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NL-05-0334

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Docket Nos.: 50-424
50-425

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant – Units 1 and 2
Response to Request for Additional Information on Request to Revise Technical
Specifications – Ultimate Heat Sink

Ladies and Gentlemen:

By letter NL-04-0238 dated April 26, 2004, Southern Nuclear Operating Company (SNC) submitted a proposed revision to the Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS). The proposed changes would revise the TS Limiting Conditions for Operation (LCO) 3.7.9, "Ultimate Heat Sink (UHS)." Additional information was requested by the NRC staff via telephone conference on February 1, 2005. The requested information is provided in the enclosure to this letter.

This letter contains no NRC commitments. If you have any questions, please advise.

Sincerely,

A handwritten signature in black ink, appearing to read "Don E. Grissette".

Don E. Grissette

DEG/kgj/daj

Enclosure

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. W. F. Kitchens, General Manager – Plant Vogtle
RType: CVC7000

U. S. Nuclear Regulatory Commission
Dr. W. D. Travers, Regional Administrator
Mr. C. Gratton, NRR Project Manager – Vogtle
Mr. G. J. McCoy, Senior Resident Inspector – Vogtle

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Vogtle Electric Generating Plant – Units 1 and 2
Response to Request for Additional Information
Request to Revise Technical Specifications – Ultimate Heat Sink

The following requests were made by the NRC staff to complete the review of the proposed revision to the Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS). The proposed changes would revise the TS Limiting Conditions for Operation (LCO) 3.7.9, “Ultimate Heat Sink (UHS).” Responses to these requests are provided as follows.

1) NRC Request:

NRC Office of Nuclear Reactor Regulation’s Office Instruction No., LIC-101, “License Amendment Review Procedures,” Revision 3, dated February 9, 2004 (ADAMS Accession No.: MLO40060258), instructs the staff to include a regulatory evaluation section in the safety evaluation on license amendment requests (LARs) and the industry has agreed to provide this information in LARs. (See Nuclear Energy Institute issued white paper entitled “Standard Format for Operating License Amendment Requests from Commercial Reactor Licensees,” dated August 24, 2001 (ADAMS Accession No.: ML013390222). The Southern Nuclear Operating Company’s (SNC’s, or licensees) LAR does not provide applicable regulatory requirements/criteria section, which is a part of a regulatory evaluation, for the staff’s review and consideration. Please provide a regulatory requirements/criteria section for review by the staff.

SNC Response:

At VEGP, the ultimate heat sink (UHS) consists of the nuclear service cooling water (NSCW) system mechanical draft towers. Two 100% capacity redundant NSCW towers are provided for each unit. One tower is associated with each train of the NSCW System. Each NSCW tower consists of a basin that contains the ultimate heat sink water supply and an upper structure that contains four individual fan spray cells where the heat loads are transferred to the atmosphere. Each spray cell contains one safety-related temperature controlled fan. Instrumentation is provided for monitoring basin level and water temperature. The tower basins each contain a safety-related transfer pump to permit the use of the combined storage capacity of the basins. The combined storage capacity of two tower basins provides greater than a 30-day cooling water supply, assuming the worst combination of meteorological conditions and accident heat loads which maximize the tower heat load, basin temperature, and evaporative losses.

TS LCO 3.7.9, “Ultimate Heat Sink (UHS),” simply requires that the UHS be operable. The LCO discussion of the Bases for LCO 3.7.9 defines an operable UHS as containing a sufficient volume of water at or below the maximum temperature that would allow the NSCW system to operate for at least 30 days following a design basis LOCA without the loss of net positive suction head, and without exceeding the maximum design temperature of the equipment served by the NSCW system. Specifically, the Bases state, in part, that two NSCW tower basins are required operable with two operable trains of NSCW tower fans, each train consisting of four fans and associated spray cells.

The first change to LCO 3.7.9 is to revise the operability requirements based on ambient wet-bulb temperature. The following would be added to the LCO statement:

“With ambient wet-bulb temperature > 63° F, four fans and four spray cells per train shall be OPERABLE. With ambient wet-bulb temperature ≤ 63° F, three fans and four spray cells per train shall be OPERABLE.”

The proposed change will facilitate maintenance on the NSCW tower fans without requiring a train of NSCW to be out-of-service. A review of the cooling tower design criteria found that the tower was designed for four-fan operation at an ambient wet-bulb temperature of 82° F and an NSCW flow rate of 15,600 gpm. These design conditions were imposed on the vendor (Marley) to support normal operation, shutdown, and emergency operations.

Existing system calculations evaluate postulated accidents in which a single train of NSCW with four tower fans in operation maintains the tower cold water temperature at acceptable temperature limits. In order to support operation with one fan out-of-service, the Marley cooling tower performance curves were reviewed to determine the ambient wet-bulb temperature at which three fans could provide the same emergency cooling. This temperature is 67° F.

Existing system calculations also evaluate a postulated accident in which a single train of NSCW with three tower fans in operation maintains the tower cold water temperature at acceptable temperature limits with a loss of offsite power (LOSP) (one fan lost from service due to a tornado). In order to support operation with one fan out-of-service, and given these conditions, the Marley cooling tower performance curves were reviewed to determine the ambient wet-bulb temperature at which two fans could provide the same emergency cooling. This temperature is 63° F.

To determine the ambient wet-bulb temperature at which a fan could be removed from service and maintain required cooling capacity, the more limiting ambient temperature value of 63° F ambient wet-bulb for the postulated LOSP with tornado is used. One fan can be removed from service during Modes 1, 2, 3, and 4 whenever the ambient wet-bulb temperature is 63° F or lower. The capacity of the cooling tower with one less fan cell will provide sufficient cooling capacity to satisfy all normal and accident conditions. This assumes that the plant maintenance operation does not prevent natural draft through the non-operating fan and that the tower water distribution system remains intact. Condition B and Required Action B.1 and SR 3.7.9.3 are modified to reflect this proposed change by inserting the word "required" to reflect that not all fans are required based on ambient wet-bulb temperature.

Condition B allowed one or both NSCW towers to be impacted. Condition B is modified to be more restrictive by addressing only the condition where one NSCW tower, with one or more fans and/or spray cells, is impacted.

The final change made to LCO 3.7.9 is editorial and clarifies CONDITION B under ACTIONS.

NRC Standard Review Plan (SRP) 9.2.5 applies to the ultimate heat sink (UHS). The acceptability of the design of the UHS is based on specific general design criteria (GDC) and regulatory guides. GDC 2, 5, 44, 45, and 46 provide the criteria for an acceptable UHS design.

General Design Criterion 2, as related to structures housing the system and the system itself being capable of withstanding the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, and floods.

General Design Criterion 5, as related to shared systems and components important to safety being capable of performing required safety functions.

General Design Criterion 44, as related to:

- a. The capability to transfer heat loads from safety-related structures, systems, and components to the heat sink under both normal operating and accident conditions.
- b. Suitable component redundancy so that safety functions can be performed assuming a single active component failure coincident with loss of offsite power.
- c. The capability to isolate components, systems, or piping if required so that safety functions are not compromised.

General Design Criterion 45, as related to the design provisions to permit in-service inspection of safety-related components and equipment.

General Design Criterion 46, as related to the design provisions to permit operation functional testing of safety-related systems or components.

The criteria related to GDC 2, 5, and 45 are not applicable to the changes proposed by this license amendment request. The changes proposed by this license amendment request have been evaluated based on the criteria for GDC 44 and 46 and found to be acceptable.

Based on the above, it is concluded that the UHS will continue to meet the requirements of GDC 2, 5, 44, 45, and 46 and is, therefore, acceptable with the proposed changes. The UHS, with the proposed changes, will continue to meet the applicable acceptance criteria of SRP Section 9.2.5.

2) NRC Request:

The SNC's LAR does not provide sufficient technical basis for supporting operation of the nuclear service cooling water (NSCW) system with (1) one fan out-of-service or (2) one fan out-of-service and one fan lost with loss of offsite power due to tornado. Using Marley cooling tower performance curves, the SNC determined that the ambient wet-bulb temperatures that are necessary to support cooling for normal operation, shutdown, and emergency operations at the above conditions were 67 and 63 °F, respectively. These temperature values, as stated in Enclosure 1 to the LAR, in part consist of the basis for the licensee's proposed changes. Please provide the cooling tower performance curves and assumptions used in determining the above values for staff review.

SNC Response:

The Marley tower performance curves (see Figure 1 attached to this Enclosure) provide the cooling capacity of the NSCW towers with one, two, three, or four fans in operation. The required tower conditions are full water distribution and fan stacks not blocked (so that the non-operating fan stacks allow additional cooling due to natural draft).

The NSCW cooling towers were designed to operate during normal plant operation, cooldown, and emergency operations assuming a wet-bulb temperature of 82°F. Emergency operations provide the highest tower heat loads (described below) and bound the other conditions.

Each tower is designed to reject 265 million BTU/ hr, which at a flow rate of 15,600 gpm provides a design range of 34 degrees. There are four operational conditions which are described as follows.

- A) Three conditions rely on four operating fans including plant cool-down with a loss of off-site power (LOSP), a main steam line break, and a loss-of-coolant-accident (LOCA).
- B) One condition relies on three fans operating in which a single train of NSCW operates four hours after station blackout with the fourth fan lost from service due to a tornado missile.

The Marley tower performance curves were used to determine the reduced wet bulb temperatures at which the heat loads (34 degree range) could be met with an additional fan removed from service for maintenance.

Three fans satisfy cooling loads at a wet-bulb of 67°F for the conditions described above in (A). Two fans satisfy the cooling load at a wet-bulb of 63°F for the conditions described above in (B). A temperature of 63°F wet-bulb is bounding for taking a fan out of service under all conditions.

3) NRC Request:

Surveillance Requirement (SR) 3.7.9.5, states "Verify ambient wet-bulb temperature $\leq 63^{\circ}\text{F}$ when one NSCW tower fan is out-of-service and daily high temperature (dry-bulb) is forecasted to be $> 48^{\circ}\text{F}$," at a frequency of 24 hours. What is the basis for selecting the dry-bulb temperature limit of 48°F ? Explain how measurement uncertainties are accounted during surveillance.

SNC Response:

Surveillance of the wet-bulb temperature is not necessary when the daily forecast high temperature (dry-bulb) will be fifteen degrees less (margin) than the TS limit of 63°F . The wet-bulb temperature will not be greater than the corresponding dry-bulb temperature. Therefore, the 48°F dry-bulb temperature ensures that a fifteen degree margin exists between the forecasted daily high temperature and the TS limit of 63°F (wet-bulb). This limit eliminates the need for surveillance of the wet-bulb temperature when daily temperatures (dry-bulb) are not expected to reach 48°F . Surveillance of the ambient temperature is necessary to ensure that 63°F (wet-bulb) is not exceeded. When ambient temperatures (dry-bulb) are greater than 48°F , daily surveillance of the wet-bulb temperature will be required to ensure that the TS limit of 63°F is not exceeded. There is a margin of 0.9 degrees in the 63°F wet-bulb limit to account for temperature measurement uncertainties.

4) NRC Request

NRC Generic Letter (GL) 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-basis Accident Conditions," dated September 30, 1966, requested licensees to determine if containment air cooler cooling water systems are susceptible to either waterhammer or two-phase flow conditions during postulated accident conditions. What is the impact of the requested changes on the Vogtle's GL 96-06 evaluation?

SNC Response:

Generic Letter 96-06 requested licensees to determine (1) if containment air cooler cooling water systems are susceptible to either waterhammer or two-phase flow conditions during postulated accident conditions; or (2) if piping systems that penetrate the containment are susceptible to thermal expansion of fluid so that over-pressurization of piping could occur.

The changes proposed by this license amendment have no impact on the thermal hydraulics of the nuclear service water (NSCW) system. The heat transfer capabilities of the NSCW system are affected by this change. However, the impacts are not adverse based on the evaluations performed and the limits set by the proposed license amendment. The ability of the NSCW system to perform its design function during accident conditions is not impacted by this proposed license amendment. This includes concerns associated with the Generic Letter 96-06 evaluation.

Figure 1 - Marley Cooling Tower Performance Curves

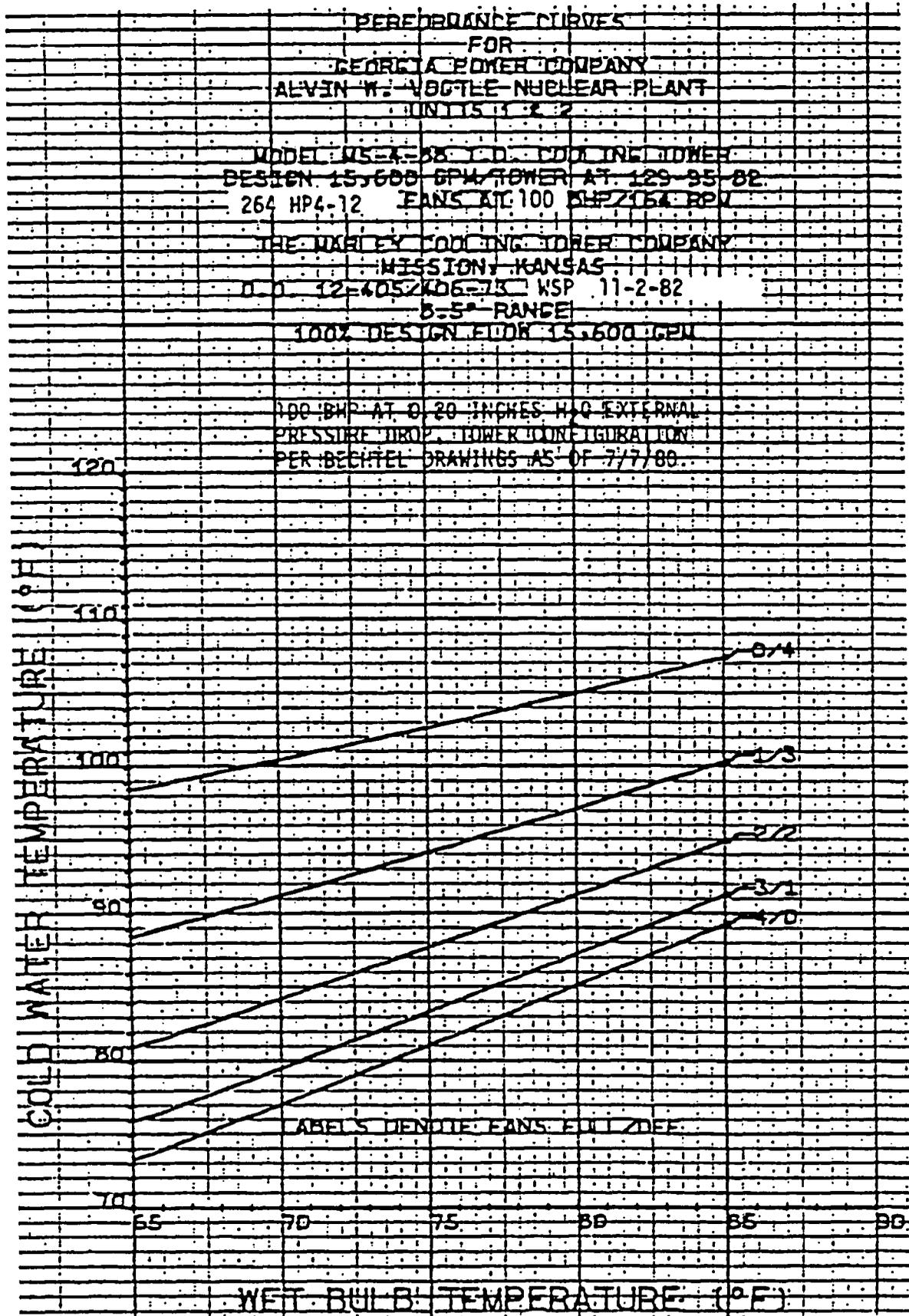


Figure 1 - Marley Cooling Tower Performance Curves

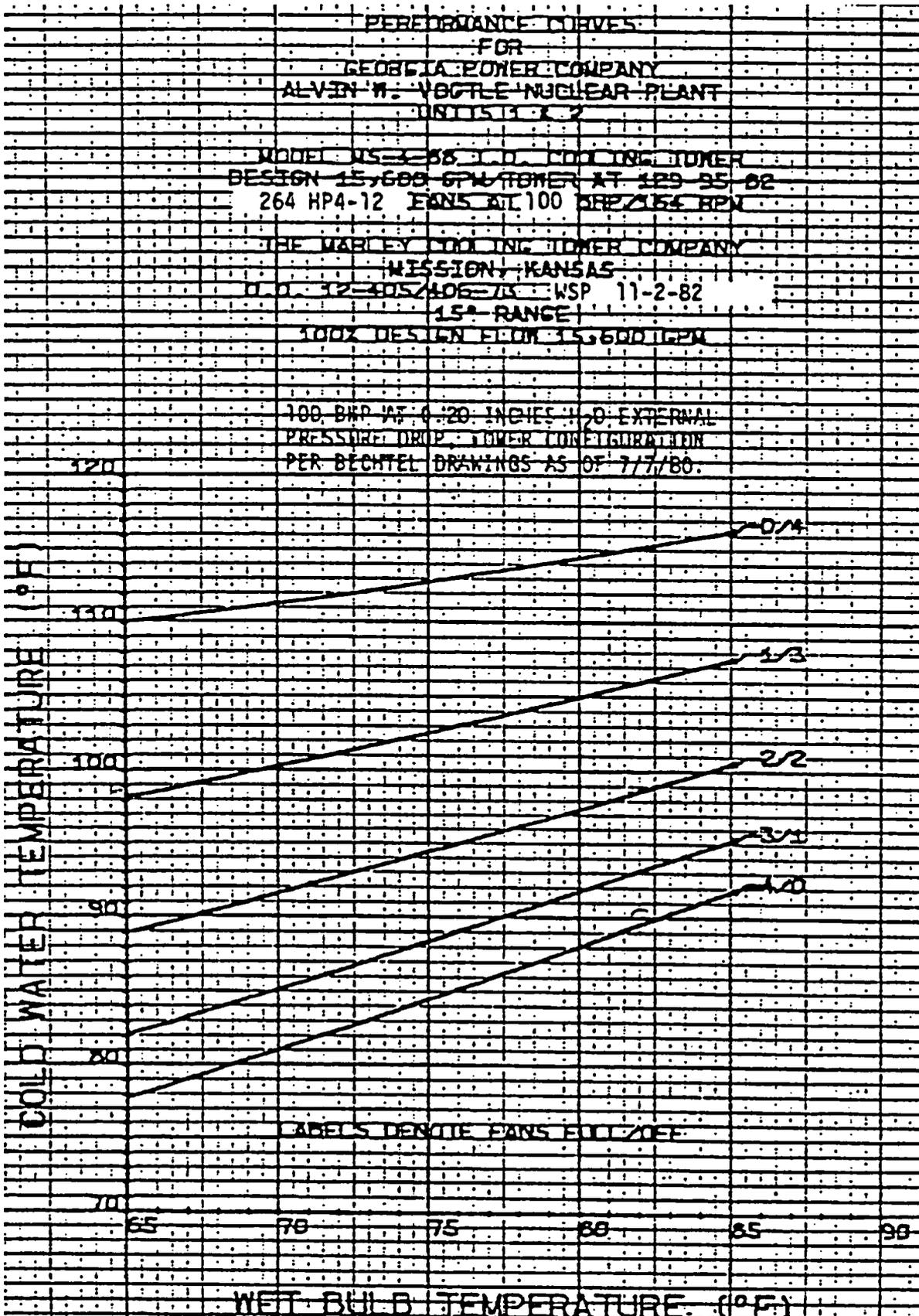


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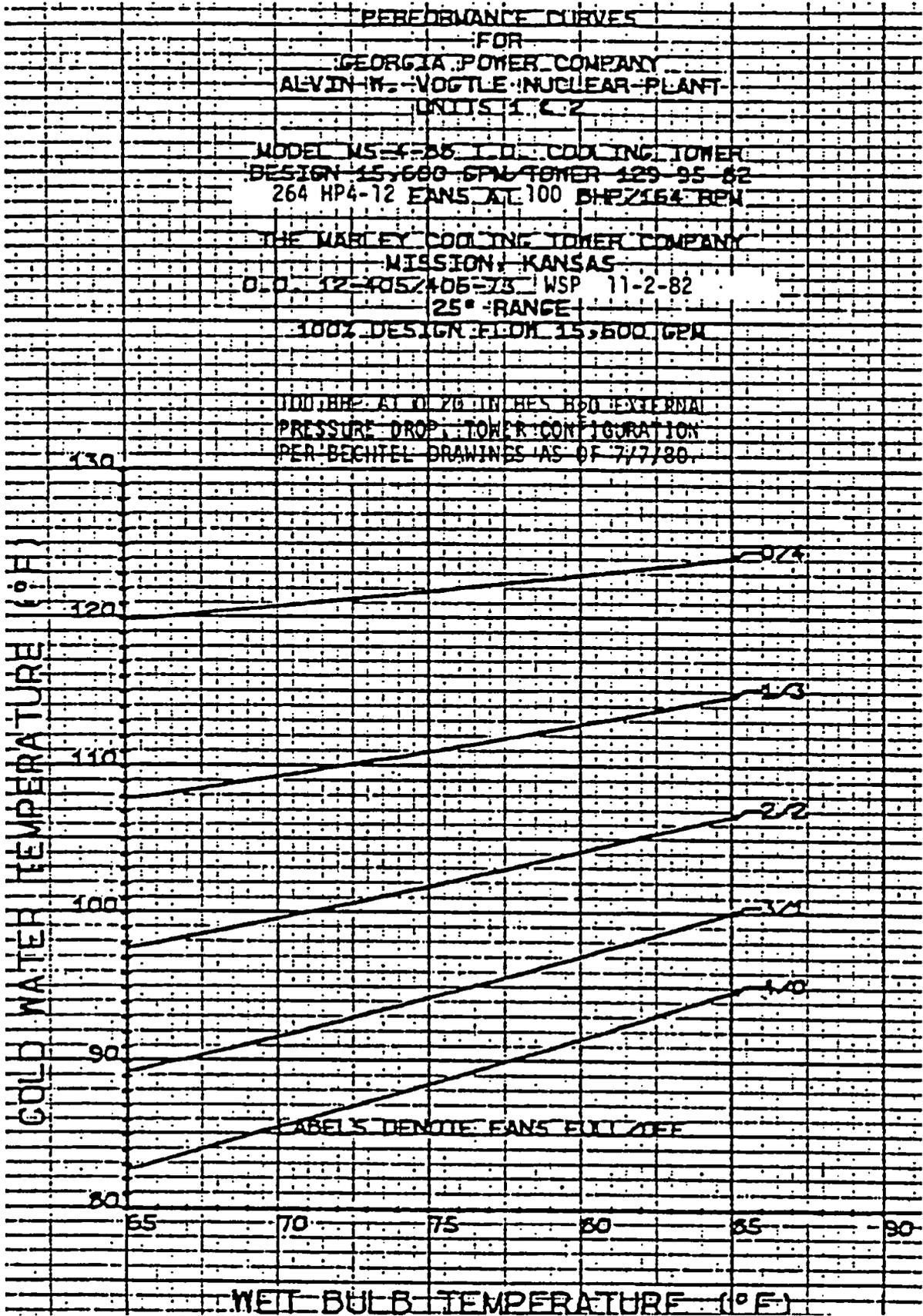


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