Omaha Public Power District

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March 12, 1982
LIC-82-046

Mr. Robert A. Clark, Chief
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Operating Reactors Branch No. 3
Washington, D.C. 20555

Reference: Docket No. 50-285

Dear Mr. Clark:

The Omaha Public Power District proposes to replace the existing spent fuel racks at the Fort Calhoun Station with a new, higher density rack configuration to provide increased storage capacity. Accordingly, this letter transmits forty (40) copies of a report entitled "Fort Calhoun Station Unit No. 1 Spent Fuel Storage Rack Modifications" dated March 1982. This report provides design information and the detailed safetv evaluation for this modification. Also, justification for the fee classification for this proposed design change is attached.

The existing spent fuel racks were installed in 1976 and provided storage space to accommodate 483 whole fuel assemblies. With this storage capacity, the desired capability to discharge the entire reactor core into the spent fuel pool would be lost beginning with Cycle 10, scheduled to commence in 1985 (see Table 2.1 of the subject report). Based on this concern and the present lack of reprocessing or central storage facilities for spent nuclear fuel, the District proposes to replace the existing racks with higher density stainless steel racks which will utilize a neutron poison material for reactivity control. These new racks would increase the spent fuel pool storage capacity to 728 whole fuel assemblies and extend the spent fuel storage and full core discharge capabilities to the year 1994. The new rack design would also permit the implementation of disassembly and compact storage of individual fuel rods in canisters beginning in 1994 which would accommodate all spent fuel through the year 2008. Though the design of the racks permits this type of storage, the District is presently requesting a license amendment to install the higher density racks that permit storage capacity of 728 whole spent fuel assemblies.

The new rack design and safety evaluation were performed by Pickard, Lowe & Garrick engineering consultants and the design criteria have been reviewed and approved by the District's staff. The District believes the enclosed report adequately addresses all safety concerns of the rack

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design. The Code of Federal Regulations, Title 10, Chapter 1, Part 50, Appendix A, General Design Criteria (GDC), addresses the general design criteria for nuclear power plants. Specifically, Criteria 61, 62, and 63 of the GDC address the design requirements for fuel storage systems. The District's proposed design of the new spent fuel racks and operation of the spent fuel pool meet these design criteria as addressed below.

Criterion 61 - Fuel Storage and Handling and Radioactivity Control

The fuel storage and handling, radioactive waste, and other systems which may contain radioactivity shall be designed to assure adequate safety under normal and postulated accident conditions.

Response

The proposed storage racks and spent fuel pool system have been designed with the utmost consideration given to safety of the public and plant personnel during normal or postulated accident conditions. The design encompasses all applicable industry codes and Regulatory Guides which should ensure adequate system safety. Specifically, Sections 4 through 9 of the enclosed report provide the required safety analysis.

1. The system shall be designed with a capability to permit appropriate periodic inspection and testing of components important to safety.

Response

The spent fuel pool (SFP) and proposed new racks are designed to permit visual inspection of the SFP, racks, and fuel assemblies. Components important to safety, as described in the Fort Calhoun Station FSAR, have been installed in accessible locations for testing and maintenance, or redundant equipment (e.g., circulating pumps) has been provided to permit testing or maintenance of one component, while the redundant component is performing its intended function. Periodic preventive maintenance is performed on most SFP components and systems to ensure operability.

2. The system shall be designed with suitable shielding for radiation protection.

Response

Section 8 of the attached report addresses this criterion. The inherent design of the SFP and new racks is such that the borated water above and surrounding the spent fuel assemblies limits (attenuates) the radiation dose rate of the surface of the pool. The maximum dose rate resulting from the fuel and components occurs when the fuel assemblies are transferred from the reactor to the spent fuel racks. The dose contributed by a full inventory of stored spent fuel would be less than

0.1% of this maximum dose rate. Radiation levels are not expected to increase significantly as the result of expanding the inventory of spent fuel assemblies in the SFP. Therefore, the District believes the SFP design provides adequate radiation protection and will not significantly increase the minor radiation doses presently received by station personnel or the public.

3. The system shall be designed with appropriate containment, confinement and filtering systems.

Response

The present location of the SFP in the auxiliary building at the Fort Calhoun Station has and will provide a protective enclosure. The basic concrete shell and watertight stainless steel liner of the SFP provide the necessary confinement. Additionally, the SFP racks and supports have been designed to limit movement of the racks during seismic events. This design feature prevents damage to the stainless steel liner and maintains watertight pool integrity.

Filtering capacity in the fuel pool is provided by two storage pool circulating pumps, a demineralizer, a particulate filter, and a strainer near the pool surface to prevent large objects from entering the pump suction piping. The filtering system is periodically inspected, with filters replaced and demineralizer resins changed to ensure optimal pool water purity. The operability of the pumps, demineralizer, and filter unit is ensured by local and/or control room monitoring of flow indicators and pressure transmitters.

4. The system shall be designed with a residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat and other residual heat removal.

Response

The present SFP cooling water system can adequately remove the residual heat produced by the additional spent fuel assemblies that would be contained as a result of installing these proposed high density racks. Section 5 of the attached report addresses the heat transfer characteristics and heat removal capabilities of the primary SFP cooling system and alternate systems. The SFP cooling system consists of two circulation pumps, a heat exchanger, two fuel transfer canal drain pumps, and associated piping, valves, and instrumentation. The redundancy of the SFP cooling pumps ensures heat removal capability is available during pump problems and routine maintenance. As stated above, indicators monitoring system flow and component differential pressure assist in monitoring the operability of the cooling system.

To ensure heat removal system redundancy, a cross-tie to the shutdown cooling system will soon be installed which will permit SFP cooling when the normal SFP cooling system is not available. This connection requires less than four hours to complete and would be operational prior to pool boiling, assuming worst case conditions.

5. This system shall be designed to prevent significant reduction in fuel storage coolant inventory under accident conditions.

Response

The stainless steel liner in the SFP is designed to provide a watertight lining to prevent leakage of pool water. As stated above, the proposed rack design limits rack movement and localized loading on the liner during a seismic event which reduces the probability of liner puncture. Additionally, the auxiliary building, SFP, and proposed SFP racks are designed to meet Category I seismic requirements which ensure integrity of the SFP during seismic events.

In the event SFP water inventory is reduced due to liner leakage, the fuel transfer canal drain pumps can be used to provide borated make-up water to the SFP from the safety injection and refueling water tank.

Criterion 62 - Prevention of Criticality in Fuel Storage and Handling

Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations.

Response

Section 4 of the attached report provides extensive discussion regarding the design and operational reactivity characteristics of the proposed high density racks. The proposed modifications ensure an adequate shutdown margin will be maintained at all times.

Criterion 63 - Monitoring Fuel and Waste Storage

Appropriate systems shall be provided in fuel storage and radioactive waste systems and associated handling areas (1) to detect conditions that may result in a loss of residual heat removal capability and excessive radiation levels and (2) to initiate appropriate safety actions.

Response

Discussion on the ability to detect a failure of the SFP cooling system is provided in the response to Criterion 61, Item 3.

Radiation monitors in the SFP area and throughout the auxiliary building provide direct indication and alarms in the control room. Periodic surveillance testing of these monitors ensures accuracy and operability. Also, periodic radiation surveys are taken by health physics technicians in order to ensure that radiologically safe working conditions are maintained for plant personnel safety.

The District believes the design of the SFP and the proposed storage racks includes the necessary systems and design features to control abnormal conditions and to ensure the safety of the public and plant personnel. Redundant SFP circulating pumps and the capability to cross-tie to the shutdown cooling system will ensure the availability of adequate SFP cooling capability. The Fort Calhoun Station operators are cognizant of the potential safety implications concerning the SFP and have been trained to respond to emergency situations. The SFP, as designed, incorporates systems, both passive and active, which ensure that a comfortable margin of safety will be maintained.

Installation of new spent fuel racks is a lengthy process and it is imperative that adequate lead times are available for contract bidding, contract awarding, rack fabrication, and installation. To ensure the new racks are installed prior to the commencement of Cycle 10, the District requests a timely review and approval of this design change by the Commission. Commission approval prior to July 1982 would greatly facilitate the present schedule for installation of this modification.

Sincerely,

W. C. Jones
Division Manager
Production Operations

WCJ/KJM/TLP/RWS:jmm

Attachments

cc: LeBoeuf, Lamb, Leiby & MacRae
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Washington, D.C. 20036

Mr. T. R. Robbins (w/o attach.)
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FEE JUSTIFICATION

The proposed design change is deemed to be Class IV, within the meaning of 10 CFR 170.22, in that it involves more than one environmental, safety, or other issue.

ATTACHMENT