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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Edwin I. Hatch Nuclear Plant
Resolution of Spent Fuel Pool Safety Issues
Comments to NRC Letter Dated September 17, 1996

Gentlemen:

On September 17, 1996, the Nuclear Regulatory Commission (NRC) Project Manager for Plant Edwin. I. Hatch issued a letter, "Resolution of Spent Fuel Storage Pool Safety Issues: Issuance of Final Staff Report and Notification of Staff Plans to Perform Plant Specific, Safety Enhancement Backfit Analyses - Edwin I. Hatch Nuclear Plant, Units 1 and 2 (TAC No. M88094)". The letter references internal NRC correspondence, "Memo to the Commission, from J. Taylor, 'Resolution of Spent Fuel Storage Pool Action Plan Issues,' dated July 26, 1996" as its basis. The letter states that the staff has identified certain design features that may reduce the reliability of the spent fuel pool decay heat removal, increase the potential for loss of spent fuel coolant inventory, or increase the potential for consequential loss of essential safety functions at an operating reactor. The NRC staff stated their intent to conduct plant-specific regulatory analyses to evaluate potential safety enhancement backfits pursuant to 10CFR50.109(a)(3) at a number of operating plants that possess one or more of these design features.

The September 17 letter invites Georgia Power Company (GPC) to provide comments relative to the NRC staff understanding of the plant design, safety significance of concerns identified, cost of potential modifications, protection provided by the existing design, and administrative controls currently in place. GPC offers the comments to the specific concerns identified for Plant Hatch in the enclosure to this letter. Cost estimates for modifications are not provided because GPC believes that adequate protection exists with the existing design and administrative controls.

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Should you have questions or comments, please contact this office.

Sincerely,

J. T. Beckham, Jr.

JAW/eb

Enclosure: Resolution of Spent Fuel Pool Safety Issues
Comments to NRC Letter Dated September 17, 1996

cc: *Georgia Power Company*
Mr. H. L. Sumner, Nuclear Plant General Manager
NORMS

U. S. Nuclear Regulatory Commission, Washington, D. C.
Mr. K. Jabbour, Licensing Project Manager - Hatch

U. S. Nuclear Regulatory Commission, Region II
Mr. S. D. Ebneter, Regional Administrator
Mr. B. L. Holbrook, Senior Resident Inspector - Hatch

State of Georgia
Mr. J. D. Tanner, Commissioner - Department of Natural Resources

Enclosure

Edwin I. Hatch Nuclear Plant
Resolution of Spent Fuel Pool Safety Issues
Comments to NRC Letter Dated September 17, 1996

In a letter to Georgia Power Company (GPC) from the NRC dated September 17, 1996, the NRC staff addresses concerns identified in an internal NRC memo, dated July 26, 1996, from James Taylor to the Commissioners. The NRC memo identifies concerns for specific sites, and categorizes them. Thus, the GPC comments reference the category numbers and title of each concern applicable to Plant Hatch as listed in the July 26 memo.

Category 4: Limited Instrumentation for Loss of Coolant Events

The letter states that Plant Hatch has only indirect indication and alarm for low Spent Fuel Pool (SFP) level, and that the SFP low level alarm is available only from the SFP surge tank level instrumentation. Also, the letter states that there are low discharge pressure alarms on the SFP cooling system pumps. Per the letter, absence of a direct SFP low level alarm could delay operator identification of a significant loss of SFP coolant inventory. *The staff plans to perform regulatory analyses to determine if enhancements to level monitoring capability are justified.*

GPC Comments:

Contrary to the staff findings in the letter, Plant Hatch does have level switches installed directly in the SFP on Units 1 and 2, in addition to the surge tank level switches, pump discharge pressure switches, and associated alarms. The switches are identified in the Unit 1 FSAR, figure 10.4-1 and Unit 2 FSAR figure 9.1-6, as G41-LS-N372. These switches provide a low level and high level alarm in the main control room for each unit, providing direct indication of loss of coolant. In addition to direct SFP level measurement, Plant Hatch has leakage detection instrumentation and alarms for the various channels attaching to the pool, including the Unit 1 to Unit 2 transfer canal, SFP to reactor cavity, drywell to reactor cavity seals, refueling bellows, and for reactor cavity level. This instrumentation provides early detection of any leakage that might decrease the pool inventory.

In addition to installed instrumentation, licensed operators are always present on the refueling floor during outages when fuel is being transferred between the SFP and the reactor pressure vessel (RPV). To facilitate fuel movement and other refueling operations, gates between the SFP and reactor vessel cavity are removed. In this configuration, procedures require continuous water level monitoring, providing additional assurance that water level is effectively monitored.

Category 6: Shared Systems and Structures at Multi-Unit Sites

The letter states that, at multi-unit sites with shared systems and structures, with one unit operating, and one unit in refueling with a full-core or near full-core offload in the pool, loss of pool cooling may cause systems required for operation or safe-shutdown of the operating unit to fail or degrade. *The staff plans to conduct detailed reviews to identify enhancements to refueling procedures or to cooling system reliability that are justified, based on the reduced potential for SFP conditions to impact safey systems supporting an operating unit.*

GPC Comments:

At Plant Hatch, this statement would be applicable with one unit in an outage, with the core offloaded to the pool, and with the other unit operating. Plant Hatch uses a defense-in-depth approach to ensure adequate pool cooling is available. Loss of cooling would require multiple failures of systems and administrative controls. GPC procedures and system design are in place to preclude sustained loss of cooling.

GPC performs an outage safety assessment every outage, controlled by procedure, which includes a review of decay heat removal capability during and after fuel offload, and during fuel reload. As input to the review, specific evaluations of the decay heat of the fuel in the vessel and in the pool are performed, including a day-by-day review of expected heat loads and system configurations. This review determines the primary means to provide decay heat removal and the backup methods available. The review determines the minimum time to the onset of boiling, the time to boiloff to the top of active fuel, and performs a time dependent decay heat model for the outage duration. With all fuel in the SFP, the minimum time to the onset of boiling is typically > 4 hours, with the gates between the pool and the reactor vessel cavity installed. With removal of the gates, the time increases to > 10 hours.

GPC uses diverse and reliable systems to perform SFP cooling. These systems are described in detail in the Plant Hatch FSAR's (Unit 1, sections 10.3 and 10.4; Unit 2 sections 9.1.2 and 9.1.3). A brief description of these systems is provided below.

1. The normal fuel pool cooling (FPC) system has three trains of cooling for both units SFP's. (Two installed in Unit 1's reactor building and one installed in Unit 2's reactor building) The outage unit has the capability of two trains being aligned for cooling its SFP, with a single train aligned to the operating unit's SFP. One train is adequately sized for the heat load from the spent fuel in the operating unit.

2. GPC has installed a Decay Heat Removal (DHR) system for SFP cooling. The outage unit will have the system piping installed in its SFP. The DHR system is a 100%

capacity system, which is powered from an offsite power source separate from the normal plant offsite power. When required during outages, GPC has a dedicated diesel generator available onsite to provide backup power to the DHR system.

3. The RHR system can be aligned for SFP cooling in the FPC Assist mode. To use this system, a blank "spectacle" flange must be removed between RHR and the FPC system, and the gates between the SFP and reactor vessel cavity removed. When used in this configuration, FPC Assist and RHR shutdown cooling are operated in parallel, with an RHR pump taking suction from the SFP and one loop of the Reactor Recirculation system, and discharging to the SFP and to the reactor vessel. The RHR system has backup power from the emergency diesel generators. Normally, the spectacle flange takes 4 to 6 hours to remove. In an emergency, the flange can likely be removed in 2 to 4 hours.

4. In an emergency, GPC has procedures in place to respond to a failure of the normal systems used for SFP cooling. If installed, the gates between the SFP and reactor vessel cavity can be removed, providing more time before the onset of boiling (One of the two overhead cranes can be powered by the emergency diesel generators). The safety related plant service water system can be used to supply water for cooling by opening manual valves. Water level is controlled using a feed and bleed approach. Additional systems can be used as well, such as fire water and demineralized water. The use of each is described in the plant procedures.

During an outage in which a full core offload is performed, the following schedule is typical (based on a review of the last Unit 1 and Unit 2 outages):

	Duration	
Day 1	(14 hours)	Begin Vessel disassembly Place Decay Heat Removal System in service
Day 3	(62 hours)	Complete Vessel disassembly Perform fuel movement prerequisites
Day 4	(0 hours)	Begin Fuel Unload
Day 8	(96 hours)	Complete Fuel Unload

Total: (172 hours)

The DHR system has 100% cooling capability for spent fuel already in the SFP and a full core offload at 24 to 48 hours after shutdown. The FPC Assist mode of RHR has 100% cooling capability for a full core offload at 150 hours after shutdown, with the maximum

quantity of spent fuel previously in the pool, by design. The normal schedule from reactor shutdown to full core offload is greater than 150 hours as demonstrated during the last two refueling outages.

During outages, at least two independent and separate systems are available for decay heat removal, with diverse power supplies. In addition, procedures are in place and adequate time is available for the plant personnel to manually align additional sources, i.e., plant service water, for cooling and level control in the incredible event that all of the normal and backup systems fail.

In the future, plans are to perform fuel shuffles, without a full core offload to the SFP. Although the total decay heat load of the spent fuel will not change, the outage safety assessments will consider the various scenarios of decay heat load and availability of cooling systems, as they do now.

Category 10: Limited Instrumentation for Loss of Cooling Events

The letter states that Plant Hatch lacks a direct reading of high SFP temperature or an alarm to identify a sustained loss of SFP cooling. The letter recognizes that other alarms may be available, such as SFP cooling system low-flow and low-pressure, which would indicate inadequate pool cooling. *The staff plans to determine if additional instrumentation or operator controls are warranted.*

GPC Comments:

The FPC system consists of pumps, piping, and heat exchangers to provide continuous pool cooling. There is temperature indication and alarm in the main control room for each pump suction and for each heat exchanger outlet. Both of these provide an indication of loss of the heat removal capability. The FPC pumps trip on low suction pressure, which would indicate draining of the pool and pump down of the skimmer surge tank. There are pressure switches which alarm in the main control room for low pump discharge pressure and high pump discharge pressure. The low pressure alarm would be indicative of a potential pump trip and a high pressure alarm would be indicative of a flow restriction downstream of the pump. In either case, the alarms would provide immediate indication to the operator of a potential loss of cooling.

In the event the normal FPC system is not available, Plant Hatch procedures require that temperature instrumentation be installed in the SFP and that it be monitored at least once per hour. Procedural controls are in place to ensure restoration of the FPC system and for providing alternate means of cooling.

In the FPC assist mode of RHR, flow indication to the SFP exists in the main control room. Also, the RHR system has numerous alarms and indications in the main control room to indicate loss of the cooling function.

Area Radiation Monitors are installed on the refueling floor which alarm in the main control room. In addition to direct instrumentation and alarm, these monitors provide a secondary indication of loss of inventory or loss of cooling. High radiation due to loss of level from evaporation or boiling would cause the alarm, alerting the operators to a potential problem on the refueling floor, and hence, the SFP. In this event, the monitors also provide an isolation signal to the secondary containment, tripping the normal ventilation systems, and starting the standby gas treatment (SBGT) system. The SBGT system, which is designed for 100% relative humidity, will assist in removing any heat and humidity created by loss of cooling.

Category 9: Infrequently Used Backup SFP Cooling Systems

The letter states that Plant Hatch appears to rely on infrequently used backup SFP cooling systems to address long term loss of power events and mechanical failures. *The staff will examine administrative controls for the availability and use of these systems during refueling, and will review technical analyses demonstrating the capability of these backup systems to determine the need for further regulatory analysis.*

GPC Comments:

Systems and administrative controls available during refueling outages are discussed in the GPC comments to Category 6.

During normal operation when the decay heat load is low, sufficient time is available for operator action to restore pool cooling and level control per procedures and controls which are currently in place. The normal means for water makeup is provided by the condensate transfer system. Backup sources include fire water (with its own diesel generator) and demineralized water hose stations. The safety related plant service water system can be aligned to provide cooling and level control. Each of these methods is procedurally controlled. As defense-in-depth, the decay heat removal system can be used for cooling, and is procedurally controlled. The FSAR (Unit 1 section 10.4.3.1, Unit 2 section 9.1.3.4) calculates time to boiling for the worst case of normal operation, bounded by one unit in operation and one unit in refueling assuming the equivalent heat load of 1/3 core offload from each unit 21 days apart. In this case, the onset of boiling occurs in Unit 1 in 14.7 hours and in Unit 2 in 22.8 hours (For the analysis, Unit 2 was considered to be shutdown first, thus the time to boiling is longer).

During refueling outages and during normal operation, loss of power alarms are available to the operator for loss of power to the FPC pumps, and for the FPC alarms themselves.

During outages, the FPC Assist mode of RHR or the DHR system will be available, and during normal operation, the PSW system or the DHR system is available to provide backup cooling and level control.

Summary

GPC believes that the existing SFP cooling systems are adequate as designed. This belief is based on the following facts:

1. Personnel are continuously present on the refueling floor during refueling operations. Any decrease in water level or substantial increase in pool temperature would not go unnoticed.

2. Plant Hatch, in addition to the normal SFP cooling systems (FPC system and FPC assist mode of RHR), has an independent decay heat removal system which is utilized during outages, which can also be used as an alternate source of SFP cooling during normal operation.

3. Plant Hatch has instrumentation available to detect loss of inventory in the SFP. In addition to the instrumentation in the skimmer surge tanks, as identified in the NRC letter, these level switches are installed directly in the pool.

4. In addition to personnel observation, temperature indication (FPC suction temperature and heat exchanger outlet temperature) is available in the main control room. If the FPC system is not available, temperature instrumentation is installed in the SFP and the temperature is recorded on an hourly basis. Procedural controls are in place to ensure restoration of the FPC system and for providing alternate means of cooling.

5. Emergency procedures are in place to assure makeup capability exists in the unlikely event that all SFP cooling is lost. Additionally, an assessment is made each outage to determine the decay heat removal capability needed for that outage.