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Your ref: Docket No. 52-006
Our ref: DCP/NRC2170

June 26, 2008

Subject: AP1000 Response to Requests for Additional Information (SRP2.3.1)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 2.3.1. This RAI response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in the response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

A response is provided for RAI-SRP2.3.1-RSAC-01 through -04 as sent in an email from Dave Jaffe to Sam Adams dated April 10, 2008. This response completes all requests received to date for SRP Section 2.3.1.

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Requests for Additional Information on SRP Section 2.3.1

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NRO

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	E. McKenna	-	U.S. NRC	1E
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ENCLOSURE 1

Response to Requests for Additional Information on SRP Section 2.3.1

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP2.3.1-RSAC-01
Revision: 0

Question:

This RAI refers to Revision 2 to TR 108. Please clarify the definition of the maximum and minimum normal air temperature site parameters presented in DCD Tier 2, Table 2-1. For example, do the maximum and minimum normal air temperature site parameters represent annual or seasonal 1 percent exceedances? Does the maximum normal coincident wet bulb value represent a mean or maximum value?

Westinghouse Response:

The 1% exceedance used for the AP600 and AP1000 is a seasonal number. The potential ambiguity in exceedance value definition stems from the mid 1990s change from seasonal to annual exceedance values in certain areas, including HVAC design inputs. Since the AP600 project was well underway when the change to annual values was made by ASHRAE and by others, the AP600 (and now the AP1000) have continued to use the older data reporting method for consistency.

ASHRAE weather data, as presented in the 2005 Fundamentals Handbook, states that: The extreme maximum wet-bulb temperature provides the highest wet-bulb temperature observed over the entire period of record and is the most extreme condition expected for evaporative processes such as cooling towers. For most locations, the extreme maximum wet-bulb value is significantly higher than the 0.4% wet-bulb and should be used only for design of critical applications where an occasional short-duration capacity shortfall is not acceptable. The Westinghouse design uses an extreme wet bulb design temperature that does not consider short term (less than two hour extreme wet bulb exceedances). As the NRC correctly noted, this somewhat reduces the extreme wet bulb design temperature.

Design Control Document (DCD) Revision:
None

PRA Revision:
None

Technical Report (TR) Revision:
None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP2.3.1-RSAC-02
Revision: 0

Question:

This RAI refers to Revision 2 to TR 108. Please address an apparent discrepancy in the revised maximum normal air temperature site parameter presented in TR 108. Page 4 of TR 108 states that the Tier 2 maximum normal air temperature site parameter was changed from 100 °F dry bulb/77 °F coincident wet bulb to 101 °F dry bulb/80.1 °F coincident wet bulb. Page 17 of TR 108 also states that FSER Section 9.2.7, "Central Chilled Water System," should be updated to reflect the revised maximum normal temperatures of 101 °F dry bulb and 80.1 °F coincident wet bulb maximum. However, the DCD Tier 2, Table 2-1 markup on page 12 of TR 108 states that the maximum normal air temperature site parameter was changed to 100 °F dry bulb/80.1 °F coincident wet bulb.

Westinghouse Response:

It should be noted that this was only an editorial error in the DCD mark-up section of the TR. A correction will be made in TR134, Revision 5 to update Table 2-1 to the correct value.

Design Control Document (DCD) Revision:
None

PRA Revision:
None

Technical Report (TR) Revision:
None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP2.3.1-RSAC-03
Revision: 0

Question:

This RAI refers to Revision 2 to TR 108. SRP Section 2.3.1 states that a DC applicant should provide a basis for each of the site parameters postulated for the design. Consequently, please provide a basis for the values chosen as revised maximum safety wet bulb (noncoincident), maximum normal dry bulb with coincident wet bulb, and maximum normal wet bulb (noncoincident) site parameters.

Westinghouse Response:

The design numbers were chosen based on the URD requirements, and the most limiting case of our existing customer base, whichever was more extreme.

Additionally, a DCD Impact Document is being generated to revise the maximum safety wet bulb temperature (noncoincident) from 85.5°F to 86.1°F and the wet bulb temperature (coincident) from 80°F to 86.1°F. These changes are being generated to support the LEVY COLA submittal. Additionally, the maximum dry bulb temperature was revised to 101°F but was inadvertently omitted in Revision 16 of the DCD.

The following DCD markups are provided as a preview of the types of changes that can be expected from the aforementioned DCD Impact Document. The document is scheduled to be submitted to the NRC by June 30, 2008.

Revise the Air Temperature portion of Tier 1 Table 5.0-1, Site Parameters as follows:

TABLE 5.0-1 SITE PARAMETERS	
Air Temperature	Limits based on historical data excluding peaks of less than 2 hours duration Maximum temperature of 115° dry bulb/86.1°F coincident wet bulb Maximum wet bulb 86.1°F (noncoincident) Minimum temperature of -40°F

Revise the Air Temperature portion of Tier 2 Table 2-1, Site Parameters as follows:

Table 2-1 (Sheet 1 of 3)

SITE PARAMETERS

Air Temperature	
Maximum Safety [a]	115°F dry bulb/86.1°F coincident wet bulb 86.1°F wet bulb (noncoincident)
Minimum Safety [a]	-40°F
Maximum Normal [b]	101°F dry bulb/80.1°F coincident wet bulb 80.1°F wet bulb (noncoincident) [d]
Minimum Normal [b]	-10°F

5.4.7.1.2.3 In-Containment Refueling Water Storage Tank Cooling

The normal residual heat removal system provides cooling for the in-containment refueling water storage tank during operation of the passive residual heat removal heat exchanger or during normal plant operations when required. The system is manually initiated by the operator. The normal residual heat removal system limits the in-containment refueling water storage tank water temperature to less than boiling temperature during extended operation of the passive residual heat removal system and to not greater than 120°F during normal operation. The system performs this function based on the following:

- Operation of the system with both subsystems of normal residual heat removal system pumps and heat exchangers available.
- The component cooling water system supply temperature to the normal residual heat removal system heat exchangers is based on an ambient design wet bulb temperature of no greater than 86.1°F (0 percent exceedance). The 86.1°F value is assumed for normal conditions and transients that start at normal conditions.

Since the normal residual heat removal system is not a safety-related system, its operation is not credited in Chapter 15 Accident Analyses.

9.2.2.1.2.1 Normal Operation

The component cooling water system transfers heat from various plant components needed to support normal power operation with a single active component failure. The component cooling water system is designed for normal operation in accordance with the following criteria:

- The component cooling water supply temperature to plant components is not more than 100°F assuming a 0 percent exceedance ambient design wet bulb temperature of 86.1°F for service water cooling at normal operations (maximum normal temperature per Table 2-1 for normal shutdown).
- The minimum component cooling water supply temperature to plant components is 60°F.
- The component cooling water system provides sufficient surge capacity to accept 50 gallons per minute leakage into or out of the system for 30 minutes before any operator action is required.

Design Control Document (DCD) Revision:
None

PRA Revision:
None

Technical Report (TR) Revision:
None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP2.3.1-RSAC-04
Revision: 0

Question:

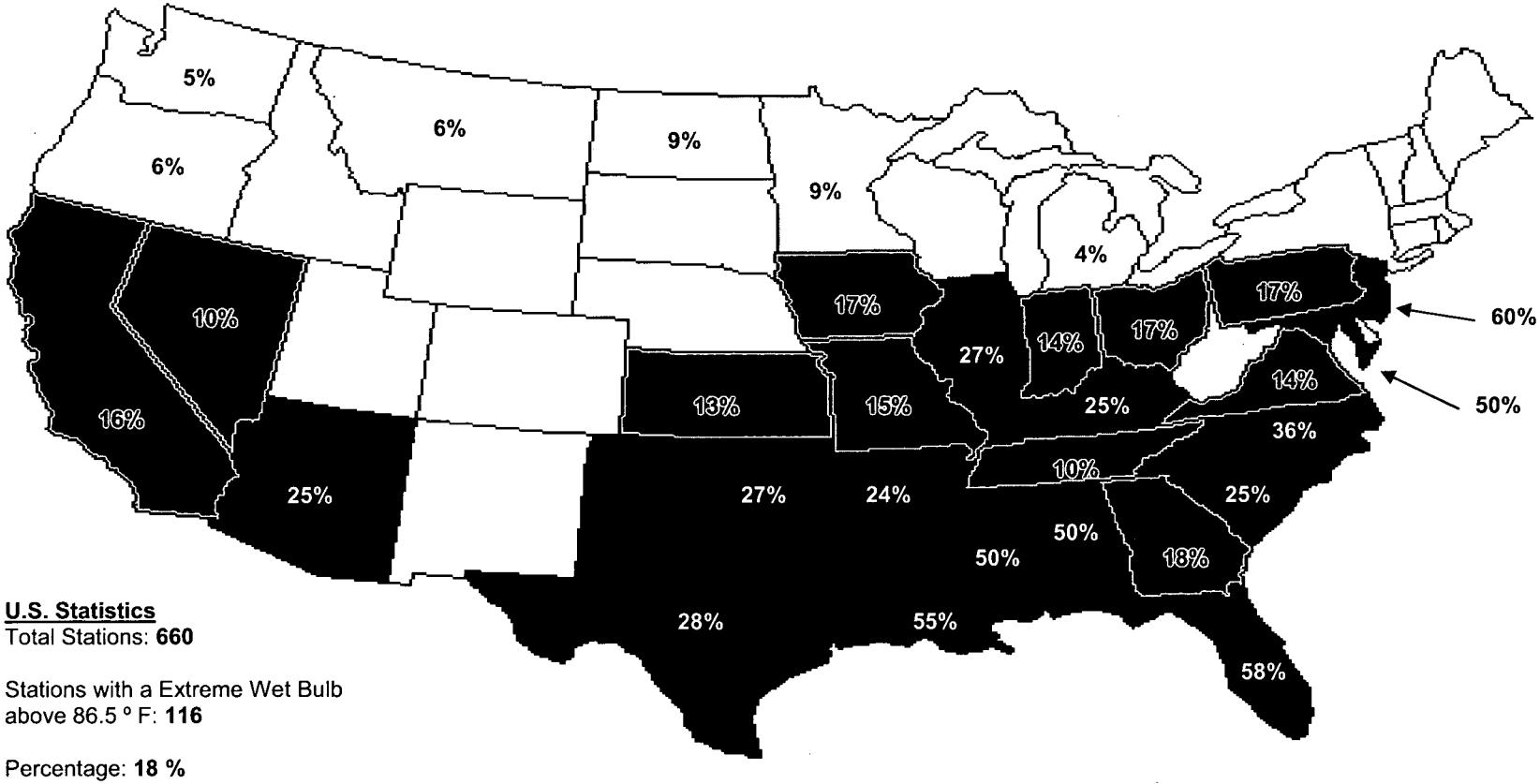
This RAI refers to Revision 2 to TR 108. The Tier 1 and the Tier 2 maximum safety wet bulb (noncoincident) air temperature site parameter was revised from 81 °F to 85.5 °F. The 85.5 °F maximum safety value is based on historical data and excludes peaks of less than two hours duration. SRP Section 2.3.1 states that postulated site parameters for a standard design certification should be representative of a reasonable number of sites that have been or may be considered for a COL application. This is intended to potentially prevent requests for an exemption or departure in future COL applications which could occur if the COL application cannot demonstrate that the design of the facility falls within the characteristics of the site.

In order to determine if the revised maximum safety wet bulb (noncoincident) air temperature site parameter value of 85.5 °F is representative of a reasonable number of potential COL sites, the staff reviewed extreme maximum wet bulb data from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Weather Data Viewer database. This database, which is discussed in Chapter 28 of the 2005 ASHRAE Handbook – Fundamentals, contains climatic wet bulb design information for approximately 660 weather stations in the continental United States.

ASHRAE provides extreme wet bulb data for each weather station. These data are hourly data (e.g., the highest of the values measured once each hour) whereas the AP1000 maximum safety wet bulb site parameter value of 85.5 °F excludes peaks of less than two hours duration. Consequently, the staff examined the ASHRAE database to identify those weather stations that had extreme wet bulb data exceeding 86.5 °F, assuming such occurrences would be equivalent to a two-hour peak exceeding 85.5 °F.

A map showing the percentage of weather stations in each state that exceed an extreme wet bulb temperature value of 86.5 °F is provided in Figure 2.3.1–1. This map shows that the states along the Gulf Coast and along the Southern and Mid-Atlantic Coasts (e.g., Texas through New Jersey) had the highest percentage of weather stations (ranging from 18% to 50%) with extreme wet bulb values exceeding 86.5 °F. These are also the same states where nearly half (e.g., 10 out of the 21) of the received or expected COL applications will be located. Consequently, please justify the selection of a maximum safety wet bulb (noncoincident) air temperature site parameter value of 85.5 °F as being representative of a reasonable number of sites that have been or may be considered for a COL application.

FIGURE 2.3.1–1 Percentage of Weather Stations with Extreme (Noncoincident) Wet Bulb Values Exceeding 86.5 °F



Westinghouse Response:

Westinghouse applied the URD requirements as a starting point for AP1000 design basis temperature selection. Using customer developed weather data, Westinghouse revised the value of some of the AP1000 design temperatures upwards to meet specific site requirements. All sites with submitted COLAs have site temperatures that lie within the existing AP1000 design parameters.

There are several AP1000 systems that are designed using the maximum safety temperatures. These systems have been reviewed, and all have margin available to increase the maximum safety non-coincident wet bulb temperature.

Westinghouse has evaluated the possibility of increasing the maximum safety non-coincident wet bulb temperature for the AP1000 beyond the current 85.5°F. This will increase the number of sites for which the standard AP1000 design temperature conditions are suitable.

A DCD Impact Document is being generated to show that the maximum safety non-coincident wet bulb temperature for AP1000 is being revised from 85.5°F to 86.1°F. This document is scheduled to be submitted to the NRC by June 30, 2008.

Design Control Document (DCD) Revision:
None

PRA Revision:
None

Technical Report (TR) Revision:
None