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March 26, 1986
ST-HL-AE-1627
File No.: G9.17

Mr. Vincent S. Noonan, Project Director
PWR Project Directorate #5
U. S. Nuclear Regulatory Commission
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Auxiliary Feedwater Requirements: Supplemental Information

Reference 1: Letter ST-HL-AE-1621 dated March 11, 1986; M. R. Wisenburg to V. S. Noonan

Reference 2: Letter ST-HL-AE-1460 dated October 25, 1985; M. R. Wisenburg to V. S. Noonan

Dear Mr. Noonan:

In Reference 1, Houston Lighting & Power (HL&P) submitted various FSAR revisions which were discussed in a meeting in Bethesda on March 6, 1986. In addition to those changes it should be further noted, as discussed during the meeting, that changes made to Section 10.4.9 "Auxiliary Feedwater System", in Reference 2 are rescinded.

In order to clarify the storage capacity of the auxiliary feedwater storage tank (AFST) FSAR Section 10.4.9.2 (as well as FSAR Section 3.8.4.1.7, Tables 5.4.A-1 and 10.1-1) and Q440.30 have been revised to reflect a usable capacity of 525,000 gallons. The revised pages are attached and will be incorporated in the FSAR. Also, the minimum AFST volume required by Technical Specifications is 518,000 gallons.

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

Very truly yours,

M. R. Wisenburg
Manager, Nuclear Licensing

JSP/yd

Attachment: Revised FSAR pages

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1/1

cc:

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The AFWS is also designed for the following normal plant operations. | 39

10.4.9.1.1 Plant Cold Startup: The AFWS is designed to back up the main FW system during plant startup in the event the main FW system and/or the startup SGFP is unavailable.

10.4.9.1.2 Plant Hot Shutdown: The AFWS is designed to back up the main FW system during plant hot shutdown (or hot standby) in the event the main FW system and/or the startup SGFP is unavailable. The AFWS can be used as a means of continuous FW supply even if this condition is maintained for extended periods. FW is continuously supplied from the AFST, which during normal operation receives required makeup from the demineralized water storage tank (DWST). The DWST in turn is supplied by water from wells through the demineralizers, as shown on Figures 9.2.3-1 and 9.2.6-1. | 45

10.4.9.1.3 Plant Cold Shutdown: The AFWS is designed to back up the main FW system when achieving plant cold shutdown.

10.4.9.2 System Description. One AFWS is provided for each unit. The piping diagram is shown on Figure 10.4.9-1. The system includes an adequate water storage, redundant pumping capacity to supply the SGs, associated piping, valves, and instrumentation. | 39

The AFWS supplies water to the SGs, where it is converted into steam by the heat transferred from the primary coolant that removes decay heat from the reactor core and heat generated in the primary coolant loop by the reactor coolant pumps. | 39

The AFST provides water to the AFW pumps. It is a concrete, stainless steel lined, ~~500,000 gallon tank with capacity based on:~~ → tank with a usable capacity of 525,000 gallons based on the following plus a margin for contingencies: | 31

- maintaining the plant in hot standby for four hours, then
- cooling down the primary system to 350°F, ~~the point at which the residual heat removal system may be initiated~~ → followed by an eight hour soak period, after which the residual heat removal system may be initiated.

The cooldown rate is 50°F/hr with one RCP operating or 25°F/hr with natural circulation. During normal cooldown the rate is limited to 100°F/hr due to structural limits of the RCS components. | 39

Four AFW pumps, each with independent motive power supplies, are provided to comply with redundancy requirements of the safety standards, both for equipment and power supplies. Pump characteristics are given in Table 10.1-1. | 46 | 39

Three horizontal, centrifugal, multistage, electric motor-driven pumps supply one SG each. Each pump motor is supplied power from a separate engineered safety bus, and the power supply is separated throughout.

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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~~ usable 525,000-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 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

TABLE 5.4.A-1

COMPLIANCE COMPARISON WITH BRANCH TECHNICAL POSITION RSB 5-1

Design Requirements of BTP RSB 5-1	Process and [System or Component]	Possible Solution for Full Compliance	Recommended Implementation for Class 2 plants*	Degree of STP Compliance**
V. Test requirement Meet RG 1.68 for PWRs, test plus analysis for cooldown under natural circulation to confirm adequate mixing and cooldown within limits specified in Emergency Operating Procedures.		Run tests and confirming analysis to meet requirement.	Compliance required.	Meets the intent of RG 1.68. Test data and analysis for a plant similar in design to STP will verify adequate mixing and cooldown under natural circulation conditions (Section 14.2).
VI. Operational procedure Meet RG 1.33. For PWRs, include specific procedures and information for cooldown under natural circulation.		Develop procedures and information from tests and analysis.	Compliance required.	Generic Procedures as developed by the Westinghouse Owners Group will be used as the basis for plant specific procedures.
VII. Auxiliary Feedwater Supply Seismic Category I supply for auxiliary feedwater for at least four hours at hot shutdown plus cooldown to residual heat removal cut-in based on longest time for only onsite or only offsite power and assumed single failure.	Emergency feedwater supply	From tests and analysis obtain conservative estimate of auxiliary feedwater supply to meet requirments and provide Seismic Category I supply.	Compliance will not be required if it is shown that an adequate alternate Seismic Category I source is available.	The AFST capacity of ~~500,000~~ 525,000 usable gals is adequate to support 4 hrs at hot standby ~~followed by~~ and a 10 hr cooldown to RHR cut in conditions with a margin for contingencies. The AFST meets Seismic Category I requirements (Section 10.4.7)

Followed by an 8 hour soak period prior to actual RHR initiation

NOTES:

* The implementation for Class 2 plants does not result in a major impact while providing additional capability to go to cold shutdown. The major impact results from the requirement for safety-related steam dump valves.

** STP falls within the category of a Class 2 plant as defined by Section H, "Implementation," of Branch Technical Position RSB 5-1, Revision 2.

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TABLE 10.1-1 (Continued)

SUMMARY OF IMPORTANT DESIGN AND PERFORMANCE CHARACTERISTICS OF THE STEAM AND POWER CONVERSION SYSTEM

6.	Auxiliary Feedwater Storage Tank:	31
	Number	1
	Capacity, gal (usable)	~~500,000~~ 525,000
	Material of construction	Concrete, stainless steel-lined
7.	Demineralized Water Storage Tank:	
	Number	1 (serves both Units 1 & 2)
	Capacity, gal	1,000,000
	Material of construction	Carbon steel, corrosion resistant interior coating 39
8.	Condensate Pumps:	
	Number	3
	Type	Vertical can
	Flow, gal/min	8,000
	Design total dynamic head, ft	1,430
	Motor, hp	4,000
9.	SG Feed Pumps:	
	Number	3
	Type	Horizontal, 1 Stage
	Flow, gal/min	15,750
	Design total dynamic head, ft	2,420
	Turbine driver, hp	10,000
10.	Low-Pressure Heater Drip Pumps:	
	Number	3
	Type	Vertical, 7 Stage
	Flow, gal/min	2,050
	Design total dynamic head, ft	1,136
	Motor, hp	800
11.	Feedwater Booster Pumps:	
	Number	3
	Type	Horizontal 1 Stage
	Flow, gal/min	21,740
	Design total dynamic head, ft	410 39
	Motor, hp	2,500

Question 440.30 Response

The most limiting failure regarding cooldown time is the loss of "A" train AC power, which results in the loss of two team generator PORV's. RHR cutin conditions can be achieved with this failure ~~20~~ 22 hours after reactor trip based on maintaining hot standby for four hours followed by a ten hour natural circulation cooldown and then a ~~six~~ eight hour soak period. Approximately 445,000 ~~420,000~~ gallons of water would be added to the steam generators during this period.

Specifically the AFST sizing considers: 4 hours at hot standby, 10 hour natural circulation cooldown, 8 hour soak period. It also considers possible level instrument error, water lost through the turbine lube oil cooler, various small system water losses (ie. flange or pump seal leakage) and a margin against vortex formation. The ~~net~~ useable volume in the AFST is ~~445,000~~ 525,000 gallons.

above the suction nozzles

water delivered to a faulted steam generator,