Consumers
Power
Company

General Offices: 212 West Michigan Avenue, Jackson, MI 49201 • (517) 788-0550

COPY

January 10, 1983

Dennis M Crutchfield, Chief
Operating Reactors Branch No 5
Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-155 - LICENSE DPR-6 -
BIG ROCK POINT PLANT - STRUCTURAL INTEGRITY OF
THE SPENT FUEL POOL: AMENDMENT 2 TO SPENT
FUEL RACK ADDITION - "CONSOLIDATED APPLICATION"

Consumers Power Company letter dated October 29, 1982 provided revisions to the "Consolidated Application" for the Big Rock Point Plant Spent Fuel Pool Rack Addition. These revisions were identified as Amendment 1. The letter notified you of our intent to issue an Amendment 2. The enclosed revisions address the structural integrity of the spent fuel pool at elevated temperatures and may be referenced as Amendment 2 to the Consolidated Application. The analyses are provided in response to a December 7, 1979 NRC letter requesting additional information and our replies dated January 16, 1980 and February 1, 1980. Also included are revisions of two pages (Table of Contents - page vi; Foreword - page x) affected by the Amendments.

This Amendment replaces Appendix II of the "Consolidated Application". Appendix II of the application was withdrawn by Consumers Power Company during the hearing on our application (reference pages 592-593 of the hearing transcript). The enclosed amended Appendix II consists of two parts. Part A contains details of the structural analysis of the spent fuel pool and Part B contains a thermal hydraulic analysis for the spent fuel pool.

The Structural Analysis, Part A, verifies that overall structural integrity of the spent fuel pool will be maintained during a postulated event in which the average fuel pool inside wall surface temperature rises to 150°F. The analysis was performed by the finite element method under appropriate thermal and mechanical loading. A thermal analysis was performed to determine the temperature distribution in the fuel pool floor and walls with the resultant thermal gradients generating loads on the structure. Combined with these thermal loads are mechanical loads due to dead weight and hydrostatic pressure. Based on the analysis results, the pool floor, pool walls and support walls are

oc1182-0091a142

Rec'd w/out original

A001
1/37

adequate to withstand the postulated event in which the inside pool wall surface temperature rises to, and remains at 150°F.

The Thermal-Hydraulic Analysis, Part B, provides a best estimate prediction of the water temperatures throughout the spent fuel pool. The analysis was performed assuming an available makeup flow of 30 gpm based upon capacities of the emergency core cooling systems concurrent with the most limiting active single failures. The temperature of the makeup water was assumed to be 100°F which is the design outlet temperature for the core spray heat exchanger. Using conservative values for the expected decay heat generation rate in the pool following a refueling outage, the results of the thermal-hydraulic analysis show that the maximum water temperature in the spent fuel pool will be less than 3° warmer than the spent fuel pool average water temperature of 150°F. It should be noted that this small incremental rise in temperature occurs very locally (i.e., above the spent fuel rack where the assemblies with the highest decay heat are located) and that the resulting local temperature (although above 150°F) is not enough to significantly influence the structural integrity of the spent fuel pool.

A simple heat balance calculation can be performed using appropriate values of spent fuel pool fission product decay heat load and makeup water flow rate and temperature to predict the maximum average pool water temperature following loss of the normal fuel pool cooling system. The makeup water flow rate and temperature are well known physical parameters. The makeup flow rate is currently 13 gpm (assuming the most limiting active single failure of the emergency core cooling system) and will be approximately 30 gpm following the proposed upgrade to the makeup system as described in our September 16, 1982 letter. Although the capacity of the upgraded system must be confirmed during system startup testing, flow rates different from 30 gpm can be accommodated as described below. The makeup temperature is at most 100°F, but may be lower based upon the actual water temperature of Lake Michigan (note that Lake Michigan provides the water utilized on the secondary or shell side of the core spray heat exchanger).

The spent fuel pool heat load is a function of the number of fuel bundles being stored in the pool, the operating history of each bundle (including the length of time since reactor shutdown and fuel discharge) and the available decay heat correlation. It is known that the maximum spent fuel pool heat load during reactor operation occurs at startup following a refueling outage. Thus, knowing the makeup flow rate and temperature, one can calculate the permissible decay heat load such that the 150°F limit is not exceeded. Consumers Power Company intends not to return the Big Rock Point reactor to service following any refueling outage involving the addition of spent fuel to the spent fuel pool, until the calculated decay heat load is less than that permitted by the known makeup flow rate and temperature. This commitment applies to any and all power operation throughout the remaining operating life of the plant.

The enclosed amendment completes the open issues to our "Consolidated Application". Prompt issuance of a supplement to your Safety Evaluation Report is requested.

Thomas C Bordine (Signed)

Thomas C Bordine
Staff Licensing Engineeer

CC Administrator, Region III, USNRC
NRC Resident Inspector-Big Rock Point

Attachment

The following revisions are to be
inserted in the April 1982
Consumers Power Company
Big Rock Point Plant
Spent Fuel Rack Addition
Consolidated Environmental Impact Evaluation
And Description And Safety Analysis

Page vi - Table of Contents
Page x - Foreword
Appendix II - Part A
Appendix II - Part B

Please remove the superceded April 1982
pages described above.

TABLE OF CONTENTS (cont'd)

FOREWORD

Because of uncertainties in government policy on fuel reprocessing, and the potential unavailability of government spent fuel storage facilities, Consumers Power Company (CPCo) plans to increase the storage capacity of the spent fuel pool at the Big Rock Point Plant to allow continued plant operation. The proposed method of accomplishing this increase is to add three high-density spent fuel storage racks to those racks already existing in the spent fuel pool.

On April 23, 1979, CPCo submitted to the U. S. Nuclear Regulatory Commission (NRC) two reports as part of their application for spent fuel storage modification at the Big Rock Point Plant. These two reports, a Description and Safety Analysis and an Environmental Impact Evaluation, were intended to provide the basis for any licensing action required to allow the increase of spent fuel pool storage capacity at the Big Rock Point Plant from 193 assemblies to 441 assemblies, an increase which would allow storage of normal spent fuel until 1990, while retaining the capability to offload a full core up to that time.

Subsequent to the April 23, 1979, submittal there was significant correspondence between CPCo and the NRC on this subject. In responding to NRC questions, CPCo assured that a future revision to the Description and Safety Analysis would be submitted that would incorporate significant information concerning the proposed spent fuel pool modification. The Consolidated Environmental Impact Evaluation and Description and Safety Analysis fulfills that commitment. In developing this new document, revisions were also found to be necessary to the Environmental Impact Evaluation to incorporate information transmitted to the NRC subsequent to the April 23, 1979, submittal.

The Consolidated Environmental Impact Evaluation and Description and Safety Analysis consists of materials previously transmitted to the NRC by CPCo.

As presented, this document merely combines into one report the April 23, 1979, two-report submittal, responses to NRC questions, and relevant analysis information. Section 1 of the revised report consists of the Environmental Impact Evaluation, and

Section 2 is the Description and Safety Analysis. Section 2.9 contains the exact text of NRC questions and their respective CPCo responses as addressed since the submittal of April 23, 1979. Changes made to the text of the original Environmental Impact Evaluation and the Description and Safety Analysis are indicated by vertical lines in the margin. The numbers beside these lines refer to the responses in Section 2.9 from which the revised information was obtained.

The Consolidated Environmental Impact Evaluation and Description and Safety Analysis also includes four appendices. Appendix I presents some of the significant correspondence between CPCo and the NRC which has been referenced in the text. Included are the proposed technical specification change requests, information pertinent to the cask drop analysis, a commitment not to move the fuel transfer cask during power operation, and additional information regarding the analysis of the postulated refueling accident inside containment. Appendix II Part A contains details of the structural analysis of the spent fuel pool structure and Part B contains the thermal hydraulic analysis for the spent fuel pool. Appendix III contains a report of verification of the adequacy of the 24-ton spent fuel transfer cask redundant support system. Appendix IV contains the seismic analysis of the 75/5 T reactor building crane.