CHAPTER 19

PROBABILISTIC RISK ASSESSMENT

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

CHAPTER 19

PROBABILISTIC RISK ASSESSMENT

19.1 INTRODUCTION

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

19.2 INTERNAL INITIATING EVENTS

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

19.3 MODELING OF SPECIAL INITIATORS

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

19.4 EVENT TREE MODELS

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

19.5 SUPPORT SYSTEMS

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

19.6 SUCCESS CRITERIA ANALYSIS

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

19.7 FAULT TREE GUIDELINES

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

19.8 PASSIVE CORE COOLING SYSTEM - PASSIVE RESIDUAL HEAT REMOVAL

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

19.9 PASSIVE CORE COOLING SYSTEM - CORE MAKEUP TANKS

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

19.10 PASSIVE CORE COOLING SYSTEM - ACCUMULATOR

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

19.11 PASSIVE CORE COOLING SYSTEM - AUTOMATIC DEPRESSURIZATION SYSTEM

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

19.12 PASSIVE CORE COOLING SYSTEM - IN-CONTAINMENT REFUELING WATER STORAGE TANK

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

19.13 PASSIVE CONTAINMENT COOLING

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

19.14 MAIN AND STARTUP FEEDWATER SYSTEM

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

19.15 CHEMICAL AND VOLUME CONTROL SYSTEM

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

19.16 CONTAINMENT HYDROGEN CONTROL SYSTEM

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

19.17 NORMAL RESIDUAL HEAT REMOVAL SYSTEM

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

19.18 COMPONENT COOLING WATER SYSTEM

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

19.19 SERVICE WATER SYSTEM

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

19.20 CENTRAL CHILLED WATER SYSTEM

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

19.21 AC POWER SYSTEM

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

19.22 CLASS 1E DC & UPS SYSTEM

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

19.23 NON-CLASS 1E DC & UPS SYSTEM

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

19.24 CONTAINMENT ISOLATION

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

19.25 COMPRESSED AND INSTRUMENT AIR SYSTEM

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

19.26 PROTECTION AND SAFETY MONITORING SYSTEM

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

19.27 DIVERSE ACTUATION SYSTEM

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

19.28 PLANT CONTROL SYSTEM

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

19.29 COMMON CAUSE ANALYSIS

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

19.30 HUMAN RELIABILITY ANALYSIS

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

19.31 OTHER EVENT TREE NODE PROBABILITIES

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

19.32 DATA ANALYSIS AND MASTER DATA BANK

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

19.33 FAULT TREE AND CORE DAMAGE QUANTIFICATION

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

19.34 SEVERE ACCIDENT PHENOMENA TREATMENT

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

19.35 CONTAINMENT EVENT TREE ANALYSIS

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

19.36 REACTOR COOLANT SYSTEM DEPRESSURIZATION

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

19.37 CONTAINMENT ISOLATION

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

19.38 REACTOR VESSEL REFLOODING

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

19.39 IN-VESSEL RETENTION OF MOLTEN CORE DEBRIS

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

19.40 PASSIVE CONTAINMENT COOLING

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

19.41 HYDROGEN MIXING AND COMBUSTION ANALYSIS

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

19.42 CONDITIONAL CONTAINMENT FAILURE PROBABILITY DISTRIBUTION

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

19.43 RELEASE FREQUENCY QUANTIFICATION

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

19.44 MAAP4.0 CODE DESCRIPTION AND AP1000 MODELING

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

19.45 FISSION PRODUCT SOURCE TERMS

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

19.46 NOT USED

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

19.47 NOT USED

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

19.48 NOT USED

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

19.49 OFFSITE DOSE EVALUATION

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

19.50 IMPORTANCE AND SENSITIVITY ANALYSIS

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

19.51 UNCERTAINTY ANALYSIS

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

19.52 NOT USED

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

19.53 NOT USED

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 no departures or supplements.

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.

19.58.3 CONCLUSION

Add the following information at the end of DCD Subsection 19.58.3:

BLN SUP 19.58-1 Table 19.58-201 documents the site-specific external events evaluation that has been performed for BLN Units 3 and 4. This table provides a general explanation of the evaluation and resultant conclusions and provides a reference to applicable sections of the COL where more detailed supporting information (including data used, methods and key assumptions) regarding the specific event is located. Based upon this evaluation, it is concluded that the BLN Units 3 and 4 site is bounded by the High Winds, Floods and Other External Events analysis documented in DCD Section 19.58 and APP-GW-101 (Reference 201) and no further evaluations are required at the COL application stage.

19.58.4 REFERENCES

201. Westinghouse Electric Company LLC, “AP1000 Probabilistic Risk Assessment Site-Specific Considerations,” Document Number APP-GW-GLR-101, Revision 1, October 2007.

202. NUREG/CR-4461, “Tornado Climatology of the Contiguous United States,” Revision 2, February 2007.

203. Texas Tech University, Wind Science and Engineering Center, “A Recommendation for an Enhanced Fujita Scale (EF-Scale),” June 2004.

204. ASCE Standard ASCE/SEI 7-05, “Minimum Design Loads for Buildings and Other Structures,” 2006

BLN SUP 19.58-1

TABLE 19.58-201 (Sheet 1 of 7)
EXTERNAL EVENT FREQUENCIES FOR BLN

Category	Event	Applicable to site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency
High Winds	EF0 Tornado	Y	The Texas Tech University (TTU) research Publication, "A Recommendation for an Enhanced Fujita Scale (EF-Scale)," (Reference 203) correlates the Fujita-Scale wind speeds with the EF-Scale wind speeds, and states that a tornado rated according to the Fujita Scale will have the same "F-Number" in the EF Scale, e.g. F3 translates into EF3, although the wind speed ranges are different. Accordingly, the tornado classifications are presented using the EF scale for consistency with APP-GW-GLR-101 (Reference 201). Tornado activity for the seven county region around the BLN site is provided in FSAR Table 2.3-208 from 1950 through 2005. The information in this table provides an adequate sample size for the BLN tornado analysis. The combined area of the seven neighboring counties represented in the table is 4,447 square miles which is slightly larger than a 1-degree box centered on the site (3,943 square miles). NUREG/CR-4461 (Reference 202), states that 1-degree boxes should only be used if the number of events is large enough to ensure reliable statistics. NUREG/CR-4461, Appendix C, indicates that a minimum of 10 events and 20 or more events are desirable. FSAR Table 2.3-208 provides 151 events for the seven counties. Therefore, the NUREG/CR-4461 criterion for sample size is met. The strike probability is determined using the methodology for large structure strike probability in NUREG/CR-4461, Section 4.2. Note, tornados with zero length were addressed by giving them average lengths based on other tornados in the same class and county. Also, EF0 tornados with zero lengths for Marshall and Franklin county were given a 2 mi length, because 2 mi is the highest average length for EF0 tornados amongst the seven counties. Additionally the characteristic dimension is taken from NUREG/CR-4461, Section 4.2 as 0.0379 miles. BLN has conservatively assumed that the strike probability for a tornado of a given intensity is equal to the overall strike probability for any tornado. These event frequencies are bounded by the limiting initiating event frequencies given in Table 3.0-1 of APP-GW -GLR -101. Therefore, the safety features of the AP1000 are unaffected and the CDFs given in APP-GW-GLR-101 Table 3.0-1 for these events are applicable to BLN Units 3 and 4.	8.89E-04 events/yr
	EF1 Tornado	Y		8.89E-04 events/yr
	EF2 Tornado	Y		8.89E-04 events/yr
	EF3 Tornado	Y		8.89E-04 events/yr
	EF4 Tornado	Y		No Recorded Events
	EF5 Tornado	Y		No Recorded Events

BLN SUP 19.58-1

TABLE 19.58-201 (Sheet 2 of 7)
EXTERNAL EVENT FREQUENCIES FOR BLN

Category	Event	Applicable to site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency
High Winds (cont.)	Cat.1 Hurricane	Y	Historical data for tropical weather is archived by the National Coastal Services Center, and dates back to 1851. This data was used to analyze the occurrence of tropical weather traveling directly over Jackson County, or near enough to Jackson County to have a substantial impact (perimeter distance defined as 100 miles). Figure 6-1B of ASCE/SEI 7-05 (Reference 204) shows the basic wind speed for the eastern part of the Gulf of Mexico, including the state of Alabama. BLN is located in the northeast part of the state beyond the 90 mph contour. Thus, it is concluded that BLN is not located in a Hurricane Prone Region. There were no recorded events for hurricanes. However, a conservative event frequency of <1E-02 was assigned for these events, consistent with APP-GW-GLR-101 for Category 4 and 5 hurricanes (Reference 201).	<1E-02
	Cat.2 Hurricane	Y		<1E-02
	Cat.3 Hurricane	Y		<1E-02
	Cat.4 Hurricane	Y		<1E-02
	Cat.5 Hurricane	Y		<1E-02
	Tropical Storm	Y	The event frequencies for tropical storms, depressions, and cyclones are based on the number of recorded events over the 158 year period of historical data archived by the National Coastal Services Center. The maximum wind speed of these storms is less than 65 mph. As documented in FSAR Table 2.0-201, the BLN site characteristic operating basis wind speed (96 mph) is below the DCD site characteristic operating basis wind speed of 145 mph and bounds the maximum wind speed identified above (65 mph). Therefore, it is concluded that the safety features of the AP1000 are unaffected by high wind events and the resultant CDFs given in Table 3.0-1 of APP-GW-GLR-101 (Reference 201) for these events are applicable to BLN Units 3 and 4.	8.23E-02
	Tropical Depression	Y		1.01E-01
	Extratropical Cyclones	Y		1.90E-02

BLN SUP 19.58-1

TABLE 19.58-201 (Sheet 3 of 7)
EXTERNAL EVENT FREQUENCIES FOR BLN

Category	Event	Applicable to site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency
External Flood	External Flood	Y	As discussed in FSAR Subsection 2.4.2, the maximum flood elevation at the BLN site is 622.5 ft. msl. Coincident wind waves would create maximum waves of 5.41 ft. (trough to crest) and produce maximum flood levels of 624.03 ft. msl, including wind wave setup and run-up. The BLN plant grade of 628.6 ft. msl is above the worst potential flood considerations. Additionally, as discussed in FSAR Subsection 2.4.2, the maximum water level due to the local PMP event without drainage is 627.53 ft. msl in the vicinity of the safety-related structures, which is below plant grade. Therefore, no external flood protection measures are required for BLN Units 3 and 4. As discussed in FSAR Subsection 2.4.3.5, the maximum flood elevation at BLN was determined to be 622.1 ft. msl, produced by the 21,400 sq. mi. storm and coincident overtopping failure of the west saddle dike at Watts Bar Dam and the north embankment at Nickajack Dam. Chickamauga Dam is overtopped but was assumed not to fail. However, proposed dam safety modifications to allow overtopping at Chickamauga Dam have not been performed. Without the dam safety modifications at Chickamauga Dam, the maximum flood elevation was determined to be 622.5 ft. msl. The BLN safety-related structures are located at elevation 628.6 ft. msl and are unaffected by flood conditions. As discussed in FSAR Subsection 1.2.2, the BLN plant grade elevation of 628.6 ft. msl corresponds to DCD grade elevation 100 ft. Based upon the quantitative evaluations performed, the BLN site is not susceptible to any external floods which would adversely impact safe operation of BLN Units 3 and 4. This is consistent with the evaluation presented in Section 4.0 of APP-GW-GLR-101 (Reference 201), which states that the AP1000 is protected against floods up to the 100' level. Therefore, it is concluded that the resultant CDF of 5.85E-15 events per year given in APP-GW-GLR-101, Section 4.0 is bounding.	Note 2

BLN SUP 19.58-1

TABLE 19.58-201 (Sheet 4 of 7)
EXTERNAL EVENT FREQUENCIES FOR BLN

Category	Event	Applicable to site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency
Transportation and Nearby Facility Accidents	Aviation (commercial/ general/ military)	Y	As discussed in FSAR Subsection 3.5.1.6, a calculation performed in accordance with the guidelines of Standard Review Plan (SRP) Section 3.5.1.6, determined the total probability of an aircraft crash into the plant to be 8.8E-07 per year. The probability of aircraft from the Scottsboro Municipal Airport crashing into the site is 7.8E-07 per year. This meets the criterion provided in APP-GW-GLR-101 (Reference 201) that sites that can demonstrate an aviation event frequency less than or equal to 1.21E-06 events/yr for small aircraft accidents are bounded by this evaluation. The probability of a crash from the high altitude airway J73 is conservatively estimated to be 1.0E-07 per year. This meets the commercial aircraft aviation event frequency of 1.0E-07 events per year provided in APP-GW-GLR-101. Therefore, it is concluded that the evaluation provided in APP-GW-GLR-101 remains applicable.	8.8E-07 events/year
	Marine (ship/barge)	Y	As discussed in FSAR Subsection 2.2.3.1.1.1, a calculation was done to quantify the risk to the BLN site from barge accidents on the Tennessee River involving either explosions or flammable vapor clouds. The results of the detonation risk assessment (to the site) show a risk value less than 1.9E-08 per year. As discussed in FSAR Subsection 2.2.3.1.2, an evaluation determined no deflagrations would be expected at the BLN site resulting from a delayed ignition of a vapor cloud released from a postulated barge accident. Based upon the quantitative consequence evaluations performed, no risk-important events related to marine transportation have been identified for BLN Units 3 and 4. This is consistent with the evaluation provided in Subsection 5.4 of APP-GW-GLR-101 (Reference 201). Therefore, because no risk-important consequences were identified in the evaluation, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4.	1.9E-08 events/yr
	Pipeline (gas/oil)	N	As stated in FSAR Subsection 2.2.2.3, there are no major pipelines within 5 miles of the BLN site.	Note 1

BLN SUP 19.58-1

TABLE 19.58-201 (Sheet 5 of 7)
EXTERNAL EVENT FREQUENCIES FOR BLN

Category	Event	Applicable to site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency
Transportation and Nearby Facility Accidents (cont.)	Railroad	Y	As discussed in FSAR Subsection 2.2.3.1.1.1, the potential hazard resulting from railroad cars was evaluated using the methodology of RG 1.91. The maximum probable cargo based on RG 1.91 was used along with a conservative TNT equivalency, which resulted in a safe standoff distance which was less than the distance from the nearest approach of a railroad line to the site boundary. As discussed in FSAR Subsection 2.2.3.1.2, unconfined vapor clouds with delayed ignition were also evaluated for various energetic combustible materials, and were determined to pose no hazard to the plant. Based upon the quantitative consequence evaluations performed, no risk-important events related to rail transportation have been identified for BLN Units 3 and 4. This is consistent with the evaluation provided in Subsection 5.4 of APP-GW-GLR-101 (Reference 201). Therefore, because no risk-important consequences were identified in the evaluation, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4.	Note 2
	Truck	Y	As discussed in FSAR Subsection 2.2.3.1.1.1, the potential hazard resulting from trucks was evaluated using the methodology of RG 1.91. The maximum probable cargo based on RG 1.91 was used along with a conservative TNT equivalency, which resulted in a safe standoff distance which was less than the distance from the nearest highway to the site boundary. As discussed in FSAR Subsection 2.2.3.1.2, unconfined vapor clouds with delayed ignition were also evaluated for various energetic combustible materials, and determined to not result in any significant damage to the plant. Based upon the quantitative consequence evaluations performed, no risk-important events related to truck transportation have been identified for BLN Units 3 and 4. This is consistent with the evaluation provided in Subsection 5.4 of APP-GW-GLR-101 (Reference 201). Therefore, because no risk- important consequences were identified in the evaluation, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4.	Note 2

BLN SUP 19.58-1

TABLE 19.58-201 (Sheet 6 of 7)
EXTERNAL EVENT FREQUENCIES FOR BLN

Category	Event	Applicable to site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency
Transportation and Nearby Facility Accidents (cont.)	Nearby Facility Accidents	Y	FSAR Subsection 2.2.3.1.1.3 discusses potential design basis events associated with accidents at nearby facilities. FSAR 2.2.3.2 concludes that the effects of events from these facilities on the safety-related components of the plant are insignificant. Therefore, because no risk-important consequences were identified, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4	Note 2
Other events	A number of external events beyond those evaluated in DCD Subsection 19.58 and APP-GW-GLR-101 (Reference 201) were evaluated for the BLN site. These events are discussed below.		Based on the evaluations below, these events do not pose a credible threat to the safe operation of the station. Thus, these events are not considered to be risk-important and it can be concluded that the BLN Units 3 and 4 site is within the bounds of the Floods and Other External Events analysis documented in DCD Section 19.58 and APP-GW-GLR-101 (Reference 201).	
	External Fires	Y	FSAR Subsection 2.2.3.1.4 discusses external fires and concludes fires originating from accidents at nearby facilities or transportation routes, and brush and forest fires will not endanger the safe operation of the station. This subsection also states fire and smoke from accidents at nearby homes, industrial facilities, transportation routes, or from area forest or brush fires, do not jeopardize the safe operation of the plant. Therefore, because no risk-important consequences were identified, the potential for hazards from external fires are minimal and will not adversely affect safe operation of BLN Units 3 and 4.	Note 2

BLN SUP 19.58-1

TABLE 19.58-201 (Sheet 7 of 7)
EXTERNAL EVENT FREQUENCIES FOR BLN

Category	Event	Applicable to site? (Y/N)[1]	Explanation of Applicability Evaluation	Event Frequency
Other events (cont.)	Toxic Chemical Releases	Y	Based on the evaluations provided in FSAR Subsections 2.2.3.1.3 and 6.4.4.2, release of toxic chemicals from stationary industrial sources and mobile sources in the vicinity of BLN does not pose a credible threat to the control room operators. Thus, these events are not considered to be risk-important.	Note 2

Notes:

1. All events that are physically possible are considered to be “applicable” and are discussed. Those events that are physically not possible are considered not applicable to the site.

2. 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 BLN Units 3 and 4. Additional details are provided in the "Explanation of Applicability Evaluation" along with references to the applicable FSAR Subsections.

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

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 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 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 19.58.3, 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 analysis 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).

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. NEI 99-02, Nuclear Energy Institute, "Regulatory Assessment Performance Indicator Guideline," Technical Report NEI 99-02, Revision 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.