Rcd 10/19/84

DEPARTMENT OF THE ARMY
SOUTHWESTERN DIVISION, CORPS OF ENGINEERS
1114 COMMERCE STREET
DALLAS, TEXAS 75242-0216

REPLY TO
ATTENTION OF:
Engineering Division
Geotechnical and Material Branch

50-498/499

Dr. Lyman Heller
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Mail Stop P-214
Washington, DC 20555

Dear Dr. Heller:

Please reference Interagency Agreement (IA) No. NRC-03-82-102; Work Order No. Five (5), South Texas, Units 1 and 2. Attached as Enclosure 1 is a list of geotechnical related questions pertaining to the South Texas Project Final Safety Analysis Report (Volumes 1 through 16 and Responses to NRC Questions Volume 1 and 2). Responses to many of the questions may be contained in the requested references shown on Enclosure 2. The Project and Financial Status report is at Enclosure 3.

As a part of this work order, we are required to prepare a draft Safety Evaluation Report (SER) and SSER. Please provide any standard formats, requirements, instructions, etc. for preparation of these documents. We would also like to make a visit to the site at your earliest convenience.

If you have any questions, please contact David E. Wright (FTS 729-2377, commercial 214-767-2377).

Sincerely,

Arthur D. Denys, P.E.
Chief, Engineering Division

Enclosures

Copy furnished:

DAEN-ECE-G, ATTN: Mr. Dale Munger
U.S. Nuclear Regulatory Commission
  Contracting Officer, DC
  Director, Division of Engineering, ATTN: Mr. C. Poslusny
  Mr. J. Knight, DE
  Mr. B. L. Grenier, NRR

A020
1/1

8410220309 841019
PDR ADOCK 05000498
A PDR

Engineering Division
Geotechnical and Material Branch

Dr. Lyman Heller
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Mail Stop P-214
Washington, DC 20555

Dear Dr. Heller:

Please reference Interagency Agreement (IA) No. NRC-03-82-102, Work Order No. Five (5), South Texas, Units 1 and 2. Attached as Enclosure 1 is a list of geotechnical related questions pertaining to the South Texas Project Final Safety Analysis Report (Volumes 1 through 16 and Responses to NRC Questions Volume 1 and 2). Responses to many of the questions may be contained in the requested references shown on Enclosure 2. The Project and Financial Status report is at Enclosure 3.

As a part of this work order, we are required to prepare a draft Safety Evaluation Report (SER) and SSER. Please provide any standard formats, requirements, instructions, etc. for preparation of these documents. We would also like to make a visit to the site at your earliest convenience.

If you have any questions, please contact David E. Wright (FTS 729-2377, commercial 214-767-2377).

Sincerely,

Arthur D. Denys, P.E.
Chief, Engineering Division

Enclosures

Copy furnished:

DAEN-ECE-G, ATTN: Mr. Dale Munger
U.S. Nuclear Regulatory Commission
Contracting Officer, DC
Director, Division of Engineering, ATTN: Mr. C. Posluszny
Mr. J. Knight, DE
Mr. B. L. Grenier, NRR

Questions
STP - FSAR

I. Chapter 2, Section 2.4 - "Hydrologic Engineering"

1. Page 2.4-29. For the conservative failures postulated, the Cooling Reservoir embankment section is assumed to translate, intact, downstream for a distance of 200 feet. Once flow begins through the breach, the embankment material will erode and soil, debris, etc. would be deposited against and adjacent to the plant facilities. What effects, if any, would this material have on the operation or safety of the structures?

2. Page 2.4-80 and 2.4-81. Potential problems (seepage, slides, overtopping, etc.) which could lead to an embankment failure are generally slow developing thereby allowing sufficient time for safe shutdown or to take necessary remedial action. Constant surveillance throughout the operational life of the project should provide early warning of any potential problem. Nevertheless, the postulated embankment failure was assumed to be instantaneous with a subsequent instantaneous flood wave against the plant structures. For such a remote occurrence, what plans could or would be implemented to provide for safe shutdown?

II. Chapter 2, Section 2.5.4 "Stability of Subsurface Materials"

1. Page 2.5.4-52, paragraph 2.5.4.5.5.2, subparagraph 2. The E layer was compacted to a minimum dry unit weight of 98 lbs/ft^3. Based upon all laboratory tests of the subgrade material, what range of percent relative density does 98 lbs/ft^3 correspond to?

2. Page 2.5.4-53, paragraph 2.5.4.5.5.2, Table 2.5.4-23, and Figure 2.5.4-57. What method or procedure was used to correlate in-place density tests with laboratory compaction data? For example, Table 2.5.4-23 indicates a mimmum dry density of 95.7 lb/ft^3 was accomplished for the Unit 1 Turbine Generator Building (cohesive subgrade). From compaction curves for Layer B (figure 2.5.4-57), 95.8 lb/ft^3 would correspond to a loose 76.9 to 83.1 percent compaction depending upon which compaction test was most applicable.

3. Page 2.5.4-57, ASTM Standards. Since density control of structural fill or backfill was based on relative density, what is the purpose of "Moisture/density relationship according to modified Proctor procedure (ASTM D 1557-70)."

4. Page 2.5.4-105, paragraph 2.5.4.12.2. Since foundation verification was generally accomplished using rapid or standard test methods on the subgrade, what conditions were encountered that led to the suspicion that the density was not satisfactory at depth throughout the E layer?

5. Page 2.5.4-106, paragraph 2.5.4.12.2. Information presented on Figure 2.5.B.5.3-5 indicates lenses or seams of clay within layer E. What maximum thickness were these seams and did any of these affect the penetration rate of the Vibroflot probe such that prolonged jetting action may have created voids immediately beneath the clay seams? Such a condition could account for the introduction of such large amounts of new soil material in the probe holes.

6. Page 2.5.4-183, Table 2.5.4-23. (1) Please distinguish, by Unified Soils Classification symbols, between non-cohesive and cohesive material. (2) Required dry densities for non-cohesive materials correspond to what per-

Encl. 1

cent relative density? (3) Please provide the results for Unit 1 Mech-Elec. Aux. Building and the Unit 2 Reactor Containment and Fuel-Handling Buildings.

7. Figures 2.5.4-54 and 2.5.4-54A. From a construction standpoint (specifications), what is the difference between Category I and Noncategory I structural backfill?

8. Figures 2.5.4-59 and 2.5.4-60. The actual gradation band plotted on these figures needs some clarification. Page 2.5.4-55 indicates gradation tests "prior to delivery of backfill to the project site" or at the site "before it was placed." Page 2.5.4-57 indicates classification tests were obtained from "the placed material" and page 2.5.4-60 indicates gradations on material "delivered from the Parker Brothers plant." Which valves are actually plotted on the figures?

9. Figures 2.5.4-61 and 2.5.4-62. In conjunction with the data shown on these figures, please provide a brief discussion of the following:

(a) Was the structural backfill saturated during placement and compaction?

(b) Were relative density max-min valves determined on material from a stockpile or on material after it has been placed and compacted?

(c) What approximate range or band of maximum and minimum densities were obtained from all relative density tests?

(d) What procedure was used to correlate in-place density tests with laboratory max-min values?

(e) Were any relative densities less than 80 percent continuous over any lift or zone or were these randomly oriented vertically and horizontally?

10. Figure 2.5.4-93 (original - "Ultimate Settlement by H-Space Analysis) and Figure 2.5.4-93 (Amendment 36). Ultimate settlement (1983 projections) based on construction data is generally about 0.5 inch greater than originally estimated. Please provide a brief discussion for the difference between the two results.

III. Chapter 2 - Section 2.5.5 - "Stability of Slopes"

1. Page 2.5.5-2, paragraph 2.5.5.2.1. This paragraph indicates "no weak soil strata are present in the surface soils." Page 2.5.6-11, paragraph 2.5.6.4.2.5 indicates, however, the ECP embankment material was placed at +3 percent to +8 percent of optimum moisture and compacted to a minimum 80 percent modified Proctor. Were any undisturbed samples and subsequent shear testing performed on materials that represented these conditions?

IV. Chapter 2 - Section 2.5.6 - "Embankments and Dams"

1. Page 2.5.6-10, paragraph 2.5.6.4.1.5. What procedure was used to correlate in-place densities with laboratory compaction data or laboratory max-min valves for relative density?

2. Page 2.5.6-10, paragraph 2.5.6.4.1.6. Was the embankment over built to compensate for the anticipated 1 to 2 feet of settlement?

3. Page 2.5.6-12, paragraph 2.5.6.4.2.6. Was the computed 1 to 2 in. ultimate settlement based on material compacted to a minimum 80 percent at +3 to +8 percent of optimum moisture?

4. Page 2.5.6-24, Table 2.5.6-2. Are strength valves for the embankment original design values or from record samples from the compacted embankment? If original valves, what percent compaction and moisture content was used? Also, in Table 2.5.6-4, what strengths were used for the post-construction analyses?

5. Figure 2.5.6-15. The "Interior Berm Detail" for Type "A" Embankment indicates 45 or 55 feet width for pore pressures greater than 25 percent whereas page 2.5.6-8 indicates 35 feet was used. Please clarify. Also, are provisions incorporated for future inspection and cleanout of the collector pipe beneath the downstream beam?

Chapter 2 - Section 2.5.A - "Foundation Verification"

1. General Comment. In addition to the foundation verification field work performed, there are many references to a "geotechnical engineering evaluation" to determine the adequacy of zones not verified. Briefly describe or present typical examples of what constituted a "geotechnical engineering evaluation."

2. Page 2.5.A-13, paragraph 2.5.A.7. Normalized data indicate 10 percent of the foundation verification strength test results and 11 percent of the dry densities did not meet minimum field acceptance criteria. What actual percentages would these valves correspond to? Also, please provide a brief discussion of any adverse construction conditions which may have prevented meeting the minimum field acceptance criteria. The same comments also apply to paragraph 2.5.A.8.

3. Tables 2.5.A.2-1 and 2.5.A.3-1. (1) Indicate by Unified Soils Classification symbols which materials were considered cohesive and which were considered cohesionless. (2) Did both the rapid method and standard method have to meet acceptance criteria? If not, which governed? (3) What range of percent compaction (cohesive material) and percent relative density (cohesionless material) do the standard method test valves correspond to?

4. Table 2.5.A.5-1. This table indicates that much of the E layer required some type of remedial action before verification. Please briefly describe the field or construction conditions leading to these remedial actions. Under the Remarks Column, what does the letter "M" represent (see page 2.5.A-31c, zones 230 and 231)?

Chapter 2 - Section 2.5.C - "Geotechnical Monitoring"

1. General Comment. Please provide a time plot of settlement measured to date for the Main Cooling Reservoir and Essential Cooling Pond embankments.

STP - FSAR

Request Copy of Following References

Reference No.	Title
2.4.13-12	McClelland Engineers Inc., Geotechnical Study, Cooling Water Reservoir, South Texas Project Supplements, Engineering Analyses and Recommendations, Embankments, Dikes, and Borrow Areas, Volume 3, October 31, 1975, and Addendum 1, February 25, 1976.
2.5.4-63	Stanley D. Wilson, Consulting Engineer, "Expert Committees Final Report on the Adequacy of Category I Structural Backfill, South Texas Project," TPNS Y310XR1378ASH, January 30, 1981.
2.5.5-13	A letter report from Woodward-Clyde Consultants to Brown & Root Inc., dated August 1, 1979 (Y570XR1378 AWC).
2.5.6.7	McClelland Engineers, Inc., Geotechnical Study, Cooling Water Reservoir, South Texas Project, Volume 1, "Engineering Analysis and Recommendations, Structures," report to Brown & Root, Inc. (1975).
2.5.6-8	McClelland Engineers, Inc., Geotechnical Study, Cooling Water Reservoir, South Texas Project, report to Brown & Root, Inc. (1975).
2.5.6-13	Brown & Root Inc., Technical Reference Document, "ECP Earthwork Design and Construction," TPNS 5Y570SQ005-1, January 31, 1980.
2.5.6-14	McClelland Engineers, Inc., Geotechnical Study, Cooling Water Reservoir, South Texas Project, "Underseepage Control," report to Brown & Root Inc., (1975).
2.5.C-1	Brown & Root, Inc. Calculation No. 7Y310SC267-2B, "Subsidence Study", 8/6/81.
-	STP Construction Procedure A040KPCCP-14 "Vibrofloatation".
-	QA Vibrofloatation Inspection Report, dated 5/3/76.

Encl. 2

Interagency Agreement No. NRC-03-82-102; Work Order No. Five (5); South Texas Project, Units 1 and 2; July 1984 to Sept. 30, 1984

I. PROJECT STATUS

1. Efforts completed: Received 16 Volumes of Final Safety Analysis Report, Volumes I and II of Responses to NRC Questions, and Amendments 1 through 40. Completed initial review of these documents and developed list of questions.

2. No problems anticipated.

3. Progress to date: Approximately 15 percent complete.

II. FINANCIAL STATUS

1. Total COE proposal - $36,850

2. Funds expended to date - $5,212.66

ENCL. 3