SYSTEM ENERGY RESOURCES, INC.
A Middle South Utilities Company

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U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Attention: Document Control Desk

Gentlemen:

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Fuel Pool Cooling and Cleanup System
Long Term Heat Removal Capability
AECM-89/0029

References: (1) AECM-86/0176, dated June 5, 1986
(2) AECM-86/0229, dated July 25, 1986
(3) MAEC-86/0264, dated August 18, 1986

As committed in a letter to the NRC dated June 5, 1986 (AECM-86/0176), System Energy Resources, Inc. (SERI) has evaluated and determined a long-term engineering solution regarding Fuel Pool Cooling and Cleanup system heat removal capability for Grand Gulf Nuclear Station Unit 1. This engineering solution is being submitted prior to startup from the third refueling outage per this commitment.

A summary of the engineering solution is attached. If you have any questions, please advise.

Yours truly,

W T Cottle

WTC:slg
Attachment

cc: (See next page)

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Background Information -

In a letter to the NRC dated June 5, 1986 (AECM-86/0176), System Energy Resources, Inc., (SERI) requested an amendment to Operating License NPF-29 for the Grand Gulf Nuclear Station Unit 1. This amendment consisted of changes to Technical Specifications 3/4.7.9.1 and 5.6.3 concerning installation of high density spent fuel racks.

As discussed in AECM-86/0176, the 140°F temperature limit for the spent fuel pool should not be exceeded with only one spent fuel pool heat exchanger in operation and with the Residual Heat Removal (RHR) system in use only for a period of time commensurate with a normal refueling outage. SERI committed to propose a suitable engineering solution to assure that the plant is in compliance with this commitment prior to startup following the third refueling outage and to implement the solution prior to startup following the fifth refueling outage.

Issue -

The 140°F temperature limit should not be exceeded with only one spent fuel pool heat exchanger in operation and with RHR in use only for a period of time commensurate with a normal refueling outage.

Spent Fuel Storage Heat Removal Systems Description -

Spent fuel stored in the high density spent fuel storage racks is cooled by the Fuel Pool Cooling and Cleanup (FPCC) system with supplemental cooling capability from RHR. As described in the UFSAR, there are two FPCC trains which consist of one pump and heat exchanger each. FPCC provides the normal spent fuel pool heat removal capability utilizing either the Component Cooling Water (CCW) system or the SSW system for cooling water. SSW is designed and flow balanced such that the system is capable of manual alignment to the FPCC heat exchangers. The RHR system has two loops, each having a pump and heat exchanger, which can be used to supplement FPCC. RHR uses SSW as its source of cooling water.

Design Basis Heat Loads -

The spent fuel cooling systems must maintain the spent fuel pool temperature below the 140°F limit for the design basis (bounding) spent fuel decay heat loads associated with the high density racks. The normal design basis decay heat load is the heat rate resulting from the worst case normal spent fuel offload scenario. This scenario fills the spent fuel pool racks to capacity in a manner which closely follows the projected fuel reload batches. The racks are projected to be filled to capacity by the Cycle 16 offload. The normal offload scenario is based on the current projections of future fuel designs. This methodology was accepted by the NRC in a letter dated August 18, 1986 (MAEC-86/0264) which licensed the high density spent fuel storage racks at GGNS.

The offload scenario for the normal design heat loads prior to the Cycle 16 offload is delineated in Attachment 2. The normal decay heat load associated with the Cycle 16 offload is delineated in Attachment 3.

Operation of FPCC -

Two FPCC trains using CCW can accommodate the worst case normal design decay heat loads following shutdown for the refueling outage. For the normal design heat loads associated with the high density spent fuel racks, one FPCC train using CCW will accommodate the spent fuel pool heat loads following the Cycle 16 offload approximately 64 days after shutdown for the refueling outage. The use of RHR for supplemental fuel pool cooling of normal design heat loads will be limited to a period of time commensurate with a normal refueling outage. This period has been limited to the first 35 days after shutdown. Therefore, FPCC alone must be able to accommodate the design heat loads 35 days after shutdown. The decay heat rate 35 days after shutdown is 13.27 million BTU/hr as shown in Attachment 3.

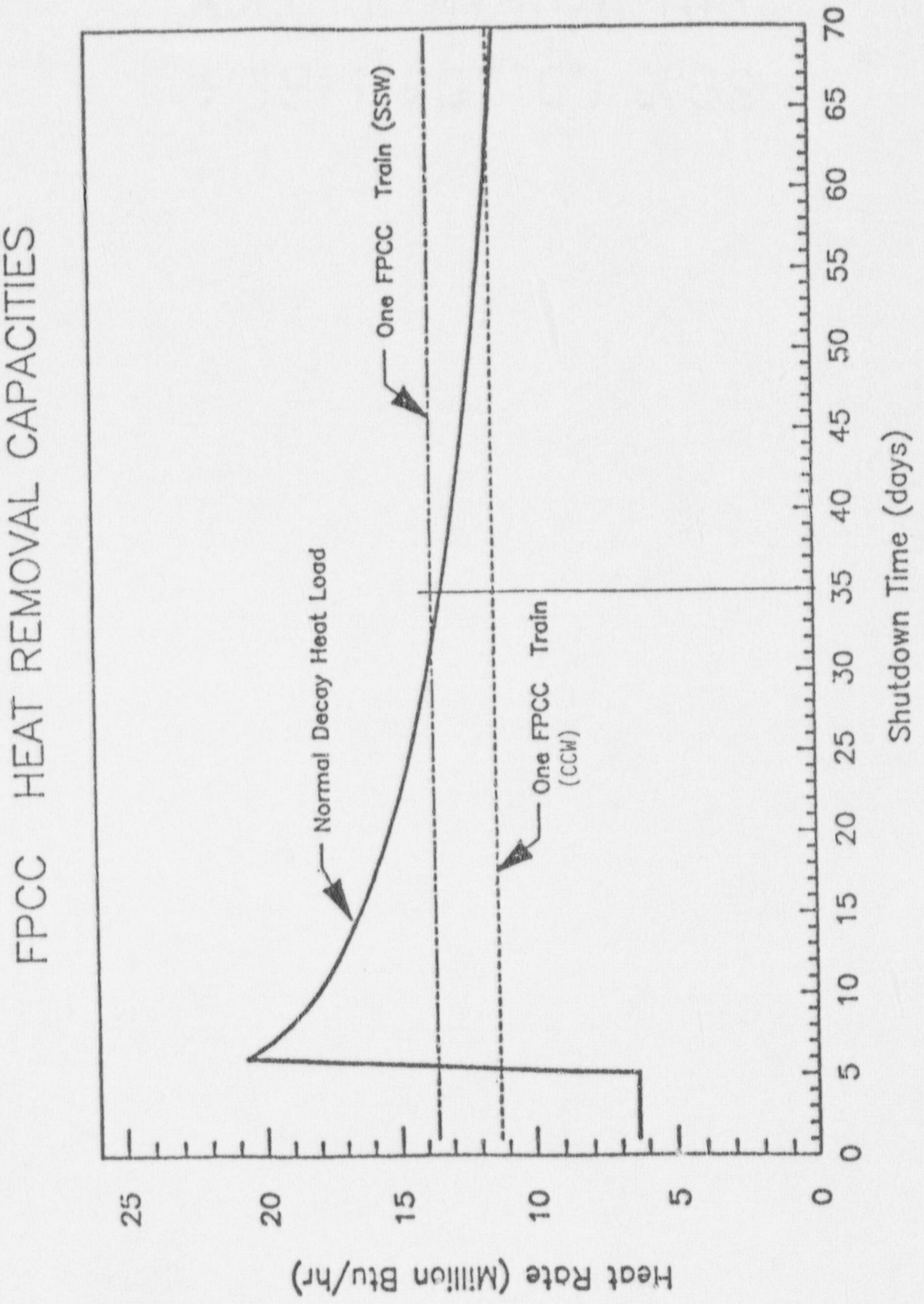
In the event a FPCC train fails during the period 35 to 64 days after shutdown, the remaining FPCC train using SSW cooling water can accommodate the normal worst case design heat loads. The heat removal capacity of one FPCC train using SSW at the Technical Specification minimum basin level flowrate is 13.39 million BTU/hr which exceeds the normal design heat loads 35 days after shutdown. The above described FPCC capabilities based on worst case normal heat loads are delineated in Attachment 3.

Conclusion -

SERI has reevaluated the existing FPCC system design and has determined that a physical modification to the plant is not required to assure adequate heat removal capability. Based on the spent fuel pool decay heat load projections from the worst case normal fuel offload scenario, operating one FPCC train using SSW can maintain the spent fuel pool temperature at or below 140°F without reliance on RHR for the period of time greater than 35 days from shutdown for a refueling outage.

Offload Scenario for the Normal Design Heat Load
Prior to Cycle 16 Offload

CYCLE	SHUTDOWN TIME (YRS)	NUMBER OF ASSEMBLIES		OFFLOAD DECAY HEAT (Btu/hr)
1	20.5	264		295202
2	19.5	288		329840
3	18.5	276		323754
4	17.5	256		307568
5	16.5	272		334709
6	15.0	272		346946
7	13.5	272		359634
8	12.0	272		372802
9	10.5	272		386516
10	9.0	272		400993
11	7.5	272		417058
12	6.0	272		438009
13	4.5	272		477177
14	3.0	272		588805
15	1.5	272		1022198
	Total	4076	Total	6401210


FPCC HEAT REMOVAL CAPACITIES
Normal Decay Heat Load
One FPCC Train (SSW)
One FPCC Train (CCW)
Heat Rate (Million Btu/hr)
0
5
10
15
20
25
Shutdown Time (days)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70