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General Manager

August 24, 1992

In reply, please  
refer to LAC-13203

DOCKET NO. 50-409

Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Gentlemen:

SUBJECT: Dairyland Power Cooperative  
La Crosse Boiling Water Reactor (LACBWR)  
Possession-Only License No. DPR-45  
Semi-Annual Radioactive Effluent Report

REFERENCES: (1) NRC Letter, Keppler to Linder, dated August 12, 1983,  
Inspection Report 50-409/83-10 (DRMSP)  
(2) LACBWR Technical Specifications 6.8.1.1.c and 6.8.1.2

In accordance with 10 CFR 50.36a(a)(2), this letter serves to transmit to you the Radioactive Effluent Report for the La Crosse Boiling Water Reactor (LACBWR) for the period January 1 through June 30, 1992.

If you have any questions, please contact us.

Sincerely,

DAIRYLAND POWER COOPERATIVE

William L. Berg, General Manager

WLB:LLN:dh

Enclosure

cc/enc - A. Bert Davis, U.S. NRC Region III  
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RADIOACTIVE EFFLUENT REPORT

FOR THE

LA CROSSE BOILING WATER REACTOR (LACBWR)

(January 1 to June 30, 1992)

DAIRYLAND POWER COOPERATIVE

Docket No. 50-409

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## INTRODUCTION:

The La Crosse Boiling Water Reactor (LACBWR), also known as Genoa Station No. 2, is located on the east bank of the Mississippi River near Genoa, Vernon County, Wisconsin. The plant was designed and constructed by the Allis-Chalmers Manufacturing Company. It was completed in 1967 and had a generation capacity of 50 MW (165 MW<sub>(th)</sub>). The reactor is owned by Dairyland Power Cooperative (DPC).

The reactor went critical in July 1967 and first contributed electricity to DPC's system in April 1968. After completing full power tests in August 1969, the plant operated between 50% and 100% full power, with the exception of plant shutdowns for maintenance and repair.

In April of 1987 plant operation was ceased. The reactor is presently defueled and work is progressing to place the plant into a SAFSTOR mode. In August of 1987 a possession-only license was received.

In accordance with LACBWR Technical Specifications 6.8.1.2 and in compliance with 10 CFR 50.36a(a)(2), this document is the Radioactive Effluent Report for the period January 1 through June 30, 1992.



EFFLUENT AND WASTE DISPOSAL REPORT  
(Supplemental Information)

FACILITY: LaCrosse Boiling Water Reactor LICENSEE: DAIRYLAND POWER COOPERATIVE

DOCKET NO. 50-409

1. REGULATORY LIMITS

a. Gaseous Effluent Release Limits:

LACBWR's Technical Specification for gaseous effluent releases of radioactive material limit the release rates of the sum of the individual radionuclides, in Curies per second, so that the dose rates to members of the public beyond the Effluent Release Boundary do not exceed 500 mRem/year to the whole body, 3000 mRem/year to the skin from noble gases, and 1500 mRem/year to a critical organ from H-3, I-131/133 and particulates with half-lives greater than 8 days.

Also, in accordance with 10 CFR 50, Appendix I, the Technical Specifications for gaseous effluent radioactive material limit the air dose to a member of the public from noble gases in areas beyond the Effluent Release Boundary to less than 5 mRad gamma and 10 mRad beta per calendar quarter, and less than 10 mRad gamma and 20 mRad beta per calendar year. The dose limits from H-3, I-131/133 and particulates with half lives greater than 8 days are less than 7.5 mRem per calendar quarter, and less than 15 mRem per calendar year to any organ.

Cumulative dose contributions from gaseous effluent releases are determined in accordance with the LACBWR Offsite Dose Calculations Manual.

b. Liquid Effluent Release Limits:

LACBWR's Technical Specifications limits for liquid effluent releases are limited to those concentrations of individual radionuclides such that the diluted discharge does not exceed 1 MPC in a 168-hour week averaged over the calendar year. For dissolved or entrained noble gases, the concentration is limited to a total activity concentration of  $6 \times 10^{-4}$   $\mu\text{Ci/ml}$ . For alpha emitting radionuclides, the concentration is limited to a total activity concentration of  $4.9 \times 10^{-9}$   $\mu\text{Ci/ml}$ , based upon an actual alpha emitting radionuclide analysis performed on a representative water sample. The values reported in tables 2A and 2B, Liquid Effluents, are based on dilution with the combination of LACBWR and Genoa Station No. 3 condenser cooling water flow prior to discharge to the Mississippi River. No credit is taken for further dilution in the mixing zone of the Mississippi River.

Also, in accordance with 10 CFR 50, Appendix I, the dose commitment to a member of the public from radioactive materials released in liquid effluents to areas beyond the Effluent Release Boundary are limited to less than 1.5 mRem whole body and 5.0 mRem organ dose per calendar quarter, and less than 3.0 mRem whole body and 10 mRem organ dose per calendar year via the critical ingestion pathway.

Cumulative quarterly and annual dose contributions from liquid effluent releases are determined for the adult fish ingestion pathway in accordance with the LACBWR Offsite Dose Calculation Manual.

c. Solid Radioactive Waste

All solid radioactive wastes are handled in accordance with a Process Control Program as defined by LACBWR procedures in order to assure that all applicable transportation and burial site disposal requirements are met.

2. MAXIMUM PERMISSIBLE CONCENTRATION (MPC)

The MPC used to calculate permissible release rates are obtained from 10 CFR 20, Appendix B, Tables I and II. In addition, the following values are used:

Tritium in Water =  $3 \times 10^{-3}$   $\mu\text{Ci/ml}$ .

Tritium in Air =  $2 \times 10^{-7}$   $\mu\text{Ci/cc}$ .

3. AVERAGE ENERGY

The release rate limits for LACBWR are not based on average energy.

4. ANALYTICAL METHODS

a. Liquid Effluents

Liquid effluent measurements for gross radioactivity are performed by Ge-64 gamma isotopic analysis of a representative sample from each tank discharged. In addition, each batch discharged tank is analyzed for alpha and tritium activity concentration. A composite sample is created by collecting representative aliquots from each tank batch discharged and is analyzed quarterly for Iron-55 and Strontium 89 & 90 by a contractor.



b. Airborne Particulates

Airborne particulate releases are determined by Ge-Li gamma isotopic analysis. This analysis is performed by analyzing a glass fiber filter paper taken from the stack monitor (Eberline SPING) which continuously isokinetically samples and monitors the stack effluent. This filter is changed and analyzed on an approximate weekly basis and analyzed within 7 days after removal. This filter is also analyzed for alpha activity. A quarterly composite of these filters is sent to a contractor for Sr 89 and 90 analysis.

c. Radioiodines

Since the plant shutdown in April 1987, the I-131/I-133 have decayed completely to stable elements. Amendment 66 to the LACBWR Technical Specifications, Table 5.7.2.2, no longer requires monitoring for iodine.

d. Fission and Activation Gases

The gaseous releases converted into concentration ( $\mu\text{Ci/cc}$ ) are continuously sampled from the stack release flow by two stack monitors, which are in-line monitors. These gas concentrations ( $\mu\text{Ci/cc}$ ) are averaged by the monitors microprocessor and flowrate/pressure compensated to obtain the daily gaseous release of the plant. Since the plant shutdown in April 1987, gaseous releases have been immeasurable. All fission gases except Kr-85 have decayed completely to stable elements.

e. Tritium

Tritium releases are determined by taking a grab sample of the stack atmosphere at the effluent of the stack monitor. Tritium, as tritiated water, is removed from the sample stream by condensation, using a cold trap containing an organic compound and dry ice. The condensed water vapor is then distilled and the distillate is analyzed for H-3 concentration,  $\mu\text{Ci/cc}$ , by internal liquid scintillation spectrophotometry and the results are expressed in terms of tritium release rates. The tritium grab samples are obtained on at least a once/month basis unless the upper reactor cavity is flooded, at which time the sampling frequency is increased to at least once per 7 days.

5. BATCH RELEASES

a. Airborne

All airborne effluent releases at LACBWR are from a single Continuous-Elevated Release Point.

b. Liquid

All liquid effluent releases at LACBWR are batch releases. This is summarized as follows:

- (1) Number of Batch Releases: 6
- (2) Total Time Period for Batch Releases: 93.6 hours
- (3) Maximum Time Period for a Batch Release: 21.8 hours
- (4) Average Time Period for a Batch Release: 15.6 hours
- (5) Minimum Time Period for a Batch Release: 11 hours
- (6) Average Stream Flow Rate During Periods

of Release of Effluent into a Flowing Stream:  $43,817 \text{ ft}^3/\text{sec}$

6. ABNORMAL RELEASES

There were no abnormal releases of radioactivity in plant effluents as summarized as follows:

a. Liquid

- (1) Number of Releases: None
- (2) Total Activity Released: N/A

b. Gaseous

- (1) Number of Releases: None
- (2) Total Activity Released: N/A

7. ESTIMATED TOTAL ANALYTICAL ERROR

The reported analytical results contain the following estimated errors:

Counting Error  $\pm 1$  Standard Deviation

Sampling Volume Error  $\pm 5\%$ .

The lower limits of detection (LLD) are expressed in terms of a 4.66  $\sigma$  as defined in Technical Specifications.

TABLE 1A

## EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1992

## GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	UNIT	QTR	QTR	QTR	QTR	TOTAL
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## A. FISSION &amp; ACTIVATION GASES

1. TOTAL RELEASE	Ci	0.00	0.00			0.00
2. AVERAGE RELEASE RATE FOR PERIOD	1Ci/Sec	0.00	0.00			

## B. IODINE I-131 - No longer analyzed for.

## C. PARTICULATES

1. PARTICULATES W/HALF- LIVES > 8 DAYS	Ci	2.68E-7	1.92E-7			4.60E-7
2. AVERAGE RELEASE RATE FOR PERIOD	1Ci/Sec	3.53E-8	2.42E-8			
3. GROSS ALPHA RADIOACTIVITY	Ci	7.07E-8	0.00			

## D. TRITIUM

1. TOTAL RELEASE	Ci	8.42E-2	3.02E-2			1.14E-1
2. AVERAGE RELEASE RATE FOR PERIOD	1Ci/Sec	1.10E-2	3.86E-3			

## E. PERCENTAGE OF (APPENDIX I) TECHNICAL SPECIFICATION LIMITS

## 1. NOBLE GAS RELEASE

		QTR	QTR	QTR	QTR	YEARLY
GAMMA	%	0.00	0.00			0.00
BETA	%	0.00	0.00			0.00

## 2. H-3 AND ALL RADIONUCLIDES IN PARTICULATE FORM WITH HALF-LIVES GREATER THAN 8 DAYS

		QTR	QTR	QTR	QTR	YEARLY
HIGHEST ORGAN	%	3.05E-5	1.14E-5			2.10E-5

TABLE 1B

## EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1992

## GASEOUS EFFLUENTS - ELEVATED RELEASE

## CONTINUOUS MCDE

NUCLIDES RELEASED	UNIT	QTR	QTR	QTR	QTR	TOTAL
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## 1. FISSION GASES

KRYPTON-85	Ci	0.00	0.00			0.00
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## 2. IODINES - No longer analyzed for.

## 3. PARTICULATES

STRONTIUM-89	Ci	0.00	0.00			0.00
STRONTIUM-90	Ci	0.00	0.00			0.00
CESIUM-134	Ci	0.00	1.26E-7			1.26E-7
CESIUM-137	Ci	4.90E-8	2.22E-8			7.12E-8
BARIUM-LANTHANUM-140	Ci	0.00	0.00			0.00
COBALT-60	Ci	2.17E-7	4.40E-8			2.61E-7
MANGANESE-54	Ci	0.00	0.00			0.00
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					



TABLE 2A

## EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1992

## LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	UNIT	QTR	QTR	QTR	QTR	TOTAL
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## A. FISSION &amp; ACTIVATION PRODUCTS

1. TOTAL RELEASE (NOT INCL TRITIUM, GASES, ALPHA)	Ci	9.90E-3	9.87E-3			1.98E-2
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ml	7.86E-9	6.67E-9			

## B. TRITIUM

1. TOTAL RELEASE	Ci	4.51E-2	6.42E-2			1.09E-1
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ml	6.48E-10	2.33E-10			

## C. DISSOLVED AND ENTRAINED GASES

1. TOTAL RELEASE	Ci	0.00	0.00			0.00
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ml	0.00	0.00			

## D. GROSS ALPHA RADIOACTIVITY

1. TOTAL RELEASE	Ci	8.42E-6	8.10E-6			1.65E-5
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E. VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)	Liters	5.62E4	6.80E4			1.24E5
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F. VOLUME OF DILUTION WATER USED DURING PERIOD	Liters	3.03E3	1.48E9			1.78E9
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## G. PERCENTAGE OF (APPENDIX I) TECHNICAL SPECIFICATION LIMITS FOR LIQUID RELEASES

		QTR	QTR	QTR	QTR	YEARLY
HIGHEST ORGAN	%	4.96E-2	1.50E-2			3.23E-2
WHOLE BODY	%	0.11	3.30E-2			7.08E-2

TABLE 2B

## EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1992

## LIQUID EFFLUENTS

NUCLIDES RELEASED	UNIT	QUARTER	QUARTER	QUARTER	QUARTER
STRONTIUM-89	Ci	--	--		
STRONTIUM-90	Ci	6.09E-5	6.50 E-5		
CESIUM-134	Ci	--	--		
CESIUM-137	Ci	2.47E-3	3.40E-3		
IODINE-131	Ci	--	--		
COBALT-58	Ci	--	--		
COBALT-60	Ci	4.36E-3	3.97E-3		
IRON-55	Ci	2.98E-3	2.43E-3		
IRON-59	Ci	--	--		
ZINC-65	Ci	--	--		
MANGANESE-54	Ci	2.46E-5	--		
CHROMIUM-51	Ci	--	--		
ZIRCONIUM-NIOBIUM-95	Ci	--	--		
MOLYBDENUM-99	Ci	--	--		
TECHNETIUM-99M	Ci	--	--		
BARIUM-LANTHANUM-140	Ci	--	--		
CERIUM-141	Ci	--	--		
SILVER-110M	Ci	--	--		
	Ci				
	Ci				
	Ci				
TOTAL FOR PERIOD (ABOVE)	Ci	9.90E-3	9.87E-3		
FR-85	Ci	--	--		

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1992  
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

## A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL)

1. TYPE OF WASTE	UNIT	6-MONTH PERIOD	6-MONTH PERIOD	TOTAL
a. SPENT RESINS, FILTER SLUDGES, EVAPORATOR BOTTOMS, ETC.	m3	0		0
	ci	0		0
b. DRY COMPRESSIBLE WASTE, CONTAMINATED EQUIPMENT, ETC.	m3	0		0
	ci	0		0
c. IRRADIATED COMPONENTS, CONTROL RODS, ETC.	m3	0		0
	ci	0		0
d. OTHER (DESCRIBE)	m3	0		0
	ci	0		0

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION  
(BY TYPE OF WASTE)

a.	PERCENT	6-MONTH PERIOD	6-MONTH PERIOD

## 3. SOLID WASTE DISPOSITION

<u>NO. OF SHIPMENTS</u>	<u>MODE OF TRANSPORTATION</u>	<u>DESTINATION</u>
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## B. IRRADIATED FUEL SHIPMENTS (DISPOSITION)

<u>NO. OF SHIPMENTS</u>	<u>MODE OF TRANSPORTATION</u>	<u>DESTINATION</u>
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8. OFFSITE DOSE CALCULATIONS SUMMARY AND CONCLUSIONS:

a. Gaseous Effluent Releases

The maximum quarterly offsite gamma dose due to noble gases was 0.00 mRad. The cumulative 1992 annual offsite gamma dose due to noble gases was 0.00 mRad.

The maximum quarterly offsite beta dose due to noble gases was 0.00 mRad. The cumulative 1992 annual offsite beta dose due to noble gases was 0.00 mRad.

The maximum quarterly offsite dose to any organ from the release of H-3 and all radionuclides in particulate form with half-lives greater than 8 days was approximately  $2.29\text{E-}6$  mRem. The cumulative 1992 annual maximum organ dose from these radionuclides was approximately  $3.15\text{E-}6$  mRem.

The highest historical monthly and annual average X/Q's for the period 1985-1987 for the worst case offsite receptor location, in accordance with the ODCM, were used to calculate these offsite dose values.

b. Liquid Effluent Releases

The maximum quarterly organ dose from liquid releases was approximately  $2.48\text{E-}3$  mRem. The maximum cumulative 1992 annual organ dose was approximately  $3.23\text{E-}3$  mRem. The maximum quarterly whole body dose for liquid releases was approximately  $1.65\text{E-}3$  mRem, and the cumulative 1992 annual whole body dose was approximately  $2.12\text{E-}3$  mRem.

c. Conclusion

All calculated offsite doses were below Technical Specification limits.