basis tornado wind speeds were decreased as a result of the analysis performed to update RG 1.76, it was no longer clear that the revised tornado design basis wind speeds would bound design-basis hurricane wind speeds in all areas of the United States. This prompted an investigation into extreme wind gusts during hurricanes and their relation to design basis hurricane wind speeds, which resulted in issuing RG 1.221, "Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants," in October 2011.

RG 1.221 also evaluated missile velocities associated with several types of missiles considered for different hurricane wind speeds. The hurricane missile analyses presented in RG 1.221 are based on missile aerodynamic and initial condition assumptions that are similar to those used for the analyses of tornado-borne missile velocities adopted for Revision 1 to RG 1.76. However, the assumed hurricane wind field differs from the assumed tornado wind field in that the hurricane wind field does not change spatially during the missile's flight time but does vary with height above the ground. Because the size of the hurricane zone with the highest winds is large relative to the size of the missile trajectory, the hurricane missile is subjected to the highest wind speeds throughout its trajectory. In contrast, the tornado wind field is smaller, so the tornado missile is subject to the strongest winds only at the beginning of its flight. This results in the same missile having a higher maximum velocity in a hurricane wind field than in a tornado wind field with the same maximum (3-second gust) wind speed.

The STP COLA incorporates by reference the ABWR Design Control Document (DCD). Section 3.5.1.4 of the DCD states, in part, that "tornado-generated missiles have been determined to be the limiting natural phenomena hazard in the design of all structures required for safe shutdown of the nuclear power plant. Since tornado missiles are used in the design basis, it is not necessary to consider missiles generated from other natural phenomena." However, Section 3.5.4.2 of the DCD states, in part, that the COL applicant "shall identify missiles generated by other site-specific natural phenomena that may be more limiting than those considered in the ABWR design and shall provide protection for the structures, systems, and components against such missiles."

Accordingly, the applicant is requested to address the following:

a. Consistent with the requirements of 10 CFR 52.79(a)(1)(iii), 10 CFR 100.20(c)(2), 10 CFR 100.21(d), and the Combined License Information requirement of ABWR DCD Section 3.5.4, please identify hurricane wind speed and missile spectra for the STP site. RG 1.221 describes a method that the staff considers acceptable in selecting site-specific hurricane wind speed and hurricane-generated missiles.

b. Pursuant to the requirements of GDC 2, GDC 4, and the Combined License Information requirement of ABWR DCD Section 3.5.4, please confirm that the ABWR standard plant and STP site-specific SSCs important to safety are designed to protect against the combined effects of hurricane winds and missiles defined in question a above.

c. Please revise the appropriate FSAR sections to appropriately reflect the results of questions a and b above.

SUPPLEMENTAL RESPONSE:

Supplement 4 to the response to RAI 02.03.01-24 was submitted with Nuclear Innovation North America (NINA) letter U7-C-NINA-NRC-120064, dated October 8, 2012. Supplement 5 to RAI 02.03.01-24 provides the response to Punch List Items (PLI) 283 through 286 described below. In addition, based on discussions with the NRC staff during the December 2012 NRC audit, COLA markups for Section 3H.11.2 provided with the Supplement 4 response are revised to replace the specified ductility limits with those specified in Section C.3 of ACI 349-97.

The following Punch List Items 283-286 are in regards to evaluations for design-basis hurricane loads that are presented in *Section 5.4.5 of calculation U7-SITE-S-CALC-DESIGN-6004, Revision B, 'Evaluation for Design-Basis Hurricane Loads'*. Evaluations for hurricane generated missiles were performed using the same methodology that was used for evaluation of site-specific Seismic Category I structures for tornado generated missile. These evaluations were performed in accordance with the methodology detailed in the "Guidelines for Extreme Wind and Tornado Design" that was examined by the NRC staff in its February 2012 audit.

Punch List Item 283: *Provide the basis for calculating the panel flexural capacity. The formula for flexure panel capacity used in the calculation is independent of the panel dimensions, panel aspect ratio, and the location of the impact load on the panel. The formula does not appear to be reasonable and applicable for the aspect ratio (1:5) of the Control Building wall panel and the location of the impact load. For example, Ref. 1 (cited below) shows that for a rectangular slab, there are number of possible yield line patterns for the concentrated load. The critical pattern depends on the aspect ratio of the slab and the position of the load. The licensee is requested to provide a justification and to demonstrate conclusively that (i) the flexural capacity of the Control Building wall panel is independent of the panel dimensions, panel aspect ratio, and the location of the impact load on the panel, and (ii) the panel flexural capacity used in the calculation is not over estimated and is based on the failure modes which gives the smallest load to cause collapse. (Ref. 1: "Reinforced Concrete Slabs" by Robert Park and William L. Gamble, Second Edition 2000, John Wiley & Sons, Inc. (pages 339-346)*

Response for PLI 283

The same formulation for panel resistance was used in the tornado missile evaluation of the Ultimate Heat Sink (UHS). The formula is per the *"Guidelines for Extreme Wind and Tornado Design"*, which states that the formula is applicable for a concentrated load anywhere on the slab.

The same formula is also provided as Equation 7.34 of the reference in PLI 283 ("Reinforced Concrete Slabs", Park and Gamble) with the following statement:

> "...for slabs with concentrated loads, the collapse mechanisms involving curved yield negative-moment lines are more critical than the straight-line mechanisms involving large triangular segments. Note also that in Eq. 7.34 the radius of the failure cone *r* has disappeared from the expression for ultimate load. Therefore, the failure cone could have any radius that lies within the slab, and hence the ultimate concentrated load is the same for any position of the concentrated load and for any shape of slab with fixed edges."

The same formula is also provided in Table 4-3 of BC-TOP-9-A for a load at the center of the panel.

Punch List Item 284: *In the calculation of the shear capacity for Cases (a) and (b) in section 5.4.5.3, the entire panel width of 74.8' is considered. If the panel width were to be 100', it is apparent that the calculation will assume the entire panel width of 100' to be effective in resisting shear. This does not appear to be reasonable and credible that the panel shear resistance will be mobilized far away from the impact location. Please provide the basis for determining the effective panel width in providing the shear resistance and the rational for selecting the entire panel width for Cases (a) and (b). Please provide a justification and demonstrate conclusively that in the calculation of the shear capacity of a panel, entire width of the panel between the supports is effective, and (ii) the panel shear capacity used in the calculation is not over estimated and is appropriate for the specific load case being analyzed.*

Response for PLI 284

Full panel width was also considered for shear resistance in tornado missile evaluation of the UHS, which also has large panels

- Pump House wall panel is 72 ft wide
- Basin panels are 83.5 ft tall (68 ft considered for shear length because of buttress height)

Per Section 5.11 (Local Tornado Missile Evaluation) of the Structural Evaluation of the UHS and the Reactor Service Water (RSW) Pump House:

> "Per section 11.10.1 and 11.12.1.1 of ACI 349-97, the critical section extends in a plane across the entire width of the wall."

Per Section 10.1 of the reference in PLI 283 ("Reinforced Concrete Slabs", Park and Gamble), the shear strength of slabs in the vicinity of concentrated loads is governed by the more severe of two conditions, either beam action or two-way action.

> "In beam action the slab fails as a wide beam with the critical section for shear extending along a section in a plane across the entire width of the slab"

> "In two-way action the slab fails in a local area around the concentrated load".

Note that punching shear was checked separately in Section 5.1 of the hurricane evaluation calculation.

Based on the above, the use of full panel width for beam shear check is justified.

Punch List Item 285: *In the calculation of the shear capacity for Case (c), in Table 5.4.5.6-1, a margin of 3% is shown between the panel shear resistance capacity and the automobile impact force. Please perform a sensitivity analysis of the assumed central automobile impact location, its orientation, and configuration (full or partial automobile foot print) on the reported 3% margin to show that any other postulated impact location, orientation or configuration will not result in the margin of less than 3%. Also, provide the basis for determining the effective shear area in calculating the shear resistance.*

Response for PLI 285

The acceptance criteria in *"Guidelines for Extreme Wind and Tornado Design"* states that "The dynamic response is acceptable, provided that $DLF_{max}F_{impact} \leq R_{ml}$". As long as this acceptance criterion is met, there is no need to provide a certain amount of margin. In addition, as noted in the response to PLI 241 in RAI 02.03.01-24 Supplement 2 response (submitted with NINA letter U7-C-NINA-NRC-120040, dated May 22, 2012), the minimum impact force of 1024 kips considered for STP 3&4 design exceeds the maximum impact force of 833 kips per Bechtel Topical Report BC-TOP-9A. Based on this margin of about 23% (1024/833 = 1.229) there is no need for additional sensitivity analysis.

Similar impact locations (near the center of the panel and near the supports) were considered in the tornado missile evaluation of the UHS, but margins were higher for UHS panels. Similar impact locations and effective areas for shear (considering 45° from the impact area) were also considered in the tornado missile evaluation of the Diesel Generator Fuel Oil Storage Vaults. The basis for the effective shear area for case (c) is that the shear will distribute in both directions at that impact location because of the panel size.

Punch List Item 286: *In calculating the flexure and shear capacity of the panel, large panel deformation of panels are likely to occur. The licensee is requested to provide the estimated magnitude of such deformation and insure that function of any safe shutdown component or equipment attached to or in the vicinity of the panel is not affected due to large panel deformations.*

Response for PLI 286

Although for hurricane missile evaluations, local non-linear behavior is permitted, there will be no gross failure (i.e. no perforation or scabbing) of the impacted panel or the structure. Thus, no secondary missiles will be generated inside the structure and considering how massive the structure is with respect to the impacting missile, the imparted shock from a hurricane missile will be localized and may be critical only for the instruments directly attached to the impacted wall near the point of impact. However, during a hurricane event, only a limited number of equipment / instruments are required for safe shutdown. Layout and support of instruments are part of the detailed design where such instruments are generally supported by instrument racks attached to floor slabs. Considering this, during a hurricane event, the safe shutdown function is not affected by impact of hurricane missiles.

See Enclosure for COLA markups.

Enclosure

COLA MARKUPS

(Note: The following COLA markups are based on COLA markups provided with Supplement 4 of this response)

3H.11.2 Evaluations for Hurricane Design

b) Response extends into plastic range

- When the response extends into the plastic range, the dynamic response is acceptable, provided the ductility limits of Section C.3 of ACI 349-97 are met.following is met:

$$\mu_{demand} \leq \mu_{limit}$$

- The ductility demand (μ_{demand}) is based on impact force time history and the parameters (t_d/T) and (R_{m1}/F_{impact}). In order to determine the acceptable ductility limit for the panel, it should be determined whether shear or flexure controls the design. Paragraph C.3.6 of ACI 349-97 states that flexure controls the design if the shear capacity exceeds the flexural capacity by 20%.
- For designs controlled by flexure, the ductility limit (μ_{limit}) is $0.05/(\rho - \rho')$, not to exceed 10.
- For designs controlled by shear, the ductility limit is 1.3.

RAI 03.08.04-18, Supplement 5

QUESTION:

Follow-up to Question 03.08.04-2 (RAI 2964)

The applicant's response to Question 03.08.04-2 states that the Radwaste Building (RWB) will be designed in accordance with the requirements of RG 1.143, Revision 2. The applicant also discussed the design criteria for this building for seismic category II/I evaluation. In order for the staff to conclude that the Radwaste Building design meets the requirements of RG 1.143, and also meets the requirement in ABWR DCD Section 3.7.2.8, item (3), the FSAR needs to include sufficient design information for the building to demonstrate that the design meets the pertinent design criteria. Guidance provided in SRP Section 3.8.4 may be used for providing such information. Therefore, the applicant is requested to provide design information for the RWB in the FSAR that includes more detailed description of the structure; applicable codes, standards and specifications; loads and load combinations including live loads, seismic loads, thermal loads, flood loads, tornado loads, lateral soil pressure, etc.; design and analysis procedures; structural acceptance criteria; materials and quality control; design of critical sections, stability evaluation, etc.

SUPPLEMENTAL RESPONSE:

The Supplement 4 response to this RAI was submitted with Nuclear Innovation North America (NINA) letter U7-C-NINA-NRC-120057, dated August 28, 2012. Based on the discussions with the NRC staff during the December 2012 NRC audit, this supplement revises the COLA markups that were provided in Supplement 4 of this response in regards to Punch List Item 265.

See Enclosure for COLA markups.

Enclosure

COLA MARKUPS

3H.6.5.2.14 Determination of Seismic Overturning Moments and Sliding Forces for Seismic Category I Structures

The evaluation of seismic overturning moments and sliding accounts for the simultaneous application of seismic forces in three directions using 100%, 40%, 40% combination rule as shown below:

±100% X-excitation ±40% Y-excitation +40% Z-excitation
±40% X-excitation ±100% Y-excitation +40% Z-excitation

(Note: X & Y are horizontal axes and Z is vertical axis. Positive Z is upward. Also, ±40% X-excitation ±40% Y-excitation ±100% Z-excitation is not critical for the UHS/RSW Pump House).

The resisting forces and moments due to dead load are calculated using a reduction factor of 0.90. Resisting forces and moments due to soil are based on at-rest soil pressure, or passive soil pressure, as appropriate. The friction coefficients used for the sliding evaluation are 0.30 under the RSW Pump House and 0.40 under the UHS Basin. See Figure 3H.6-137 for formulations used for calculation of factors of safety against sliding and overturning. The calculated stability safety factors for the UHS/RSW Pump House are provided in Table 3H.6-5.

Note: Figure 3H.6-137 presents the formulations for sliding and overturning check for a single horizontal direction earthquake. When considering two horizontal (X and Y) excitations, for sliding check, the formulations of Figure 3H.6-137 remain unchanged except that the friction force (F) along the X or Y direction is replaced with Fx and Fy (friction force along the x and y axes, respectively). Fx and Fy forces are determined as follows:

Let:

Rx = Total driving sliding force along the x-axis
Ry = Total driving sliding force along the y-axis
R = Resultant driving sliding force = $[Rx^2 + Ry^2]^{1/2}$
F = Total friction force as defined in Figure 3H.6-137
Fx = Friction force along the x-axis
Fy = Friction force along the y-axis

Then,

Fx = F(Rx/R)
Fy = F(Ry/R)

For overturning check, when considering two horizontal (X and Y) excitations, the structure will tend to tip about a building corner. However, since under two simultaneous horizontal excitations there is no reduction in the resisting dead load and soil pressures against overturning about each of the two principal axes of the structure, the formulations of Figure 3H.6-137 for calculation of minimum factor of safety against overturning will remain unchanged. Depending on the magnitude of the driving and resisting forces as well as building geometry, overturning about one of the two principal axes of the structure will yield the minimum safety factor against overturning. Since the STP 3&4 overturning evaluations address overturning about each of the two principal axes of the structure, the minimum safety factor against overturning of the structure is appropriately determined.

RAI 03.08.04-39, Revision 1

QUESTION:

10 CFR 50, Appendix A, General Design Criterion 2 states that structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena without loss of capability to perform their safety functions. It also states that the design bases for these SSCs shall reflect the importance of the safety functions to be performed.

General Design Criterion 60 requires in part that nuclear power units control suitably the release of radioactive materials during normal operation and anticipated operational occurrences.

General Design Criterion 61 requires in part that radioactive waste systems be designed with suitable shielding and appropriate containment and confinement to assure adequate safety under normal and postulated accident conditions.

In response to RAI 03.08.04-37, and in the related calculation packages provided for staff audit, the applicant provided their assumptions and calculations addressing the unmitigated release and unmitigated exposure criteria provided in Regulatory Guide 1.143, Revision 2, Regulatory Position 5.2 (RW-IIb), for the STP 3 & 4 radwaste buildings. In performing this analysis, however, the applicant assumed that various passive features in the buildings (such as cubicle shield walls) remained intact. By making the assumptions that various cubicle shield walls and building walls remained intact, the applicant took credit for the shielding provided by these intact walls in order to mitigate both the release of radioactive materials and worker exposure. It is the staff's position that the phrases "unmitigated radiological release" and "unmitigated exposure" as stated in Regulatory Position 5 of RG 1.143, Rev. 2, mean that no credit can be taken for building or system design features in reducing the source term or exposure since the objective is to define a bounding condition and an adequate radwaste building design. The staff concludes that the approach and assumptions used by the applicant in its evaluation are not consistent with the guidance provided in RG 1.143, Revision 2, for the Radwaste Building and associated SSCs.

Therefore, the applicant is requested to determine the dose rate at the boundary of the unprotected area from the maximum unmitigated radiological release and the maximum unmitigated exposure to site personnel within the protected area using a calculation which is consistent with the guidance provided in RG 1.143, Revision 2, and classify and design the Radwaste Building and associated SSCs appropriately, in accordance with the results of the calculation. Alternately, the applicant can use an alternative method to design the radwaste building and systems. For either option chosen, the applicant is requested to provide sufficient information for the staff to do an independent evaluation to either confirm compliance with RG 1.143, Rev. 2 or evaluate the acceptability of an alternate method, once formally submitted.

REVISED RESPONSE:

To resolve this issue, Nuclear Innovation North America will revise the COLA to change the Radwaste Building (RWB) classification to RW-IIa. Table 1 below is provided to show the details of how the STP 3&4 RWB design loading now complies with Table 2 of RG 1.143 for a RW-IIa classification.

The original response to this RAI (submitted October 8, 2012 with letter number U7-C-NINA-NRC-120063) changed the classification of the Radwaste Building (RWB) to RW-IIa. The purpose of this revision is to provide FSAR updates to add the classification of radwaste systems and components in the RWB based on its RW-IIa classification. This has been added as Supplemental information to Tier 2 Table 3.2-1, as shown in Enclosure 1. This revised response also includes a summary of the methodology used to determine the classification of the radwaste systems and components in the RWB. The classification of systems and components addresses Punch List Item 277.

In addition, updates to Tier 2 Section 3H.3 have been included to address malevolent vehicle assault, accidental explosion, and small aircraft crash in accordance with Table 2 of Regulatory Guide 1.143. The updates for malevolent vehicle assault and accidental explosion address Punch List Items 281 and 282, respectively. The portions of Table 1 of the response addressing malevolent vehicle assault, accidental explosion, and small aircraft crash have also been revised.

<u>System and Component Classification Methodology</u>

For a RWB classified as RW-IIa, system and component classification is performed in accordance with Regulatory Guide 1.143, Regulatory Position 5.3:

> *Any systems or components in a RW-IIa facility (see Regulatory Position 5.1) that store, process, or handle radioactive waste in excess of the A_1 quantities given in Appendix A, "Determination of A_1 and A_2," to 10 CFR Part 71, "Packaging and Transportation of Radioactive Material," are classified as RW-IIa. These systems or components that process radioactive waste in excess of the A_2 quantities but less than the A_1 quantities given in Appendix A to 10 CFR Part 71 are classified as RW-IIb. All other components are classified as RW-IIc. This classification may be modified for specific radwaste components.*

Based on the excerpt above, an A_1 and A_2 quantity for each system and component is required to classify each system and component. Since the systems and components in the RWB contain waste that is a mixture of different radionuclides, an A_1 and A_2 quantity for each system and component inventory is calculated. Using the guidance provided in Section IV(c) of 10 CFR Part 71 Appendix A, the A_1 quantity for a mixture is given by the following equation:

$$A_1 = \frac{1}{\sum_i \frac{f(i)}{A_1(i)}}$$

where:

A_1 = A_1 quantity for the whole mixture,
$f(i)$ = fraction of activity for radionuclide i in the mixture,
$A_1(i)$ = appropriate A_1 quantity for radionuclide i, and
i = indicates the summation is done for all radionuclides in the mixture.

A similar equation is provided for the calculation of the A_2 quantity of a mixture in Section IV(d) in 10 CFR Part 71 Appendix A.

Table 2 summarizes the classification of each component and subsystem in the RWB. The components that are included are all of the components in radwaste subsystems that are located in the RWB and have defined radionuclide inventories in Chapter 12 of the SAR. The A_1 and A_2 quantities for the mix of nuclides in each component are calculated as described above and compared to the component inventory to determine the classification.

The subsystem inventories are determined by summing the inventories for all the major components in the subsystem. For example, the High Conductivity Waste subsystem includes two collector tanks, two sample tanks and a filter/demin skid. The activity in these components are summed and then increased by 10% to account for pipes, valves, pumps and other components in the subsystem that may contain waste. The A_1 and A_2 quantities for the resulting inventory are then calculated and the classification of the subsystem determined as described above. For those subsystems that have a component that is classified as RW-IIa, the subsystem is automatically classified as RW-IIa and the A_1 and A_2 values are not separately determined.

As Table 2 indicates, both the Liquid Waste Management System (LWMS) and Solid Waste Management System (SWMS) contain components that are classified as RW-IIa, so these systems would also be classified as RW-IIa.

Table 1
STP 3&4 Radwaste Building Design vs. RW-IIa Criteria (refer to RG 1.143 Table 2)

Loading	Classification RW-IIa	STP 3&4 RW/B Design	STP 3&4 RW/B Structure II/I Design
Earthquake	OBE or ½ SSE	½ SSE	• Stability – Amplified Site Specific SSE • II/I – Envelope of amplified site-specific SSE and 0.3g RG 1.60 SSE
Wind	ASCE 7-95, Category III (126 mph)	ASCE 7-95, Category III (126 mph)	ASCE 7-95, Category III (126 mph)
Tornado	ANS 2.3 at Probability 10^{-5}/yr or three-fifths of Criteria in RG 1.76, Table 1.	Max. speed = three-fifths of 200mph (120 mph)	• Stability – Regulatory Guide 1.76, Rev. 1, Region II (200 mph) • II/I – DCD tornado wind, Tier 1 Table 5.0 (300 mph)
Tornado Missile SRP Section 3.5	A. 75 lbs, 3 in. nominal diameter sch. 40 pipe. Maximum velocity 0.4 x max. wind speed horizontal and 0.28 times max. wind speed vertical direction. (Penetrating missile) B. Automobile wt. 4000 lbs with frontal area of 20.0 sq. ft. traveling horizontally at 0.2 times maximum wind speed horizontally and 0.14 times maximum wind speed up to a height of 35 ft above grade. (Impact-type missile)	For RW-IIa components located above grade: A. 3 in. pipe: Horizontal 48 mph, Vertical 34 mph B. Automobile: Horizontal 24 mph, Vertical 17 mph	Exterior structural walls and slabs above grade, in accordance with Tier 1 Table 5.0: A. 3 in. pipe: Horizontal 120 mph, Vertical 84 mph B. Automobile: Horizontal 105 mph
Flood	Regulatory Guide 1.59, one-half of the PMF (Probable Maximum Flood).	Site PMF is 26.3 ft MSL (FSAR Section 2.4S.3), design flood level 33' MSL (1' below grade)	Structural design flood loading for flood elev. 40' MSL
Precipitation (Rain, Snow)	ANS 2.8 at probability of 1 x 10-3/yr or Regulatory Guide 1.59, one-half precipitation specific for the PMF. Roof (snow) load < 50 psf ½ PMP rate = 9.9 in/hr ½ PMP flood < 36.6'MSL	Roof (snow) load < 50 psf ½ PMP rate = 9.9 in/hr ½ PMP flood < 36.6'MSL	In accordance with Tier 1 Table 5.0: Snow load (50 psf) Rainfall (Max. PMP rate 19.8 in/hr) PMP flood 36.6'MSL
Accidental Explosion Fixed Facility	To be evaluated on a case-by-case basis, plant-specific definition.	See FSAR Section 3H.3.4.3.3.3.	
Accidental Explosion Transportation Vehicle	See Regulatory Guide 1.91.	See FSAR Section 3H.3.4.3.3.3.	

Loading	**Classification RW-IIa**	**STP 3&4 RW/B Design**	**STP 3&4 RW/B Structure II/I Design**
Malevolent Vehicle Assault	Regulatory Guide 5.68 or plant-specific definition.	See FSAR Section 3H.3.4.3.3.2.	
Small Aircraft Crash	Plant-specific definition	See FSAR Section 3H.3.4.3.3.4.	

Table 2
System and Component Classification for RWB Classified as RW-IIa

System or Component	Radionuclide Inventory (MBq)	Mixture A_1 Value (MBq)	Mixture A_2 Value (MBq)	Classification
Low Conductivity Waste (LCW) Subsystem	1.04E+07	-	-	RW-IIa
LCW Collector Tank	7.40E+05 (Table 12.2-13a)	6.68E+05	4.79E+05	RW-IIa
LCW Filter/Demin Skid	6.52E+06 (Table 12.2-13b)	1.05E+06	5.61E+05	RW-IIa
LCW Sample Tank	5.84E+02 (Table 12.2-13d)	7.47E+05	5.08E+05	RW-IIc
High Conductivity Waste (HCW) Subsystem	8.16E+04	6.54E+05	3.17E+05	RW-IIc
HCW Collector Tank	1.80E+04 (Table 12.2-13e)	5.75E+05	2.83E+05	RW-IIc
HCW Filter/Demin Skid	2.02E+04 (Table 12.2-13f)	1.03E+06	4.71E+05	RW-IIc
HCW Sample Tank	1.81E+00 (Table 12.2-13g)	1.67E+06	1.32E+06	RW-IIc
Detergent Waste (HSD) Subsystem	1.77E+03	1.12E+06	6.75E+05	RW-IIc
HSD Receiver Tank	1.59E+03 (Table 12.2-13h)	1.13E+06	6.78E+05	RW-IIc
HSD Sample Tank	2.43E+01 (Table 12.2-13i)	1.11E+06	6.54E+05	RW-IIc
Chemical Drain Subsystem	7.18E+00	6.62E+05	4.74E+05	RW-IIc
Chemical Drain Tank	6.52E+00 (Table 12.2-13j)	6.61E+05	4.74E+05	RW-IIc
Spent Resins and Sludge Collection and Processing Subsystem	1.03E+09	-	-	RW-IIa
LW Backwash Receiving Tank	2.33E+06 (Table 12.2-15l)	1.46E+06	7.66E+05	RW-IIa
Phase Separator	5.10E+08 (Table 12.2-15c)	1.09E+06	7.27E+05	RW-IIa
Spent Resin Storage Tank	5.72E+06 (Table 12.2-15d)	1.15E+06	7.84E+05	RW-IIa

Enclosure 1

Table 3.2-1 Classification Summary (Continued)

Principal Component[a]		Safety Class[b]	Location[c]	Quality Group Classification[d]	Quality Assurance Requirement[e]	Seismic Category[f]	Notes
U13	*Radwaste Building* {5}	N	W	_	E	_	(p) (jj)
	~~*1. Structural walls and slabs above grade level (see Subsection 3H.3.3.)*~~	~~N~~	~~W~~	_	~~E~~	_	
	~~*2. Radwaste Building Substructure*~~	~~3~~	~~W~~	_	~~B~~	~~1~~	
	3. Low Conductivity Waste (LCW) Subsystem	N	W	_	E	_	(p) (jj)
	3.a LCW Collection Tank	N	W	_	E	_	(p) (jj)
	3.b LCW Filter/Demin Skid	N	W	_	E	_	(p) (jj)
	3.c LCW Sample Tank	N	W	_	E	_	(p) (kk)
	4. High Conductivity Waste (HCW) Subsystem	N	W	_	E	_	(p) (kk)
	4.a HCW Collection Tank	N	W	_	E	_	(p) (kk)
	4.b HCW Filter/Demin Skid	N	W	_	E	_	(p) (kk)
	4.c HCW Sample Tank	N	W	_	E	_	(p) (kk)
	5. Detergent Waste (HSD) Subsystem	N	W	_	E	_	(p) (kk)
	5.a HSD Receiver Tank	N	W	_	E	_	(p) (kk)
	5.b HSD Sample Tank	N	W	_	E	_	(p) (kk)
	6. Chemical Drain Subsystem	N	W	_	E	_	(p) (kk)
	6.a Chemical Drain Tank	N	W	_	E	_	(p) (kk)
	7. Spent Resins and Sludge Collection and Processing Subsystem	N	W	_	E	_	(p) (jj)
	7.a LW Backwash Receiving Tank	N	W	_	E	_	(p) (jj)
	7.b Phase Separators	N	W	_	E	_	(p) (jj)
	7.c Spent Resin Storage Tanks	N	W	_	E	_	(p) (jj)

Table 3.2-1 Notes and Footnotes

*c.***MCH = Hot Machine Shop**

*X = Control Building/***Control Building Annex**
*U = Ultimate Heat Sink Pump House** **(Ultimate Heat Sink and Associated Structures)**
*P = Power Cycle Heat Sink Pump House** **(Turbine Service Water Pump House or Circulation Water Intake Structure)**
Pump House Structures are out of the ABWR Standard Plant Scope.* **The names in the parentheses are also used in the DCD, COLA, or site-specific MPL.

m. The RCIC turbine <u>and pump are designed and fabricated to ASME Code Section III.</u>~~*and pump are designed and fabricated to ASME Code Section III. is not included in the scope of standard codes. To assure that the turbine is fabricated to the standards commensurate with safety and performance requirements, General Electric has established specific design requirements for this component which are as follows:*~~

~~*1. All welding shall be qualified in accordance with Section IX, ASME Boiler and Pressure Vessel Code.*~~
~~*2. All pressure-containing castings and fabrications shall be hydrotested at 1.5 times the design pressure.*~~
~~*3. All high-pressure castings shall be radiographed according to:*~~
~~*ASTM E-94*~~
~~*E-141*~~
~~*E-142 Maximum feasible volume*~~
~~*E-446, 186 or 280 Severity level 3*~~
~~*4. As-cast surfaces shall be magnetic-particle or liquid-penetrant tested according to ASME Code, Section III, Paragraphs NB-2545, NC-2545, or NB-2546, and NC-2546.*~~
~~*5. Wheel and shaft forgings shall be ultrasonically tested according to ASTM A-388.*~~
~~*6. Butt welds in forgings shall be radiographed and magnetic particle or liquid penetrant tested according to the ASME Boiler and Pressure Vessel Code, Section III Paragraph NB-2575, NC-2575, NB-2545, NC- 2545, NB-2546, NC-2546 respectively. Acceptance standards shall be in accordance with ASME Boiler and Pressure Vessel Code Section III, Paragraph NB-5320, NC-5320, NB-5340, NC-5340, NB-5350, NC-5350, respectively.*~~
~~*7. Notification shall be made on major repairs and records maintained thereof.*~~
~~*8. Record system and traceability shall be according to ASME Section III, NCA-4000.*~~
~~*9. Quality control and identification shall be according to ASME Section III, NCA-4000.*~~
~~*10. Authorized inspection procedures shall conform to ASME Section III, NB-5100 and NC-5100.*~~
~~*11. Non-destructive examination personnel shall be qualified and certified according to ASME Section III, NB-5500 and NC-5500.*~~

p. A quality assurance program meeting the guidance of Regulatory Guide 1.143 will be applied during design and construction.

v. See Regulatory Guide 1.143, **Revision 1,** *Paragraph C.5 for the offgas vault seismic requirements.*

x. The cranes and ~~*Safety Class 2*~~ {3} *fuel servicing equipment are designed to hold up their loads and to maintain their positions over the units under conditions of SSE.*

ii. Watertight doors that protect safety-related equipment from the Design Basis Flood are designated as Seismic Category I.

jj. Classified as RW-IIa (High Hazard) per Regulatory Guide 1.143, Revision 2.
kk. Classified as RW-IIc (Non-Safety) per Regulatory Guide 1.143, Revision 2.

Table 3.4-1 Structures, Penetrations, and Access Openings Designed for Flood Protection (Note 9)

Structure	**Reactor Building**	**Service Building**	**Control Building**	**Radwaste Building**	**Turbine Building**	**Ultimate Heat Sink/RSW Pump House (Note 8)**	**Diesel Generator Fuel Oil Storage Vaults**
Design Flood Level ~~(mm)~~	~~11,695~~ **12,192 mm (40.0 ft)**	~~11,695~~ **10058 mm (33 ft) (Note 7)**	~~11,695~~ **12,192 mm (40.0 ft)**	~~11,695~~ **10058 mm (33 ft) (Note 7)**	~~11,695~~ ***10058*** **mm (33 ft) (Note 7)**	**12,192 mm (40.0 ft)**	**12,192 mm (40.0 ft)**
Design Ground Water Level ~~(mm)~~	~~11,390~~ **9,753mm (32 ft)**	~~11,390~~ **9,753 mm (32 ft)**	~~11,390~~ **9,753 mm (32 ft)**	~~11,390~~ **9,753 mm (32 ft)**	~~11,390~~ **9,753 mm (32 ft)**	**8,534 mm (28.0 ft)**	**8,534 mm (28.0 ft)**
Reference Plant Grade ~~(mm)~~	~~12,000~~ **10,363 mm (34ft)**	~~12,000~~ **10,363 mm (34ft)**	~~12,000~~ **10,363 mm (34ft)**	~~12,000~~ **10,363 mm (34ft)**	~~12,000~~ **10,363 mm (34ft)**	**10,363 mm (34 ft)**	**10,363 mm (34 ft)**
Top of Base Slab ~~(mm)~~	~~−8,200~~ **−9,837 mm (-32.27 ft)**	~~−2,150 & 3,500~~ **-3,787 mm (-12.42 ft)**	~~−8,200~~ **−9,837 mm (-32.27 ft)**	~~-1,500~~ **-3,353 mm (-11 ft)**	~~5,300~~ **-4,840 mm (-15.88 ft)**	**4,267 mm (UHS), -5,486 mm (RSW Pump House) (14 ft, UHS) (-18 ft, RSW Pump House)**	**-914 mm (-3 ft)**
Actual Plant Grade ~~(mm)~~	~~12,000~~ **Varies between 9,753 mm (32 ft) and 10,973 mm (36 ft)**	~~12,000~~ **Varies between 9,753 mm (32 ft) and 10,973 mm (36 ft)**	~~12,000~~ **Varies between 9,753 mm (32 ft) and 10,973 mm (36 ft)**	~~12,000~~ **Varies between 9,753 mm (32 ft) and 10,973 mm (36 ft)**	~~12,000~~ **Varies between 9,753 mm (32 ft) and 10,973 mm (36 ft)**	**Varies between 9,753 mm (32 ft) and 10,973 mm (36 ft)**	**Varies between 9,753 mm (32 ft) and 10,973 mm (36 ft)**
~~*Building Height (mm)*~~	~~*49,700*~~	~~*22,200*~~	~~*22,200*~~	~~*28,000*~~	~~*54,300*~~		
Penetrations Below Design Flood Level (Notes 1 through 4)	Refer to Table 6.2-9	None	RCW, RSW and miscellaneous lines, and electrical penetrations	None, except radwaste piping	Radwaste piping	**RSW piping and electric cables**	**Fuel oil transfer piping**

Table 3.4-1 Structures, Penetrations, and Access Openings Designed for Flood Protection (Note 9) (Continued)

Structure	Reactor Building	Service Building	Control Building	Radwaste Building	Turbine Building	Ultimate Heat Sink/RSW Pump House (Note 8)	Diesel Generator Fuel Oil Storage Vaults
Access Openings Below Design Flood Level (Notes 5 and 6)	Access ways **to outside and** from S/B **and C/B (Fig. 1.2-4 through 1.2-8)** ~~@ 4,800 mm~~	Access ways from R/B, **C/B and T/B. (Fig. 1.2-17 through 1.2-20)** ~~@ 3,500 mm, (Fig. 1.2-18)~~ ~~Area access ways from C/B @ 2,150 mm, 3,500 mm, and 7,900 mm (Fig. 1.2-19)~~ ~~Area access way from T/B @ 3,500 mm (Fig. 1.2-24)~~	~~Hx area access from S/B @ –2,150 mm, (Fig. 1.2-15)~~ ~~Area access from S/B @ 3,500 (See Fig. 1.2-18~~ ~~Area access way from S/B @ 7,900 mm, (See Fig. 1.2-15)~~ **Access ways to outside, S/B, R/B, and RW/B (See Fig 1.2-17 through 1.2-20)**	None	Access ways from S/B ~~@ 5,300 mm,~~ **(Fig 1.2-18)**	**None**	**Access room door**

Notes:

1 Watertight penetrations will be provided for all Reactor, ~~and~~ Control, Turbine and Radwaste Building~~s~~ penetrations that are below ~~grade~~ design flood level.

2 The safety-related and non-safety-related tunnels prevent the lines running through them from being exposed to outside ground flooding.

3 Penetrations below design flood level will be sealed against any hydrostatic head resulting from the design basis flood, or from a moderate energy pipe failure in the tunnel or inside a connecting building.

4 Waterproof sealant applied to the building exterior walls below flood level will also be extended a minimum of 150 mm along the penetration surfaces.

5 Watertight doors (bulkhead type) are provided at all Reactor, ~~and~~ Control Building, and Diesel Generator Fuel Oil Storage Vault *access ways that are below ~~grade~~* design flood level.

6 The figure shown best depicts the indicated access.

7 The Turbine Building and Service Building shall also meet the flood design requirements of ASCE 7-05. The Radwaste Building is structurally designed for the Design Flood Level and is designed to be watertight up to 36 ft MSL. ~~shall also meet the flood design requirements of ASCE 7-95.~~

8 UHS includes safety-related cooling towers and RSW Pump House, which are contiguous to the UHS.

9 All elevations in this table correspond to mean sea level (msl).

Appendix 3H
Section 3H.3 Radwaste Building

The RWB is classified as RW-IIa (High Hazard) ~~RW-IIb (Hazardous)~~ in accordance with RG 1.143.

A) Criteria for Design Basis:

- Design basis analysis and design are per requirements of ~~Revision 2 of~~ RG 1.143 for RW-IIa ~~RW-IIb~~ classification.

Section 3H.3.1 Objective and Scope

The scope of this subsection is to document the structural design and analysis of the Radwaste Building (RWB) for STP Units 3 & 4. The RWB is not a Seismic Category I structure. The RWB is classified as RW-IIa (High Hazard) ~~RW-IIb (Hazardous)~~ for STP 3 & 4 site per ~~Section 5 of~~ Regulatory Guide (RG) 1.143 ~~Revision 2~~ and designed to meet or exceed applicable requirements of RG 1.143 ~~Revision 2~~. ~~The determination of the RWB classification is based on an evaluation of an unmitigated release from the RWB. The unmitigated release results in an annual dose outside the protected area of less than 500 mrem/yr and an annual dose to site personnel of less than 5 rem/yr. This results in a RW-IIb classification for the structure in accordance with Section 5.2 of RG 1.143. Although, the RWB is classified as RW-IIb, it is designed conservatively for earthquake, tornado and wind loadings based on the requirements for RW-IIa classification. Design for other loads is based on the requirements for RW-IIb classification.~~

3H.3.4.2.3 Design Flood Level

Design flood level is 33 feet MSL, as shown in DCD, Tier 1, Table 5.0. This flood level is above the level ~~derived from the ASCE 7-05~~ resulting from one-half of the PMF (RG 1.143 requirement) described in Section 2.4S.3 ~~for the STP 3 & 4 site~~.

3H.3.4.2.4 Maximum Snow Load

Roof snow load is 50 psf (2.39 kPa) as shown in DCD Tier 1 Table 5.0. This snow load is very conservative ~~above the value derived from ASCE 7-95 (RG 1.143 requirement)~~ for the STP 3 & 4 site. This load is not combined with normal roof live load.

3H.3.4.3.3.2 Malevolent Vehicle Assault

The RWB is protected from malevolent vehicle assault in accordance with Regulatory Guide 5.68.

3H.3.4.3.3.3 Accidental Explosion

In accordance with Table 2 of RG 1.143 Revision 2 for RW-IIa classification, accidental explosion hazards have been evaluated and found not to pose any hazards to the Radwaste Building.

3H.3.4.3.3.4 Small Aircraft Crash

As discussed in FSAR section 2.2S.2.7, the methodology described in NUREG-0800 section 3.5.1.6, RG 1.117 and DOE-STD-3014-96 was used to determine that the risks due to aircraft hazards are sufficiently low and are not considered in the design of SSCs at the STP 3&4 site.

3H.5.5 Structural Analysis Report For The Radwaste Building (Including Radwaste Tunnels) and The Turbine Building

STD DEP 1.8-1

STD DEP T1 2.15-1

The RW/B (including Radwaste Tunnels) and *T/B* ~~*is*~~are *not classified as* ~~*a*~~ *Seismic Category 1 structure*s. ~~*However, the buildings*~~The T/B ~~*is*~~are *designed such that damage to safety-related functions does not occur under seismic loads corresponding to the safe shutdown earthquake (SSE) ground acceleration.* The RW/B (including Radwaste Tunnels) is designed per Regulatory Guide 1.143, with IIa Classification.

Table 3H.9-1 Extreme Environmental Design Parameters for Seismic Analysis, Design, Stability Evaluation and Seismic Category II/I Design

Structure	Seismic Analysis				
	SSI			SSSI	
	Input Motion	Soil Type	Structural Damping for Generation of ISRS	Input Motion	Soil Type
Diesel Generator Fuel Oil Tunnels (DGFOT)	Envelope of Amplified(1) Site-Specific SSE & 0.3g RG 1.60	DCD & Site-Specific	4% for all SSI analysis cases	Site-Specific SSE	Site-Specific
UHS/RSW Pump House	Site-Specific SSE	Site-Specific	4% for all SSI analysis cases	Site-Specific SSE	Site-Specific
RSW Piping Tunnels	Amplified(1) Site-Specific SSE	Site-Specific	4% for all SSI analysis cases Except 7% for Cracked Case	Site-Specific SSE	Site-Specific
Diesel Generator Fuel Oil Storage Vault (DGFOSV)	Envelope of Amplified(1) Site-Specific SSE & 0.3g RG 1.60	Site-Specific	4% for all SSI analysis cases	Site-Specific SSE	Site-Specific
Radwaste Building (RWB)	NA	NA	NA	Site-Specific SSE	Site-Specific
Control Bldg. Annex (CBA)	NA	NA	NA	NA	NA
Turbine Building (TB)	NA	NA	NA	NA	NA
Service Building (SB)	NA	NA	NA	NA	NA

Table 3H.9-1 Extreme Environmental Design Parameters for Seismic Analysis, Design, Stability Evaluation and Seismic Category II/I Design (Continued)

Structure	Design Structure			
	Seismic	Tornado[(5)]	Tornado Missiles[(5)]	Flood
Diesel Generator Fuel Oil Tunnels (DGFOT)	Envelope of Amplified[(1)] Site-Specific SSE & 0.3g RG 1.60 (See Note 4)	DCD Tornado Wind Parameters (As described in Table 5.0 of DCD/Tier 1)	DCD Missile Spectrum 1 as defined in Table 5.0 of DCD/Tier 1	Flood El. 40' MSL, Water Density 63.85 lb/ ft^3 (above grade) + Drag Effect 44 psf (above grade) + Impact of Floating Debris per COLA Section 3.4.2 + Wind Generated Wave Action per COLA Figure 3.4-1 (only hydrodynamic portion)
UHS/RSW Pump House	Site-Specific SSE	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ ft^3 (above grade) + Drag Effect 44 psf (above grade) + Impact of Floating Debris per COLA Section 3.4.2 + Wind Generated Wave Action per COLA Figure 3.4-1 (only hydrodynamic portion)
RSW Piping Tunnels	Amplified[(1)] Site-Specific SSE (See Note 4)	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ ft^3 (above grade) + Drag Effect 44 psf (above grade) + Impact of Floating Debris per COLA Section 3.4.2 + Wind Generated Wave Action per COLA Figure 3.4-1 (only hydrodynamic portion)
Diesel Generator Fuel Oil Storage Vault (DGFOSV)	Envelope of Amplified[(1)] Site-Specific SSE & 0.3g RG 1.60	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ ft^3 (above grade) + Drag Effect 44 psf (above grade) + Impact of Floating Debris per COLA Section 3.4.2 + Wind Generated Wave Action per COLA Figure 3.4-1 (only hydrodynamic portion)
Radwaste Building (RWB)	1/2 of 0.3g RG 1.60 SSE for RW-IIa Classification, 4% Damping	Per Table 2 of RG 1.143 Rev. 2 for RW-IIa Classification	Per Table 2 of RG 1.143 Rev. 2 for RW-IIa Classification ~~(See Note 6)~~	Flood El. 33' MSL RW-IIa~~IIb~~ Classification
Control Bldg. Annex (CBA)	IBC 2006	NA	NA	NA
Turbine Building (TB)	IBC 2006	NA	NA	NA
Service Building (SB)	IBC 2006	NA	NA	NA

Table 3H.9-1 Extreme Environmental Design Parameters for Seismic Analysis, Design,

Stability Evaluation and Seismic Category II/I Design (Continued)

Structure	Design Stability				
	Seismic	Tornado[5]	Tornado Missiles[5]	Flotation	Coeff. Of Friction for Water-proofing Membrane
Diesel Generator Fuel Oil Tunnels (DGFOT)	Amplified[1] Site-Specific SSE	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1 (Note 2)	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade)	Site-Specific
UHS/RSW Pump House	Site-Specific SSE	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade)	Site-Specific
RSW Piping Tunnels	Amplified[1] Site-Specific SSE	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade)	Site-Specific
Diesel Generator Fuel Oil Storage Vault (DGFOSV)	Amplified[1] Site-Specific SSE	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade)	Site-Specific
Radwaste Building (RWB)	Amplified[1] Site-Specific SSE , 7% Damping	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade)	Site-Specific
Control Bldg. Annex (CBA)	Amplified[1] Site-Specific SSE	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade)	Site-Specific
Turbine Building (TB)	Site-Specific SSE	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade)	Site-Specific
Service Building (SB)	Amplified[1] Site-Specific SSE	Site-Specific Tornado Wind Parameters (Region II, RG 1.76 Rev. 1)	Site-Specific Tornado Missile Spectrum for Region II as shown in Table 2 of RG 1.76 Rev. 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade)	Site-Specific

Table 3H.9-1 Extreme Environmental Design Parameters for Seismic Analysis, Design, Stability Evaluation and Seismic Category II/I Design (Continued)

Structure	Design for II/I (applicable to the design of lateral load resisting system)			
	Seismic	**Tornado**[5]	**Tornado Missiles**[5]	**Flood**
Diesel Generator Fuel Oil Tunnels (DGFOT)	NA	NA	NA	NA
UHS/RSW Pump House	NA	NA	NA	NA
RSW Piping Tunnels	NA	NA	NA	NA
Diesel Generator Fuel Oil Storage Vault (DGFOSV)	NA	NA	NA	NA
Radwaste Building (RWB)	Envelope of Amplified[1] Site-Specific SSE & 0.3g RG 1.60, 7% Damping	DCD Tornado Wind Parameters (As described in Table 5.0 of DCD/Tier 1)	DCD Missile Spectrum 1 as defined in Table 5.0 of DCD/Tier 1 [7]	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade) + Drag Effect 44 psf (above grade) + Impact of Floating Debris per COLA Section 3.4.2 + Wind Generated Wave Action per COLA Figure 3.4-1 (only hydrodynamic portion)
Control Bldg. Annex (CBA)	Envelope of Amplified[1] Site-Specific SSE & 0.3g RG 1.60	DCD Tornado Wind Parameters (As described in Table 5.0 of DCD/Tier 1)	DCD Missile Spectrum 1 as defined in Table 5.0 of DCD/Tier 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade) + Drag Effect 44 psf (above grade) + Impact of Floating Debris per COLA Section 3.4.2 + Wind Generated Wave Action per COLA Figure 3.4-1 (only hydrodynamic portion)
Turbine Building (TB)	0.3g RG 1.60 SSE	DCD Tornado Wind Parameters (As described in Table 5.0 of DCD/Tier 1)	DCD Missile Spectrum 1 as defined in Table 5.0 of DCD/Tier 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade) + Drag Effect 44 psf (above grade) + Impact of Floating Debris per COLA Section 3.4.2 + Wind Generated Wave Action per COLA Figure 3.4-1 (only hydrodynamic portion)
Service Building (SB)	Envelope of Amplified[1] Site-Specific SSE & 0.3g RG 1.60	DCD Tornado Wind Parameters (As described in Table 5.0 of DCD/Tier 1)	DCD Missile Spectrum 1 as defined in Table 5.0 of DCD/Tier 1	Flood El. 40' MSL, Water Density 63.85 lb/ft^3 (above grade) + Drag Effect 44 psf (above grade) + Impact of Floating Debris per COLA Section 3.4.2 + Wind Generated Wave Action per COLA Figure 3.4-1 (only hydrodynamic portion)

Table 3H.9-1 Extreme Environmental Design Parameters for Seismic Analysis, Design, Stability Evaluation and Seismic Category II/I Design (Continued)

~~General~~ Notes:

1) **Amplified Site-Specific SSE accounts for the influence of nearby heavy Reactor Building, Control Building, and/or UHS/RSW Pump House.**
2) **For stability under tornado loading with tornado missile, restraints are required at top of DGFOT access regions.**
3) **NA: Not Applicable**
4) **Seismic wave propagation for DGFOT and RSW Piping Tunnels is based on site-specific SSE because their layouts are site-specific.**
5) **See Section 3H.11 for site-specific hurricane wind and hurricane missiles.**
6) **~~The Radwaste Building Structure is designed for tornado missiles and hurricane missiles as described. The large openings at and above grade are missile protected in accordance with Table 2 of RG 1.143 Revision 2 for RW-IIa classification.~~**
7) **The exterior doors of the Radwaste Building are normally closed.**