



**Consumers
Power
Company**

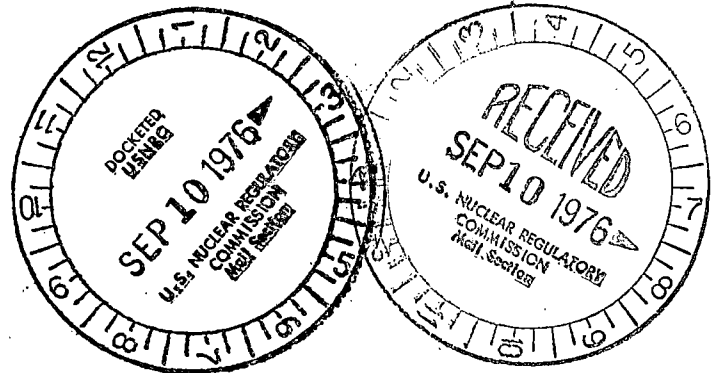
Regulatory Docket File

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

September 8, 1976

Director of Nuclear Reactor Regulation
Att: Mr Albert Schwencer, Chief
Operating Reactor Branch No 1
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255, LICENSE DPR-20
PALISADES PLANT
SPENT FUEL POOL MODIFICATIONS



Because of uncertainties in the availability of future fuel reprocessing facilities, Consumers Power Company plans to increase the storage capacity of the spent fuel pool at the Palisades Nuclear Generating Plant to prevent a shortage of spent fuel storage capacity. As the plant has been operating since 1972, the proposed method of accomplishing this increase is to install high density spent fuel storage racks of smaller center-to-center spacing between assemblies, utilizing neutron absorbing material to maintain the required shutdown margin. The design concept and criteria for this proposed modification are attached.

The proposed schedule for installation of the high density storage racks is also discussed in the attachment. As indicated, the installation would be done in two phases. The first phase is installation of the modified racks in the cask area and the unused, upper tilt mechanism pool (see sketch in the attachment) by August 6, 1977 which is the start of the next refueling shutdown. The remainder of the racks are to be installed as necessary to provide adequate storage and core unloading capacity. To meet this schedule, NRC approval of the spent fuel pool modification is requested no later than January 31, 1977.

We propose to submit a formal request for approval of the pool modifications, but to be sure that all NRC requirements are included, we request a meeting with appropriate members of the NRC staff on or about September 16, 1976 to discuss these requirements and the attached design concept and criteria. The formal submittal, which will include a safety analysis and environmental impact evaluation, will be submitted on or before November 1, 1976.

We trust that a meeting can be arranged and appreciate your prompt consideration of our request.

David A. Bixel
Assistant Nuclear Licensing Administrator

CC: JGKepler, USNRC

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PALISADES NUCLEAR GENERATING PLANT
SPENT FUEL POOL MODIFICATION PLAN

The present spent fuel storage design capacity for Palisades is 272 fuel assemblies or one and one-third cores. The present fuel racks are stainless steel with a stored assembly center-to-center spacing of 11-1/4 inches. There are two 1/4 inch stainless steel plates between each pair of bundles throughout the active length of the fuel bundles to maintain the required subcriticality. The planned modification discussed below will increase this capacity to over 800 fuel assemblies.

1. High Density Spent Fuel Storage Rack - Concept and Design

The proposed high density racks will utilize neutron absorbing material (poison) to reduce the center-to-center spacing of the locations to 10-1/4 inches. The design incorporates Boron Carbide (B_4C) neutron absorber plates to ensure subcriticality. Each individual fuel assembly is surrounded by an absorber plate on all four sides with a water gap between adjacent locations. The individual assembly locations consist of concentric stainless steel square tubes with the cavity between, occupied by B_4C plates. The concentric tubes are seal welded, top and bottom. The tubes are grouped and welded to a base structure to form storage racks. The base structure has openings to receive the fuel assembly and allow sufficient flow through the stored assembly to ensure adequate heat removal. The racks are welded into modules of various sizes to maximize use of the available pool space. This conceptual rack design is similar to the high density spent fuel storage rack design which was recently approved for use in the Connecticut Yankee spent fuel storage pool modification.

To brace the racks, seismic restraints at the upper and lower ends of the rack modules are proposed. The spent fuel pool cooling system will be analyzed and modified as necessary to be adequate for the increased fuel storage capacity.

2. Storage Rack Design Criteria

The codes, standards and other criteria to be used for the nuclear, structural, and cooling system design and analyses of the high density storage racks are based on the appropriate NRC General Design Criteria (App A 10 CFR 50). They include:

- a. Regulatory Guide 1.13, Fuel Storage Facility Design Basis (Safety Guide 13, 3/10/71).
- b. Regulatory Guide 1.25, Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors (Safety Guide 25, 3/23/72).

- c. ANSI N16.1-1969, Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors.
- d. ANSI N18.2-1973, Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants.

The rack will be designed such that the maximum effective multiplication factor (k_{eff}) will be no greater than 0.95 with the racks fully loaded with fuel of the highest level of enrichment expected, pool water at the most reactive temperature, no dissolved neutron absorber in the water, and considering all tolerances and uncertainties in calculation, under normal wet and accident conditions.

The racks will be designed to seismic category I in accordance with Regulatory Guide 1.29, Revision 1 of August 1973, using the seismic accelerations and response spectra used in the original design of the spent fuel storage facility. Rack loading will be analyzed following the recommendations of Standard Review Plan 3.8.4. The racks will be designed in accordance with AISC Specification for Design, Fabrication and Erection of Structural Steel Buildings, February 1969, with supplements through Supplement No 3 of June 12, 1974.

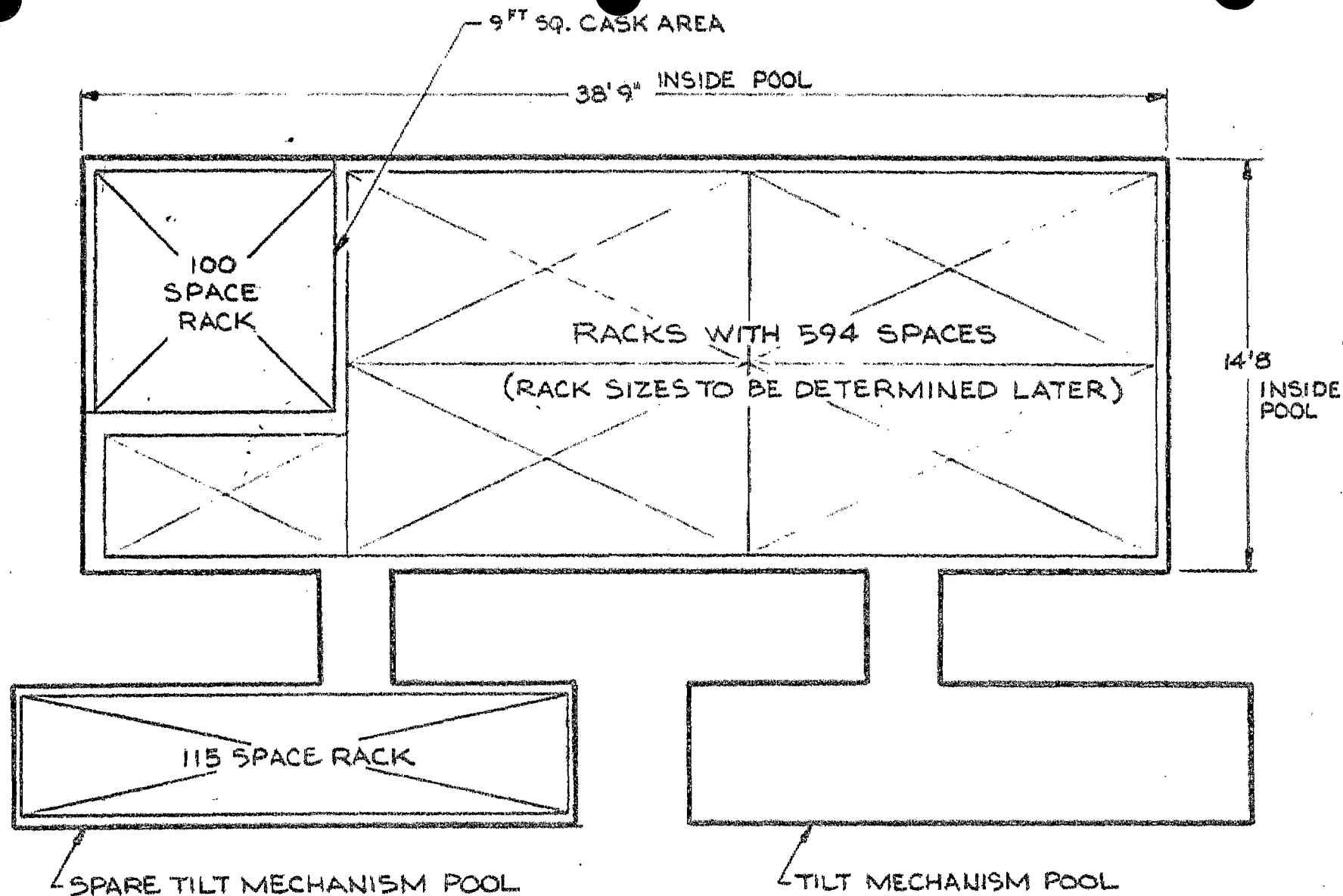
The spent fuel pool cooling system capacity will be analyzed by considering refueling discharges from the first discharge until the spent fuel pool is fully loaded. The two cases to be analyzed are the normal case of regular spent fuel discharges to the pool and the limiting case of a full core off-load to the pool at a time that will produce the maximum heat generation rate in the pool.

The capacity of the cooling system will be evaluated considering a single active failure and modifications made, if necessary, to the system so that pool cooling can be maintained even with the most severe single active failure.

3. High Density Storage Rack Schedule

In order to reestablish the capability of fully unloading the core at the next refueling, the following schedule is proposed:

Conceptual Design Submitted to NRC	September 8, 1976
Discussions With NRC and Preliminary Concept Approval Received	September 16, 1976
Formal Application to NRC for Spent Fuel Storage Modification Approval	November 1, 1976
NRC Approval Received	January 31, 1977
Fabrication and Delivery of the New Racks	February 1, 1977 - December 1, 1977
Rack Installation:	
Phase 1 - Cask Area and Spare Tilt Mechanism Pool (See Attached Figure 1)	August 1, 1977
Phase 2 - Remainder of Spent Fuel Pool	Commencing December 1, 1977



	SPACES *
RACKS INSTALLED, 8/1/77 { TILT POOL	115
CASK AREA	100
RACKS INSTALLED AFTER 12/1/77	594
FINAL CAPACITY OF POOL	809

* TENTATIVE SUBJECT TO FINAL DESIGN VERIFICATION

FIGURE 1
CONSUMERS POWER CO. - PALISADES PLANT
FUEL STORAGE MODIFICATION
PROPOSED FUEL POOL ARRANGEMENT