ENTERGY

Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150
Tel (601) 437-6409

W. T. Cottle
Vice President
Operations
Grand Gulf Nuclear Station

September 25, 1992

U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Response to Request for Additional Information
Related to Ground Water Level Control and Monitoring

GNRO-92/00123

Gentlemen:

On April 30, 1992, Entergy Operations, Inc. provided a final report on high ground water levels at the Grand Gulf Nuclear Station (GGNS). This report summarized the outstanding ground water issues at GGNS and described actions taken to resolve these issues. This report also contained a post-construction ground water level contour map and evaluation results providing the maximum expected post-construction ground water level within the power block area.

By letter dated July 17, 1992, the Staff requested additional information to support completion of its review. The attachment provides our response to this request for additional information.

Should you have any questions or require additional clarification, please contact Jewel Summers at (601) 437-2149.

Yours truly,

WTC/JS/ams
attachment: Request for Additional Information on Ground Water
cc: (See Next Page)

280095

G9209181/SNLICFLR - 1

A001
1/1

cc: Mr. R. H. Bernhard (w/a)
Mr. D. C. Hintz (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
Mr. H. L. Thomas (w/o)

Mr. Stewart D. Ebneter (w/a)
Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta St., N.W., Suite 2900
Atlanta, Georgia 30323

Mr. P. W. O'Connor, Project Manager (w/2)
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop 13H3
Washington, D.C. 20555

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

QUESTION NO. 1

The licensee proposed to raise the Design Ground Water Level (DGWL) from El. 109.0 ft. above mean sea level to El. 114.5 ft. for the Control Building and Standby Service Water (SSW) basins and to El. 117.0 ft. for the remaining safety related structures. The licensee stated that several studies and calculations since 1983 have been performed to justify raising of the DGWL, but no details and documentation of these studies have been presented. Please provide a summary of those studies and technical reports, including report titles, date of issuance, brief descriptions and documentations, for future reference and retrieval.

RESPONSE:

Note: As discussed in the final report dated April 30, 1992, the Control Building and SSW Basins have been evaluated for a ground water elevation of 114.5 ft. and the remaining safety related structures have been evaluated for a ground water elevation of 117.0 ft. However, Entergy has stated the DGWL will be raised from 109 ft. to 114.5 ft. for all structures within the power block.

The following is a list of the major documents generated in the evaluation of high ground water levels and available for review at GGNS. The reference section within each document cites additional related documents.

- Studies

  1983 Study

  Date: December 1983

  Title: High Ground Water Level Study, Grand Gulf Unit 1. Performed by Bechtel Corporation (Reference: AECM-85/0035, dated February 14, 1985).

  Description: This study was conducted to determine if the integrity of safety related structures was compromised by the high ground water levels experienced in 1983. A review of the structural analysis for stability and hydrostatic loading was performed.

  1989-1990 Study

  Date: November 1990

  Title: Status Report - Program to Resolve High ground water Level Issue. Performed by Bechtel Corporation.

  Description: This study was initiated to investigate the source(s) of ground water flow into the backfill adjacent to the power block structures.

1991 Study

Date: January 1991

Title: Addendum to Status Report - Program to Resolve High Ground Water Level Issue. Performed by Bechtel Corporation.

Description: Study was initiated to ex,and on the previous studies and provide an action plan for resolution of the high ground water level issue.

- Engineering Report

Date: April 28, 1992

Title: GGNS Ground Water Assessment. Report No. GGNS-92-0026, Revision 0.

Description: This report presents the results of efforts begun in 1989 to determine why ground water levels at GGNS had exceeded the design ground water level. It reflects the recommended resolution to the ground water level issues, including raising of the DGWL.

- Calculations

Date: May 28, 1992

Title: Ground Water Level Evaluation Calculation Review. (GEXI-92/00722)

Description: This letter references calculations reviewed by Bechtel Corporation to support resolution of the GGNS ground water issue.

Question No. 2

The licensee reported that the major sources of recharge to the ground water at GGNS are infiltration from precipitation and leakage from the cooling tower.

a. What is the probable maximum precipitation (PMP) rate that has been considered at the GGNS site? Is it consistent with the latest position of NRC Standard Review Plan Section 2.4.3, Revision 3, April 3, 1989?

RESPONSE:

The PMP analysis for GGNS was conducted in accordance with Regulatory Guide 1.59, Revision 2. This analysis determined that approximately 30.5 inches of rainfall would be received during a 6 hr storm event (based on HMR-33 for 10 square mile area with a maximum intensity of 16.4 in./hr). Acceptance of this analysis is documented in NUREG-0831, Section 2.4.4.

A storm event consistent with the latest revision of NRC Standard Review Plan Section 2.4.3, Revision 3, April 1, 1989 would be based on HMR-51, where a 6 hr storm event would produce approximately 31.5 inches of rainfall with a maximum intensity of 28.2 in./hr. Therefore, the overall rainfall amount is not significantly different than that already evaluated. However, as shown above the maximum rainfall intensity is significantly increased. Although, changes to intensity may have a significant effect on PMP, the duration of these rainfall rates are for a short time period (less than 30 minutes). Other parameters being equal, a higher intensity rainfall would promote runoff and provide less time for the rainfall to percolate for a given storm event. Also, saturated ground conditions would tend to promote runoff and dry ground conditions would provide a buffer. Additionally, as stated in a letter from Entergy Operations, Inc. dated April 30, 1992, water levels typically rise when precipitation is high for several consecutive months and fall during similar periods of lower than average precipitation. Although short duration rainfall events do affect the ground water level, the effects dissipate quickly. Therefore, it is reasonable to assume that this short duration, high intensity rainfall would not adversely affect ground water levels.

b. Although the cooling tower has been repaired and the leakage stopped at present, what is the basis to believe that leakage will not happen again in the future?

RESPONSE:

A walkdown of the cooling tower tunnels during the fourth refueling outage revealed a major leak at one of the expansion joints. The failure of this expansion joint seal was due primarily to the type of seal installed at an expansion joint that was misaligned during construction. A different type of seal was installed at the expansion joint during the fifth refueling outage. In addition, several expansion/contraction cracks in the tunnel walls were also repaired. These cracks were very small in width and didn't contribute significantly to cooling tower leakage. However, these cracks were repaired to prevent degradation of rebar in the tunnel walls. Other than the failed expansion joint seal, no degradation mechanisms were identified during the walkdown which could lead to significant cooling tower leakage. Nonetheless, as committed in our final report, dated April 30, 1992, a visual inspection of the cooling tower will be performed during each refueling outage to verify no potential leakage paths exist.

Based on periodic inspection, repair of the failed expansion joint and the absence of mechanical/chemical degradation mechanisms that could lead to significant unidentified leakage, we are confident that cooling tower leakage of this magnitude will not recur.

QUESTION NO. 3

The licensee stated that no dewatering wells will be required to maintain ground water levels below El. 114.5 ft. adjacent to safety related structures. What necessary steps should be taken in case the ground water level of El. 114.5 ft. is exceeded? How can we monitor the ground water level in the future if all the monitoring devices are removed?

RESPONSE:

Exceeding 114.5 ft is not considered credible from an historical perspective (no such exceedance has ever been recorded within the power block). The ground water level data that has been recorded indicates that extended periods of heavy precipitation have the greatest effect on ground water levels. These periods of heavy precipitation affect primarily the southeast area of the plant where dewatering well DW-8 is located. In determining the maximum expected ground water level for the plant, the highest recorded level (El. 110.2 ft.) with minimal influence from plant recharge sources was added to the highest ground water level change (3 ft.) from a period of heavy precipitation. This results in a conservatively determined maximum expected ground water level of approximately 113 ft. within the power block area. Therefore, ground water levels are not expected to rise to or even approach elevation 114.5 feet.

The construction dewatering system was originally installed to remove seepage of ground water into the excavation and inflow of precipitation during construction (Reference: UFSAR Section 2.5.4.6). Monitoring was considered a temporary measure until completion of Unit 2 construction. Since the Unit 2 Construction Permit has been revoked and construction on this unit terminated, the Unit 2 backfill completed, repairs to the cooling tower completed and the expected maximum ground water level determined, there is no longer a need to continue monitoring the plant ground water level.

However, as previously noted, a visual inspection of the cooling tower will be performed during each future refueling outage to verify no potential leakage paths exist.

QUESTION NO. 4

Provide for comparison the following response spectra of design ground motion to demonstrate that additional evaluation of seismic structural design is not required for the new DGWL change:

(a) Spectra for the old DGWL El. 109.0 ft.

(b) Broadened (+/-15%) spectra for the old DGWL El. 109.0 ft.

(c) Spectra for the new DGWL El. 117.0 ft

RESPONSE:

The design spectra for GGNS design ground motion is provided in UFSAR Figures 3.7-1 and 3.7-2. These spectra were obtained by modifying Newmark's curves to account for variations in site conditions, foundation properties,

and effects of focal and epicentral distance from the site. Ground water elevation is not a parameter directly considered in the development of the GGNS free field ground motion design spectra.

The plant site specific design synthesized time-history was obtained through modification of the 1940 El Centro earthquake since no recorded earthquake motions were available. Using the synthesized time-history, response spectra were developed that enveloped the modified Newmark design spectra (UFSAR Figures 3.7-4 through 3.7-15) at a sufficient number of frequencies. This time-history was used to determine in-structure seismic response.

However, ground water levels could potentially affect the in-structure response spectra. The areas of concern are the dynamic soil properties and the analysis methodology. The dynamic soil properties are affected by the raised ground water level and the analysis methodology is affected by the dynamic soil properties. The effect of raising the DGWL on the key soil parameters has been investigated (Ref. GGNS Ground Water Assessment Report No. GGNS-92-0026, Revision 0, April 28, 1992) and found that the effect of these changes in the soil properties on the analysis methodology is negligible. These slight variations in soil properties would have a minimal effect on response and would be more than adequately enveloped by the broadening of the in-structure design response spectra (+-15%) discussed in UFSAR Section 3.7.2.5. Therefore GGNS in-structure design response spectra remain unchanged and are applicable to a ground water elevation of 114.5 ft. or 117.0 ft. (see note under response to Question No. 1).