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October 22, 1985
ST-HL-AE-1447
File No.: G9.17

Mr. George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Responses to DSER/FSAR Items Concerning
Chapter 3, Section 3.8 on Design
Codes, Standards and Specifications

Dear Mr. Knighton:

The attachment enclosed provide STP's response to Draft Safety Evaluation Report (DSER) or Final Safety Analysis Report (FSAR) items.

The item numbers listed below correspond to those assigned on STP's internal list of items for completion which includes open and confirmatory DSER items, STP FSAR open items and open NRC questions. This list was given to your Mr. N. Prasad Kadambi on October 8, 1985 by our Mr. M. E. Powell.

The attachment includes mark-ups of FSAR pages which will be incorporated in a future FSAR amendment unless otherwise noted below.

The items which are attached to this letter are:

Attachment	Item No.*	Subject
1	F 3.8-2	Identification of Codes, Standards, and Specifications applicable to design

*Legend
D - DSER Open Item   C - DSER Confirmatory Item
F - FSAR Open Item   Q - FSAR Question Response Item

B001 1/1

L1/DSER/aac

If you should have any questions concerning this matter, please contact Mr. Powell at (713) 993-1328.

Very truly yours,

M. R. Wisenburg
Manager, Nuclear Licensing

MEP/vmq

Attachments: See above

L1/DSER/aac

cc:

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L1/DSER/aac

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use and comment in 1973, including subsequent addenda 1 through 6. Hereinafter, this code shall be referred to as the ASME-ACI 359 document. Exceptions to the code are as follows:

- Authorization and stamping requirements in Subsection CA

- Personnel qualifications for Level III Inspection Engineer

- The filing and certification of those design and construction documents required by Subsections CA-3200 and CA-3300, which are required only for stamping (The information required by these subsections will be available, but not necessarily in the format specified)

- Those exceptions described in Sections 3.8.1.5.2.2.2 and 3.8.1.6.3

Additional codes used in the design of the Containment are:

1. American Society of Mechanical Engineers - ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 1, Subsection NE for Class MC components, 1971, including the winter 1973 addenda; ASME B&PV Code, Section IX and Section II, 1971 including the winter 1973 addenda.

2. American Institute of Steel Construction - AISC ~~Manual of Steel Construction~~ Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, 1969, including supplements 1, 2, and 3. 32

3. American National Standards Institute - ANSI A58.1-1972, "American Standard Building Code Requirements for Minimum Design Loads in Buildings and Other Structures"

3.8.1.2.2 Government Regulations and Regulatory Guides: The design, construction, materials, testing, examination, etc., of the Containment are in conformance with government regulations as discussed in Section 3.1 and with the following NRC Regulatory Guides (RGs) as noted in Section 3.12. 40

RG 1.10 "Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures," Revision 1

RG 1.15 "Testing of Reinforcing Bars for Category I Concrete Structures," Revision 1

RG 1.18 "Structural Acceptance Test for Concrete Primary Reactor Containments," Revision 1

RG 1.19 "Nondestructive Examination of Primary Containment Liner Welds," Revision 1 4

RG 1.35 "Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containment Structures," Revision 2

RG 1.55 "Concrete Placement in Category I Structures," Revision 0

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RG 1.57 "Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components," Revision 0

RG 1.69 "Concrete Radiation Shields for Nuclear Power Plants," Revision 0

RG 1.76 "Design Basis Tornado for Nuclear Power Plants," Revision 0

The following guides are not applicable to STP per the implementation portion of the guide; however, degree of compliance is addressed in the FSAR.

RG 1.94 "Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants," Revision 1 21

RG 1.103 "Post-Tensioned Prestressing Systems for Concrete Reactor Vessels and Containments," Revision 1

An exception is taken to RG 1.10, "Mechanical (Cadweld) Splices in Reinforcing Bars." For further explanation of this position, see Section 3.8.1.6.3. The 8
requirements of RG 1.35 are complied with. 45

3.8.1.2.3 <u>Specifications and Standards</u>: The specifications and standards are used as a basis for the construction, inspection, materials, and testing of the Containment structure. 24

1. American Society for Testing and Materials (ASTM) - ASTM Standards as referenced in the ASME-ACI 359 document and Section III of the ASME B&PV Code. Different issue dates of ASTM standards ~~are~~ may be used provided they meet ~~or exceed~~ the minimum technical requirements ~~of the specified dates~~ as stated herein. 8

2. American Concrete Institute - ACI <u>Manual of Standard Practice</u>

3. Prestress Concrete Institute (PCI) - "Tentative Specification for Post-Tensioning Materials," as reported by the PCI Post-Tensioning Subcommittee, <u>PCI Journal</u> (January - February 1971)

4. American Institute of Steel Construction (AISC) - AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings," 1969, including supplements 1, 2, and 3. 32

5. American Welding Society (AWS) - AWS D1.1-75, "Structural Welding Code". Visual inspection acceptance criteria for welding in conformance with AWS D1.1 are specifically defined in Appendix 3.8.B. The criteria are incorporated in construction specifications where field welding per AWS D1.1 is specified. 32 4
The polar crane runway girder welding is in accordance with AWS D1.1 (1972) including revision through 1974.

6. American National Standards Institute - ANSI N45.4-1972, "Leakage Rate Testing of Containment Structure for Nuclear Reactors"

7. Army Corps of Engineers (C of E) - CRD C39, "Coefficient of Thermal Expansion," and C44, "Coefficient of Thermal Conductivity"; CRD C588-76, "Specifications for Non-Shrink Grout"

3.8.1.3 Loads and Loading Combinations.

3.8.1.3.1 Definitions of Loads: The following nomenclature and definitions apply to all the loads to be encountered and/or to be postulated in the design of the Containment.

1. Dead Loads (D)

Dead load of the structure plus any other superimposed permanent loads, except prestressing forces. Included are the weights of piping, cable trays, ductwork, and equipment operating loads as specified by the equipment manufacturers. Hydrostatic loads and crane loads are also treated as dead load.

The polar crane's rated lift capacity is 417 tons (Unit 1)/500 tons (Unit 2). 40
Girders and brackets are designed to loads given by the crane vendors. Horizontal and vertical impact loads are considered in accordance with the AISC ~~Manual of Steel Construction.~~ Specification.

Hydrostatic loads are calculated assuming the water table at El. 27 ft and a 32
unit weight of water at 62.4 lb/ft^3. A reinforced concrete density of 145 lb/ft^3 is used in the calculation of dead load.

2. Live Loads (L)

Conventional floor live loads which account for movable loads and maintenance and laydown loads. Also considered are the construction loads, lateral soil pressure loads and the minimum roof load on the dome.

The minimal conventional floor live load as applied to the slab and grating 18
areas of the Containment is 50 lb/ft^2. The dome roof load is 12 lb/ft^2 on the projected area as specified in ANSI A58.1-1972.

Lateral soil pressure loads including pressures resulting from adjacent foundation loads are calculated as indicated in Section 2.5.4.10.5.

3. Prestressing Loads (F)

The prestressing load to be considered is the initial prestressing load, F_i, which occurs when the prestressing tendons are subjected to the most critical stress during the initial tensioning, and the effective prestressing load, F_e, which considers the time-dependent losses for the life of the plant.

The initial prestress load, F_i, is calculated based on a tendon ultimate strength of 240 $kip/in.^2$ with initial jacking of tendon to 80 percent ultimate and lockoff stress of 70 percent ultimate. Effective prestress load, F_e, includes long-term prestress losses of 14.1 percent in the vertical and 15.8 percent in the hoop tendons.

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ANSI N45.2.5-1974 - "Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Structural Concrete and Structural Steel during the Construction Phase of Nuclear Power Plants"

5. Army Corps of Engineers

CRD-C39 - "Coefficient of Thermal Expansion"

CRD-C44 - "Coefficient of Thermal Conductivity"

CRD-C588 - "Specification for Nonshrink Grout"

6. Crane Manufacturers Association of America (CMAA)

CMAA Specification 70

7. American Society of Mechanical Engineers

ASME B&PV Code, Section III, Subsections NA, NE and NF, 1974 edition, including winter 1975 addenda and Code Cases 1644-5, 1741, and N-182. 32

The following exceptions to the code are taken: Code NPT stamping requirements, as per NA-8200 and stress report as per NA-3352 for Steam Generator and Reactor Coolant Pump column supports between elevation -11 ft.-3 in. to elevation 16-ft.-0 in., are deleted. These column supports are classified as Category I structural steel but designed and fabricated as per ASME Code. The design of the Fuel Transfer Tube Sleeve system is in accordance with ASME NE code requirements, except that no code stamping will be required. 32 13 32

8. American Society for Testing and Materials (ASTM)

ASTM standards are as referenced herein. Different issue dates of ASTM standards ~~are~~ may be used, provided they meet ~~or exceed~~ the minimum technical requirements ~~of the specified dates~~ as stated herein. 8

3.8.3.2.2 Government Regulations and Regulatory Guides: The design, construction, materials, testing, examination, etc., of the Containment internal structures are in conformance with the applicable regulatory guides as listed below and as noted in Section 3.12: 40

RG 1.10 - "Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures," Exceptions to this guide are stated in Section 3.8.1.6.3.

RG 1.15 - "Testing of Reinforcing Bars for Category I Concrete Structures,". 40

RG 1.55 - "Concrete Placement in Category I Structures,".

RG 1.69 - "Concrete Radiation Shields for Nuclear Power Plants,". 40

RG 1.94 - "Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants,". 40

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3.8.4.1.6 Class 1E Underground Electrical Raceway System: The Class 1E Underground Electrical Raceway System provides electrical distribution from the MEAB to the DGB, Diesel Oil Storage Structure, and the ECW Intake Structure. The dimensions of the electrical raceways at the MEAB are approximately 5-ft-deep and 7-ft-wide. At the junction of the remaining structures, the electrical raceways branch into sections. The total length is approximately 1,100 ft.

The raceway system consists of a bank of 4-in.-diameter conduits arranged in a ductbank pattern. Each conduit is separated by spacers and the bank of conduits is encased in a rectangular reinforced-concrete section. The devised structural system is capable of supporting its own weight and other external loads. Manholes are provided at specified intervals along the system. Ductbanks are a minimum 4-ft-below the finished grade level, and slope 3 in. per 100 ft toward the manholes.

3.8.4.1.7 Auxiliary Feedwater Storage Tank: The Auxiliary Feedwater Storage Tank (AFST) is a reinforced-concrete structure with cylindrical walls covered by a circular slab. The tank measures approximately 50-ft-in-diameter and 47-ft-high. The tank is supported on a circular concrete mat. The inside of the tank has a stainless steel liner. The tank has a 500,000-gallon demineralized water storage capacity. The exterior wall and roof slab are designed to prevent tornado-missile penetrations. 31 31

3.8.4.2 Applicable Codes, Standards, and Specifications.

3.8.4.2.1 Codes, Standards, and Specifications: The following codes, standards and specifications are used as a basis for the design, fabrication, construction, testing, and surveillance of other Category I Structures. Different issue dates of the documents may be used provided they meet the minimum technical requirements stated herein. 40

1. Uniform Building Code - 1973

2. ANSI A58.1-1972, "American National Standard Building Code Requirements for Minimum Design Loads in Buildings and Other Structures"

3. ACI 318-1971, "Building Code Requirements for Reinforced Concrete"

4. ACI 336-1972 "Suggested Design Procedures for Combined Footings and Mats"

5. ACI 347-1968 "Recommended Practice for Concrete Formwork" 32

6. AISC - Manual of Steel Construction, Seventh Edition 36

7. AISC 1972 "Code of Standard Practice for Steel Buildings and Bridges" 32

8. National Fire Protection Association 1973, Codes and Standards

9. American Welding Society D1.1-75, "AWS Structural Welding Code". Visual inspection acceptance criteria for welding ~~is~~ in conformance with AWS D1.1 are specifically defined in Appendix 3.8.B. The ~~same~~ criteria are incorporated in construction specifications where welding per AWS D1.1 is specified. 32

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10. ACI - Manual of Concrete Practice (Part I & II - 1973, Part III - 1972) 40

11. AISC-1969 ~~- "American Institute of Steel Construction~~ "Specification ~~of~~ for the Design, Fabrication and Erection of Structural Steel for Buildings", including supplements 1, 2, and 3.

12. ASME, Section VIII, Division 1, 1974 including Winter 1975 addenda.

13. ASME, Section IX, Division 1, 1974 including Winter 1975 addenda (for Fuel Transfer Tube bellows only)

14. ASME, Section IX, Division 1, 1971 including Winter 1973 addenda

15. ASME, Section III, Division 1, 1974 including Winter 1975 addenda

16. ASME, Section II, Part II, Part C, 1974 including Winter 1975 addenda 40

17. Army Corps of Engineers - Handbook of Concrete and Cement

18. CMAA Specification 70 (1971)

19. ACI 315, 1974 - Manual of Standard Practice for Detailing Reinforced Concrete Structures

20. AISC - 1976 - "Spefication for Structural Joints Using ASTM A325 or A490 Bolts"

21. ~~20.~~ AISC - "Structural Steel Detailing" ~~(1971).~~ -1971-

22. ~~21.~~ ANSI B18.3-1976 - "Socket Cap, Shoulder and Set Screws - Inch Series"

~~22. Visual inspection acceptance criteria for welding in conformance with AWS D1.1 are specifically defined in Appendix 3.8.B. The criteria are incorporated in construction specification where field welding per AWS D1.1 is specified.~~ 43

3.8.4.2.2 Government Regulations and Regulatory Guides: The design, construction, materials, testing, examination, etc., of the other Category I structures are in conformance with government regulations as discussed in Section 3.1 and with the following RGs as stated in Section 3.12: 40

RG 1.10	"Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures". An exception is taken to RG 1.10, as previously stated in Sections 3.8.1.6.3 and 3.8.3.6.3. 40 7 Q130.24
RG 1.13	"Spent Fuel Storage Facility Design Basis" 43
RG 1.15	"Testing of Reinforcing Bars for Category I Concrete Structures"
RG 1.29	"Seismic Design Classification" 40
RG 1.55	"Concrete Placement in Category I Structures"
RG 1.59	"Design Basis Floods for Nuclear Power Plants"