LA CROSSE BOILING WATER
REACTOR (LACBWR)

DAIRYLAND POWER
COOPERATIVE

February 23, 2009

In reply, please refer to LAC-14058

DOCKET NO. 50-409

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

SUBJECT: Dairyland Power Cooperative
La Crosse Boiling Water Reactor
Possession-Only License No. DPR-45
Annual Radioactive Effluent Report and
Radiological Environmental Monitoring Report

REFERENCES: (1) NRC Letter, Keppler to Linder, dated August 12, 1983, Inspection Report 50-409/83-10 (DRMSP)
(2) LACBWR Technical Specifications 6.4.2, 6.5.1.1.c & d

In accordance with 10 CFR 50.36a(a)(2), this letter serves to transmit to you the Radioactive Effluent Report and Radiological Environmental Monitoring Report for the La Crosse Boiling Water Reactor (LACBWR) for 2008.

If you have any questions, please contact us.

Sincerely,

DAIRYLAND POWER COOPERATIVE

W. L. Berg / lae

William L. Berg, President & CEO

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Enclosures

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RADIOACTIVE EFFLUENT REPORT

AND

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

FOR THE
LA CROSSE BOILING WATER REACTOR (LACBWR)

(January 1 to December 31, 2008)

DAIRYLAND POWER COOPERATIVE
3200 EAST AVENUE SOUTH
LA CROSSE WI 54602-0817

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RADIOACTIVE EFFLUENT REPORT

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 $MW_{(th)}$). 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 60% 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 in a SAFSTOR mode. In August of 1987 a possession-only license was received.

In accordance with LACBWR Technical Specifications 6.5.1.1.d and in compliance with 10 CFR 50.36a(a)(2), this document is the Radioactive Effluent Report for the period January 1 through December 31, 2008.

EFFLUENT AND WASTE DISPOSAL REPORT

(Supplemental Information)

FACILITY: La Crosse Boiling Water Reactor LICENSEE: Dairyland Power Cooperative

DOCKET NO. 50-409

1.0 REGULATORY LIMITS

a. Gaseous Effluent Release Limits:

LACBWR's stack effluent release limitations for gaseous effluent releases of radioactive material limits the release rate of the sum of the individual radionuclides, 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 and particulates with half-lives greater than 8 days as per the requirements of the Offsite Dose Calculation Manual (ODCM).

Also, in accordance with 10 CFR 50, Appendix I, the ODCM limitations 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 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 liquid effluent release limitations for liquid effluent releases are those concentrations specified in 10 CFR 20 Appendix B, Table 2, Column 2. For alpha emitting radionuclides, the concentration is limited to a total activity concentration of 4.9E-9 µCi/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.

2.0 EFFLUENT RELEASE CONCENTRATION LIMIT

The Effluent Release Concentration used to calculate permissible release rates are obtained from 10 CFR 20, Appendix B, Table 2, Column 2.

3.0 AVERAGE ENERGY

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

4.0 ANALYTICAL METHODS

a. Liquid Effluents

Liquid effluent measurements for gross radioactivity are performed by HPGe 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 during a calendar quarter. This composite is analyzed for Iron-55 and Strontium-90 by a contractor on a quarterly basis.

b. Airborne Particulates

Airborne particulate releases are determined by HPGe gamma isotopic analysis. This analysis is performed by analyzing a glass fiber filter paper taken from the stack monitor 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-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, deleted the requirement for monitoring for iodine.

d. Fission and Activation Gases

The concentration of radioactivity (μCi/cc) in gaseous releases from the stack is continuously monitored by two in line stack monitors. These gas concentrations (μCi/cc) are corrected for pressure loss in the sampling system and averaged by the monitors microprocessor. The results are used along with the stack flow rate to obtain the daily gaseous release from the plant. Since the plant shutdown in April 1987, gaseous releases have been immeasurable. All fission gases except Kr-85 have decayed 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. The condensed water vapor is then distilled and the distillate is analyzed for H-3 concentration (μCi/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.

5.0 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:	13
(2)	Total Time Period for Batch Releases:	251.4 hours
(3)	Maximum Time Period for a Batch Release:	27.5 hours
(4)	Average Time Period for a Batch Release:	19.3 hours
(5)	Minimum Time Period for a Batch Release:	8.33 hours
(6)	Average Stream Flow Rate During Periods of Release of Effluent into a Flowing Stream:	63038 ft^3/sec

6.0 ABNORMAL RELEASES

There were no abnormal releases of radioactivity in plant effluents.

7.0 ESTIMATED TOTAL ANALYTICAL ERROR

The reported analytical results contain the following estimated errors:

Counting Error 95% Confidence Level

Sampling Volume Error ± 5%.

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2008

GASEOUS EFFLUENTS – SUMMATION OF ALL RELEASES

		UNIT	QTR	QTR	QTR	QTR	TOTAL
A.	**FISSION & ACTIVATION GASES**						
1.	TOTAL RELEASE	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.	AVERAGE RELEASE RATE FOR PERIOD	µCi/ Sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
B.	**IODINE I-131 - No longer analyzed for.**						
C.	**PARTICULATES**						
1.	PARTICULATES WITH HALF-LIVES > 8 DAYS	Ci	6.84E-8	5.63E-7	8.78E-7	8.10E-7	2.32E-6
2.	AVERAGE RELEASE RATE FOR PERIOD	µCi/ Sec	8.80E-9	7.19E-8	1.10E-7	1.02E-7	
3.	GROSS ALPHA RADIOACTIVITY	Ci	5.00E-8	6.90E-8	1.32E-7	2.70E-8	2.78E-7
D.	**TRITIUM**						
1.	TOTAL RELEASE	Ci	4.88E-3	5.55E-3	1.65E-2	8.52E-3	3.55E-2
2.	AVERAGE RELEASE RATE FOR PERIOD	µCi/ Sec	6.28E-4	7.06E-4	2.08E-3	1.07E-3	
E.	**PERCENTAGE OF ODCM DOSE LIMITS FOR GASEOUS EFFLUENT RELEASES**						
			QTR	QTR	QTR	QTR	YEARLY
1.	NOBLE GAS RELEASE						
	GAMMA	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	BETA	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.	H-3 AND ALL RADIONUCLIDES IN PARTICULATE FORM WITH HALF-LIVES GREATER THAN 8 DAYS						
	GAMMA (Highest Organ)	%	7.96E-5	5.29E-5	4.07E-4	6.79E-5	2.93E-4

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2008

GASEOUS EFFLUENTS – ELEVATED RELEASE

			CONTINUOS MODE				
		UNIT	QTR	QTR	QTR	QTR	TOTAL
NUCLIDES RELEASED							
1.	FISSION GASES						
	KRYPTON-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL FOR PERIOD	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.	IODINE I-131 - Analysis no longer required.						
3.	PARTICULATES						
	STRONTIUM-90	Ci	6.84E-8	3.03E-8	3.28E-7	1.97E-8	4.46E-7
	CESIUM-134	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	CESIUM-137	Ci	0.00E+00	2.90E-7	5.50E-7	3.10E-7	1.15E-6
	COBALT-60	Ci	0.00E+00	2.43E-7	0.00E+00	4.80E-7	7.23E-7
		Ci					
		Ci					
		Ci					
		Ci					
		Ci					
		Ci					
	TOTALS	Ci	6.84E-8	5.63E-7	8.78E-7	8.10E-7	2.32E-6

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2008

LIQUID EFFLUENTS – SUMMATION OF ALL RELEASES

		UNIT	QTR	QTR	QTR	QTR	TOTAL
A	**FISSION & ACTIVATION PRODUCTS**						
1.	TOTAL RELEASE (NOT INCL. TRITIUM, GASES, ALPHA)	Ci	3.18E-2	3.80E-2	8.47E-3	0.00E+00	7.83E-2
2.	AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ ml	2.45E-8	7.67E-9	4.23E-9	0.00E+00	
B.	**TRITIUM**						
1.	TOTAL RELEASE	Ci	1.44E-3	4.53E-3	5.33E-3	0.00E+00	1.13E-2
	AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ ml	1.11E-9	9.14E-10	2.66E-9	0.00E+00	
C.	**DISSOLVED AND ENTRAINED GASES**						
1.	TOTAL RELEASE	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.	AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
D.	**GROSS ALPHA RADIOACTIVITY**						
1.	TOTAL RELEASE	Ci	5.72E-5	6.97E-5	4.74E-6	0.00E+00	1.32E-4
E.	**VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)**	Liters	4.32E+4	1.60E+5	6.59E+4	0.00E+00	2.70E+5
F.	**VOLUME OF DILUTION WATER USED DURING PERIOD**	Liters	1.30E+9	4.96E+9	2.00E+9	2.22E+2	8.26E+9
G.	**PERCENTAGE OF ODCM LIMITS FOR LIQUID RELEASES**						
			QTR	QTR	QTR	QTR	YEARLY
	HIGHEST ORGAN	%	12.77	11.77	2.43	0.00	13.49
	WHOLE BODY	%	26.89	24.87	5.15	0.00	28.45

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2008

LIQUID EFFLUENTS

NUCLIDES RELEASED	UNIT	QTR	QTR	QTR	QTR
MANGANESE-54	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IRON-55	Ci	0.00e+00	1.20E-5	6.51E-6	0.00E+00
COBALT-60	Ci	1.67E-4	1.14E-3	1.26E-4	0.00E+00
STRONTIUM-90	Ci	3.64E-4	7.06E-4	1.95E-4	0.00E+00
CESIUM-134	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CESIUM-137	Ci	3.16E-2	3.62E-2	8.14E-3	0.00E+00
TOTAL FOR PERIOD (ABOVE)	Ci	3.22E-2	3.80E-2	8.47E-3	0.00E+00
KRYPTON-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 3

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT – 2008
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR DISPOSAL (Not Irradiated Fuel)

1. TYPE OF WASTE	UNIT	6-MONTH PERIOD	6-MONTH PERIOD	TOTAL
a. SPENT RESINS, FILTER SLUDGES, EVAPORATOR BOTTOMS, ETC	m^3	0	0	0
	Ci	0	0	0
b. DRY COMPRESSIBLE WASTE, CONTAMINATED EQUIPMENT, ETC	m^3	70	35.5	105.5
	Ci	0.46	1.5E-3	4.62E-1
c. IRRADIATED COMPONENTS, CONTROL RODS, ETC	m^3	0	0	0
	Ci	0	0	0
d. OTHER (DESCRIBE)	m^3	0	0	0
	Ci	0	0	0

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION (BY TYPE OF WASTE)	PERCENT OF TOTAL	6-MONTH PERIOD CURIES	6-MONTH PERIOD CURIES
Co-60	45.7	2.08E-1	5.0E-4
Fe-55	7.2	3.3E-2	1.0E-4
Ni-63	44.7	2.04E-1	9.0E-4
Pu-241	2.4	1.1E-2	4.6E-5

3. SOLID WASTE DISPOSITION

NO. OF SHIPMENTS	MODE OF TRANSPORTATION	DESTINATION
5	Sole Use	Duratek, Oak Ridge, TN
1	Sole Use	Energy Solutions, Clive UT

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION)

NO OF SHIPMENTS	MODE OF TRANSPORTATION	DESTINATION
NONE		

8. 0 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 2008 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 2008 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 3.06E-5 mRem. The cumulative 2008 annual maximum organ dose from these radionuclides was also approximately 4.39E-5 mRem.

The highest historical annual average X/Q equal to 1.82 E-6 sec/m^3 for the period 1985-1987 for the worst case offsite receptor location, in accordance with the ODCM, was used to calculate these offsite dose values.

b. Liquid Effluent Releases

The maximum quarterly organ dose from liquid releases was approximately 0.638 mRem. The cumulative 2008 annual organ dose was approximately 1.35 mRem. The maximum quarterly total body dose for liquid releases was approximately 0.403 mRem, and the cumulative 2008 annual total body dose was approximately 0.854 mRem.

c. Conclusion

All calculated offsite doses were below ODCM limits.

9. 0 OFFSITE DOSE CALCULATION MANUAL (ODCM) REVIEW

The ODCM was revised twice in 2008. Revision 10 changed the footnote (d) in Table 3.3.

The ODCM Revision 11 was modified to format to the current DPC word processor software being used. No changes were made to the content of the ODCM. Revision 11 to the ODCM is included in its entirety.

10.0 PROCESS CONTROL PROGRAM (PCP) REVIEW

The PCP was not revised in 2008.

LA CROSSE BOILING WATER REACTOR
(LACBWR)

OFFSITE DOSE CALCULATION MANUAL

Prepared by: _____ 10/23/08
Date

Health Physics Review: Al Hansen 10-29-8
Date

Radiation Protection Engineer Review: Seymour J Raffety 11-03-08
Date

Quality Assurance Review: David L. Eq 11/3/08
Date

ORC Approved: _____ 11/4/08
Date

October 2008

Revision 10

Dairyland Power Cooperative
3200 East Avenue South
La Crosse, WI 54602-0817

Footnote (d) to Table 3.3 on page 47 has been deleted. This footnote added to the monthly sampling requirements for H-3 (tritium) as follows "When upper cavity is flooded or FUEL HANDLING is being performed, stack tritium grab samples will be taken at least once per seven (7) days."

This table with the H-3 analysis requirement and a form of footnote (d) was initially made a LACBWR Technical Specification (TS) requirement by LACBWR License Amendment 36, issued October 18, 1984. At that time, the footnote did not contain the words "or Fuel Handling is being performed." These words about fuel handling first appeared in the TS's issued under License Amendment 66, dated August 7, 1991, after the reactor had been permanently shut down and all the fuel removed to the FESW. No explanation or basis for the wording change has been found.

The sampling and analysis for tritium release is based on the assumption that tritium is in the form of heavy water (HTO). HTO molecules are chemically essentially the same as H_2O molecules of water and will be distributed through out the water in the FESW system. Sampling is performed by condensing the water vapor in a measured volume of air being discharged at the stack in a cold trap. The condensate is then analyzed to determine the amount of tritium that was in the volume of air being discharged. Therefore, the rate of tritium release appears to be more a function of the evaporation rate from the FESW system than a function of the fuel handling itself and the timing of the fuel handling in relation to the sampling is not critical.

The purpose of footnote (d) in the original TS (during reactor operation) was probably to ensure and enhance the sampling for tritium when the water surface area of the upper cavity was adding to the evaporation rate as well as the fact that upper cavity flooding implied that the reactor primary system (a significant source of tritium) was open and connected to the upper cavity. After reactor shutdown the addition of the words "or Fuel Handling is being performed" may have had a similar incentive to ensure and enhance the sampling for tritium when the pool covers are removed and work is being performed that may increase the evaporation rate.

Tritium has a half life of 12.32 years, so the total source in the LACBWR facility has decreased significantly since reactor shutdown. This total source is now estimated to be approximately 171 Ci, mostly tied up in the fuel material in the sealed fuel rods and therefore not readily available for release. During reactor operation the reported measured per year release rate for tritium was approximately 125 Ci per year in liquid waste some years plus as much as 42 Ci per year in gaseous discharges up the stack. The releases for the last 5 years have been approximately 0.03 Ci or less in liquid waste and 0.02 to 0.087 Ci per year up the stack. At these low H-3 source levels the accuracy of the sampling and analysis apparently has more effect on test results than the surface area of the water exposed to evaporation or physical activity in the FESW. (The upper cavity no longer exists since the reactor vessel was removed). Therefore, the deletion of footnote (d) appears justified.

The monthly sampling for H-3 will continue.

Prepared or Revised By	Date	Rad. Prot. Engineer Review	Date	Operations Review Comm. Approval	Date
LA...Y L. NELSON	10/23/08	[signature]	11-03-08	[signature]	11/4/08

Table 3.3

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS

Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis [d]
Stack Effluent	Continuous [b]	Weekly [a] Particulate Sample	Principal Gamma Emitters [c]
	Continuous [b]	Quarterly Particulate Sample Composite	Sr-90
	Continuous [b]	Weekly [a] Particulate Sample	Gross Alpha
	Continuous [b]	Noble Gas Monitor	Noble Gases Gross Beta and Gamma
	Monthly	Monthly	H-3

NOTES:

(a) The filter sample shall be changed at least weekly, and filter analyses shall be completed within seven (7) days.

(b) The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation.

(c) The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Mn-54, Co-60, Zn-65, Cs-134, Cs-137, and Ce-144 for particulate emissions. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable and measurable, together with those of the above nuclides, shall also be analyzed and reported in the annual Radioactive Effluent Release Report.

(d) Lower Limits of Detection (LLD) are determined in accordance with plant procedures and are calculated in accordance with criteria of NUREG-0473, Revision 2.