DAIRYLAND POWER COOPERATIVE

La Crosse, Wisconsin

54601

October 26, 1978

In reply, please refer to LAC-5519

DOCKET NO. 50-409

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: DAIRYLAND POWER COOPERATIVE
LA CROSSE BOILING WATER REACTOR (LACBWR)
PROVISIONAL OPERATING LICENSE NO. DPR-45
PROPOSED MODIFICATION - SPENT FUEL STORAGE

Reference: 1) NRC Letter, Ziemann to Madgett, dated September 28, 1978.
2) DPC Letter, LAC-5341, Madgett to Director of Nuclear Reactor Regulation, dated June 7, 1978.

Gentlemen:

Enclosed with this letter is additional information requested by you in Reference 1 for completion of your review of DPC Technical Report LAC-TR-064, "Environmental Impact Evaluation of Spent Fuel Pool Rack Modification", submitted by Reference 2.

The data required to respond to Question 9 is presently being collected. A response will be provided shortly in a later submittal.

If there are any questions concerning this submittal, please contact us.

Very truly yours,

DAIRYLAND POWER COOPERATIVE

John P. Madgett, General Manager

JPM:NLH:af

cc: (See attached list).

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Coulee Region Energy Coalition
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NRC QUESTION

1. *Your submittal of June 7, 1978 indicates that the SFP will be filled with 13 feet of water above the storage racks, whereas filling the pool to the maximum pool water level, at the 700-foot elevation, would allow an excess of 20 feet above these racks. Explain why this additional 7 feet of water shielding isn't planned to be used during the modification to reduce the dose rate levels in operating areas (i.e., over the pool center and edge of the pool) so that occupational exposures are reduced to levels that are as low as is reasonably achievable (ALARA).*

DPC RESPONSE

Whenever fuel handling is performed in the FESW, the water level is maintained at the 700-foot elevation. During outages and for the proposed modification work, this practice will be followed.

NRC QUESTION

2. *Can the collective dose (man-rem) to the divers be reduced by re-arrangement of the spent fuel, in the SFP, so that a greater than 5-foot water shield may result during diver operations?*

DPC RESPONSE

The effective 5-foot water shield is an estimated value and is considered a minimal value. Every effort will be made to re-arrange spent fuel assemblies in order to minimize the radiation exposure to the divers. The addition of lead sheeting under water is also being considered as a means of reducing radiation exposure. A reliable determination of dose-rate levels and shielding requirements will be obtained after the next refueling.

NRC QUESTION

3. *On an ALARA basis justify your decision to use modification Plan A considering that Plan B provides a smaller occupational exposure.*

DPC RESPONSE

Plan B is the preferred plan intended for use and assumes that workers can disconnect all bolts and fittings with the use of tools with extended handles. In the event that this is not feasible, divers would be required to perform some of the underwater work. When the June 7, 1978 submittal was issued, a possibility existed (and still does) that LACBWR would be shut down due to the inability to discharge spent fuel to the FESW for lack of sufficient storage space. Thus, Plan A was submitted which would require 100 fewer man-hours to complete.

NRC QUESTION

4. *Provide an estimate of the dose rate above the spent fuel pool from concentrations of radionuclides in the pool averaging about 1 x 10^{-3} µCi/ml, as indicated in Section 3.1 of your June 7, 1978 submittal.*

DPC RESPONSE

The dose rate one meter above the fuel pool water surface from concentrations of radionuclides in the pool averaging about 1 x 10^{-3} µCi/ml is approximately 2.0 mrem/hr. The 1 x 10^{-3} µCi/ml activity represented an early estimate based on a limited number of samples. It should be noted that based on the average accumulated data for the year 1978 to date, the pool concentration of radionuclides is closer to 3 x 10^{-3} µCi/ml with a resulting dose rate of approximately 6.0 mrem/hr.

NRC QUESTION

5. *What is the present annual occupational exposure (in man-rem) in the SFP area from all operations in the SFP? Describe the impact of the proposed modification on this occupational exposure. Include in your analysis the expected exposure from more frequent changing of the demineralizer and filter cartridge.*

DPC RESPONSE

The annual man-rem exposure in the FESW (SFP) area from all operations for the past three years is summarized below:

Year	Man-Rem Exposures	
	Refueling	All Other Operations (Except Those Described Below)
1978	0.360	3.136
1977	0.893	4.584
1976	0.314	1.655*

*Includes rack modification of 1976.

The proposed modification is not anticipated to have any significant impact on these occupational exposures. Exposures for other jobs previously addressed elsewhere are:

- Routine non-fuel handling exposures - response to Question 13.
- Filter changing and demineralizer resin sluicing - Section 2.2 of LAC-TR-064 (June 7, 1978).

NRC QUESTION

6. *Provide the estimated volume of contaminated material (e.g., spent fuel racks, seismic restraints) expected to be removed from the spent fuel pool during modification and shipped to a licensed burial site.*

DPC RESPONSE

The estimated packaged volume of contaminated material removed from the spent fuel pool and shipped to a licensed burial site is eight hundred (800) ft^3.

NRC QUESTION

7. *Your June 7, 1978 submittal did not address the impact of the proposed pool modification on the radioactive gaseous effluent from the pool to the environment. Include in your discussion the change in the annual exposure to the population from this source of radioactivity.*

DPC RESPONSE

There will be no change in the annual exposure to the population due to the short-lived gaseous isotopes. This exposure is related to the number of elements discharged annually and not to the FESW inventory since these gaseous isotopes decay to negligible quantities after approximately 100 days.

The annual exposure increase per spent fuel assembly to the low population zone due to ^{85}Kr based on a conservative fuel cladding failure of 10% is estimated to be 0.034 mrem beta dose and 0.035 mrem gamma dose.

NRC QUESTION

8. Provide the failed fuel fraction for each year La Crosse has operated.

DPC RESPONSE

The "failed fuel fraction" is taken to mean the fraction of fuel assemblies determined by the dry sipping process to have cladding defects. It is not possible to determine this on a year-by-year basis and the information available (cycle-by-cycle basis) is outlined in the following:

Cycle	Dates	Elements	Fraction of Total
Cycle 1	*Initial Startup August 19, 1972	8*	.111
Cycle 1A	October 14, 1972-March 30, 1973	20	.277
Cycle 2	June 25, 1973-November 3, 1973	23	.319
Cycle 3	December 21, 1973-May 9, 1975	10	.138
Cycle 4	August 11, 1975-May 11, 1977	26	.361

*Cycle 1 was concluded prior to the installation of out-of-core sipping equipment. These elements were removed based on indications of the in-core failed fuel element detection system. Two of the eight elements were later determined to be satisfactory for reuse.

NRC QUESTION

9. *Provide a discussion of the impact of the pool modification on pool leakage. Include in your discussion the pool leakage at different heights of water in the pool, the leakage expected after the pool modification, and the capability of the radwaste system to process this water.*

DPC RESPONSE

The data required to respond to the above request is presently being collected. A response will be provided shortly in a later submittal.

NRC QUESTION

10. Discuss the spent fuel pool water level and water temperature instrumentation. Include the capability of the instrumentation to alarm and the location of the alarms.

DPC RESPONSE

The low level alarm for the spent fuel pool is installed at the 680 foot level and will actuate at three inches below the 680 foot level. The top of the upper tier of racks is nominally at 677'-9-3/4". This means 20 foot-7 inches or 18,000 gallons of water would exist in the fuel pool at the low level alarm point. The low level alarm is brought to the Control Room Annunciator Panel and will give a visual and audible annunciation. The spent fuel pool water inlet and outlet temperature is monitored and recorded in the Control Room. This temperature will cause an alarm in the Control Room if the temperature exceeds 135°F and will annunciate in the Control Room giving a visual and audible annunciation. The temperature is also logged by an Operator each 8 hours on a Control Room Log Sheet.

Two 0-200°F temperature indicators are provided at the fuel storage cooler inlet and outlet for local monitoring.

MAY 23, 1978

TO: DISTRIBUTION

FROM: ROBERT PRINCE, LACBWR RADIATION PROTECTION ENGINEER

SUBJECT: REPORT - "ENVIRONMENTAL IMPACT EVALUATION OF SPENT FUEL POOL RACK MODIFICATION"

Please note the corrections on pages 2, 3 and B-3 of the subject report. The values used were for half value layers (HVL) when tenth value layers (TVL) were actually being considered.

R. Prince

RP:af

NRC QUESTION

11. *In Appendix B "In-Plant Radiological Assessment" on page B-3, the evaluation of dose rate found from the given mathematical model is 3.24×10^7 R/hr. To reduce this value to 30 mrem/hr requires a factor of reduction of 10^9 or 9 tenth value layers (TVL's). The report states that 9 half-value layers (HVL's) or ~ 3 feet of water is required to provide this factor of reduction. Since 9 HVL's only give a factor of reduction of 512, please calculate the additional thickness of water required to provide the appropriate factor of reduction (i.e., 10^9). Include buildup factors in the calculation, and relevant references.*

DPC RESPONSE

This question has previously been answered in the revised June 7, 1978 submittal. Please refer to the attached memo concerning the original calculations. It should be noted that buildup factors are incorporated in equation 2 on page B-2 of the submittal.

NRC QUESTION

12. *When two tiers of racks are installed, the top of the second rack will be at about the 680' level. Therefore, when a fuel element is transferred to this upper rack, only approximately 10 feet of water shielding will be available above the top of this assembly during the transfer. What additional dose will personnel receive, as a result of this fuel transfer, compared to the 10 to 20 feet of shielding that would be available if a fuel transfer was made with only a single tier involved?*

DPC RESPONSE

The top of the upper tier is at the 678' level. This allows a water depth of 14 feet above the top of the fuel assembly even during the transfer process. This water depth is greater than what has been used for fuel transfer in the past. In order to transfer fuel from the reactor vessel to the FESW, the fuel assembly must clear the bottom of the transfer canal. Thus, the depth of the transfer canal determines the effective water shield (12') during transfer and not the height of the storage racks. Since the same amount of water shield will be available, no additional dose to personnel is expected during fuel transfer operations.

NRC QUESTION

13. *For the two tier design, justify why the water level in the spent fuel pool would be below the 700-foot elevation and why the resulting occupational exposure would be ALARA. In your discussion, tabulate when the water level is below this elevation, why it is below this elevation, what the dose rate would be to personnel at this elevation, what the expected occupany is at this elevation and what is the estimated collective dose (man-rem) during the time when the water level is below this elevation. In addition, justify why specification 4.2.8.3 of the La Crosse Technical Specifications should not be amended to require that the minimum water level, during handling and storage of irradiated fuel assemblies, be near the 700' elevation.*

DPC RESPONSE

During all fuel handling operations, the Fuel Element Storage Well (FESW) water level is maintained at the 700 foot elevation. While the plant is operating, the water level is usually maintained below the 700 foot elevation to decrease the liner leak rate.

The dose rate in the immediate vicinity and/or directly over the pool is 10-30 mrem/hr when the water level is at the 680 foot elevation. Approximately three feet from the edge of the pool, all dose rate levels are less than 10 mrem/hr.

During plant operation, occupancy times in the vicinity of the FESW are minimal. The FESW is not located in a high traffic area. Operator tours represent the most significant occupany factors for this area. These occupancy times amount to approximately two hoursper week on the 701 level. It is conservatively estimated that, out of this time, 10 minutes per week is spent in the immediate vicinity of the FESW. The annual exposure due to this occupancy is 0.17 man-rem based on an average exposure of 20 mrem/hr.

Based on this information, it is felt that the important requirement is to maintain a minimum water depth over the spent fuel assemblies and that amended technical specifications requiring that the water level be maintained at the 700 foot elevation is not mandated.