RADIOACTIVE EFFLUENT REPORT
AND ENVIRONMENTAL MONITORING REPORT
OF
THE LA CROSSE BOILING WATER REACTOR
FROM
JANUARY 1, 1982 to JUNE 30, 1982
DAIRYLAND POWER COOPERATIVE
DOCKET NO. 50-409

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SECTION A

RADIOACTIVE EFFLUENT REPORT

Table 1-A

REPORT OF RADIOACTIVE EFFLUENTS — Year 1982

Facility: Dairyland Power Cooperative — La Crosse Boiling Water Reactor — Docket 50-409

I. LIQUID RELEASES	Units	Jan.	Feb.	Mar.	Apr.	May	June
1. Gross Radioactivity (β,γ)							
a) Total Release	Curies	2.47×10^{-1}	8.39×10^{-2}	1.66×10^{-1}	4.72×10^{-1}	1.86	1.10
b) Average Concentration Released	µCi/ml	7.44×10^{-9}	7.59×10^{-9}	1.36×10^{-8}	5.47×10^{-8}	1.74×10^{-7}	5.33×10^{-8}
c) Maximum Concentration Released	µCi/ml	5.54×10^{-6}	1.75×10^{-7}	9.51×10^{-7}	7.05×10^{-7}	1.49×10^{-6}	2.51×10^{-6}
d) Percent of Allowable Limit	%	1.24×10^{-1}	1.30×10^{-1}	3.19×10^{-1}	1.00	1.25	3.54×10^{-1}
2. Tritium							
a) Total Release	Curies	4.36	7.37	1.15×10^{1}	7.27	1.24	2.30
b) Average Concentration Released	µCi/ml	1.31×10^{-7}	6.66×10^{-7}	9.42×10^{-7}	8.42×10^{-7}	1.16×10^{-7}	1.11×10^{-7}
c) Percent of Allowable Limit	%	4.38×10^{-3}	2.22×10^{-2}	3.14×10^{-2}	2.81×10^{-2}	3.88×10^{-3}	3.72×10^{-3}
3. Dissolved Noble Gases							
a) Total Release	Curies	1.68×10^{-3}	3.49×10^{-3}	8.09×10^{-3}	1.17×10^{-2}	1.17×10^{-3}	1.91×10^{-3}
b) Average Concentration Released	µCi/ml	5.06×10^{-11}	3.16×10^{-10}	6.57×10^{-10}	1.36×10^{-9}	1.10×10^{-10}	9.22×10^{-11}
c) Percent of Allowable Limit	%	1.69×10^{-3}	1.00×10^{-2}	2.02×10^{-2}	4.49×10^{-2}	3.66×10^{-3}	3.07×10^{-3}
4. Gross Alpha Radioactivity							
a) Total Release	Curies	6.48×10^{-5}	4.05×10^{-5}	6.00×10^{-5}	1.50×10^{-4}	2.30×10^{-3}	8.55×10^{-4}
b) Average Concentration Released	µCi/ml	1.95×10^{-12}	3.66×10^{-12}	4.91×10^{-12}	1.73×10^{-11}	2.16×10^{-10}	4.03×10^{-11}
5. Average Stream Flow	ft^3/Sec	1.85×10^{4}	1.79×10^{4}	3.57×10^{4}	1.02×10^{5}	7.92×10^{4}	45284
6. Volume of Liquid Waste to Discharge Canal	Liters	1.29×10^{5}	9.91×10^{4}	1.39×10^{5}	3.49×10^{5}	2.89×10^{5}	1.95×10^{5}
7. Volume of Dilution Water	Liters	3.32×10^{10}	1.11×10^{10}	1.22×10^{10}	8.63×10^{9}	1.07×10^{10}	2.07
8. Batch Releases (only type at this facility)							
a) Total Number of Releases		12	8	10	27	21	15
b) Total Release Time	Hours	75.97	52.47	54.35	145.25	108.08	49.7
c) Maximum Release Time	Hours	16.17	10.75	9.13	8.0	10.42	6.33
d) Average Release Time	Hours	6.33	6.57	5.44	5.38	5.15	3.31
e) Minimum Release Time	Hours	0.33	1.25	0.52	2.33	2.33	0.50
9. Isotopic Releases							
Ba/La-140	Curies	3.87×10^{-4}	5.48×10^{-4}	6.40×10^{-4}	3.04×10^{-3}	7.12×10^{-4}	4.53×10^{-5}
Ce-141	Curies	3.36×10^{-2}	4.73×10^{-5}	--	4.44×10^{-3}	1.61×10^{-2}	4.93×10^{-3}
Ce-144	Curies	1.28×10^{-3}	3.94×10^{-4}	3.73×10^{-4}	2.57×10^{-3}	91×10^{-2}	2.01×10^{-2}
Co-57	Curies	1.28×10^{-4}	1.47×10^{-5}	1.17×10^{-4}	1.53×10^{-4}	9.71×10^{-4}	5.82×10^{-4}
Co-58	Curies	7.00×10^{-3}	1.38×10^{-3}	5.22×10^{-4}	2.34×10^{-2}	1.04×10^{-1}	1.21×10^{-1}
Co-60	Curies	8.82×10^{-2}	3.49×10^{-2}	3.70×10^{-2}	1.44×10^{-1}	7.62×10^{-1}	5.10×10^{-1}

NOTE: --Indicates none detected or less than LLD.

Table I-B

I. LIQUID RELEASES (pg 2)

REPORT OF RADIOACTIVE EFFLUENTS — Year 1982

9. Isotopic Releases (Con't)

	Units	Jan.	Feb.	Mar.	Apr.	May	June
Cr-51	Curies	1.94×10^{-3}	1.94×10^{-4}	1.18×10^{-3}	4.95×10^{-3}	3.47×10^{-2}	1.31×10^{-2}
Cs-134	Curies	1.13×10^{-2}	3.40×10^{-3}	1.01×10^{-2}	2.22×10^{-2}	2.51×10^{-2}	1.74×10^{-2}
Cs-137	Curies	1.11×10^{-1}	3.42×10^{-2}	1.04×10^{-1}	2.15×10^{-1}	1.92×10^{-1}	1.31×10^{-1}
Fe-59	Curies	4.57×10^{-4}	1.77×10^{-4}	--	1.05×10^{-2}	1.17×10^{-2}	4.21×10^{-2}
I-131	Curies	3.61×10^{-4}	7.45×10^{-4}	5.78×10^{-4}	5.00×10^{-3}	4.23×10^{-4}	--
I-132	Curies	--	--	--	5.42×10^{-4}	--	--
I-133	Curies	1.33×10^{-4}	8.46×10^{-4}	1.18×10^{-3}	5.34×10^{-4}	6.44×10^{-5}	--
I-135	Curies	--	1.70×10^{-4}	6.34×10^{-4}	--	--	--
Mn-54	Curies	7.70×10^{-3}	3.07×10^{-3}	2.02×10^{-3}	2.38×10^{-2}	2.71×10^{-1}	1.61×10^{-1}
Mo-99	Curies	--	5.64×10^{-4}	9.78×10^{-4}	1.24×10^{-3}	--	--
Nb-95	Curies	4.60×10^{-4}	1.08×10^{-3}	4.44×10^{-3}	1.72×10^{-3}	5.38×10^{-2}	1.99×10^{-2}
Np-239	Curies	9.56×10^{-5}	1.61×10^{-5}	4.52×10^{-6}	3.75×10^{-3}	--	--
Ru-103	Curies	5.19×10^{-4}	8.03×10^{-5}	5.52×10^{-4}	1.20×10^{-3}	2.68×10^{-2}	8.90×10^{-3}
Ru/Rh-105	Curies	9.27×10^{-4}	3.86×10^{-4}	2.88×10^{-4}	2.40×10^{-3}	1.32×10^{-2}	1.26×10^{-3}
Ru/Rh-106	Curies	1.13×10^{-3}	3.81×10^{-4}	--	2.94×10^{-4}	2.45×10^{-2}	1.07×10^{-2}
Sr-89	Curies	1.17×10^{-2}	1.08×10^{-3}	1.29×10^{-3}	2.49×10^{-3}	2.53×10^{-3}	5.78×10^{-4}
Sr-90	Curies	5.15×10^{-5}	4.80×10^{-5}	1.33×10^{-4}	8.04×10^{-5}	6.81×10^{-5}	4.98×10^{-5}
Sr-91	Curies	--	7.62×10^{-5}	2.30×10^{-4}	1.00×10^{-4}	--	--
Sr-92	Curies	2.88×10^{-5}	3.87×10^{-5}	1.02×10^{-4}	7.96×10^{-5}	2.01×10^{-6}	--
Tc-99m	Curies	2.33×10^{-4}	9.15×10^{-4}	1.66×10^{-3}	4.88×10^{-3}	3.42×10^{-4}	--
Xe-131m	Curies	1.53×10^{-4}	3.59×10^{-4}	--	1.24×10^{-3}	--	7.76×10^{-4}
Xe-133	Curies	8.74×10^{-4}	2.59×10^{-4}	6.46×10^{-4}	3.97×10^{-3}	1.36×10^{-4}	5.94×10^{-4}
Xe-133m	Curies	--	--	2.31×10^{-3}	7.43×10^{-5}	4.90×10^{-4}	9.71×10^{-4}
Xe-135	Curies	1.41×10^{-4}	4.87×10^{-4}	1.06×10^{-3}	2.67×10^{-4}	--	--
Zn-65	Curies	1.79×10^{-3}	5.56×10^{-4}	5.03×10^{-4}	3.05×10^{-3}	2.56×10^{-2}	1.81×10^{-2}
Zn-95	Curies	2.81×10^{-4}	5.67×10^{-5}	--	1.42×10^{-3}	3.52×10^{-2}	1.22×10^{-2}
Zr-97	Curies	--	1.63×10^{-6}	1.34×10^{-7}	--	3.90×10^{-6}	5.53×10^{-6}
Kr-85m	Curies	1.89×10^{-5}	2.03×10^{-5}	3.11×10^{-5}	--	5.63×10^{-5}	4.48×10^{-5}
Kr-87	Curies	--	3.53×10^{-5}	--	--	--	--
Nb-97	Curies	--	--	--	--	--	--
Ba-139	Curies	9.56×10^{-5}	2.24×10^{-5}	1.21×10^{-5}	3.51×10^{-5}	--	--
Xe-135m	Curies	--	2.79×10^{-5}	1.92×10^{-4}	--	--	--
Kr-88	Curies	--	6.47×10^{-5}	7.02×10^{-5}	--	--	--
Rb-88	Curies	--	4.77×10^{-4}	1.33×10^{-3}	--	--	--
I-134	Curies	--	--	--	9.98×10^{-5}	--	--
Mn-56	Curies	--	--	--	6.79×10^{-6}	4.18×10^{-6}	--
Ce-143	Curies	--	--	--	2.51×10^{-5}	--	--

NOTE: --Indicates none detected or less than LLD.

Table II-A

Year 1982

II. AIRBORNE RELEASES	Units	Jan.	Feb.	Mar.	Apr.	May	June
1. Total noble gases	Curies	193.70	953.59	432.66	127.41	--	--
2. Total halogens	Curies	8.78×10^{-5}	3.65×10^{-4}	3.79×10^{-4}	3.81×10^{-4}	2.68×10^{-4}	3.01×10^{-5}
3. Total particulate gross radioactivity (β,γ) with <8 day half-life	Curies						
4. Total Tritium	Curies	6.30×10^{-1}	9.35×10^{-1}	1.44	9.93×10^{-1}	2.81×10^{-1}	2.57×10^{-2}
5. Total particulate gross alphs radioactivity	Curies	5.84×10^{-8}	1.05×10^{-7}	1.77×10^{-7}	3.20×10^{-7}	1.11×10^{-6}	7.75×10^{-7}
6. Maximum noble gas release rate	µCi/sec	555.84	2921.2	3739.8	4249.4	--	--
7. Percent of applicable limit for:							
a. Noble Gases	%	.75	1.62	.70	.36	--	--
b. I-131	%	.08	.23	.08	.20	.20	.0098
c. Particulates <8 day half-life (2)							
d. Tritium	%	.0006	.0006	.0008	.0006	.0002	.0001
8. Average Release Rates							
a. Noble Gases	µCi/sec	72.3	394.3	161.5	49.2	--	--
b. I-131	µCi/sec	2.50×10^{-5}	1.17×10^{-4}	4.16×10^{-5}	1.02×10^{-4}	9.24×10^{-5}	3.94×10^{-6}
c. <8 day half-life particulates (2)	µCi/sec						
d. Tritium	µCi/sec	2.35×10^{-1}	3.87×10^{-1}	5.38×10^{-1}	3.83×10^{-1}	1.05×10^{-1}	9.91×10^{-3}
9. Allowable Total Releases							
a. Gases	Curies	2.59×10^{4}	5.90×10^{4}	6.15×10^{4}	3.58×10^{4}	2.53×10^{4}	2.07×10^{4}
b. I-131	Curies	8.02×10^{-2}	1.24×10^{-1}	1.41×10^{-1}	1.32×10^{-1}	1.23×10^{-1}	1.03×10^{-1}
c. Particulates (2)	Curies						
d. Tritium	Curies	1.09×10^{5}	1.65×10^{5}	1.82×10^{5}	1.76×10^{5}	1.68×10^{5}	1.36×10^{5}
10. Actual Releases							
a. Gases							
Kr-85	Curies	--	--	--	4.00×10^{-6}	--	--
Xe-133	Curies	50.81	192.3	76.0	24.5	--	--
Kr-88	Curies	15.4	82.1	38.3	11.3	--	--
Kr-87	Curies	5.98	36.9	17.7	4.89	--	--
Kr-85m	Curies	7.62	40.2	19.0	5.71	--	--
Xe-138	Curies	1.37×10^{-1}	27.0	15.0	9.16×10^{-1}	--	--
Xe-135m	Curies	6.33×10^{-1}	8.74	4.83	6.80×10^{-1}	--	--
Xe-135	Curies	110.4	551.5	254.5	77.5	--	--
Xe-133m	Curies	2.09	9.57	4.76	1.54	--	--
Xe-131m	Curies	6.00×10^{-1}	2.78	1.18	3.56×10^{-1}	--	--
Xe-129m	Curies	--	--	--	--	--	--
Kr-89	Curies	4.83×10^{-3}	--	--	--	--	--
Xe-137	Curies	1.47×10^{-2}	2.15	1.50	3.71×10^{3}	--	--

NOTE: -- Indicates none detected or less than LLD.

Table II-B

Year 1982

II. AIRBORNE RELEASES (Pg. 2)

10. Actual Releases	Units	Jan.	Feb.	Mar.	Apr.	May	June
b. Halogens							
I-131	Curies	6.47×10^{-5}	1.42×10^{-4}	1.15×10^{-4}	2.65×10^{-4}	2.42×10^{-4}	1.01×10^{-5}
I-133	Curies	1.83×10^{-5}	1.61×10^{-4}	1.55×10^{-4}	6.41×10^{-5}	4.17×10^{-6}	9.89×10^{-7}
I-135	Curies	3.04×10^{-6}	5.27×10^{-5}	1.09×10^{-4}	4.11×10^{-5}	2.17×10^{-5}	1.90×10^{-5}
I-132	Curies	--	3.85×10^{-6}	1.33×10^{-6}	5.50×10^{-6}	--	--
I-134	Curies	1.69×10^{-6}	--	--	6.13×10^{-5}	--	--
c. Particulates							
Co-57	Curies	1.50×10^{-7}	7.00×10^{-8}	7.00×10^{-8}	--	2.70×10^{-7}	2.76×10^{-7}
Ce-144	Curies	2.29×10^{-6}	--	1.08×10^{-6}	6.25×10^{-6}	2.41×10^{-6}	1.02×10^{-6}
Ce-141	Curies	4.90×10^{-7}	--	3.10×10^{07}	5.00×10^{-7}	--	2.61×10^{-7}
Ba+La-140	Curies	1.60×10^{-5}	2.32×10^{-4}	6.20×10^{-4}	7.53×10^{-5}	4.92×10^{-6}	2.24×10^{-6}
Cs-134	Curies	1.00×10^{-7}	8.70×10^{-7}	2.60×10^{-7}	1.28×10^{-6}	6.90×10^{-7}	2.90×10^{-7}
Cs-137	Curies	2.53×10^{-6}	3.38×10^{-5}	2.25×10^{-5}	1.88×10^{-5}	1.50×10^{-5}	8.50×10^{-6}
Cr-51	Curies	4.22×10^{-6}	6.18×10^{-6}	4.82×10^{-6}	4.03×10^{-6}	2.75×10^{-6}	2.87×10^{-6}
Mn-54	Curies	2.76×10^{-6}	4.30×10^{-6}	2.07×10^{-6}	3.31×10^{-6}	7.82×10^{-6}	2.95×10^{-6}
Fe-59	Curies	1.01×10^{-6}	--	--	--	1.66×10^{-6}	--
Co-58	Curies	2.66×10^{-6}	--	9.50×10^{-7}	2.95×10^{-6}	1.04×10^{-5}	1.59×10^{-6}
Co-60	Curies	2.24×10^{-5}	3.77×10^{-5}	2.51×10^{-5}	3.18×10^{-5}	1.00×10^{-4}	2.76×10^{-5}
Zn-65	Curies	1.49×10^{-6}	--	2.63×10^{-6}	2.06×10^{-6}	--	--
Zr-95	Curies	2.54×10^{-6}	5.80×10^{-7}	3.50×10^{-7}	6.10×10^{-7}	--	3.38×10^{-7}
Nb-95	Curies	1.66×10^{-6}	7.11×10^{-5}	7.80×10^{-7}	1.15×10^{-6}	2.90×10^{-7}	7.24×10^{-7}
Ru-Rh-106	Curies	5.04×10^{-6}	6.21×10^{-6}	4.40×10^{-6}	1.37×10^{-5}	--	--
Ru-103	Curies	8.20×10^{-7}	5.80×10^{-7}	7.10×10^{-7}	5.60×10^{-7}	9.50×10^{-7}	3.10×10^{-7}
Cs-136	Curies	4.30×10^{-7}	--	--	--	--	--
Sr-89(2)	Curies						
Sr-90(2)	Curies						
Mo-99	Curies	--	--	--	--	--	1.17×10^{-6}

NOTE: --Indicates none detected or less than LLD.
(2) Sr-89 and Sr-90 analyses are still in progress by ion exchange methodology in lieu of gravimetric methodology and will be presented in the 1982 annual report.

Table III

1982 January - June
Radioactive Solid Waste Shipments

Shipment #	Type of Radioactive Material	Volume (m^3)	Activity (Ci)	Mode of Transportation	Destination for Disposal
#1 (06-82-134A)	Dewatered Spent Condensate, Spent FESW, Seal Inject., and Primary Clean-Up Resins In A CNS 8-120 High Integrity Container*	3.39	51.95	Chem Nuclear Sys. Sole Use Truck (USA 6601/B,B-120 Cask).	Barnwell, S.C.

* Radionuclide composition of Shipment #1 radioactive material was composed of Co^{60} = 59.78%, Mn^{54} = 11.11%, Co^{58} = 9.39%, Cs^{137} = 7.07%, Zn^{65} = 2.79%, Fe^{59} = 2.10%, Cs^{134} = 1.90%, Nb^{95} =1.04%, Ce^{144} = 0.91%, $Ru(Rh)^{106}$ = 0.77%, Cr^{51} =0.73%, Zr^{95} =0.65%, Ru^{103} = 0.54%, Ba^{140} =0.44%, La^{140} = 0.35%, Ce^{141} =0.28%, I^{131} = 0.06%, Co^{57} =0.07%, and 1.35 nCi/g Transuranics.

1.4 Supplemental Information to the Annual Effluent and Waste Disposal Report

Facility: La Crosse Boiling Water Reactor (LACBWR)

Licensee: Dairyland Power Cooperative, Docket No. 50-409

1) Regulatory Limits

LACBWR Technical Specifications for airborne effluents are limited to the following "Curie Release Rates", for various plant conditions, based on the MPC of the mixture (in µCi/cc) being discharged:

	Stack Blowers Operating	Maximum Release Rate	Yearly Average Release Rate
Particulates and Halogens with Half-lives Greater than 8 days	1	$2.4 \times 10^3 \times$ MPC	$2.4 \times 10^2 \times$ MPC
	2	$5.1 \times 10^3 \times$ MPC	$5.1 \times 10^2 \times$ MPC
All Other Radioactive Isotopes (Gases)	1	$1.6 \times 10^6 \times$ MPC	$1.6 \times 10^5 \times$ MPC
	2	$3.4 \times 10^6 \times$ MPC	$3.4 \times 10^5 \times$ MPC

The values expressed in Table II, Airborne Releases, Item 9, "Allowable Total Releases", show the allowable yearly average releases based on actual plant conditions, i.e., one or two blower operation whichever had occurred during the month, and any recalibrations which had been performed on the off-gas monitor.

LACBWR Technical Specification limits for liquid effluents are limited to 1 MPC value after dilution averaged over the year. The values reported in Table I, Liquid Releases, Items 1b and c; 2b and c; 3b and c; and 4b are based on dilution with plant site circulating water flow only. No credit is taken for further dilution in the mixing zone of the Mississippi River, shown as Item

5, Average Stream Flow.

2) Maximum Permissible Concentration (MPC)

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

Tritium in Water = 3×10^{-3} µCi/ml.

Tritium in Air = 2×10^{-7} µCi/ml.

3) Average Energy

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

4) Measurement Methods

Liquid effluent measurements for gross radioactivity are performed by gamma analysis on a Ge-Li detector for each tank discharged. A composite sample is created by collecting representative amounts from each tank batch discharged and it is analyzed monthly for Tritium, Strontium 89 and 90, and Gross alpha activity. In addition, each tank is analyzed for alpha concentration and the higher of these two analyses is the basis for the values reported in Table I, Item 4. Airborne gaseous effluents are determined by gamma analysis on a Ge-Li detector of samples from the various flow paths. The analysis includes a determination of gaseous halogen content.

Airborne particulate and particulate halogen releases are determined by gamma analysis on a Ge-Li detector of weekly samples of stack discharges on glass fiber filter paper and charcoal cartridge absorbants.

5) Batch Releases

All airborne effluent releases at LACBWR are Continuous-Elevated Release point type releases.

All liquid effluent releases at LACBWR are Batch Releases and the relevant information is included in Table I, Item 8.

6) Abnormal Releases

No abnormal releases occurred during this reporting period at LACBWR.

7) Estimated Total Error

The values reported in Table I, II, and III contain the following estimated errors:

Counting Error ± 1 Standard Deviation

Sampling Volume Error ± 5%.

SECTION B

ENVIRONMENTAL MONITORING REPORT

2.0 INTRODUCTION

The La Crosse Boiling Water Reactor, also known as Genoa #2, is located on the east bank of the Mississippi River at Genoa, Vernon County, Wisconsin. The plant was designed and constructed by the Allis-Chalmers Manufacturing Company. It was completed in 1967 and has a generation capacity of 50 MW 165 $Mw_{(th)}$. The reactor is owned and operated 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 has been operating between 60% and 100% of full power, with the exception of plant shutdowns for maintenance and repair. During the first half of 1982, the plant factor has been approximately 23%.

The monitoring program at the LACBWR facility includes monitoring of liquid and gaseous releases from the plant as well as environmental samples of surface air, river water, rain water, sediment, milk, fish, vegetation and penetrating radiation. The penetrating radiation is measured by thermoluminescent dosimetry (TLD).

The program is conducted to the extent necessary to ensure that releases of radioactivity to the environment do not result in radiation doses to the surrounding population, which exceed established radiation protection regulations.

This monitoring report includes the period from January 1, 1982 to July 1, 1982. The report includes a description of the environmental samples collected, analytical methods and the results from these analyses.

A map of the general vicinity surrounding LACBWR is provided for the reader so that he may determine the spatial relationship of the plant to the surrounding area. The map includes the plant boundary, roads, other generating plants, relation of the plant site to the nearest local community as shown in Figure 1.

Figure 2 is a map that pinpoints the location of the environmental sampling stations for surface air, rain water, milk, vegetation and TLD's. This map will allow the reader to determine the spatial relationship of the plant to the surrounding sampling stations.

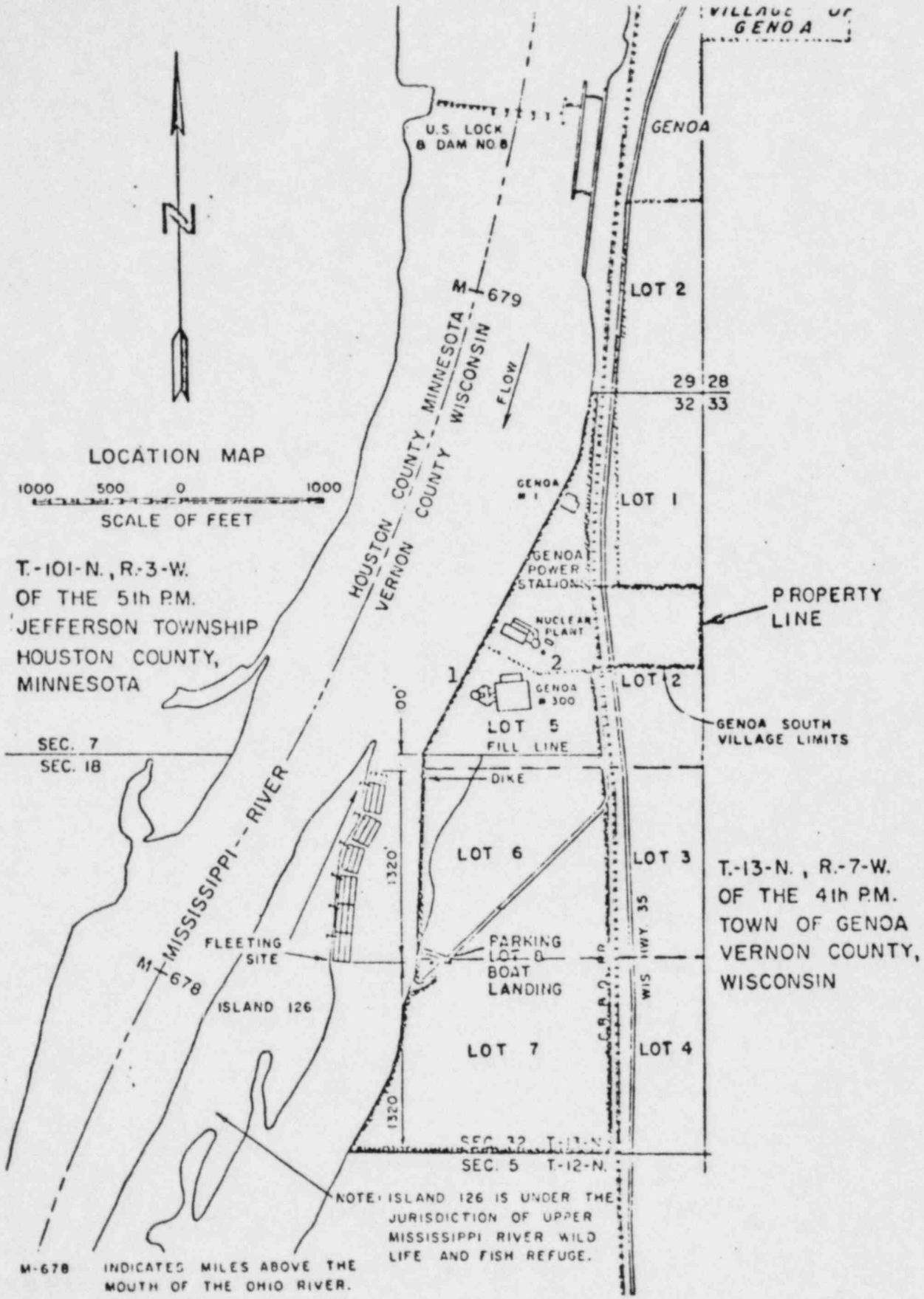

FIGURE 1 - LACBWR PROPERTY MAP

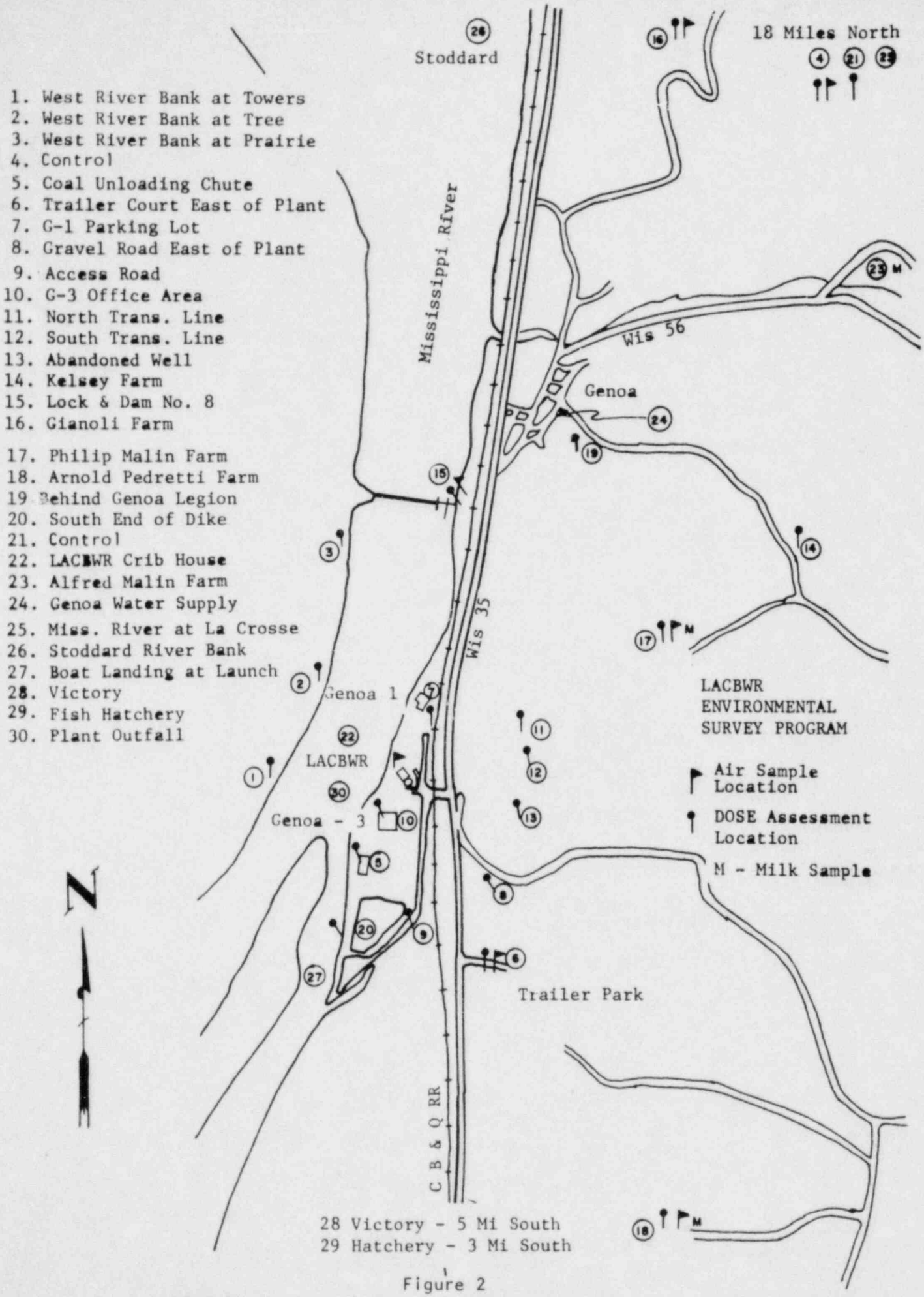

Figure 2
LACBWR Environmental Survey and Dose Assessment Locations

3.0 SAMPLE COLLECTION

The sampling frequency of the various environmental samples and the analyses performed on these samples are shown in TableIV. The number of various samples collected and analyzed during 1982 appear in Table V.

The penetrating radiation dose is measured by thermoluminescent dosimeters consisting of five lithium fluoride (LiF) chips. The TLD's are located in the vicinity of the plant on poles, trees or adjacent to air samplers. The TLD's are collected, shipped and then analyzed by the Eberline Instrument Company.

Air samples are collected continuously at seven sites, six of which are within three miles of the plant and the seventh used as a control, located eighteen miles north of the plant in La Crosse, Wisconsin. Particulate air samples are collected at the rate of approximately 30 lpm with Gelman Air Samplers. The air filter consists of a glass fiber filter with an associated pore size of approximately 0.45 μ an activated charcoal CESCO type cartridge for iodine collection. The particulate filters are analyzed for gross beta activity with a low background internal proportional counter and the activated charcoal filter for ^{131}I.

River and rain water samples are collected monthly. River water samples above and below the plant site are collected and gross beta activity determined on a one-liter sample.

A four-liter milk sample is collected from three farmers in the vicinity of the plant on a biweekly basis during the

grazing season. The milk samples are then analyzed for ^{131}I and ^{90}Sr, with a minimum sensitivity of 1 pCi/liter.

Fish samples are purchased on a monthly basis from commercial fishermen. The fish are from Pool #8 above the plant, and Pool #9 below the plant. These samples are analyzed by Ge(Li)-MCA gamma spectroscopy.

4.0 RESULTS OF THE JANUARY - JUNE 1982 RADIO-ENVIRONMENTAL MONITORING SURVEY

4.1 PENETRATING RADIATION

The thermoluminescent dosimeters are changed on a quarterly basis and analyzed for dose by the Eberline Instrument Corporation. The results of the analysis are shown on Table VI. The highest measured on-site dose from LACBWR operations was to the adjacent coal-fired power plant, Genoa #3, (Environmental Station #10). This dose was approximately 22.6 mRem/1st quarter and 22.8 mRem/2nd quarter. The average dose per quarter attributable to LACBWR operations at all off-site environmental stations during the year was <1 mRem/quarter. The maximum off-site dose at any location was 4 mRem/quarter and occurred at Station 11 (1st quarter).

4.2 AIR PARTICULATE

The gross beta-gamma activity concentrations from air particulate filters are shown in Table VII. The air particulate beta activity concentrations ranged from less than 0.14 pCi/m^3 to 0.175 pCi/m^3. The annual average concentration at the control location was 0.062 pCi/m^3 while for the other six stations, the annual average concentration was 0.044 pCi/m^3.

4.3 PRECIPITATION AND RIVER SAMPLES

The results of the gross beta activity measurements for river water and precipitation are shown in Tables VIII and IX, respectively. The river water samples taken above and below the plant generally exhibit similar patterns in activity over the year. Downstream samples were three times the upstream concentrations during May 1982. The highest measured concentrations of 17.96 pCi/l occurred in May at Victory on the Mississippi River.

The gross beta concentrations in precipitation samples taken during January to June 1982 ranged from <1 to 55.3 pCi/l (Lock and Dam #8).

4.4 SEDIMENT SAMPLES

Sediment samples ranged from 6.4 to 12.2 pCi/g with ^{60}Co being detected in addition to ^{40}K.

4.5 MILK SAMPLES

Milk samples were collected on a biweekly basis during the grazing season (May through September) from three dairy farms in the vicinity of LACBWR and analyzed for ^{131}I with a detection limit of 1 pCi/l. These samples are listed in Table XI.

4.6 ACTIVATED CHARCOAL CARTRIDGES

The analysis of the activated charcoal cartridges for ^{131}I

was performed by counting each cartridge collected during a 1-week period and averaging the measured concentrations. Weekly average ^{131}I concentrations for the seven measurement locations are shown in Table XII. Average concentrations are 1.87×10^{-15} µCi/cc.

4.7 VEGETATION

No vegetation samples were collected during the period January 1 to June 30, 1982.

4.8 FISH

Fish samples were collected monthly above and below the plant discharge. The results of gamma spectral analysis of fish samples appear in Table XIV. There has been no significant accumulation of radionuclides of plant origin in fish in the plant vicinity.

5.0 CONCLUSIONS

The maximum off-site dose as determined by TLD was 4 mrem/quarter. The average off-site dose as determined by TLD was less than 1 mrem/quarter. The dose to the general populations during 1982 was well within current regulations.

The concentration of radioisotopes found in the environmental samples collected during 1982 was found to be well within current regulations.

TABLE IV

SAMPLE FREQUENCY AND ANALYSIS OF RADIO-ENVIRONMENTAL SAMPLES

SAMPLE	FREQUENCY	ANALYSIS PERFORMED
TLD (LiF) Dosimeters	Quarterly	Dose in mrem
Particulate Air Glass Fiber Filters	Weekly	Gross Beta
Activated Charcoal Cartridges	Weekly	Gamma Spectroscopy (HPGe-MCA)
Water (River and Rain)	Monthly	Gross Beta
Milk	Biweekly during grazing season	^{131}I and ^{90}Sr
Vegetation	Twice per year	Gamma Spectroscopy
Sediment	Twice per year	Gamma Spectroscopy
Fish	Monthly	Gamma Spectroscopy

TABLE V

RADIO-ENVIRONMENTAL SAMPLES COLLECTED

JANUARY- JUNE 1982

TYPE OF SAMPLE	NUMBER OF SAMPLES
Penetrating Radiation (TLD's)	76
Air Particulate	182
River Water	0
Precipitation	1
Sediment	1
Vegetation	0
Milk	19
Charcoal Cartridge	175
Fish	8
Effluent Split W/ST. of WI.	5

TABLE VI

QUARTERLY THERMOLUMINESCENT DOSIMETER DOSE
MEASUREMENTS IN THE LACBWR VICINITY

JANUARY - JUNE 1982

STATION NO.	1st QUARTER (mrem)	2nd QUARTER (mrem)	3rd QUARTER (mrem)	4th QUARTER (mrem)
Control 4	23.6 ± 6.3	16.9 ± 2.8		
Control 21	28.8 ± 4.1	21.4 ± 4.7		
1	23.6 ± 4.7	18.2 ± 2.3		
2	26.1 ± 6.5	20.5 ± 5.5		
3	24.2 ± 9.7	18.5 ± 4.9		
5	22.4 ± 5.5	17.1 ± 1.7		
6	24.2 ± 5.0	17.7 ± 1.8		
7	27.1 ± 4.3	27.2 ± 7.6		
8	25.4 ± 9.1	23.1 ± 2.4		
9	25.2 ± 2.6	22.8 ± 4.4		
10	48.8 ± 10.6	41.9 ± 8.1		
11	29.3 ± 7.4	20.5 ± 1.4		
12	26.5 ± 4.7	20.9 ± 2.1		
13	24.7 ± 4.5	21.4 ± 1.5		
14	*	22.8 ± 3.8		
15	21.7 ± 5.0	16.8 ± 2.0		
16	*	20.9 ± 4.2		
17	20.4 ± 5.6	18.3 ± 1.9		
18	25.3 ± 5.5	20.2 ± 5.2		
19	25.4 ± 6.8	23.1 ± 4.1		
20	25.6 ± 6.3	22.9 ± 2.1		

*Missing Data

TABLE VII

WEEKLY BETA AIR PARTICULATES IN THE LACBWR VICINITY

COLLECTION DATE 1982	STATION #4 (LACBWR PLANT) pCi/M^3	STATION #6 (TRAILER COURT) pCi/M^3	STATION #7 (DAM #8) pCi/M^3	STATION #16 (GIANOLI FARM) pCi/M^3	STATION #17 (MALIN FARM) pCi/M^3	STATION #18 (PEDRETTI FARM) pCi/M^3	CONTROL (LA CROSSE OFFICE) pCi/M^3
1/05/82	0.071 ± .026	0.051 ± .011	0.060 ± .011	0.076 ± 0.14	0.021 ± .021	0.068 ± .012	0.039 ± .012
1/12/82	0.101 ± .022	0.008 ± .008	0.057 ± .009	0.084 ± .012	No Sample	0.083 ± .010	0.085 ± .012
1/19/82	0.052 ± .019	0.021 ± .008	0.029 ± .008	0.064 ± .012	0.022 ± .010	0.046 ± .009	0.057 ± .011
1/27/82	0.102 ± .018	0.060 ± .008	0.041 ± .007	0.067 ± .010	0.049 ± .013	0.049 ± .008	0.088 ± .014
2/02/82	0.070 ± .022	0.040 ± .010	0.045 ± .010	0.072 ± .013	0.047 ± .023	0.019 ± .009	0.050 ± .011
2/09/82	0.072 ± .018	0.015 ± .008	0.031 ± .008	0.075 ± .012	0.055 ± .020	0.052 ± .008	0.050 ± .009
2/16/82	0.085 ± .018	0.056 ± .009	0.054 ± .008	0.083 ± .011	0.054 ± .017	0.052 ± .008	0.090 ± .010
2/23/82	0.041 ± .017	0.020 ± .008	0.041 ± .008	0.050 ± .011	0.053 ± .019	0.058 ± .009	0.057 ± .008
3/02/82	0.055 ± .019	0.028 ± .009	0.062 ± .011	0.023 ± .010	0.037 ± .019	0.045 ± .009	0.037 ± .008
3/09/82	0.074 ± .019	0.039 ± .008	0.057 ± .008	0.082 ± .012	0.037 ± .018	0.044 ± .008	0.074 ± .011
3/16/82	0.026 ± .019	0.043 ± .009	0.038 ± .009	0.029 ± .011	0.064 ± .024	0.028 ± .008	0.041 ± .009
3/23/82	0.037 ± .014	0.016 ± .007	0.030 ± .007	0.017 ± .007	0.022 ± .014	0.016 ± .006	0.031 ± .007
3/30/82	0.056 ± .015	0.018 ± .006	0.039 ± .006	0.051 ± .011	0.035 ± .015	0.043 ± .007	0.051 ± .008
4/06/82	0.076 ± .020	0.026 ± .009	0.050 ± .010	0.045 ± .011	0.037 ± .019	0.030 ± .008	0.057 ± .012
4/14/82	0.068 ± .018	0.031 ± .006	0.049 ± .008	0.067 ± .008	0.047 ± .013	0.066 ± .007	0.047 ± .008
4/21/82	0.044 ± .019	0.024 ± .009	0.051 ± .009	0.030 ± .010	0.020 ± .018	0.032 ± .009	0.038 ± .010
4/28/82	0.032 ± .018	0.033 ± .009	0.045 ± .009	0.059 ± .011	0.058 ± .018	0.052 ± .009	0.073 ± .011
5/05/82	0.057 ± .022	0.025 ± .010	0.034 ± .009	0.048 ± .012	0.045 ± .021	0.038 ± .009	0.024 ± .011
5/12/82	0.047 ± .021	0.023 ± .009	0.044 ± .009	0.052 ± .011	0.047 ± .019	0.045 ± .009	0.039 ± .010
5/19/82	0.038 ± .019	0.023 ± .012	0.044 ± .009	0.043 ± .011	0.030 ± .016	0.042 ± .009	0.098 ± .023
5/26/82	0.027 ± .018	0.023 ± .009	0.058 ± .009	0.034 ± .011	0.023 ± .014	0.014 ± .008	0.063 ± .017
6/02/82	0.031 ± .019	0.025 ± .011	0.040 ± .009	0.032 ± .010	0.025 ± .020	0.033 ± .012	0.053 ± .026
6/09/82	0.021 ± .019	<.0089	0.025 ± .011	0.064 ± .010	0.021 ± .019	0.023 ± .020	0.121 ± .044
6/16/82	0.043 ± .021	0.026 ± .012	0.033 ± .012	0.025 ± .011	0.043 ± .021	0.032 ± .012	0.175 ± .061
6/23/82	0.027 ± .019	0.027 ± .012	0.039 ± .011	0.033 ± .010	0.050 ± .019	0.053 ± .012	0.032 ± .011
6/30/82	0.024 ± .018	0.031 ± .013	0.039 ± .011	0.037 ± .010	0.040 ± .019	0.038 ± .012	0.044 ± .012

TABLE VIII

RESULTS OF ANALYSIS OF RIVER WATER

IN THE LACBWR VICINITY (pCi/1)

COLLECTION DATE	ABOVE THE PLANT SITE DAM #8	BELOW THE PLANT SITE BOAT LAUNCH	VICTORY
01/27/82	8.19 ± 2.09	8.79 ± 2.10	5.66 ± 2.05
02/23/82	11.1 ± 2.77	12.3 ± 3.07	5.14 ± 1.71
03/23/82	5.18 ± 2.05	8.82 ± 2.25	6.57 ± 2.17
04/21/82	6.77 ± 1.64	10.06 ± 1.67	6.10 ± 1.91
05/19/82	<5.63	5.15 ± 2.03	17.96 ± 2.62
06/23/82	8.34 ± 1.80	10.78 ± 2.61	6.92 ± 2.62

TABLE IX

RESULTS OF ANALYSIS OF PRECIPITATION

FROM THE VICINITY OF LACBWR (pCi/l)

COLLECTION DATE	STATION #15 (DAM #8)	STATION #17 (MALIN FARM)	STATION #18 (PEDRETTI FARM)
01/27/82	55.3 ± 2.38	10.86 ± 1.39	7.30 ± 1.35
02/23/82	33.2 ± 2.26	No Sample*	No Sample*
03/23/82	36.1 ± 2.23	19.5 ± 2.14	13.9 ± 2.12
04/21/82	4.23 ± 1.25	7.29 ± 1.32	<1.35±
05/19/82	3.87 ± 1.18	5.69 ± 1.26	2.97 ± 1.19
06/23/82	4.92 ± 1.38	19.79 ± 2.23	6.25 ± 1.25

* Precipitation volume not significant.

TABLE X

RESULTS OF ANALYSIS OF MISSISSIPPI RIVER SEDIMENT

IN THE VICINITY OF LACBWR (pCi/g)

COLLECTION DATE SAMPLE LOCATION	Sample 1 04/02/82 Lock & Dam #8	Sample 2 04/02/82 Boat Launch Area	Sample 3 04/02/82 Outfall
ISOTOPE			
^{60}Co	--	2.14×10^{-1}	5.98
^{137}Cs	1.51×10^{-2}	2.54×10^{-1}	4.50×10^{-1}
^{40}K	6.35	9.63	5.71
^{134}Cs	--	8.28×10^{-3}	2.76×10^{-1}
^{54}Mn	--	--	2.11×10^{-1}
^{58}Co	--	--	4.78×10^{-2}

TABLE XI

RESULTS OF ANALYSIS OF MILK SAMPLES IN THE

VICINITY OF LACBWR (pCi/l)

Collection Date	Station #16 (A. Malin Farm)		Station #17 (P. Malin Farm)		Station #18 (Pedretti Farm)	
	^{131}I	^{90}Sr	^{131}I	^{90}Sr	^{131}I	^{90}Sr
04/06/82	<1.0		<1.0		<1.0	
04/20/82	<1.0		<1.0		<1.0	
05/04/82	<1.0		<1.0		--	
05/19/82	<1.0		<1.0		<1.0	
06/02/82	--		<1.0		<1.0	
06/16/82	<1.0		<1.0		<1.0	
06/23/82	<1.0		<1.0		<1.0	

NOTE: -- Indicates No Sample

The results for Sr^{90} are unavailable at this time. These results will be reported in the annual report.

TABLE XII

RESULTS OF COMPOSITE CHARCOAL FILTER ANALYSIS FOR AIRBORNE ^{131}I

COLLECTION DATE	^{131}I AVERAGE CONCENTRATION (μCi/cc)
01/05/82	1.89 E-15
01/12/82	2.32 E-15
01/19/82	1.95 E-15
01/27/82	4.76 E-15
02/02/82	3.16 E-15
02/09/82	3.76 E-15
02/16/82	6.78 E-16
02/23/82	7.60 E-16
03/02/82	1.51 E-15
03/09/82	1.03 E-15
03/16/82	1.21 E-15
03/23/82	1.33 E-15
03/30/82	1.25 E-15
04/06/82	1.89 E-15
04/14/82	3.06 E-15
04/21/82	3.03 E-15
04/28/82	6.01 E-16
05/05/82	9.37 E-16
05/12/82	1.23 E-15
05/19/82	2.30 E-15
05/26/82	1.50 E-15
06/02/82	1.49 E-15
06/09/82	1.90 E-15
06/16/82	5.81 E-16
06/23/82	2.31 E-15
06/30/82	2.26 E-15

TABLE XIII

ISOTOPIC ANALYSIS OF VEGETATION SAMPLES

(pCi/g)

There were no samples collected during January to June for 1982.

TABLE XIV

FISH SAMPLE ACTIVITY IN THE VICINITY OF LACBWR

(pCi/g)

SAMPLE NO.	1	2	3	4	5	6
DATE COLLECTED	02/01/82	01/31/82	02/20/82	02/20/82	03/08/82	03/08/82
Isotope						
^{57}Co	6.85 E-3	*	3.85 E-3	1.31 E-3	1.80 E-3	1.76 E-3
^{58}Co	8.10 E-3	*	*	*	*	*
^{60}Co	9.31 E-2	5.44 E-2	5.05 E-2	6.30 E-2	*	*
^{134}Cs	7.97 E-2	4.15 E-3	*	8.27 E-3	*	*
^{137}Cs	3.13 E-2	6.09 E-3	1.83 E-2	*	4.98 E-2	1.97 E-2
^{131}I	1.62 E-2	1.23 E-2	7.09 E-3	*	*	8.71 E-3
^{141}Ce	9.54 E-3	*	1.65 E-2	6.49 E-3	*	*
^{144}Ce	3.40 E-2	*	3.18 E-2	*	*	4.83 E-2
^{51}Cr	*	*	*	*	8.67 E-2	*
^{65}Zn	1.50 E-2	2.51 E-2	*	9.98 E-3	*	*

SAMPLE NO.	7	8	9	10	11	12
DATE COLLECTED	04/27/82	04/27/82				
Isotope						
^{54}Mn	2.23 E-1	6.80 E-2				
^{59}Fe	6.54 E-2	*				
^{58}Co	2.28 E-1	7.85 E-2				
^{60}Co	1.53	4.07 E-1				
^{137}Cs	9.24E-2	1.54 E-2				
^{141}Ce	2.00 E-2	1.82 E-2				
^{40}K	2.47	2.02				
^{57}Co	*	4.27 E-3				
^{144}Ce	*	8.28 E-2				

* Indicates none detected.