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This section was not required for DCD and is not used by DCD and FSAR.

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This section was not required for DCD and is not used by DCD and FSAR.

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This section was not required for DCD and is not used by DCD and FSAR.

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This section was not required for DCD and is not used by DCD and FSAR.

19.54 LOW POWER AND SHUTDOWN PRA ASSESSMENT

This section of the referenced DCD is incorporated by reference with no departures or supplements.

19.55 SEISMIC MARGIN ANALYSIS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

19.55.6.3 Site Specific Seismic Margin Analysis

PTN COL 19.59.10-6

The Turkey Point site seismic demand, based on the site Ground Motion Response Spectra (GMRS), as described in FSAR 3.7.1, is enveloped by the AP1000 CSDRS as defined by Tier 1 criteria for SSE. Therefore, the Seismic Margin Assessment analysis documented in DCD Section 19.55 is applicable to the Turkey Point Units 6 & 7 site.

The nuclear island (NI) for Turkey Point Units 6 & 7 is founded on approximately 20 feet of lean concrete fill underlain by about 80 feet of bedrock. For seismic stability of the NI, it was demonstrated that the Turkey Point Units 6 & 7 NI margins against sliding and overturning were greater than the limiting NI margins calculated for the standard AP1000 design cases. For seismic stability, the Seismic Margin Assessment analysis documented in DCD Section 19.55 is applicable to the Turkey Point Units 6 & 7 site.

For site-specific conditions relating to soil- or rock-related failure modes, the demonstration of adequate seismic margin of the AP1000 design was performed for an earthquake of 1.67 x GMRS for Turkey Point Units 6 & 7 for liquefaction potential and bearing capacity.

The liquefaction potential factor of safety was computed to be above the acceptable value of 1.25 except for four measurements in deep soil beneath the bedrock. Two were vertically adjacent measurements (within 0.1 foot of each other) in a cone penetrometer testing (CPT), the third was in another CPT, and the fourth was a shear wave velocity measurement in a borehole. In these four cases, the factor of safety immediately above and below the two adjacent measurements and the two single measurements was higher than 1.25, confirming that the four measurements were isolated measurements and that the factor of safety values lower than 1.25 would have no impact on soil stability. Thus, liquefaction potential was screened out as a contributor to design-specific plant-level High Confidence of Low Probability of Failure (HCLPF) capacity. Similarly, bearing pressure-capacity-to-demand ratio demonstrated sufficient margin (factor of safety of 3) so that this potential failure mode was screened out as a contributor to design-specific plant level HCLPF capacity.

19.56 PRA INTERNAL FLOODING ANALYSIS

This section of the referenced DCD is incorporated by reference with no departures or supplements.

19.57 INTERNAL FIRE ANALYSIS

This section of the referenced DCD is incorporated by reference with no departures or supplements.

19.58 WINDS, FLOODS, AND OTHER EXTERNAL EVENTS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

19.58.1 INTRODUCTION

Add the following text to the end of DCD Subsection 19.58.1:

PTN COL 19.59.10-2 A summary of the risk evaluations of the various external events is provided in Table 19.58-202.

19.58.2.1 Severe Winds and Tornadoes

Replace the text of DCD Subsection 19.58.2.1 with the following:

PTN DEP 19.58-1 The overall methodology recommended by NUREG-1407, “Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities” for analyzing plant risk due to high winds and tornadoes is a progressive screening approach. This approach is modified to consider hazards occurrence, likelihood and risk.

High winds (including tornadoes) can affect plant structures in at least two ways: (1) If wind forces exceed the load capacity of a building or other external facility, the walls or framing might collapse or the structure might overturn from the excessive loading; and (2) If the wind is strong enough, as in a tornado or hurricane, it may be capable of lifting materials and thrusting them as missiles against the plant structures that house safety related equipment. Critical components or other contents of plant structures not designed to resist missile penetration might be damaged and lose their ability to function.

NUREG-1407, Section 2.3, High Winds and Tornados, states that “For plants designed against NRC's current criteria, these events pose no significant threat of a severe accident because the current design criteria for wind are dominated by tornadoes having an annual frequency of exceedance of about 10^{-7}.” This is interpreted to mean that external events with an annual frequency less than about 1.0E–07 may be screened from further consideration and events with an annual frequency greater than 1.0E–07 may require further evaluation. However, the NUREG-1407 screening criterion was developed for current operating plants.

If the external event category cannot be screened out on the basis of its annual frequency, a second screening criterion based on the annual core damage frequency (CDF) associated with that external event category can be used. If the CDF can be demonstrated to not exceed 1.0E–08, the external event category can be screened out.

The AP1000 design basis wind speed is 300 mph, as described in DCD Chapter 2. This value is assumed to be the maximum wind speed that will not challenge the safety related structures. The AP1000 operating basis wind speed is 145 mph, also described in DCD Chapter 2. This value is assumed to be the maximum wind speed that will not challenge the non-safety related structures.

The structures protecting safety related features of the AP1000 are designed for extreme winds and missiles associated with these winds. As long as the external event wind speeds are less than the design basis value, the safety features of the AP1000 will be unaffected. If the winds exceed the design values, then the integrity of the safety related structures may be compromised.

The structures protecting non-safety related features of the AP1000 are designed according to the Uniform Building Code that provides some level of protection against seismic and high wind events. As long as the external event winds are less than the operating basis wind speed, the non-safety features of the AP1000 will be unaffected. If the winds exceed the operating basis values, then the integrity of the non-safety related structures may be compromised.

Per the Enhanced Fujita (EF) Scale for Tornadoes, no tornadoes are expected to have wind speeds that exceed 300 mph; however, EF3, EF4, and EF5 tornado wind speeds do exceed the operating basis wind speed. Per the Saffir-Simpson Scale for Hurricanes, no hurricanes are expected to reach 300 mph winds; however, Category 3, Category 4, and Category 5 hurricane winds may exceed the operating basis wind speed.

The evaluation of the high winds hazard uses the two screening criteria established from the previous description. The first criterion is that if the high wind event category annual frequency does not exceed 1.0E–07, the event category can be screened out from the requirement to perform further analysis. If the first criterion is not met, the second criterion is that if the annual CDF for the event category is assessed to not exceed 1.0E–08, the event category can be screened out. As can be seen from Table 19.58-202, the annual frequency of tornado and hurricane events exceeds 1.0E–07 per year. Therefore, the screening CDF is calculated for high winds to determine if detailed analysis is required.

Risk assessment studies for nuclear power plants typically assume that high wind events cause a Loss of Offsite Power (LOSP) because the site switchyard is not designed to withstand hurricane and tornado wind speeds. For wind speeds greater than the operating basis wind speed, additional structures, systems and components (SSC) may also be damaged. Two analyses were performed to calculate the conditional core damage probability (CCDP) for two plant states resulting from high wind events and are presented in Reference 201. One analysis considered only a LOSP with all plant systems available and the other analysis considered a LOSP along with failure of all standby non-safety systems. These two plant states are defined by the maximum wind speed experienced during the event being either (1) less than or equal to the plant operating basis wind speed or (2) greater than the plant operating basis wind speed. The CCDP for the case of maximum wind speed less than or equal to the operating basis wind speed is 9.81E–09 and the CCDP for the case of maximum wind speed greater than the operating basis wind speed is 5.85E–08.

Risk (CDF) due to the event can then be estimated using the equation:

$$CDF = IEF * CCDP$$

where IEF is the initiating event frequency. If this evaluation indicates an acceptably small contribution to risk (e.g., CDF not greater than about 1.0E–08 events/yr) then the progressive screening is complete and a detailed PRA is not required.

Three studies (Case 1, Case 2, and Case 3) are presented to evaluate CDF for the high wind events for Units 6 & 7. These studies utilize the process described in Reference 201 along with event frequencies specifically for Units 6 & 7.

In the Case 1 study, plant response is a LOSP induced by high wind, with all plant equipment available. All tornados and hurricanes are considered in this Case 1 as they may challenge the switchyard. Extratropical cyclones are normal storms and thunderstorms that typically have wind speeds below the operating basis, but they can, however, regain winds of hurricane or tropical storm force and are also included in the Case 1 analysis, assuming that they cause a LOSP. In Case 1, the CCDP of 9.81E–09 is applied to all storms.

The Case 2 study was performed by modifying Case 1 to apply the CCDP of 5.85E–08 to events that could expose the plant to wind speed greater than the operating basis wind speed.

Category 2 and lower hurricanes and EF0, EF1, and EF2 tornadoes have a CCDP of 9.81E–09 applied.

The range of sustained wind speed for Category 3 hurricanes is 111 mph to 130 mph. Although this range of wind speed is less than the operating basis wind speed, Category 3 hurricanes can have wind gusts that do exceed the operating basis wind speed. Hurricanes labeled as “Category 3" had a maximum wind speed that was within the Category 3 range but some storms were below the Category 3 level for some of the time. To more appropriately represent the effect of Category 3 hurricanes in this Case 2 study, the Category 3 hurricane data for Units 6 & 7 was subdivided on the basis of the fraction of time, while within the 100 nautical mile radius of the site, that the storms were at or below Category 3. If the storm intensity decayed below the Category 3 level, then even wind gusts from the storm would not generate wind speeds that exceed operating basis wind speed and for this fraction of the time that Category 3 hurricanes resided in the 100 nautical mile radius of interest, they would not pose a threat to AP1000 non-safety systems. For the 13 documented Category 3 hurricanes, there are a total of 42 data points reported. Of these 42 data points, 13 indicate that the storm was below Category 3 hurricane intensity. On this basis, 13/42, or 31 percent of the Category 3 event frequency will have a CCDP of 9.81E–09 applied and 69 percent of the Category 3 event frequency will have a CCDP of 5.85E–08 applied.

Category 4 and higher hurricanes and EF3, EF4, and EF5 tornados have a CCDP of 5.85E–08 applied.

Case 3 is a conservative study where all high wind events are evaluated as a LOSP with failure of all non-safety systems. The CCDP of 5.85E–08 was applied to all events. This case was created to represent the risk to the plant if the non-safety structures were not designed to any code. This is a very conservative sensitivity study because all of the structures are designed to the Uniform Building Code.

Results of the calculation of CDF, using the appropriate value of CCDP and the tornado and hurricane occurrence frequencies for Units 6 & 7, are shown in Table 19.58-202. As can be seen from Table 19.58-201, both Cases 1 and 2 have CDF not greater than 1.0E–08 per year. Case 3 has a CDF slightly higher than 1.0E–08 per year.

Case 2 is the “base case” and is considered to be the representative conservative model for high winds, with Case 1 and Case 3 being treated as sensitivity studies. Case 3 is very conservative in that it assumes total failure of the standby non-safety systems (CVS, RNS, SFW, automatic DAS, and Diesel Generators) for all high wind events. Non-safety structures are designed to the Uniform Building Code that offers a degree of robustness such that the above failures are considered extreme and conservative. Therefore, while the total Case 3 CDF does fall slightly above the 1.0E–08 per year CDF screening criterion, the results are considered very conservative for the above reasons. The CDF for Case 2 is 1.0E–08 and, consequently, further detailed PRA is not necessary for the Units 6 & 7 High Winds and Tornados analysis.

19.58.2.3.1 Aviation Accidents

Replace the text of DCD Subsection 19.58.2.3.1 with the following:

PTN COL 19.59.10-2 A conservative analysis was performed to evaluate the risk to Turkey Point Units 6 & 7 due to aviation accidents. The aviation accident hazard evaluation considered airport operations and airway operations for both large and small aircraft. The approach to evaluating aviation accident hazards is similar to that discussed in Subsection 19.58.2.1 for severe winds and tornados. Two screening criteria are used to determine whether a detailed analysis is required: (1) event frequency is less than 1.0E-07 events/year, and (2) CDF associated with aviation accidents is less than 1.0E-08 events/year.

As can be seen from Table 19.58-203, which uses the methodology described in Subsection 2.2.2.7.2 for determining the event frequency, the total annual aircraft accident frequency, considering all types of aircraft, is 3.86E-06, and thus exceeds the first screening criteria. Therefore, an evaluation of CDF associated with aviation accidents was performed.

Risk (CDF) due to aircraft accident hazards can be estimated using the following equation:

$$CDF = IEF * CCDP$$

where IEF is the initiating event frequency and CCDP is the conditional core damage probability.

DCD Appendix 19F includes an assessment of the effects on the plant from the beyond design basis impact of a large commercial aircraft accident. The evaluation of plant damage caused by the impact of a commercial aircraft involves phenomena associated with structural impact, shock-induced vibration and fire effects. The assessment of the aircraft impact also considers structural damage that is caused by impact/penetration of hardened components such as engine rotors and landing gear. DCD Subsection 19F.4.1 concludes that safety-related components inside containment, including the reactor pressure vessel and passive core cooling system, would remain intact and maintain their intended function following the shock-induced vibrations resulting from the impact of a large commercial aircraft.

Accordingly, to establish appropriate CCDPs for the aircraft accidents, it was conservatively assumed that the crash of any aircraft causes an LOSP along with the failure of standby non-safety systems, which are not protected by the reactor containment structures. A CCDP value of 5.85E-08 (Reference 201) represents an LOSP along with the additional failure of standby non-safety systems and was applied to all aviation accidents in the base case. Application of this CCDP to small aircraft accidents is conservative, as it is highly unlikely that a small aircraft would be capable of causing such extensive failures for an AP1000 plant. However, large aircraft crashes would be expected to result in more severe consequences than small aircraft crashes and it is more reasonable to assume that the crash of a large aircraft causes LOSP along with failure of the standby non-safety systems.

To make this distinction between small and large aircraft crashes in the aircraft crash hazard evaluation for Turkey Point Units 6 & 7, a sensitivity evaluation was performed where the CCDP associated with large aircraft accidents was conservatively increased by two orders of magnitude.

The results of the base and sensitivity cases are provided in Table 19.58-203. The resulting CDFs associated with the base case (2.26E-13 events/year) and sensitivity case (1.19E-12 events/year) are both below the screening criterion of 1.0E-08 events/year, and further analysis is not required.

19.58.4 REFERENCES

201. APP-GW-GLR-101, *AP1000 Probabilistic Risk Assessment Site-Specific Considerations*, Rev. 1.

Table 19.58-201
High Winds and Tornadoes Results for Units 6 & 7

DEP 19.58-1

Category	Event	Limiting Initiating Event Frequency (events/yr)	CDF (events/yr)		
			LOSP (Case 1) (events/yr)	LOSP with Non-Safety Systems Unavailable for Select Events (Case 2) (events/yr)	LOSP with Non-Safety Systems Unavailable for All Events (Case 3) (events/yr)
High Winds	EF0 Tornado	2.39E-05	2.34E-13	2.34E-13	1.40E-12
	EF1 Tornado	1.81E-05	1.78E-13	1.78E-13	1.06E-12
	EF2 Tornado	4.30E-05	4.22E-13	4.22E-13	2.52E-12
	EF3 Tornado	1.64E-05	1.61E-13	9.59E-13	9.59E-13
	EF4 Tornado	1.64E-05	1.61E-13	9.59E-13	9.59E-13
	EF5 Tornado	1.64E-05	1.61E-13	9.59E-13	9.59E-13
	Cat. 1 Hurricane	1.02E-01	1.00E-09	1.00E-09	5.97E-09
	Cat. 2 Hurricane	5.10E-02	5.00E-10	5.00E-10	2.98E-09
	Cat. 3A Hurricane	2.57E-02	2.52E-10	2.52E-10	1.50E-09
	Cat. 3B Hurricane	5.73E-02	5.62E-10	3.35E-10	3.35E-09
	Cat. 4 Hurricane	6.40E-02	6.28E-10	3.74E-09	3.74E-09
	Cat. 5 Hurricane	1.90E-02	1.86E-10	1.11E-09	1.11E-09
	Extratropical Cyclones	1.90E-02	1.86E-10	1.86E-10	1.11E-09
Totals			3.3E-09	1.0E-08	2.0E-08

Table 19.58-202 (Sheet 1 of 5)
External Event Frequencies for Turkey Point Units 6 & 7

Category	Event	Evaluation Criteria (See Notes)	Applicable to Site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency (Events/yr)
High Winds	EF0 Tornado	A, C	Y	Turkey Point tornado activity is provided in Subsection 2.3.1.3.2. The event frequency was determined for the 2-degree square area including all or portions of six counties (Broward, Collier, Hendry, Miami-Dade, Monroe, and Palm Beach). There were 297 tornadoes from the six counties that occurred in the 2-degree square in the 58.58 years (1/1/1950 to 7/31/2008) of data examined. Average areas were calculated for each EF scale tornado and assigned to all storms, even if damage path data was not included in a record. Area was normalized by the land area of the 2-degree square. There being no EF Category 4 or 5 events in the 2-degree area during the period of record, the event frequency was estimated to be the same as for an EF3 tornado. The tornado event frequency for each category is bounded by the associated limiting initiating event frequency given in Table 3.0-1 of APP-GW-GLR-101. However, because event frequencies related to hurricanes are not bounded by Table 3.0-1 of APP-GW-GLR-101 a screening CDF evaluation for high winds was performed (FSAR Subsection 19.58.2.1), and the results documented in Table 19.58-201. Based on this analysis, a more detailed PRA is not necessary for Turkey Points Units 6 & 7.	2.39E-05
	EF1 Tornado	A, C	Y		1.81E-05
	EF2 Tornado	A, C	Y		4.30E-05
	EF3 Tornado	A, C	Y		1.64E-05
	EF4 Tornado	A, C	Y		1.64E-05
	EF5 Tornado	A,C	Y		1.64E-05
	Cat. 1 Hurricane	C	Y	The National Oceanic and Atmospheric Administration's Coastal Services Center provides a comprehensive historical database, extending from 1851 through 2007, of tropical cyclone tracks based on information compiled by the National Hurricane Center. Subsection 2.3.1.3.3 summarizes the occurrence of the various categories of hurricanes that have tracked within 100-nautical miles from the Turkey Point Units 6 & 7. This data was used to analyze the event frequency of12 hurricane activity. The event frequency is determined by dividing the number of occurrences of tropical weather by the period of record (157 years). In each of the hurricane categories, with the exception of the extratropical storms, the event frequency exceeds the limiting initiating event frequency given in Table 3.0-1 of the APP-GW-GLR-101. As documented in FSAR Table 2.0-201 the Turkey Point Units 6 & 7 site characteristic tornado wind loadings (200 mph) are less than the AP1000 DCD site characteristic tornado wind loadings (300 mph). However, the Turkey Point Units 6 & 7 site characteristic operating basis wind speed (150 mph-3 second gust, 50 year return) exceeds the DCD site characteristic operating wind speed of 145 mph (PTN DEP 2.0-1). Based on the screening CDF evaluation presented in FSAR Subsection 19.58.2.1 and the results documented in Table 19.58-202, a more detailed PRA is not necessary for Turkey Points Units 6 & 7.	1.02E-01
	Cat. 2 Hurricane	C	Y		5.10E-02
	Cat. 3 Hurricane	C	Y		8.30E-02
	Cat. 4 Hurricane	C	Y		6.40E-02
	Cat. 5 Hurricane	C	Y		1.90E-02
	Extratropical Cyclones	A, C	Y		1.90E-02

Table 19.58-202 (Sheet 2 of 5) External Event Frequencies for Turkey Point Units 6 & 7

Category	Event	Evaluation Criteria (See Notes)	Applicable to Site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency (Events/yr)
External Flood	External Flood	D	N	Potential flooding events and the determination of the design basis flood elevation that may affect Turkey Point Units 6 & 7 safety-related facilities are described in Subsection 2.4.2. The design basis flooding elevation for Turkey Point Units 6 & 7 is determined by considering a number of different flooding scenarios. The potential flooding scenarios applicable and investigated for Turkey Point Units 6 & 7 include the following: probable maximum flood (PMF) on streams and rivers, potential dam failures, probable maximum surge and seiche flooding, probable maximum tsunami, flooding due to ice effects, and potential flooding caused by channel diversions. The flooding scenarios were investigated in conjunction with other flooding and meteorological events, such as wind-generated waves and tidal levels, as recommended in the guidelines presented in ANSI/ANS-2.8-1992. PMF on streams and rivers: Flooding due to the PMF on streams and rivers is assessed and described in Subsection 2.4.3. The PMF on streams and rivers is defined by the probable maximum precipitation (PMP) storm event over the stream or river watershed. As addressed in Subsection 2.4.3, flood levels at Turkey Point Units 6 & 7 during severe storms, such as the PMP event, would be controlled by storm tides in the Biscayne Bay because Turkey Point Units 6 & 7 are located on the Biscayne Bay shoreline and there are no major streams or rivers nearby. As a result, a detailed modeling analysis to determine the flood levels from PMF on streams and rivers was not performed for Turkey Point Units 6 & 7. Potential dam failures: There are no dams located upstream or downstream of Turkey Point Units 6 & 7. The makeup water reservoir, located south of the power block, is constructed of a concrete basin with a top of basin wall at 24 feet NAVD 88, which is 2 feet below the design grade of 26 feet NAVD 88 for the safety-related structures. It is concluded in Subsection 2.4.4 that a postulated breach of the reservoir wall would not pose a flooding risk to the safety-related facilities of the plant. Probable maximum surge and seiche flooding: Probable maximum surge and seiche flooding as a result of the probable maximum hurricane (PMH) is presented in Subsection 2.4.5. The maximum water surface elevation including wave run-up at the plant area during the postulated passage of the PMH is estimated to be 24.8 feet NAVD 88. This flood level also constitutes the design basis flood elevation for the site, and is below the design grade including the elevation of floor entrances and openings of all safety-related facilities at 26 feet NAVD 88. Thus, the safety functions of the plant are not impacted by the PMH-induced flooding.	N/A

Table 19.58-202 (Sheet 3 of 5)
External Event Frequencies for Turkey Point Units 6 & 7

Category	Event	Evaluation Criteria (See Notes)	Applicable to Site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency (Events/yr)
External Flood (Continued)				Probable maximum tsunami: Subsection 2.4.6 describes the estimation of flood levels associated with the probable maximum tsunami (PMT). The maximum water level associated with the PMT at Units 6 & 7 is conservatively estimated to be 16.7 feet NAVD 88. Therefore, the PMT does not pose a flood risk to the safety-related facilities for Units 6 & 7. Flooding due to ice effects: Based on the historical data assessed in Subsection 2.4.7, it is unlikely that ice effects would pose any flood risk to Units 6 & 7. Potential flooding caused by channel diversions: Subsection 2.4.9 describes the effects of channel diversions, and it is determined that channel diversion would not pose any flood risk to Turkey Point Units 6 & 7. The maximum water level at Turkey Point Units 6 & 7 due to a local PMP storm event is estimated and described in Subsection 2.4.2.3. Because the design plant grade (26.0 feet NAVD 88), including the elevation of the openings and entrances to the Turkey Point Units 6 & 7 safety-related buildings, is located above the design basis flood elevation (24.8 feet NAVD 88), as described in Subsection 2.4.2, the safety-related functions of the plant will not be adversely impacted by flooding events. Subsection 2.4.10 describes the flooding protection requirements for Turkey Point Units 6 & 7.	
Transportation and Nearby Facility Accidents	Aviation (commercial/ general/military)	C	Y	As discussed in Subsection 2.2.2.7.2, a calculation to determine the probability of an aircraft accident into the plant and its impact frequency was performed following NUREG-0800 and DOE-STD-3014-96 methodology to determine whether the accident probability rate (external event frequency) is less than an order of magnitude of 1.0E-07 events per year. This assessment led to a total impact frequency of 3.86E-06 per year when considering both the airport and non-airport operations, which is an order of magnitude greater than 1.0E-07 per year. Because the total impact frequency (external event frequency) is greater than 1.0E-07 events per year, a determination was made to ascertain whether the external event frequencies are bounded by the limiting event frequency criterion given in APP-GW-GLR-101. The event frequency numbers were compared to the limiting event frequency numbers, 1.21E-06 and 1.0E-07, for small and large aircraft, respectively, given in APP-GW-GLR-101. (Note, commercial air carrier aircraft, commercial air taxi aircraft, military small aircraft, and military large aircraft are included in the large aircraft category.) The determined impact frequency also exceeded the limiting event frequency of 1.21E-06 events per year for small aircraft in APP-GW-GLR-101. However, based on the screening CDF evaluation presented in Subsection 19.58.2.3.1 and the results documented in Table 19.58-203, the second criterion, the CDF is not greater than about 1.0E-08, is met and the further detailed PRA is not necessary for Turkey Point Units 6 & 7.	General Aviation: 3.70E-06 Commercial Aviation Carrier: 1.72E-08 Commercial Aviation Air Taxi: 3.86E-08 Military Aviation-Large: 2.38E-08 Military Aviation-Small: 8.66E-08 Total: 3.86E-06

Table 19.58-202 (Sheet 4 of 5)
External Event Frequencies for Turkey Point Units 6 & 7

Category	Event	Evaluation Criteria (See Notes)	Applicable to Site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency (Events/yr)
Transportation and Nearby Facility Accidents (Continued)	Marine (ship/barge)	D	N	As described in Subsection 2.2.2.4, Turkey Point Units 6 & 7 are located on the western shore of south Biscayne Bay. Biscayne Bay is a shallow coastal lagoon located on the lower southeast coast of Florida. The Biscayne Bay contains the Miami to Key West, Florida Intracoastal Waterway. The only commodity transported on the Miami to Key West, Florida Intracoastal Waterway is residual fuel oil. In 2005, there were 611,000 short tons of residual fuel oil transported, and the entirety of this commodity was delivered to the Turkey Point Units 1-5 site. Because the storage of residual fuel oil at the Turkey Point Units 1-5 site exceeds the quantity transported by a barge, the storage tanks present a greater hazard and, as such, the analysis of residual fuel oil located in the storage tanks is bounding and no further analysis of the residual fuel oil transported by the barge is warranted.	N/A
	Pipeline (gas/oil)	D	N	As described in Subsection 2.2.2.3, there are two natural gas transmission pipelines operated by Florida Gas Transmission Company within 5 miles of the plant. The Florida Gas Transmission Company owns and operates a high-pressure natural gas pipeline system that serves FPL and other customers in south Florida. Two of the pipelines, the Turkey Point Lateral and the Homestead Lateral, are located within 5 miles of Turkey Point Units 6 & 7. As discussed in Subsections 2.2.3.1.1.7, 2.2.3.1.2.7, and 2.2.3.1.3.5, the postulated scenarios resulting from a release of the bounding natural gas pipeline within 5 miles of the Turkey Point Unit 6 & 7 site do not pose a credible hazard to the site.	N/A
	Railroad	D	N	As discussed in Subsection 2.2.2.6, there are no railroads in the vicinity (5 miles) of Turkey Point Units 6 & 7. Thus, the safety functions of the plant are not impacted by the hazards from this source.	N/A
	Truck	D	N	A description of the highways in the vicinity of Turkey Point Units 6 & 7 is presented in Subsection 2.2.2.5. The only identified chemicals whose transportation route may approach closer than 5 miles to Turkey Point Units 6 & 7 are those chemicals transported onto the Turkey Point plant property. Of these chemicals, gasoline was the only identified roadway transportation event that is not bounded. As discussed in Subsections 2.2.3.1.1.6, 2.2.3.1.2.6, and 2.2.3.1.3.4, the potential hazards resulting from the truck transport of gasoline concluded that there were no adverse impacts to the site.	N/A
	Nearby Facility Accidents	D	N	As detailed in Subsections 2.2.2.2.1, and 2.2.2.2.2, two nearby facilities were evaluated, Turkey Point Units 1-5, and the Homestead Air Reserve Base. Based on the discussions in Subsections 2.2.3.1.1.3, 2.2.3.1.2.3, and 2.2.3.1.3.1 (Turkey Point Units 1-5) and Subsections 2.2.3.1.1.5, 2.2.3.1.2.5, and 2.2.3.1.3.3 (Homestead Air Reserve), the effects of explosions, flammable vapor clouds and toxic chemicals at Turkey Point Units 1-5 and the Homestead Air Reserve Base were evaluated and determined to meet the safe distance requirements and toxicity limits of Regulatory Guides 1.91 and 1.78. Therefore, because no significant consequences were identified for these events, the potential safety effect from nearby facilities to the site is insignificant.	N/A

Table 19.58-202 (Sheet 5 of 5)
External Event Frequencies for Turkey Point Units 6 & 7

Category	Event	Evaluation Criteria (See Notes)	Applicable to Site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency (Events/yr)
Other Events	External Fires	D	N	External fires in the vicinity of the Turkey Point Units 6 & 7 site that could lead to high heat fluxes or smoke and nonflammable gas or chemical-bearing clouds from the release of materials as a consequence of fires have been addressed in Subsection 2.2.3.1.4. Fires in adjacent industrial plants and storage facilities–chemical, oil and gas pipelines; brush and forest fires; and fires from transportation accidents–were evaluated as events that could lead to high heat fluxes or to the formation of such clouds. Based on the above, it is demonstrated that there are no external fire events that adversely affect Turkey Point Units 6 & 7. Therefore, no further consideration of external fires is required in the PRA analysis. This event is not specifically addressed in DCD Section 19.58 or in APP-GW-GLR-101, though DCD Section 19.58 does state that the COL applicant should reevaluate and include external fires in the site specific PRA if any site specific susceptibilities are found. As discussed above, no site specific susceptibilities have been identified for the Turkey Point Units 6 & 7 site, therefore the evaluations presented in DCD Section 19.58 and APP-GW-GLR-101 are bounding to the Turkey Point Units 6 & 7 site.	N/A
	On-Site Chemical Storage	D	N	Potential hazards from on-site storage tanks are addressed in Subsections 2.2.3.1.1.4, Subsections 2.2.3.1.2.4, and 2.2.3.1.3.2. Chemicals not screened from further consideration on the basis of chemical properties such as low toxicity or volatility have been specifically evaluated. Chemicals with potential explosion or flammable vapor cloud hazards have been evaluated in accordance with Regulatory Guide 1.91 as described in Subsections 2.2.3.1.1 and 2.2.3.1.2. Chemicals with potential hazards to control room personnel have been evaluated using the methodology of Regulatory Guide 1.78 as described in Subsection 2.2.3.1.3. Based upon the quantitative evaluations performed, it is concluded that these evaluations demonstrate through bounding analyses that these hazards do not adversely affect Turkey Point Units 6 & 7. Therefore, the hazard can be excluded from further consideration in the PRA analysis. This event is not specifically addressed in DCD Section 19.58 or in APP-GW-GLR-101. As discussed, the event screens out from further PRA considerations, therefore the evaluations presented in DCD Section 19.58 and APP-GW-GLR-101 are bounding to the Turkey Point Units 6 & 7 site.	NA

Notes:
1. An event is applicable (Y) to the Turkey Point Units 6 & 7 site if the external event frequency is greater than 1.0E-07, or if a quantitative consequence evaluation has demonstrated that there are site specific parameters that exceed the parameters used in APP-GW-GLR-101 (Reference 201). An event is not applicable (N) to the Turkey Point Units 6 & 7 site if the external event frequency is less than 1.0E-07 or if the quantitative consequence evaluation performed in the FSAR has demonstrated that the event will not adversely impact the safe operation of the Turkey Point Units 6 & 7.

Evaluation Criteria:
A: The initiating event frequency (IEF) is less than the IEF in DCD Tier 2 Section 19.58 or Table 19.58-3 for the event.
B: External Event Frequency is less than 1.0E-07.
C: Core Damage frequency (CDF) is less than 1.0E-08.
D: A specific event frequency for this event has not been determined. A deterministic quantitative consequence evaluation has been performed that has demonstrated that the event does not adversely impact the safe operation of Turkey Point Units 6 & 7. Additional details are provided in the "Explanation of Applicability Evaluation" with references to the applicable FSAR Subsections.

Table 19.58-203
Aircraft Impact Frequency and Resulting Core Damage Frequency (CDF)

Aircraft Type	Impact Frequency (Events/Year)	Conditional Core Damage Probability		CDF (Events/Year)	
		Base	Sensitivity	Base	Sensitivity
General Aviation	3.70E-06	5.85E-08	5.85E-08	2.16E-13	2.16E-13
Commercial Carrier	1.72E-08	5.85E-08	5.85E-06	1.01E-15	1.01E-13
Commercial Air Taxi	3.86E-08	5.85E-08	5.85E-06	2.26E-15	2.26E-13
Military – Large	2.38E-08	5.85E-08	5.85E-06	1.39E-15	1.39E-13
Military – Small	8.66E-08	5.85E-08	5.85E-06	5.07E-15	5.07E-13
Total[(a)]	3.86E-06	—	—	2.26E-13	1.19E-12

(a) The totals are slightly different than the sum of the individual frequencies shown due to rounding.

19.59 PRA RESULTS AND INSIGHTS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

19.59.10.5 Combined License Information

STD COL 19.59.10-1
STD COL 19.59.10-6

A review of the differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis will be completed prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated and the seismic margins analysis modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design. A comparison of the as-built SSC high confidence, low probability of failures (HCLPFs) to those assumed in the AP1000 seismic margin evaluation will be performed prior to fuel load. Deviations from the HCLPF values or assumptions in the seismic margin evaluation due to the as-built configuration and final analysis will be evaluated to determine if vulnerabilities have been introduced. The requirements to which the equipment is to be purchased are included in the equipment specifications. Specifically, the equipment specifications include:

1. Specific minimum seismic requirements consistent with those used to define the AP1000 DCD Table 19.55-1 HCLPF values.

   This includes the known frequency range used to define the HCLPF by comparing the required response spectrum (RRS) and test response spectrum (TRS). The test response spectra are chosen so as to demonstrate that no more than one percent rate of failure is expected when the equipment is subjected to the applicable seismic margin ground motion for the equipment identified to be applicable in the seismic margin insights of the site-specific PRA. The range of frequency response that is required for the equipment with its structural support is defined.

2. Hardware enhancements that were determined in previous test programs and/or analysis programs will be implemented.

STD COL 19.59.10-2

A review of the differences between the as-built plant and the design used as the basis for the AP1000 PRA and DCD Table 19.59-18 will be completed prior to fuel load. The plant specific PRA-based insight differences will be evaluated and the plant specific PRA model modified as necessary to account for plant-specific design and any design changes or departures from the design certification PRA.

As discussed in Section 19.58.2.1, it has been confirmed that the Winds, Floods, and Other External Events analysis documented in DCD Section 19.58 is applicable to the site. The site-specific design has been evaluated and is consistent with the AP1000 PRA assumptions. Therefore, Section 19.58 of the AP1000 DCD is applicable to this design.

STD COL 19.59.10-3 A review of the differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analyses will be completed prior to fuel load. Plant specific internal fire and internal flood analyses will be evaluated and the analyses modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design.

STD COL 19.59.10-4 The AP1000 Severe Accident Management Guidance (SAMG) from APP-GW-GLR-070, Reference 1 of DCD Section 19.59, is implemented on a site-specific basis. Key elements of the implementation include:

- SAMG based on APP-GW-GLR-070 is provided to Emergency Response Organization (ERO) personnel in assessing plant damage, planning and prioritizing response actions and implementing strategies that delineate actions inside and outside the control room.
- Severe accident management strategies and guidance are interfaced with the Emergency Operating Procedures (EOP's) and Emergency Plan.
- Responsibilities for authorizing and implementing accident management strategies are delineated as part of the Emergency Plan.
- SAMG training is provided for ERO personnel commensurate with their responsibilities defined in the Emergency Plan.

STD COL 19.59.10-5 A thermal lag assessment of the as-built equipment required to mitigate severe accidents (hydrogen igniters and containment penetrations) will be performed to provide additional assurance that this equipment can perform its severe accident functions during environmental conditions resulting from hydrogen burns associated with severe accidents. This assessment will be performed prior to fuel load and is required only for equipment used for severe accident mitigation that has not been tested at severe accident conditions. The ability of the as-built equipment to perform during severe accident hydrogen burns will be assessed using the Environment Enveloping method or the Test Based Thermal Analysis method discussed in EPRI NP-4354 (DCD Section 19.59 Reference 3).

STD COL 19.59.10-6
PTN COL 19.59.10-6

As discussed in Subsection 19.55.6.3, it has been confirmed that the Seismic Margin Analysis (SMA) documented in DCD Section 19.55 is applicable to the site. The site-specific effects (i.e., soil-related failure modes, etc.) have been evaluated and it was concluded that the plant-specific plant level HCLPF value is equal to or greater than 1.67 times the site-specific GMRS peak ground acceleration.

Add the following new information after DCD Subsection 19.59.10.5:

STD SUP 19.59-1

19.59.10.6 PRA Configuration Controls

PRA configuration controls contain the following key elements:

- A process for monitoring PRA inputs and collecting new information.
- A process that maintains and updates the PRA to be reasonably consistent with the as-built, as operated plant.
- A process that considers the cumulative impact of pending changes when applying the PRA.
- A process that evaluates the impact of changes on currently implemented risk-informed decisions that have used the PRA.
- A process that maintains configuration control of computer codes used to support PRA quantification.
- A process for upgrading the PRA to meet PRA standards that the NRC has endorsed.
- Documentation of the PRA.

PRA configuration controls are consistent with the regulatory positions on maintenance and upgrades in Regulatory Guide 1.200.

Schedule for Maintenance and Upgrades of the PRA

The PRA update process is a means to reasonably reflect the as designed and as operated plant configurations in the PRA models. The PRA upgrade process includes an update of the PRA plus a general review of the entire PRA model, and as applicable the application of new software that implements a different methodology, implementation of new modeling techniques, as well as a comprehensive documentation effort.

- During construction, the PRA is upgraded prior to fuel load to cover those initiating events and modes of operation contained in NRC-endorsed consensus standards on PRA in effect one year prior to the scheduled date of the initial fuel load for a Level 1 and Level 2 PRA.
- Prior to license renewal the PRA is upgraded to include all modes of operation.
- During operation, PRA updates are completed as part of the upgrade process at least once every four years.
- A screening process is used to determine whether a PRA update should be performed more frequently based upon the nature of the changes in design or procedures. The screening process considers whether the changes affect the PRA insights. Changes that do not meet the threshold for immediate update are tracked for the next regulatory scheduled update. If the screening process determines that the changes do warrant a PRA update, the update is made as soon as practicable consistent with the required change importance and the applications being used.

PRA upgrades are performed in accordance with 10 CFR 50.71(h).

Process for Maintenance and Upgrades of the PRA

Various information sources are monitored to determine changes or new information that affects the model assumptions or quantification. Plant specific design, procedure, and operational changes are reviewed for risk impact. Information sources include applicable operating experience, plant modifications, engineering calculation revisions, procedure changes, industry studies, and NRC information.

The PRA upgrade includes initiating events and modes of operation contained in NRC-endorsed consensus standards on PRA in effect one year prior to each required upgrade.

This PRA maintenance and update incorporates the appropriate new information including significant modeling errors discovered during routine use of the PRA.

Once the PRA model elements requiring change are identified, the PRA computer models are modified and appropriate documents revised. Documentation of modifications to the PRA model include the changes as well as the upgraded portions clearly indicating what has been changed. The impact on the risk insights is clearly indicated.

PRA Quality Assurance

Maintenance and upgrades of the PRA are subject to the following quality assurance provisions:

Procedures identify the qualifications of personnel who perform the maintenance and upgrade of the PRA.

Procedures provide for the control of PRA documentation, including revisions.

For updates of the PRA, procedures provide for independent review, or checking of the calculations and information.

Procedures provide for an independent review of the model after an upgrade is completed. Additionally, after the PRA is upgraded, the PRA is reviewed by outside PRA experts such as industry peer review teams and the comments incorporated to maintain the PRA current with industry practices. Peer review findings are entered into a tracking system. PRA upgrades receive a peer review for those aspects of the PRA that are upgraded.

PRA models and applications are documented in a manner that facilitates peer review as well as future updates and applications of the PRA by describing the processes that were used, and provide details of the assumptions made and their bases. PRA documentation is developed such that traceability and reproducibility is maintained. PRA documentation is maintained in accordance with Regulatory Position 1.3 of Regulatory Guide 1.200.

Procedures provide for appropriate attention or corrective actions if assumptions, analyses, or information used previously are changed or determined to be in error.

Potential impacts to the PRA model (i.e., design change notices, calculations, and procedure changes) are tracked. Errors found in the PRA model between periodic updates are tracked using the site tracking system.

PRA-Related Input to Other Programs and Processes

The PRA provides input to various programs and processes, such as the Maintenance Rule implementation, reactor oversight process, the RAP, and the RTNSS program. The use of the PRA in these programs is discussed below, or cross-references to the appropriate FSAR sections are provided.

PRA Input to Design Programs and Processes

The PRA insights identified during the design development are discussed in DCD Subsection 19.59.10.4 and summarized in DCD Table 19.59-18. DCD Section 14.3 summarizes the design material contained in AP1000 that has been incorporated into the Tier 1 information from the PRA. A discussion of the plant features important to reducing risk is provided in DCD Subsection 19.59.9.

PRA Input to the Maintenance Rule Implementation

The PRA is used as an input in determining the safety significance classification and bases of in-scope SSCs. SSCs identified as risk-significant via the Reliability Assurance Program for the design phase (DRAP, Section 17.4) are included within the initial Maintenance Rule scope as high safety significance SSCs.

For risk-significant SSCs identified via DRAP, performance criteria are established, by the Maintenance Rule expert panel using input from the reliability and availability assumptions used in the PRA, to monitor the effectiveness of the maintenance performed on the SSCs.

The Maintenance Rule implementation is discussed in Section 17.6.

PRA Input to the Reactor Oversight Process

The mitigating systems performance indicators (MSPI) are evaluated based on the indicators and methodologies defined in NEI 99-02 (Reference 201).

The Significance Determination Process (SDP) uses risk insights, where appropriate, to determine the safety significance of inspection findings.

PRA Input to the Reliability Assurance Program

The PRA input to the Reliability Assurance Program is discussed in DCD Subsection 19.59.10.1.

PRA Input to the Regulatory Treatment of Nonsafety-Related Systems Programs

The importance of nonsafety-related SSCs in the AP1000 has been evaluated using PRA insights to identify SSCs that are important in protecting the utility's investment and for preventing and mitigating severe accidents. These investment protection systems, structures and components are included in the D-RAP/MR Program (refer to Subsection 17.4), which provides confidence that availability and reliability are designed into the plant and that availability and reliability are maintained throughout plant life through the maintenance rule. Technical Specifications are not required for these SSCs because they do not meet the selection criteria applied to the AP1000 (refer to Subsection 16.1.1).

MOV Program

The MOV Program includes provisions to accommodate the use of risk-informed inservice testing of MOVs (Subsection 3.9.6).

19.59.11 REFERENCES

Add the following text to the end of DCD Subsection 19.59.11:

201. Nuclear Energy Institute, *Regulatory Assessment Performance Indicator Guideline*, Technical Report NEI 99-02, Rev. 5, July 2007.

APPENDIX 19A THERMAL HYDRAULIC ANALYSIS TO SUPPORT SUCCESS CRITERIA

This section of the referenced DCD is incorporated by reference with no departures or supplements.

APPENDIX 19B EX-VESSEL SEVERE ACCIDENT PHENOMENA

This section of the referenced DCD is incorporated by reference with no departures or supplements.

APPENDIX 19C ADDITIONAL ASSESSMENT OF AP1000 DESIGN FEATURES

This section of the referenced DCD is incorporated by reference with no departures or supplements.

APPENDIX 19D EQUIPMENT SURVIVABILITY ASSESSMENT

This section of the referenced DCD is incorporated by reference with no departures or supplements.

APPENDIX 19E SHUTDOWN EVALUATION

This section of the referenced DCD is incorporated by reference with no departures or supplements.

APPENDIX 19F MALEVOLENT AIRCRAFT IMPACT

This section of the referenced DCD is incorporated by reference with no departures or supplements.