GULF STATES UTILITIES COMPANY
POST OFFICE BOX 2951 • BEAUMONT, TEXAS 77704
AREA CODE 713 838-6631

April 5, 1984
RBG- 17,511
File Code No. G9.5
G9.8.6.2

Mr. Harold R. Denton, Director
Office Of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

River Bend Station - Unit 1
Docket No. 50-458

Enclosed for your review are Gulf States Utilities Company responses to the open items identified in the Draft Safety Evaluation Report by the Auxiliary Systems Branch and responses to the request for additional information identified in part by Staff letters dated August 5, 1981 and December 31, 1981. This letter supplements docketed correspondence from Mr. Booker to Mr. Denton dated December 1, 1983, December 30, 1983, February 2, 1984, March 6, 1984, and March 29, 1984. Attachment 1 summarizes the open item and indicates changes to be made in the River Bend Station FSAR. It also provides a brief discussion of the open items, the response and reference material for each item. Where indicated, these responses will be provided in a future amendment to the FSAR.

Sincerely,

William J. Reed Jr.

for J. E. Booker
Manager-Engineering,
Nuclear Fuels and Licensing
River Bend Nuclear Group

JEB/WJR/ERG/je

Enclosures

B001
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Attachment 1

| ITEM NUMBER | DSER SECTION | SUBJECT | FSAR REVISIONS |
|---|---|---|---|
| 9a. | 9.1.3<br>Pg. 9-16 | Spent Fuel Pool<br>Heat Load Assumptions | Attachment 2 |

RESPONSE TO DSER OPEN ITEM

9a. The applicant should provide the number of fuel bundles and frequency assumed for "normal"refueling so that the heat load calculations for the spent fuel pool may be verified.

RESPONSE

Assumptions and results of the design heat load calculations for the fuel pool cooling system are provided in revised Section 9.1.3.1.1, Table 9.1-5 and 9.1-8, and Figure 9.1-8. (See Attachment 2.) These revisions reflect the heat inputs of an eighteen month refueling cycle which provides a more conservative design basis than any shorter refueling cycle.

Attachment 2

Insert for Pages 9.1-16 & 9.1-17.

(424 fuel assemblies stored in the spent fuel pool, with 200 fuel assemblies stored in the containment fuel pool)

severe radiation environments. These coupons are designed to simulate the material and support conditions of the poison material in the racks. Periodically, a coupon is removed and evaluated. $B_{10}$ concentration and mechanical properties will be evaluated and compared against acceptable ranges established by the criticality calculation and poison material qualification reports.

### 9.1.3 Fuel Pool Cooling and Cleanup System

The fuel pool cooling and cleanup system consists of two separate subsystems: the fuel pool cooling subsystem and the fuel pool purification subsystem.

The fuel pool cooling subsystem provides heat removal for spent fuel and maintains the spent fuel covered with water during all storage conditions. The purification subsystem maintains required water purity under normal conditions and is not required under accident conditions.

#### 9.1.3.1 Design Bases

##### 9.1.3.1.1 Fuel Pool Cooling Subsystem

The fuel pool cooling subsystem is designed to remove decay heat produced by stored spent fuel assemblies during all anticipated plant operation, refueling, and accident conditions. The design criteria for the fuel pool cooling subsystem are as follows:

1. The fuel pool cooling subsystem and the connecting piping for the backup source of fuel pool makeup are classified as Safety Class 3 and Seismic Category I and are designed in accordance with Regulatory Guides 1.13, 1.26, and 1.29 and General Design Criteria 2, 4, 5, 44, 45, 46, 61, and 63.

2. 11 The spent fuel storage capacity is 3,172 fuel assemblies, approximately 5.08 cores, of which 4.08 cores are designated for routine spent fuel storage in the fuel building. This provides fuel pool cooling capacity for an offload of a full reactor core in addition to normal storage. Under normal operating conditions, spent fuel assemblies 11 in the pool do not exceed 4.08 cores.

3. The fuel pool cooling subsystem is designed to maintain the temperature of the water in the fuel 3 building fuel storage pool at or below 125°F during normal operation, with one cooler and one cooling pump in service.

The heat load for normal operation was calculated based on the following: 3

a. Storage of ~~400~~ 429 percent of an equilibrium core is in the pool. 11

This storage is comprised of 200 fuel assemblies removed from the first core after the first 18 months of operation, and 248 assemblies removed each 18-month refueling cycle thereafter. Residual decay energy release rates are calculated in accordance with Branch Technical Position ASB 9-2, Revision 1. 11

b. A batch of equilibrium core from the most recent refueling outage is assumed to have been in the pool 150 hr after reactor shutdown, with the batches from previous refueling outages in the pool.

4. The fuel pool cooling subsystem is designed to remove the decay heat from the ~~combined~~ spent fuel storage pool~~s' capacity~~ at a rate sufficient to maintain the temperature of the water at or below [redacted] 155.6°F, when [redacted] 497 percent of an equilibrium core is stored in the pools (Fig. 9.1-8). The calculation of the water temperature for this abnormal load with the storage of [redacted] 497 percent of an equilibrium core was based on the following: 11

a. A full core removal event is assumed to be required at the time when batches from each of the previous refueling outages, totaling [redacted] 4.29 cores, are in the pool. 11

b. The last refueling outage required 30 days to complete. At the end of the 30-day period, the reactor was started up and brought to full power, and was forced to be shut down immediately. [redacted] After waiting five days, the full core was removed, which required 10 days. Two hundred spent fuel assemblies from the full core were stored in the containment fuel storage pool.

5. The fuel pool cooling subsystem is designed to maintain the temperature of the containment fuel storage pool water at or below 127°F, when [redacted] 32 percent of an equilibrium core is stored in the fuel storage area of the containment pool during refueling operations.

service water is also supplied to the heat exchangers for cooling (Section 9.2.7).

Normal pool makeup water from the condensate storage tank is sized for normal evaporation and equipment leakage losses, as well as leakage rates associated with potential damage to the fuel storage pool (Section 9.1.4.2.2.1).

The fuel pool cooling subsystem is designed with complete redundancy during both normal, abnormal, and accident plant conditions. Either one of the two cooling loops can maintain fuel building fuel storage pool temperature at or
139.8 below [redacted]°F, with the design decay heat load (criteria discussed in Section 9.1.3.1) at the time of plant startup after the refueling is completed. Fig. 9.1-8 is a graphical representation of an analysis of fuel building fuel pool temperature versus heat load. If an abnormal operating condition requires full core removal (criteria discussed in Section 9.1.3.1), the fuel building fuel storage pool temperature may rise up to [redacted]°F. This temperature is within the design limits of the pool concrete structure.
155.6

During a refueling outage, spent fuel may be stored in the containment fuel storage racks. A fuel pool cooling pump and heat exchanger are then aligned to cool the containment fuel pool. The other fuel pool cooling pump and heat exchanger are aligned to cool the fuel building storage pool. In the event of failure of either train during this situation, the operating train is used to cool the fuel 3
building pool and the RHR train in standby is aligned and initiated as necessary to cool the containment fuel pool. Figures 5.4-12 (RHR) and 9.1-23a and b (fuel pool cooling) show this capability.

The spent fuel cask pool is normally isolated from the fuel storage pool with a watertight gate, which closes the opening through which spent fuel passes as it is being transported to the cask area. The bottom of this opening is above the top of the spent fuel storage racks so that if water in the spent fuel cask pool is lost while the gate is open, the fuel storage racks are not uncovered.

The consequence of fuel pool cooling subsystem component failures are presented in the Failure Modes and Effects Analysis (FMEA) report submitted under separate cover.

A radiological evaluation of the fuel pool purification subsystem is presented in Chapter 12.

TABLE 9.1-5

DESIGN PARAMETERS OF FUEL POOL COOLING AND PURIFICATION SUBSYSTEMS

## Cooling Subsystem

| | | |
|---|---|---|
| **Fuel Bldg Fuel Storage Pool** | | |
| Max Normal Temp (4.29 cores) | | 139.8 F |
| Max Abnormal Temp (4.97 cores) | | 155.6 F |
| **Containment Fuel Storage Pool** | | |
| Max Normal Temp (0.32 cores) | | 126.9 F |
| Max Abnormal Temp (0.32 cores) | | 134.6 F |
| **Cooling Water Temperature** | | |
| RPCCW | | 105 F (maximum) |
| SSW | | 95 F (maximum) |
| **Pump** | | |
| Capacity | | 2 @ 100% |
| Type | | Horizontal Centrifugal |
| Design Flow | | 2,500 gpm |
| Design Total Head | | 87.6 ft $H_2O$ |
| **Cooler** | Shell Side | Tube Side |
| Fluid | RPCCW | Fuel Pool Water |
| Flow | 1,000,000 lb/hr | 1,250,000 lb/hr |
| Design Pressure | 150 psig | 150 psig |
| **Heat Loads (Fuel Bldg Pool)*** | | |
| Normal Heat Load | | $16.62 \times 10^6$ Btu/hr |
| Temp, in | 105 F | 139.8 F |
| Temp, out | 121.7 F | 125.1 F |
| Abnormal Heat Load | | $24.68 \times 10^6$ Btu/hr |
| Temp, in | 105 F | 155.6 F |
| Temp out | 129.8 F | 135.4 F |

KEY: RPCCW - Reactor Plant Component Cooling Water
SSW - Standby Service Water

* - Heat Loads shown are for the Fuel Bldg Fuel Storage Pool only. These values are the limiting case numbers for the fuel storage pools.

TABLE 9.1-8

FUEL DISCHARGE
HEAT LOAD FOR NORMAL OPERATION
(18 MONTH REFUELING CYCLE)

| Discharge No. | No. of Fuel Assemblies | Decay Time (Yrs) |
|---|---|---|
| 1 | 200 | 14.5 |
| 2 | 248 | 13.5 |
| 3 | 248 | 12 |
| 4 | 248 | 10.5 |
| 5 | 248 | 9 |
| 6 | 248 | 7.5 |
| 7 | 248 | 6 |
| 8 | 248 | 4.5 |
| 9 | 248 | 3 |
| 10 | 248 | 1.5 |
| 11 | 248 | 150 hours |

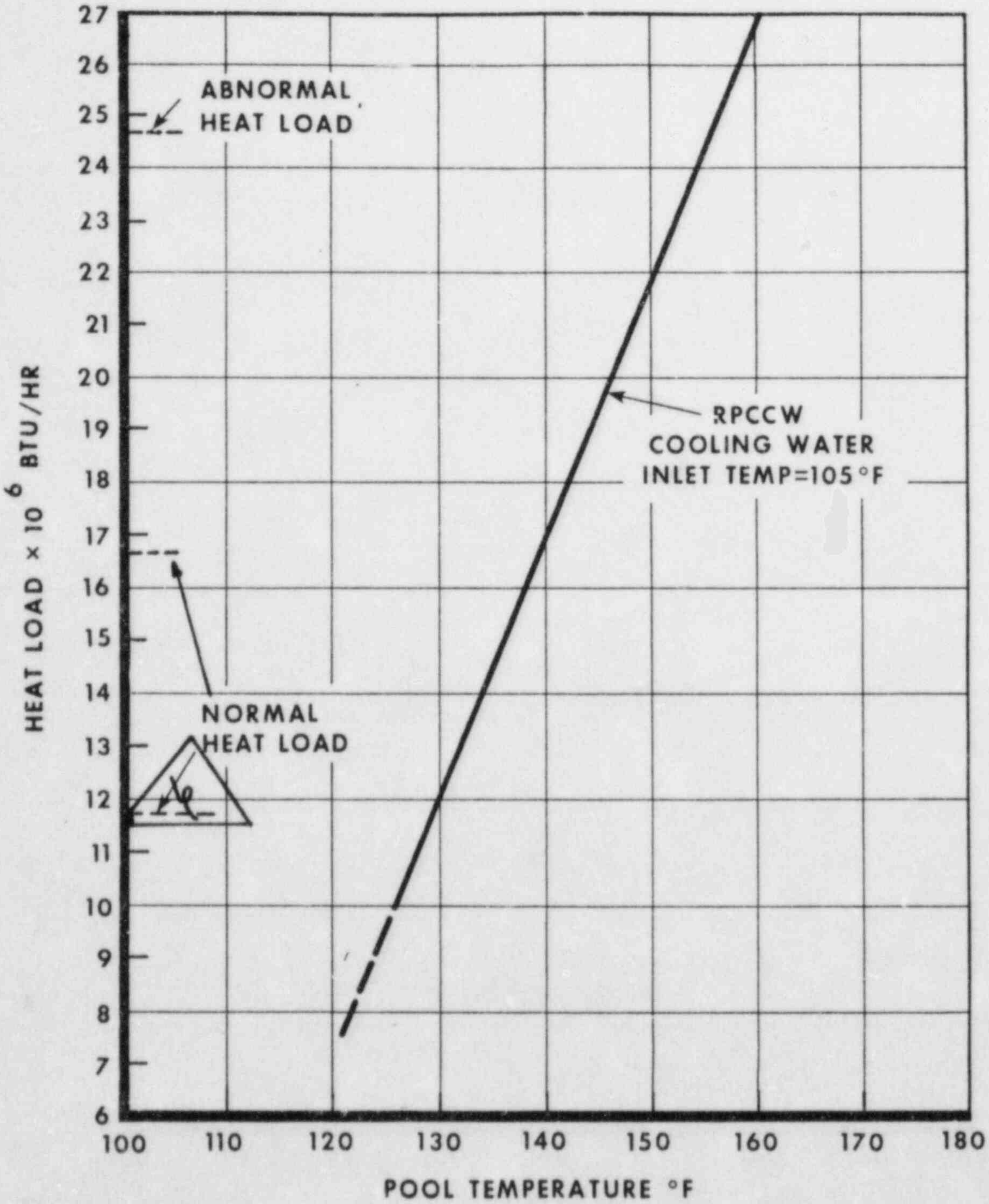


FIGURE 9.1-8

FUEL POOL TEMPERATURE VS HEAT LOAD

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT