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STATE OF WISCONSIN

1985

La Crosse Boiling Water Reactor

Environmental Radioactivity Survey

NRC 30-83-647

Wisconsin Department of Health and Social Services
Division of Health
Bureau of Environmental Health
Section of Radiation Protection
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LA CROSSE BOILING WATER REACTOR

ENVIRONMENTAL RADIOACTIVITY SURVEY

INTRODUCTION

This report is prepared under U.S. Nuclear Regulatory Commission Contract NRC 30-83-647 by the State of Wisconsin, Department of Health and Social Services, Section of Radiation Protection. This report covers the calendar year 1985. Results of environmental radioactivity monitoring are listed in tabular form. The data presented consists of duplicative sample analysis such as air and TLD data and split sample analysis conducted by the state radiation protection laboratory or subcontractor and the licensee. A brief description of sample collection techniques and analytical procedures conducted by the state laboratory is also given. A sample collection summary for 1985 is included in Table 3. The sample summary includes type and number of samples collected as well as the range of reported activities for each type of sample analysis.

SAMPLING TECHNIQUES

Direct Radiation - Thermoluminescent Dosimeters (TLD's)

Continuous monitoring of direct radiation is performed quarterly using thermoluminescent dosimeters. The dosimeters are placed at 29 locations in the area of the La Crosse Boiling Water Reactor (LACBWR) nuclear power plant.

Air Samples

Continuous air samples are collected weekly from two stations. Air particulate samples are collected on 47 mm. glass fiber filters. Air iodine samples are collected using charcoal absorbers mounted downstream of the air particulate filters. The nominal sampling rate is 1 - 2.5 cubic feet of air per minute.

Surface Water

A split sample is collected monthly at a point close to the discharge of the LACBWR effluent channel, 0.1 mile W. This sample is a grab sample and is collected while the plant is discharging wastewater to the channel. A background surface water sample is also collected monthly from Lock and Dam #8, 0.7 mile N.

Milk

A raw, split milk sample is collected monthly from one of three local farms located in the Genoa, Wisconsin area.

Sediment

Sediment is collected from three locations in the Mississippi River channel on a semi-annual basis.

Fish

Game and scavenger fish are collected periodically from locations in the Mississippi River near the LACBWR nuclear power plant.

Food Products

A blended sample of mixed vegetables was collected from a local garden.

ANALYTICAL PROCEDURES

The procedures given are abstracted to present only the basic steps. The analysis of the samples has been subcontracted to the State Laboratory of Hygiene. A detailed description of the procedures used is available from the State Laboratory of Hygiene.

Air Particulate Samples - Beta Gamma

Place the 47 mm. glass fiber filter on a 2-inch stainless steel planchet. Beta count in an external gas flow proportional counter. Calculate activity correcting for counter efficiency.

Air Particulate Samples - Gamma

The monthly composite of air particulate filters is placed on a Ge(Li) detector and the gamma spectrum is collected. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Surface Water - Alpha, Beta Gamma

Filter a 500 ml. aliquot of sample. Evaporate filtrate in a 2-inch stainless steel planchet. Place filter paper in a 2-inch stainless steel planchet and dry at 103 degrees Celsius. Beta and alpha count the soluble and insoluble portions in an external gas flow proportional counter. Calculate activity correcting for counter efficiency and self-absorption.

Surface Water - Gamma Isotopic

A 3.5 liter sample is placed in a Marinelli beaker and analyzed on a GeLi detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Vegetation or Food Product - Alpha, Beta and Gamma Isotopic

Dry sample at 110 degrees Celsius, grind, weigh into stainless steel planchet. Beta and alpha count in an external gas flow proportional counter. Calculate activity correcting for self-absorption and counter efficiency.

The food product sample is finely chopped. The sample is packed to the 500 ml mark of a 500 ml Marinelli beaker, weighed and counted for 900 minutes on a Ge(Li) detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Soil or Sediment -Alpha, Beta and Gamma Isotopic

Dry sample at 110 degrees Celsius, grind and weigh into a stainless steel planchet. Beta and alpha count in an external gas flow proportional counter. Calculate activity correcting for self-absorption and counter efficiency.

The dried soil is added to a 500 ml Marinelli beaker, weighed and counted for 100 minutes on a Ge(Li) detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Milk - Gamma Isotopic

Procedure same as for Surface Water.

Milk - Iodine 131 Chemical Extraction

A stable iodine carrier is added to a 2 liter sample of raw milk. The sample is passed through an anion exchange column and the iodine is removed from the resin by batch/extraction using NaOCl. After reduction to elemental iodine by hydroxylamine hydrochloride, the iodine is extracted into carbon tetrachloride reduced with bisulfite, and back extracted into water. The iodine is precipitated as palladous iodide with the chemical yield determined gravimetrically and counted in an external gas flow proportional counter correcting for counter efficiency and for decay.

Fish - Gamma Isotopic

An edible portion is placed in a 500 ml. Marinelli beaker. Place the sample on a GeLi detector and collect the gamma spectrum. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Direct Radiation

Thermoluminescent dosimeters are supplied by the U.S. Nuclear Regulatory Commission. The exposed TLD's are shipped to NRC Region I and are read by the Commission.

QUALITY ASSURANCE

The analysis of the samples is performed under subcontract with the State Laboratory of Hygiene (SLH). SLH maintains its own quality assurance program which was also reviewed by the NRC in January, 1985.

Analytical procedures provide for routine replicate analyses to verify methods and instrument operation. Traceable sources are used to regularly calibrate the counters and daily performance checks are made between calibrations. In addition, quality control charts are maintained on the counters.

SLH participates in the EPA Cross Check program. The quality assurance progam that the SLH participates in include analysis of blind samples, air filters, food, milk, gamma in water, alpha-beta in water, iodine in water, strontium in water and tritium in water. The EPA Cross Check code for SLH is "AF". A complete listing of the EPA Cross Check results for 1984 and 1985 is included in Table 6.

SENSITIVITIES AND ERROR - WISCONSIN

Following the recommendations of the Health Physics Society, detection limits will be expressed as a minimum detectable concentration (MDC). The minimum detectable concentration or MDC is an "a priori" estimate of the capability for detecting an activity concentration by a given measurement system, procedure, and type of sample. The MDC should not be viewed as an absolute activity concentration that can or cannot be detected. Minimum detectable concentrations (MDC) are based on the analysis performed and for gamma isotopic analysis nave been calculated for a zero decay time. A listing of the Wisconsin MDC values is included in Table 4.

The Wisconsin definition for minimum detectable concentration follows closely the equation for the lower limits of detection as defined in the NRC contract NRC-30-83-647. Activities defined by the equation for MDC will be used in this report.

The MDC for each radioisotope has been calculated from the following equation:

$$MDC = \frac{4.66\ s_b}{E * V * 2.22 * Y * S * \exp(-dt)}$$

Where:

MDC is the "a priori" lower limit of detection as defined above, as picocuries per unit mass or volume,

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

S is the self-absorption correction factor,

d is the radioactive decay constant for the particular radionuclide, and

t for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting.

Guidelines adopted by the U.S. Environmental Protection Agency are used in the reporting of specific analyses. Results from specific analyses will be reported whether the results are negative, zero, or positive. Caution should be exercised in the interpretation of individual negative values. While a negative activity value does not have physical significance, it is significant when taken together with other observations which indicate that the true value of a distribution is near zero. This procedure will allow all of the data to be reported and will allow a statistical evaluation without an arbitrary cutoff of small or negative numbers. An estimation of bias in the nuclide analyses is then possible as well as a better evaluation of distributions and trends in the environmental data. It is important when reviewing the data in the following tables to compare the reported result to the actual minimum detectable concentration (MDC) for that analysis.

Results for specific analyses will be reported as an activity followed by an error term for that analysis. The error term is a plus or minus counting error term at the 2 sigma (95%) confidence interval and is printed as (+/-).

SENSITIVITIES - LACBWR

Lower limits of detection (LLD) or minimum detectable activity (MDA) as reported by LACBWR are defined in their manual LACBWR, HEALTH & SAFETY DEPARTMENT PROCEDURE, LACBWR ENVIRONMENTAL MONITORING PROGRAM. The method for calculating the LLD and a representative table of LLD's for LACBWR is included in this report. In most cases, reported activities for LACBWR are less than the required Nuclear Regulatory Commission LLD's.

CONCLUSIONS

A sample collection summary for 1985 is included in Table 4. The sample summary includes the type and number of samples collected as well as the range of reported activities for each type of sample analysis. Disagreements in the comparison of Wisconsin and LACBWR reported results from the environmental split sample monitoring program are listed in Table 5. Results from the individual sample analyses are listed in Tables 7-23.

Air Particulate

Wisconsin and LACBWR maintain separate air sampling stations. The indicator site for both Wisconsin and LACBWR is located at Lock & Dam #8, 0.7 miles N. The control site for Wisconsin is located at the state office building in La Crosse, 16 miles N and for LACBWR at the Dairyland Power office in La Crosse. Results from the individual sample analyses are listed in Tables 7-10.

The yearly averages, from a log-normal distribution, for the gross beta analysis on the air particulate filters, are given in Table 1.

Table 1. Comparison of the yearly average for gross beta activity from air particulate filters for 1985.

WI - Section of Radiation Protection		LACBWR	
units of pCi/M^3			
Indicator	Control	Indicator	Control
0.016 ± 0.002	0.012 ± 0.002	0.017 ± 0.002	0.017 ± 0.002

The Wisconsin and LACBWR yearly averages for gross beta activity from the air particulate filters are comparable and showed no significant differences between their respective indicator and control sites.

A summary of reported gamma isotopic activities for Wisconsin and LACBWR from the monthly air particulate filter composites is included in Table 4. Results from the individual sample analyses are listed in Tables 11 - 14. The only radioisotope detected in the Wisconsin gamma isotopic analysis above its respective MDC was beryllium-7 (Be-7). Beryllium-7 (Be-7) is a naturally occurring radioisotope that is constantly produced through nuclear reactions between cosmic rays and nuclei in the atmosphere. Beryllium-7 (Be-7) was detected in composites from both the indicator and control sites.

LACBWR does not report naturally occurring radioisotopes and no comparison can be made for the beryllium-7 (Be-7) reported by Wisconsin. All of the reported radioisotopes for LACBWR were at trace activity levels and all were less than the respective Wisconsin MDC's.

At the observed lower levels of activity, the Wisconsin and LACBWR data compared favorably in the gross beta and gamma isotopic analysis on the air particulate samples. Influence by the LACBWR nuclear facility on air quality is not evident when comparing the data from the indicator and control sites.

Air Iodine

All reported air iodine measurements, for both Wisconsin and LACBWR, were below the required NRC LLD of 0.07 pCi/M^3 for both the indicator and the control sites.

Surface Water

The surface water samples are split samples taken as a grab sample on a monthly basis. The discharge channel is taken as the indicator site and Lock and Dam #8 is taken as the control site.

A summary of reported activities by Wisconsin and LACBWR from the monthly surface water samples is included in Table 4. Disagreements in the reported Wisconsin and LACBWR results are listed in Table 5. Results from the individual sample analyses are listed in Tables 15-18.

The Wisconsin and LACBWR reported activities from the monthly surface water samples taken at the control station, Lock & Dam #8, are all at background levels. All reported activities by Wisconsin for gamma isotopic and tritium were less than the respective Wisconsin minimum detectable concentration (MDC). All reported gamma isotopic activities by LACBWR are less than the respective Wisconsin MDC.

Analysis of the surface water samples taken from the indicator site, discharge channel, by Wisconsin and LACBWR detected small activities of manganese-54 (Mn-54), cobalt-60 (Co-60), cesium-137 (Cs-137), ruthenium-103 (Ru-103) and tritium (H-3). Reported activities above MDC or LLD levels by Wisconsin and LACBWR were comparable except for the disagreements listed in Table 5. All detected activities above MDC or LLD levels were less than the corresponding Nuclear Regulatory Commission reporting levels for radioactivity concentrations in environmental samples.

All activities reported by either Wisconsin or LACBWR are below the standards for uncontrolled areas as specified in ICRP Report No.2 or 10 CFR 20.

Disagreements in the Wisconsin and LACBWR reported results for activities above MDC or LLD levels are listed in Table 5. The disagreement in the reported Co-60 activity for the discharge sample collected 01/15/85 is small. A review of the Wisconsin and LACBWR sample analysis reports did not show any problems in the sample analysis by either Wisconsin or LACBWR. The Wisconsin and LACBWR sample analysis reports were reviewed for the disagreement in the gross beta activity from the discharge sample collected 06/12/85.

Gross beta activities are compared by adding the two individual gross beta activities from the soluble and insoluble portions for Wisconsin and comparing that sum with the LACBWR reported gross beta activity. For Wisconsin the higher gross beta activity was in the insoluble portion. The lower reported result by LACBWR for gross beta activity could be due to improper mixing in the sample preparation of the surface water sample.

Tritium (H-3) is the major source of disagreements between reported activities by Wisconsin and LACBWR. In all cases the reported activity for Wisconsin was less than the Wisconsin MDC for tritium. Disagreements exist in both the control and indicator sites. A review of the Wisconsin quality assurance program involving the EPA Cross Check Program did not detect any problems by Wisconsin in its tritium analyses. It should be noted that except for one case the differences in the reported activities for tritium by Wisconsin and LACBWR were less than the required NRC LLD of 3000 pCi/liter.

Fish

Both LACBWR and Wisconsin analyze the same samples with LACBWR first performing its analysis and then Wisconsin.

A summary of reported activities by Wisconsin and LACBWR from fish samples is included in Table 4. Disagreements in the reported Wisconsin and LACBWR results are listed in Table 5. Results from the individual sample analyses are listed in Tables 19-20.

The reported Wisconsin activities for potassium-40 (K-40) can not be compared since LACBWR does not report naturally occurring radioisotopes. The disagreement listed in Table 5 for the Co-60 activity in the 03/26/85 walleye sample is small and a review of the Wisconsin and LACBWR sample analysis reports did not detect any problems in the sample analysis by either Wisconsin or LACBWR.

At the low level of reported activities the Wisconsin and LACBWR data compare favorably.

Bottom Sediments

Both Wisconsin and LACBWR analyze the same samples with LACBWR first performing its analysis and then Wisconsin.

A summary of reported activities by Wisconsin and LACBWR from bottom sediment samples is included in Table 4. Disagreements in the reported Wisconsin and LACBWR results are listed in Table 5. Results from the individual sample analyses are listed in Table 21.

The gamma isotopic analysis of the upstream sample, Lock & Dam #8, by Wisconsin did not detect any radioisotopes above the Wisconsin MDC's. Analysis by LACBWR detected only trace activities of cesium-137 (Cs-137) and cobalt-60 (Co-60). The detected activities by LACBWR were less than the respective Wisconsin MDC's or the required NRC LLD's.

Samples collected 06/05/85 and 10/16/85 were comparable in the detected activities.

The highest activities were detected at the discharge point with cobalt-60 (Co-60) and cesium-137 (Cs-137) predominating and smaller detected activities for cesium-134 (Cs-134), manganese-54 (Mn-54) and niobium-95 (Nb-95). Inspection of the Wisconsin data from the discharge point shows a range of activity for cobalt-60 (Co-60) and cesium-137 (Cs-137). This observation was also observed in 1984. The range in activity for cobalt-60 (Co-60) and cesium-137 (Cs-137) for 1984 and 1985 are listed in Table 2. The observed range in activity would tend to indicate that the discharge point is not the best site to observe trends of accumulated radioactivity versus time. From correspondence with Dairyland Power Cooperative environmental department personnel, their observations are that the discharge point has a very small area to collect bottom sediment with larger aggregate predominating. This observation together with the fact that there is also a high scouring rate at the discharge point would support the argument that the discharge point is not a good site to study trends of accumulated radioactivity versus time but it is probably the only point available due to the large amount of riprap in the area.

Table 2. Range of activity for cobalt-60 (Co-60) and cesium-137 (Cs-137) for bottom sediments from the outfall site collected in 1984 and 1985 - Wisconsin data.

Collection	Co-60	Cs-137
	(pCi/kg dry)	
03/27/84	32400 ± 400	11600 ± 300
03/27/84	16400 ± 300	13200 ± 300
06/26/84	9900 ± 300	11000 ± 200
06/26/84	7400 ± 200	9700 ± 200
06/05/85	620 ± 50	120 ± 30
10/16/85	8620 ± 170	17600 ± 200

From the downstream site, boat launch, trace activities were detected for cobalt-60 (Co-60) and cesium-137 (Cs-137). The detected activities were at or less than the required NRC LLD's and were at approximately the same activity levels detected in 1984.

For samples collected at the upstream and downstream sites the Wisconsin and LACBWR data are comparable. Disagreements are listed in Table 5 for samples taken at the outfall site. The Wisconsin and LACBWR sample analysis reports were reviewed and no problems were noticed in either the Wisconsin or LACBWR sample analysis.

Milk

The milk samples are obtained as grab samples on a monthly basis and are then split for analysis.

A summary of reported activities by Wisconsin and LACBWR from milk samples is included in Table 4. Disagreements in the reported Wisconsin and LACBWR results are listed in Table 5. Results from the individual sample analyses are listed in Table 22.

Wisconsin detected only naturally occurring potassium-40 above its MDC in its gamma isotopic analysis of the milk samples. Activities for iodine-131 were all below its MDC of 0.40 pCi/l.

LACBWR does not report naturally occurring radioisotopes and a comparison is not possible with the Wisconsin data. All of the reported isotopes were less than the respective Wisconsin MDC's except for those differences listed in Table 5.

The Wisconsin and LACBWR sample analysis reports were reviewed regarding the disagreement listed in Table 5 for the milk sample collected 11/12/85 from the A. Malin farm. No problems were noted in either the Wisconsin or LACBWR sample analysis.

The reported data by Wisconsin for 1985 is comparable to data reported for previous years. Influence by the LACBWR facility is not apparent in the milk samples analyzed by either Wisconsin or LACBWR.

Vegetation - Food Products

A split sample of food products was taken in 1985. A blended sample of mixed vegetables was collected from a local farm, 1.0 mile NE.

A summary of reported activities by Wisconsin and LACBWR from the food product sample is included in Table 4. Results from the individual sample analyses are listed in Tables 23.

Wisconsin detected only naturally occurring potassium-40 (K-40) above its MDC in its gamma isotopic analysis of the food product sample. Activities for iodine-131 (I-131) were below its MDC of 60 pCi/kg. LACBWR also reported naturally occurring potassium-40 (K-40) and the reported activity for cesium-137 (Cs-137) is below the respective Wisconsin MDC.

Comparison of the Wisconsin and LACBWR results are favorable and influence by the LACBWR facility is not evident in food product samples.

Dose to Individuals from Gaseous and Liquid Effluents

Dose calculations for gaseous and liquid effluent releases were performed according to the mathematical models illustrated in USNRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I". The doses, listed in Table 3, were calculated for the maximum exposed individual for Wisconsin samples with activities greater than MDC and background levels.

Table 3. Calculated doses to a maximum exposed individual for Wisconsin samples with activities greater than MDC and background levels.

				Maximum Exposed Individual (mrem/year)		
Sample type	Description		population	whole body	bone	thryoid
fish	03/26/85	carp	infant	---	---	---
			child	0.0008±0.0004	---	---
			teenager	0.007±0.004	---	---
			adult	0.007±0.004	---	---
fish	03/26/85	walleye	infant	---	---	---
			child	0.0012±0.0003	---	---
			teenager	0.011±0.003	---	---
			adult	0.011±0.003	---	---
bottom sediment	06/05/85	outfall	infant	---	---	---
			child	0.006±0.001		
			teenager	0.030±0.002		
			adult	0.005±0.001		
bottom sediment	06/05/85	down-stream	infant	---		
			child	0.0017±0.0005		
			teenager	0.003±0.002		
			adult	0.0014±0.0004		
bottom sediment	10/16/85	outfall	infant	---		
			child	0.123±0.002		
			teenager	0.612±0.009		
			adult	0.110±0.002		
bottom sediment	10/16/85	down-stream	infant	---		
			child	0.0014±0.0004		
			teenager	0.0068±0.0019		
			adult	0.0012±0.0003		

From Table 3 it is apparent that the most significant dose to a maximum exposed individual is at the outfall site. The outfall site, however, is not readily accessible for individual use for recreational purposes including either fishing or swimming. Doses resulting from gaseous and liquid effluent releases are in compliance with 10 CFR Part 50, Appendix I.

Table 4. Sample summary for 1985 from the environmental split sample monitoring program conducted by Wisconsin and LACBWR.

Sample type (units)	Wisconsin data: MDC	Number of Samples	*a	Analysis	range	LACBWR data: NRC LLD	Number of Samples	*a	Analysis	range
air particulate (pCi/M^3)	0.003	104/101		gross beta	0.001 - 0.051	0.01	104		gross beta	0.009 - 0.047
		24		gamma isotopic			24		gamma isotopic	
	0.050	24/22		Be-7	0.04 - 0.012				Be-7	analysis not required
	0.011	24/0		Zr,Nb-95	-0.004 - 0.005	----	24/1		Zr,Nb-95	<LLD *b - 0.000081
	0.005	24/0		Ru-103	-0.003 - 0.003	----	24/0		Ru-103	<LLD *b
	0.030	24/0		Ru-106	-0.010 - 0.02	----	24/0		Ru-106	<LLD *b
	0.005	24/0		Cs-134	-0.001 - 0.001	0.05	24/0		Cs-134	<LLD *b
	0.005	24/0		Cs-137	-0.002 - 0.000	0.06	24/3		Cs-137	<LLD *b - 0.0013
	0.008	24/0		Ce-141	-0.005 - 0.003	----	24/0		Ce-141	<LLD *b
	0.025	24/0		Ce-144	-0.004 - 0.007	----	24/1		Ce-144	<LLD *b - 0.0015
	0.006	24/0		Co-60	<MDC	----	24/7		Co-60	<LLD *b - 0.002
	0.006	24/0		Mn-54	<MDC	----	24/5		Mn-54	<LLD *b - 0.0007
	0.015	24/0		I-131	<MDC	0.07	24/1		I-131	<LLD *b - 0.003
air iodine (pCi/M^3)	0.046	104/0		I-131	<MDC	0.07	104/0		I-131	<LLD *b - 0.004
surface water (pCi/liter)	1.6	24/24		gross beta	3.0 - 286	4	24/24		gross beta	2.0 - 64
	750	24/2		H-3	-200 - 3000	2000	24/14		H-3	<1053 - 4364
		24		gamma isotopic			24		gamma isotopic	
	9	24/1		Mn-54	-4 - 149	15	24/3		Mn-54	<LLD *b - 176.
	20	24/0		Fe-59	-8 - 15	30	24/0		Fe-59	<LLD *b
	13	24/0		Co-58	-3 - 14	15	24/0		Co-58	<LLD *b
	11	24/3		Co-60	-3 - 290	15	24/5		Co-60	<LLD *b - 344
	22	24/0		Zn-65	-1 - 14	30	24/0		Zn-65	<LLD *b
	0.4	24/0		I-131	-0.4 - 0.4	1	24/0		I-131	<LLD *b
	13	24/1		Cs-134	-2 - 18	15	24/0		Cs-134	<LLD *b
	12	24/1		Cs-137	-1 - 37	18	24/4		Cs-137	<LLD *b - 19
	15	24/0		Zr-95	-15 - 23	15	24/1		Zr-95	<LLD *b - 4
	15	24/0		Ba,La-140	-4 - 5	15	24/0		Ba,La-140	<LLD *b
	12	24/0		Ru-130	<MDC	----	24/1		Ru-103	<LLD *b - 17
bottom sediments (pCi/kg dry)	740	6/6		gross beta	7000 - 23000	----			gross beta	analysis not required
		6		gamma isotopic			6		gamma isotopic	
	60	6/1		Mn-54	-2 - 180	----	6/5		Mn-54	<LLD *b - 267
	70	6/0		Co-58	-5 - 20	----	6/0		Co-58	<LLD *b
	90	6/4		Co-60	2 - 8620	----	6/5		Co-60	<LLD *b - 9726
	60	6/1		Cs-134	-2 - 560	150	6/1		Cs-134	<LLD *b - 868
	80	6/4		Cs-137	7 - 17600	180	6/5		Cs-137	<6 - 21340
	800	6/6		K-40	5900 - 13900	----			K-40	analysis not required
	1900	6/0		Ra-226	40 - 1900	----			Ra-226	analysis not required
	180	6/3		Pb-214	130 - 400	----			Pb-214	analysis not required
	200	6/3		Bi-214	160 - 1570	----			Bi-214	analysis not required
	300	6/2		Tl-208	110 - 420	----			Tl-208	analysis not required
	320	6/2		Ac-228	200 - 600	----			Ac-208	analysis not required

Table 4. (continued)

Sample type (units)	Wisconsin data: MDC	Number of Samples *a	Analysis	range	LACBWR data: NRC LLD	Number of Samples *a	Analysis	range
fish		8	gamma isotopic			8	gamma isotopic	
(pCi/kg wet)	785	8/8	K-40	2200 - 3500		8	K-40	analysis not required
	66	8/0	Mn-54	-3 - 20	130	8/2	Mn-54	<11 - 44
	145	8/0	Fe-59	-18 - 50	260	8/0	Fe-59	<29
	54	8/0	Co-58	-4 - 40	130	8/0	Co-58	<12
	70	8/2	Co-60	-8 - 110	130	8/4	Co-60	<28 - 183
	133	8/0	Zn-65	-14 - 60	260	8/0	Zn-65	<29
	51	8/0	Cs-134	-2 - 1	130	8/0	Cs-134	<12
	74	8/0	Cs-137	-4 - 30	150	8/2	Cs-137	<11 - 55
	100	8/0	Ce-141	<100	---	8/1	Ce-141	<LLD *b - 24
	130	8/0	Nb-95	<130	---	8/1	Nb-95	<LLD *b - 12
milk		12	gamma isotopic			12	gamma isotopic	
(pCi/l)	120	12/12	K-40	1050 - 1560	--	12	K-40	analysis not required
	20	12/0	Co-57	<20	--	12/2	Co-57	<LLD *b - 21
	12	12/0	Co-60	<12	--	12/1	Co-60	<LLD *b - 5
	0.4	12/0	I-131	-0.4 - 0.3	5	12/0	I-131	<5.9
	12	12/0	Cs-134	-1 - 8	15	12/0	Cs-134	<6.9
	12	12/0	Cs-137	-1 - 8	18	12/4	Cs-137	<6 - 30
	15	12/0	Ba-140	-3 - 7	15	12/0	Ba-140	<26
food products	740	1/1	gross beta	2100	--	1	gross beta	analysis not required
(pCi/kg wet)		1	gamma isotopic			1	gamma isotopic	
	1100	1/0	Be-7	-16		1	Be-7	analysis not required
	600	1/1	K-40	2100	--	1/1	K-40	3130
	50	1/0	Co-58	-5	--	1/0	Co-58	<7
	55	1/0	Co-60	10	--	1/0	Co-60	<17
	80	1/0	Zr-95	-4	--	1/0	Zr-95	<13
	60	1/0	I-131	-13	60	1/0	I-131	<8
	50	1/0	Cs-134	-1	60	1/0	Cs-134	<7
	60	1/0	Cs-137	-1	80	1/1	Cs-137	27

* a - Number of samples / number of analyses detected above MDC or LLD.

* b - In most cases, reported activities for LACBWR are less than the required NRC LLD's.

Table 5. Disagreements in the comparison of Wisconsin and LACBWR reported results from the environmental split sample monitoring program.

Type	Collection	Description		Wisconsin	LACBWR
surface water	01/15/85	discharge channel	(H-3)	-160±270 (<700 MDC)	1509
surface water	01/15/85	discharge channel	(Co-60)	37±10	<MDA
surface water	05/14/85	discharge channel	(H-3)	70±290 (<700 MDC)	2629
surface water	06/12/85	discharge channel	(beta)	270±10	64±2
surface water	06/12/85	discharge channel	(H-3)	120±290 (<700 MDC)	2559
surface water	09/10/85	discharge channel	(H-3)	170±300 (<700 MDC)	2396
surface water	10/08/85	discharge channel	(H-3)	230±300 (<700 MDC)	1472
surface water	11/12/85	discharge channel	(H-3)	280±310 (<700 MDC)	2370
surface water	12/10/85	discharge channel	(H-3)	10±310 (<700 MDC)	4364
surface water	01/15/85	Lock & Dam #8	(H-3)	30±280 (<700 MDC)	2264
surface water	09/10/85	Lock & Dam #8	(H-3)	170±300 (<700 MDC)	2396
surface water	10/08/85	Lock & Dam #8	(H-3)	4±300 (<700 MDC)	1472
surface water	11/12/85	Lock & Dam #8	(H-3)	40±300 (<700 MDC)	1650
surface water	12/10/85	Lock & Dam #8	(H-3)	-120±310 (<700 MDC)	2619
fish	03/26/85	walleye	(Co-60)	110±310	183±23
bottom sediment	06/05/85	outfall	(Co-60)	620±50	777±21
bottom sediment	10/16/85	outfall #2	(Co-60)	8620±170	9726±71
bottom sediment	10/16/85	outfall #2	(Cs-134)	560±90	868±23
bottom sediment	10/16/85	outfall #2	(Cs-137)	17600±200	21340±88
milk	11/12/85	A. Malin	(Cs-137)	1±6 (<12 MDC)	30±13

Table 6. U.S. Environmental Protection Agency's crosscheck program, comparision of EPA and State Laboratory of Hygiene (SLH) results.

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	01-06-84	Sr-89	39+/-1.5	36+/-5	0.9
		Sr-90	21+/-1.1	24+/-1.5	-3.1
Water	01-20-84	Alpha	11+/-2	10+/-5.0	0.2
		Beta	8+/-1.8	12+/-5.0	-1.5
Food	01-27-84	Sr-89	No data provided	34+/-5.0	
		Sr-90	No data provided	20+/-5.0	
		I-131	22+/-5	20+/-6.0	0.6
		Cs-137	21+/-5	20+/-5.0	0.5
		K	2958+/-180	2720+/-136	3.0
Water	02-03-84	Cr-51	<60	40+/-5	
		Co-60	11+/-3	10+/-5	0.2
		Zn-65	54+/-8	50+/-5	1.4
		Ru-106	<50	61+/-5	
		Cs-134	29+/-5	31+/-5	-0.7
		Cs-137	15+/-4	16+/-5	-0.2
Water	02-10-84	H-3	2767+/-390	2383+/-351	1.9
Milk	03-02-84	I-131	6+/-1.0	6+/-0.9	0.0
Water	03-09-84	Ra-226	4.8+/-0.6	4.1+/-0.6	1.9
		Ra-228	2.2+/-0.3	2.0+/-0.3	1.2
Water	03-18-84	Alpha	5+/-2	5+/-5.0	0.2
		Beta	18+/-2	20+/-5.0	-0.6
Filter	03-23-84	Alpha	20+/-2	15+/-5	1.6
		Beta	49+/-4	51+/-5	-0.6
		Sr-90	20+/-1.5	21+/-1.5	-0.8
		Cs-137	12+/-5	10+/-5	0.6
Water	04-06-84	I-131	4+/-1.0	6+/-0.9	-4.3
Water	04-13-84	H-3	3330+/-400	3508+/-364	-0.8
Water	05-04-84	Sr-89	21+/-1.0	25+/-5	-1.4
		Sr-90	5+/-0.7	5+/-1.5	0.0
Water	05-18-84	Alpha	4+/-1.3	3+/-5.0	0.3
		Beta	8+/-1.5	6+/-5.0	0.6

Table 6 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	06-08-84	H-3	3007+/-400	3081+/-389	-0.2
Water	06-01-84	Cr-51	63+/-30	66+/-5	-1.2
		Cc-60	32+/-3	31+/-5	0.5
		Zn-65	68+/-7	63+/-5	1.7
		Ru-106	<35	29+/-5	
		Cs-134	44+/-4	47+/-5	-1.0
		Cs-137	37+/-3	37+/-5	0.0
Water	06-15-84	Ra-226	4.5	3.5+/-0.53	3.4
		Ra-228	1.8	2.0+/-0.30	-1.0
Milk	06-22-84	Sr-89	No data provided	25+/-5	
		Sr-90	17+/-1.5	17+/-1.5	0.4
		I-131	44+/-8	43+/-6	0.2
		Cs-137	39+/-9	35+/-5	1.3
		K	1710+/-210	1496+/-75	4.9
Water	07-20-84	Alpha	6+/-1.5	6+/-5	-0.1
		Beta	9+/-1.7	13+/-5	-1.4
Water	08-03-84	I-131	33+/-5	34+/-6	-0.2
Water	08-07-84	H-3	2970+/-360	2817+/-356	0.7
Filter	08-24-84	Alpha	19+/-1.7	17+/-5	0.6
		Beta	47+/-2	51+/-5	-1.5
		Sr-90	17+/-1.0	18+/-1.5	-1.2
		Cs-137	18+/-5	15+/-5	1.2
Water	09-07-84	Sr-89	31+/-1.6	34+/-5	-0.9
		Sr-90	20+/-1.1	19+/-1.5	1.2
Water	09-14-84	Ra-226	5.1+/-0.7	4.9+/-0.74	0.4
		Ra-228	2.1+/-0.4	2.3+/-0.35	-1.2
Water	10-05-84	Cr-51	48+/-16	40+/-5	2.9
		Co-60	19+/-3	20+/-5	-0.2
		Zn-65	158+/-9	147+/-7.4	2.5
		Ru-106	47+/-16	47+/-5	0.0
		Cs-134	29+/-3	31+/-5	-0.8
		Cs-137	23+/-3	24+/-5	-0.2
Water	10-12-84	H-3	2783+/-320	2810+/-356	-0.1

Table 6 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	10-22-84	Alpha	13+/-2	14+/-5.0	-0.2
		Beta	69+/-5	64+/-5.0	1.7
		Ra-226	3.0+/-0.5	3.0+/-0.45	0.0
		Ra-228	3.1+/-0.3	2.1+/-0.32	5.2
		Sr-89	12+/-4	11+/-5.0	0.2
		Sr-90	13+/-1.5	12+/-1.5	1.5
		Co-60	15+/-5	14+/-5.0	0.5
		Cs-134	<10	2+/-5.0	
		Cs-137	15+/-5	14+/-5.0	0.2
Milk	10-26-84	Sr-89	No data provided	22+/-5	
		Sr-90	No data provided	16+/-1.5	
		I-131	41+/-9	42+/-6	-0.2
		Cs-137	30+/-7	32+/-5	-0.6
		K	1567+/-150	1517+/-76	1.1
Water	11-16-84	Alpha	8+/-4	7+/-5	0.2
		Beta	22+/-2	20+/-5.0	0.8
Filter	11-23-84	Alpha	18+/-5	15+/-5	1.2
		Beta	53+/-5	52+/-5	0.2
		Sr-90	20+/-1.5	21+/-1.5	-1.2
		Cs-137	11+/-4	10+/-5	0.3
Water	12-07-84	I-131	41+/-8	36+/-6	1.4
Water	12-14-84	H-3	2977+/-320	3182+/-360	-1.0
Water	01-04-85	Sr-89	<1	3+/-5	
		Sr-90	31+/-2	30+/-1.5	0.8
Water	01-18-85	Alpha	4+/-2	5+/-5	-0.3
		Beta	20+/-2	15+/-5	1.6
Food	01-25-85	Sr-89	No data provided	34.0+/-5.0	
		Sr-90	No data provided	26.0+/-1.5	
		I-131	33+/-6	35+/-6	-0.4
		Cs-137	30+/-6	29+/-5	0.2
		K	1290+/-90	1382+/-120	0.9
Water	02-08-85	Cr-51	53+/-18	43+/-5	1.8
		Co-60	18+/-5	20+/-5	-0.7
		Zn-65	59+/-5	55+/-5	1.4
		Ru-106	31+/-5	25+/-5	2.0
		Cs-134	35+/-5	35+/-5	0.0
		Cs-137	25+/-5	25+/-5	0.1

Table 6 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	02-15-85	H-3	3927+/-330	3796+/-366	0.6
Milk	03-01-85	I-131	9+/-1.0	9+/-0.9	0.6
Water	03-15-85	Ra-226	4.3+/-0.8	5.0+/-0.75	-1.6
		Ra-228	7.8+/-1.4	9.0+/-1.35	-1.6
Water	03-22-85	Alpha	6+/-3	6+/-5	0.0
		Beta	15+/-2	15+/-5	-0.1
Filter	03-29-85	Alpha	12.7+/-4	10.0+/-5.0	0.9
		Beta	33+/-4	36.0+/-5.0	-1.0
		Sr-90	15+/-2	15.0+/-1.5	0.0
		Cs-137	9.3+/-4	6.0+/-5.0	1.1
Water	04-05-85	I-131	8.0+/-1.0	7.5+/-0.8	1.1
Water	04-12-85	H-3	3480+/-350	3559+/-364	-0.4
Water	04-19-85	Alpha	34.7+/-3	32.0+/-5.0	0.9
		Beta	75.3+/-5	72.0+/-5.0	1.2
		Ra-226	6.9+/-0.6	4.1+/-0.6	8.2
		Ra-228	12.0+/-0.9	6.2+/-0.9	11.1
		U	No data provided	7.0+/-6.0	
		Sr-89	13.3+/-5	10.0+/-5.0	1.2
		Sr-90	12.7+/-1.5	15.0+/-1.5	-2.3
		Co-60	14+/-4	15.0+/-5.0	-0.3
		Cs-134	12+/-4	15.0+/-5.0	-1.0
		Cs-137	10.7+/-4	12.0+/-5.0	-0.5
Water	05-10-85	Sr-90	15.3+/-1.2	15.0+/-1.5	0.4
		Sr-89	39.0+/-1.5	39.0+/-5.0	0.0
Water	05-24-85	Alpha	11.7+/-2	12.0+/-5.0	-0.1
		Beta	13.7+/-1.8	11.0+/-5.0	0.9
Water	06-07-85	Cr-51	52+/-8	44.0+/-5.0	2.9
		Co-60	13+/-2	14.0+/-5.0	-0.2
		Zn-65	50+/-6	47.0+/-5.0	1.2
		Ru-106	57+/-19	62.0+/-5.0	-1.6
		Cs-134	36+/-3	35.0+/-5.0	0.2
		Cs-137	19+/-3	20.0+/-5.0	-0.2
Water	06-14-85	H-3	2200+/-320	2416+/-351	-1.1

Table 6 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	06-21-85	Ra-226	3.2+/-0.5	3.1+/-0.4	0.3
		Ra-228	5.2+/-0.6	4.2+/-0.6	2.7
Milk	06-28-85	Sr-89	No data provided	11.0+/-5.0	
		Sr-90	14+/-2	11.0+/-1.5	3.9
		I-131	12+/-5	11.0+/-6.0	0.3
		Cs-137	11+/-5	11.0+/-5.0	-0.1
		K	1660+/-120	1525+/-76	3.1
Water	07-19-85	Alpha	10.7+/-1.5	11.0+/-5.0	0.6
		Beta	10.0+/-1.5	8.0+/-5.0	0.7
Food	07-26-85	Sr-89	No data provided	33.0+/-5.0	
		Sr-90	No data provided	26.0+/-1.5	
		I-131	32+/-8	35.0+/-6.0	-0.9
		Cs-137	28+/-8	29.0+/-5.0	-0.2
		K	1560+/-100	1514+/-76	1.0
Water	08-09-85	I-131	29+/-10	33.0+/-6.0	-1.3
Water	08-14-85	H-3	4453+/-360	4480+/-448	-0.1
Water	08-23-85	U	5+/-5	4.0+/-6.0	0.3
Filter	08-30-85	Alpha	15.3+/-1.5	13.0+/-5.0	0.8
		Beta	41.0+/-1.5	44.0+/-5.0	-1.0
		Sr-90	19.0+/-1.5	18.0+/-1.5	1.2
		Cs-137	7.7+/-4	8.0+/-5.0	-0.1
Water	09-06-85	Sr-89	23+/-2	20.0+/-5.0	1.2
		Sr-90	6.0+/-1.5	7.0+/-1.5	-1.2
Water	09-13-85	Ra-226	8.7+/-1.3	8.9+/-1.3	-0.3
		Ra-228	3.4+/-0.8	4.6+/-0.7	-2.9
Water	09-20-85	Alpha	7.3+/-1.7	8.0+/-5.0	-0.2
		Beta	10.0+/-1.7	8.0+/-5.0	0.7
Water	10-04-85	Cr-51	<44.	21.0+/-5.0	
		Co-60	19+/-5	20.0+/-5.0	-0.3
		Zn-65	21+/-5	19.0+/-5.0	0.8
		Ru-106	<40	20.0+/-5.0	
		Cs-134	16+/-5	20.0+/-5.0	-1.3
		Cs-137	19+/-5	20.0+/-5.0	-0.2
Water	10-11-85	H-3	1823+/-320	1974+/-345	-0.8

Table 6 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Milk	10-25-85	Sr-89	No data provided	48.0+/-5.0	
		Sr-90	30.7+/-1.8	26.0+/-1.5	5.4
		I-131	41+/-5	42.0+/-6.0	-0.2
		Cs-137	56+/-5	56.0+/-5.0	0.1
		K	1630+/-180	1540.+/-77.0	2.0
Water	12-06-85	I-131	46+/-5	45.0+/-6.0	0.2

* a - pCi/sample refers to the following:

Sample	Units
water	pCi/liter
milk	pCi/liter except for K mg/liter
food	pCi/kg except for K mg/kg
filter	pCi/filter

ATTACHMENT A - RADIO-ENVIRONMENTAL SAMPLE ANALYSES MAXIMUM LOWER LIMITS OF DETECTION VALUES (LLD)[a] - (Cont'd)

(a) Calculation of Lower Limits of Detection:

The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ s_b}{E \times V \times 2.22 \times Y \times Exp(-\lambda \Delta t)}$$

WHERE:

LLD is the a priori lower limit of detection as defined above (as picocurie per unit mass or volume).

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute). Typical values of E, V, Y, and Δt shall be used in the calculations.

E is the counting efficiency (as counts per transformation).

V is the sample size (in units of mass or volume).

2.22 is the number of transformations per minute per picocurie.

Y is the fraction radiochemical yield (when applicable).

λ is the radioactive decay constant for the particular radionuclide.

Δt is the elapsed time between sample collection (or end of the sample collection period) and time of counting.

(b) (2,000) LLD drinking water.

(c) LLD for gamma spectrum analyses not separation and specific isotopic analysis.

ATTACHMENT A

RADIO-ENVIRONMENTAL SAMPLE ANALYSES MAXIMUM LOWER LIMITS OF DETECTION VALUES (LLD)[a]

Analysis	Sample Type				
	Water pCi/l	Airborne Particulate or Radioiodine (pCi/m^3)	Fish (pCi/Kg, Wet)	Milk (pCi/l)	Sediment (pCi/kg Dry)
Gross Beta	6	1×10^{-2}			
H-3	3500(2000)[b]				
Mn-54	15		130		
Fe-59	30		260		
Co-58, 60	15		130		
Zn-65	30		260		
Zr-95	30				
Nb-95	15				
I-131	3[c]	7×10^{-2}		5[c]	
Cs-134	15	5×10^{-2}	130	15	150
Cs-137	18	6×10^{-2}	150	18	180
Ba-140	60			60	
La-140	20			20	

(See Footnotes a, b, and c on following page.)

References

La Crosse Boiling Water Reactor, LACBWR, Health & Safety Department Procedure, LACBWR Environmental Monitoring Program, HSP-03.4, Issue 5, pages 29,30.

Radiation Protection Standards, Federal Radiation Council, Report No. 2, September 1961.

U.S. Environmental Protection Agency, Upgrading Environmental Radiation Data, Health Physics Society Committee Report HPSR-1 (1980), EPA 520/1-80-012, August 1980.

U.S. Nuclear Regulatory Commission, Title 10, Part 20.

Wisconsin Department of Health and Social Services, Division of Health, Section of Radiation Protection. NRC 30-83-647, 1984 Annual Report, La Crosse Boiling Water Reactor.

Table 7. Air particulate gross beta and air iodine (I-131) results for January - June, 1985. Indicator site.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LAC8WR

1985

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

LAC8WR data

Lock & Dam #8
0.7 miles N

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01-09-85	0.025+/-0.003	0.004+/-0.03	01-08-85	0.052+/-0.006	<0.00145
01-16-85	0.021+/-0.003	-0.013+/-0.03	01-15-85	0.028+/-0.003	<0.00131
01-23-85	0.016+/-0.002	-0.006+/-0.03	01-22-85	0.037+/-0.003	<0.00134
01-30-85	0.017+/-0.002	0.004+/-0.03	01-29-85	0.033+/-0.003	<0.00148
02-06-85	0.020+/-0.003	-0.003+/-0.05	02-05-85	0.029+/-0.003	<0.00127
02-13-85	0.031+/-0.003	0.000+/-0.03	02-12-85	0.045+/-0.003	<0.00133
02-20-85	0.021+/-0.003	0.011+/-0.03	02-19-85	0.037+/-0.003	<0.00118
02-27-85	0.018+/-0.003	0.004+/-0.03	02-26-85	0.033+/-0.003	<0.00133
03-06-85	0.018+/-0.002	0.016+/-0.05	03-05-85 * a	0.013+/-0.001	<0.00134
03-13-85	0.018+/-0.003	0.017+/-0.03	03-12-85	0.017+/-0.001	<0.00127
03-20-85	0.008+/-0.002	-0.03+/-0.03	03-19-85	0.010+/-0.001	<0.00118
03-27-85	0.011+/-0.002	0.003+/-0.03	03-26-85	0.014+/-0.001	<0.00158
04-03-85	0.010+/-0.002	-0.009+/-0.03	04-02-85	0.015+/-0.001	<0.00147
04-10-85	0.013+/-0.002	0.004+/-0.03	04-19-85	0.011+/-0.001	<0.00169
04-17-85	0.017+/-0.003	-0.008+/-0.03	04-16-85	0.018+/-0.001	<0.00121
04-24-85	0.016+/-0.003	0.019+/-0.03	04-23-85	0.019+/-0.002	<0.00132
05-01-85	0.010+/-0.002	-0.011+/-0.03	04-30-85	0.011+/-0.001	<0.00131
05-08-85	0.011+/-0.002	-0.001+/-0.03	05-07-85	0.015+/-0.002	<0.00167
05-15-85	0.011+/-0.002	0.001+/-0.04	05-14-85	0.017+/-0.001	<0.00174
05-22-85	0.009+/-0.002	0.000+/-0.03	05-21-85	0.010+/-0.001	<0.00130
05-29-85	0.015+/-0.002	0.000+/-0.03	05-28-85	0.017+/-0.002	<0.00233
06-05-85	0.001+/-0.002	-0.03+/-0.04	06-04-85	0.013+/-0.002	<0.00175
06-12-85	0.011+/-0.002	0.000+/-0.03	06-11-85	0.014+/-0.002	<0.00192
06-19-85	0.012+/-0.002	0.005+/-0.03	06-18-85	0.013+/-0.001	<0.00161
06-26-85	0.015+/-0.002	0.007+/-0.03	06-26-85	0.021+/-0.002	<0.00123

* a - A new counting instrument was used for gross beta counting of the air particulaate samples.

Table 8. Air particulate gross beta and air iodine (I-131) results for July - December, 1985. Indicator site.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LAC8WR

1985

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

LAC8WR data

Lock & Dam #8
0.7 miles N

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
07-03-85	0.010+/-0.002	-0.004+/-0.03	07-02-85	0.015+/-0.002	<0.00320
07-10-85	0.017+/-0.002	-0.001+/-0.03	07-09-85	0.024+/-0.002	<0.0344
07-17-85	0.016+/-0.002	-0.004+/-0.03	07-16-85	0.021+/-0.002	<0.00177
07-24-85	0.015+/-0.002	-0.018+/-0.02	07-23-85	0.021+/-0.002	<0.00214
07-31-85	0.012+/-0.002	-0.005+/-0.03	07-30-85	0.015+/-0.002	<0.00480
08-07-85	0.016+/-0.002	-0.004+/-0.03	08-06-85	0.019+/-0.002	<0.00426
08-14-85	0.021+/-0.003	-0.005+/-0.03	08-13-85	0.021+/-0.002	<0.00522
08-21-85	0.011+/-0.002	0.012+/-0.03	08-20-85	0.018+/-0.002	<0.0171
08-28-85	0.015+/-0.002	-0.005+/-0.03	08-27-85	0.016+/-0.002	<0.00209
09-04-85	0.017+/-0.002	0.020+/-0.03	09-03-85	0.024+/-0.002	<0.00228
09-11-85	0.012+/-0.002	0.002+/-0.03	09-10-85	0.017+/-0.002	<0.00190
09-18-85	0.016+/-0.002	-0.005+/-0.03	09-17-85	0.024+/-0.002	<0.00190
09-25-85	0.009+/-0.002	-0.016+/-0.03	09-24-85	0.009+/-0.001	<0.00173
10-02-85	0.009+/-0.002	-0.018+/-0.05	10-01-85	0.016+/-0.002	<0.00185
10-09-85	0.018+/-0.003	-0.011+/-0.04	10-08-85	0.019+/-0.002	<0.00185
10-16-85	0.010+/-0.002	0.013+/-0.03	10-15-85	0.009+/-0.001	<0.00152
10-23-85	0.016+/-0.002	-0.006+/-0.03	10-22-85	0.015+/-0.001	(3.8+/-1.3) E-3
10-30-85	0.012+/-0.002	-0.007+/-0.04	10-29-85	0.015+/-0.002	<0.00154
11-06-85	0.012+/-0.002	0.001+/-0.04	11-05-85	0.019+/-0.002	<0.00481
11-13-85	0.012+/-0.002	-0.010+/-0.04	11-12-85	0.011+/-0.001	<0.0018
11-20-85	0.018+/-0.003	-0.004+/-0.03	11-19-85	0.017+/-0.002	<0.00166
11-27-85	0.025+/-0.003	-0.005+/-0.04	11-26-85	0.030+/-0.003	<0.00188
12-04-85	* a	* a	12-03-85	0.033+/-0.002	<0.00202
12-11-85	0.051+/-0.004	-0.004+/-0.03	12-10-85	0.047+/-0.003	<0.00217
12-18-85	0.033+/-0.003	0.005+/-0.03	12-18-85	0.028+/-0.002	<0.00156
12-25-85	0.025+/-0.003	-0.007+/-0.04	12-26-85	0.018+/-0.001	<0.00128
01-01-86	0.013+/-0.002	-0.016+/-0.03	12-31-85	0.018+/-0.002	(4.2+/-2.1) E-3

* a - Sampler was not properly connected resulting in no air flow through the sampler.

Table 9. Air particulate gross beta and air iodine (I-131) results for January - June, 1985. Control site.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR

1985

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data			LACBWR data		
La Crosse 15.6 miles N			LaCrosse 16 miles N		
Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01-07-85	0.023+/-0.002	0.001+/-0.02	01-08-85	0.045+/-0.005	<0.00142
01-14-85	0.010+/-0.001	0.015+/-0.03	01-15-85	0.029+/-0.003	<0.00114
01-21-85	0.013+/-0.001	-0.003+/-0.011	01-22-85	0.031+/-0.005	<0.00135
01-28-85	0.012+/-0.001	0.006+/-0.02	01-29-85	0.032+/-0.004	<0.00146
02-04-85	0.015+/-0.001	0.011+/-0.02	02-05-85	0.023+/-0.004	<0.00168
02-11-85	* a	* a	02-12-85	0.035+/-0.004	<0.00175
02-19-85	0.020+/-0.001	0.007+/-0.011	02-19-85	0.043+/-0.004	<0.00136
02-25-85	0.028+/-0.002	0.009+/-0.02	02-26-85	0.033+/-0.003	<0.00126
03-04-85	0.013+/-0.001	-0.004+/-0.02	03-05-85 * c	0.012+/-0.001	<0.00155
03-11-85	0.014+/-0.001	0.010+/-0.02	03-12-85	0.015+/-0.001	<0.00142
03-18-85	0.008+/-0.001	-0.004+/-0.012	03-19-85	0.009+/-0.001	<0.00152
03-25-85	0.010+/-0.001	0.009+/-0.02	03-26-85	0.012+/-0.001	<0.00259
04-01-85 * b	0.013+/-0.005	0.013+/-0.04	04-02-85	0.014+/-0.001	<0.00169
04-08-85	0.009+/-0.001	0.05+/-0.03	04-09-85	0.012+/-0.001	<0.00215
04-15-85	0.016+/-0.002	-0.012+/-0.02	04-16-85	0.018+/-0.002	<0.00117
04-22-85	0.016+/-0.002	-0.005+/-0.02	04-23-85	0.017+/-0.002	<0.00159
04-29-85	0.008+/-0.001	0.000+/-0.013	04-30-85	0.010+/-0.001	<0.00154
05-06-85	0.012+/-0.001	0.000+/-0.02	05-07-85	0.017+/-0.002	<0.00185
05-13-85	0.012+/-0.001	-0.013+/-0.02	05-14-85	0.018+/-0.002	<0.00144
05-20-85	0.009+/-0.001	0.002+/-0.02	05-21-85	0.012+/-0.001	<0.00175
05-28-85	0.011+/-0.001	0.002+/-0.02	05-28-85	0.017+/-0.002	<0.00177
06-03-85	0.005+/-0.001	-0.016+/-0.02	06-04-85	0.013+/-0.002	<0.00185
06-10-85	0.011+/-0.001	-0.002+/-0.02	06-11-85	0.015+/-0.002	<0.00190
06-17-85	0.013+/-0.001	-0.002+/-0.02	06-18-85	0.017+/-0.002	<0.00202
06-24-85	0.003+/-0.002	0.000+/-0.02	06-26-85	0.026+/-0.002	<0.00182
07-01-85	0.012+/-0.001	0.000+/-0.02			

* a - Sampler was not operating.
* b - Sampler was not operating for approximately 5.8 days.
* c - A new counting instrument was used for gross beta counting of the air particulate filters starting 03/05/85.

Table 10. Air particulate gross beta and air iodine (I-131) results for July - December, 1985. Control site.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LAC8WR

1985

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

La Crosse
15.6 miles N

Collection date	Air Particulate	Air Iodine
07-08-85	0.017+/-0.002	-0.001+/-0.014
07-15-85	0.020+/-0.002	-0.001+/-0.02
07-22-85	0.016+/-0.002	-0.017+/-0.02
07-29-85	0.014+/-0.001	0.001+/-0.02
08-05-85	0.012+/-0.001	0.000+/-0.013
08-12-85	0.011+/-0.001	0.004+/-0.015
08-19-85	0.015+/-0.001	0.001+/-0.02
08-26-85	0.011+/-0.001	0.006+/-0.014
09-04-85	0.017+/-0.001	-0.003+/-0.013
09-09-85	0.016+/-0.002	-0.002+/-0.018
09-16-85	0.009+/-0.001	0.003+/-0.016
09-23-85	0.012+/-0.001	-0.007+/-0.03
09-30-85	0.009+/-0.001	-0.001+/-0.03
10-07-85	0.012+/-0.001	0.004+/-0.03
10-14-85	0.011+/-0.001	-0.019+/-0.03
10-21-85	0.015+/-0.001	-0.014+/-0.02
10-28-85	0.012+/-0.001	-0.004+/-0.03
11-04-85	0.010+/-0.001	-0.005+/-0.03
11-11-85	0.010+/-0.001	-0.002+/-0.02
11-18-85	0.015+/-0.001	-0.005+/-0.02
11-25-85	0.017+/-0.001	-0.016+/-0.02
12-03-85	0.019+/-0.001	0.003+/-0.014
12-09-85	0.048+/-0.003	-0.008+/-0.03
12-16-85	0.000+/-0.001	-0.018+/-0.02
12-23-85	0.024+/-0.002	-0.012+/-0.04
01-06-86	0.012+/-0.001	-0.003+/-0.015

LAC8WR data

LaCrosse
16 miles N

Collection date	Air Particulate	Air Iodine
07-02-85	0.015+/-0.002	<0.00320
07-09-85	0.024+/-0.002	<0.0344
07-16-85	0.021+/-0.002	<0.00177
07-23-85	0.021+/-0.002	<0.00214
07-30-85	0.015+/-0.002	<0.00488
08-06-85	0.019+/-0.002	<0.00426
08-13-85	0.021+/-0.002	<0.00522
08-20-85	0.018+/-0.002	<0.0171
08-27-85	0.016+/-0.002	<0.00209
09-03-85	0.024+/-0.002	<0.00228
09-10-85	0.017+/-0.002	<0.00190
09-17-85	0.024+/-0.002	<0.00190
09-24-85	0.009+/-0.001	<0.00173
10-01-85	0.016+/-0.002	<0.00185
10-08-85	0.022+/-0.002	<0.00203
10-15-85	0.012+/-0.002	<0.00152
10-22-85	0.022+/-0.002	<0.00192
10-29-85	0.017+/-0.002	<0.00146
11-05-85	0.019+/-0.002	<0.00193
11-12-85	0.014+/-0.002	<0.00174
11-29-85	0.018+/-0.002	<0.00148
12-03-85	0.039+/-0.003	<0.00323
12-10-85	0.045+/-0.003	<0.00295
12-18-85	0.034+/-0.003	<0.00244
12-26-85	0.021+/-0.002	<0.00208
12-31-85	0.017+/-0.002	<0.00321

Table 11. Gamma isotopic results for January - June, 1985 from the monthly composite of air particulate samples. Indicator site - Lock & Dam #8.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR

1985

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

Lock & Dam #8
0.7 miles N

	January	February	March	April	May	June
Be-7	0.06+/-0.05	0.11+/-0.05	0.07+/-0.02	0.08+/-0.04	0.10+/-0.03	0.09+/-0.03
Zr,Nb-95	-0.001+/-0.011	-0.004+/-0.010	-0.001+/-0.005	0.004+/-0.009	0.000+/-0.006	-0.001+/-0.005
Ru-103	-0.002+/-0.005	0.003+/-0.006	0.000+/-0.002	-0.003+/-0.004	0.001+/-0.003	-0.001+/-0.002
Ru-106	-0.010+/-0.04	0.02+/-0.04	0.000+/-0.016	-0.005+/-0.03	-0.007+/-0.018	0.003+/-0.016
Cs-134	0.001+/-0.004	0.000+/-0.004	0.000+/-0.002	0.001+/-0.003	0.000+/-0.002	-0.001+/-0.002
Cs-137	-0.001+/-0.005	0.000+/-0.005	0.000+/-0.002	-0.001+/-0.004	-0.001+/-0.002	0.000+/-0.002
Ce-141	0.003+/-0.008	-0.005+/-0.007	-0.001+/-0.003	0.000+/-0.006	0.002+/-0.004	0.001+/-0.003
Ce-144	0.002+/-0.02	0.002+/-0.02	0.007+/-0.010	-0.001+/-0.018	0.005+/-0.012	0.000+/-0.009

Isotopes other than those reported were not detected.

LACBWR data

Lock & Dam #8
0.7 miles N

	January	February	March	April	May	June
Be-7	* a	* a	* a	* a	* a	* a
Zr,Nb-95	<MDA	8.1E-5+/-6.1E-5	<MDA	<MDA	<MDA	<MDA
Ru-103	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-106	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-134	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-137	<MDA	<MDA	<MDA	9.4E-4+/-2.5E-4	<MDA	<MDA
Ce-141	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ce-144	<MDA	<MDA	<MDA	1.5E-3+/-8.9E-4	<MDA	<MDA
Co-60	<MDA	1.0E-4+/-1.7E-4	2.3E-4+/-5.6E-4	<MDA	2.0E-3+/-6.2E-4	2.4E-4+/-5.6E-4
I-131	<MDA	<MDA	<MDA	<MDA	2.8E-3+/-1.5E-3	<MDA

* a - The isotope is not required for analysis.

Table 12. Gamma isotopic results for July - December, 1985 from the monthly composite of air particulate samples. Indicator site - Lock & Dam #8.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACSWR

1985

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h

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

Lock & Dam #8
0.7 miles N

	July	August	September	October	November	December
Be-7	0.10+/-0.04	0.11+/-0.03	0.04+/-0.04	0.06+/-0.03	0.06+/-0.03	0.06+/-0.04
Zr,Nb-95	-0.002+/-0.006	0.001+/-0.005	0.005+/-0.009	0.004+/-0.006	0.001+/-0.007	0.003+/-0.009
Ru-103	0.001+/-0.003	-0.001+/-0.003	-0.002+/-0.004	0.000+/-0.003	0.000+/-0.003	0.003+/-0.004
Ru-106	-0.002+/-0.022	-0.003+/-0.016	0.003+/-0.03	-0.004+/-0.02	-0.003+/-0.02	0.003+/-0.03
Cs-134	0.000+/-0.003	0.000+/-0.002	0.001+/-0.003	0.000+/-0.002	0.001+/-0.003	0.001+/-0.003
Cs-137	0.000+/-0.002	-0.001+/-0.002	0.000+/-0.003	-0.001+/-0.002	-0.001+/-0.002	-0.002+/-0.003
Ce-141	-0.001+/-0.005	0.001+/-0.004	-0.002+/-0.006	0.000+/-0.003	-0.001+/-0.004	-0.002+/-0.006
Ce-144	0.004+/-0.012	-0.004+/-0.009	0.000+/-0.016	0.005+/-0.011	-0.003+/-0.011	-0.004+/-0.015

Isotopes other than those reported were not detected.

LACSWR data

Lock & Dam #8
0.7 miles N

	July	August	September	October	November	December
Be-7	* a	* a	* a	* a	* a	* a
Zr,Nb-95	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-103	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-106	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-134	<3.43 E-4	<3.27 E-4	<3.15 E-4	<MDA	<MDA	<MDA
Cs-137	<3.63 E-4	<2.57 E-4	<3.89 E-4	<MDA	<MDA	<MDA
Ce-141	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ce-144	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
I-131	<5.70 E-3	<1.84 E-3	<1.73 E-3	<MDA	<MDA	<MDA
Mn-54	3.9E-4+/-1.8E-4	<MDA	<MDA	<MDA	<MDA	<MDA
Co-60	4.1E-4+/-7.7E-4	<MDA	<MDA	<MDA	<MDA	<MDA

* a - The isotope is not required for analysis.

Table 13. Gamma isotopic results for January - June, 1985 from the monthly composite of air particulate samples. Control site - La Crosse.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LAC8WR

1985

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

La Crosse
15.6 miles N

	January	February	March	April	May	June
Be-7	0.044+/-0.011	0.058+/-0.017	0.09+/-0.03	0.102+/-0.018	0.12+/-0.02	0.11+/-0.02
Zr,Nb-95	0.000+/-0.002	0.000+/-0.003	0.000+/-0.006	0.000+/-0.003	0.001+/-0.004	0.000+/-0.002
Ru-103	0.000+/-0.001	0.000+/-0.002	-0.001+/-0.003	-0.001+/-0.001	0.000+/-0.002	-0.001+/-0.001
Ru-106	0.002+/-0.007	0.008+/-0.012	0.001+/-0.02	-0.001+/-0.010	0.002+/-0.012	0.000+/-0.008
Cs-134	0.000+/-0.001	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	0.000+/-0.001	-0.001+/-0.003	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001
Ce-141	0.001+/-0.001	0.001+/-0.002	0.000+/-0.004	0.000+/-0.002	0.001+/-0.003	0.000+/-0.002
Ce-144	0.001+/-0.004	0.002+/-0.007	-0.001+/-0.012	0.005+/-0.006	0.000+/-0.007	0.001+/-0.005

Isotopes other than those reported were not detected.

LAC8WR

La Crosse
16 miles N

	January	February	March	April	May	June
Be-7	* a	* a	* a	* a	* a	* a
Zr,Nb-95	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-103	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-106	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-134	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-137	<MDA	<MDA	<MDA	<MDA	1.3E-3+/-2.2E-4	5.1E-4+/-2.1E-4
Ce-141	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ce-144	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-60	<MDA	5.4E-4+/-8.1E-4	<MDA	<MDA	1.5E-3+/-6.8E-4	<MDA
Mn-54	6.7E-4+/-3.8E-4	4.5E-4+/-2.1E-4	<MDA	7.3E-4+/-2.3E-4	<MDA	6.8E-4+/-2.2E-4

* a - The isotope is not required for analysis.

Table 14. Gamma isotopic results for July - December, 1985 from the monthly composite of air particulate samples. Control site - La Crosse.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR

1985

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

La Crosse
15.6 miles N

	July	August	September	October	November	December
Be-7	0.114+/-0.017	0.08+/-0.02	0.060+/-0.018	0.075+/-0.016	0.056+/-0.012	0.057+/-0.013
Zr,Nb-95	-0.001+/-0.003	0.001+/-0.003	0.001+/-0.004	0.000+/-0.003	0.000+/-0.002	0.000+/-0.002
Ru-103	0.000+/-0.002	-0.001+/-0.001	0.000+/-0.003	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001
Ru-106	0.006+/-0.011	-0.004+/-0.007	0.004+/-0.011	-0.002+/-0.010	0.001+/-0.007	-0.005+/-0.007
Cs-134	0.000+/-0.001	-0.001+/-0.001	0.000+/-0.001	0.001+/-0.001	0.000+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001
Ce-141	0.000+/-0.002	-0.001+/-0.002	0.000+/-0.002	0.001+/-0.002	0.001+/-0.001	0.000+/-0.001
Ce-144	0.005+/-0.006	-0.002+/-0.005	-0.001+/-0.006	0.001+/-0.005	0.001+/-0.004	-0.001+/-0.004

Isotopes other than those reported were not detected.

LACBWR

La Crosse
16 miles N

	July	August	September	October	November	December
Be-7	* a	* a	* a	* a	* a	* a
Zr,Nb-95	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-103	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-106	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-134	<4.74 E-4	<3.55 E-4	<3.91 E-4	<MDA	<MDA	<MDA
Cs-137	<3.24 E-3	<3.77 E-4	<4.11 E-4	<MDA	<MDA	<MDA
Ce-141	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ce-144	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
I-131	<6.90 E-3	<2.68 E-3	<1.92 E-3	<MDA	<MDA	<MDA

* a - The isotope is not required for analysis.

Table 15. Analysis of surface water samples from January - June, 1985. Indicator site.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR
1985

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

Effluent channel
0.1 mile W

Collection Date	01-15-85	02-12-85	03-12-85	04-09-85	05-14-85	06-12-85
Gross Alpha-sol.	1.0+/-1.0	2.3+/-1.3	0.1+/-0.8	1.8+/-1.1	2.1+/-1.5	3.7+/-1.8
Gross Alpha-insol	0.3+/-0.6	0.2+/-0.5	0.4+/-0.7	0.2+/-0.6	0.2+/-0.7	5.8+/-1.4
Gross Beta-sol.	12.0+/-1.7	15.2+/-1.5	8.6+/-1.5	8.1+/-1.5	4.1+/-1.3	61+/-4
Gross Beta-insol.	16.2+/-1.8	13.2+/-1.8	3.1+/-1.2	1.6+/-1.1	1.3+/-1.0	225+/-6
H-3	-160+/-270	3000+/-330	170+/-290	-140+/-310	70+/-290	70+/-290
Sr-89	-0.5+/-0.6	1.7+/-1.0	0.3+/-0.5	-0.15+/-0.4	0.3+/-0.6	0.7+/-0.6
Sr-90	0.3+/-0.6	0.0+/-1.0	0.17+/-0.5	1.1+/-0.4	1.0+/-0.6	0.5+/-0.5
I-131	-0.02+/-0.5	8+/-6 * a	-0.37+/-0.15	-0.14+/-0.10	-0.32+/-0.11	0.09+/-0.19
Gamma Isotopic						
Mn-54	7+/-5	4+/-5	0+/-4	0+/-4	0+/-2	149+/-18
Fe-59	15+/-11	9+/-9	3+/-8	2+/-8	-1+/-4	10+/-20
Co-58	8+/-5	4+/-5	0+/-4	-2+/-4	0+/-2	14+/-12
Co-60	37+/-10	12+/-7	4+/-6	0+/-5	-1+/-2	290+/-30
Zn-65	2+/-10	14+/-12	4+/-10	2+/-10	0+/-4	13+/-30
Cs-134	1+/-5	6+/-5	5+/-5	1+/-4	-1+/-2	18+/-11
Cs-137	7+/-6	2+/-5	4+/-5	2+/-5	0+/-2	37+/-14
Zr-95	13+/-12	6+/-11	-1+/-10	1+/-10	-2+/-5	23+/-20
Ba,La-140	2+/-8	2+/-7	-4+/-6	-2+/-6	-4+/-3	1+/-7

* a - The reported data is from a gamma isotopic analysis.
Isotopes other than those reported were not detected.

LACBWR data

Effluent channel
0.1 mile W

Collection Date	01-15-85	02-12-85	03-12-85	04-09-85	05-14-85	06-12-85
Gross Alpha	<6.8	<14	<20	<19	<15	<25
Gross Beta	27+/-3	38+/-3	6.1+/-0.8	6.7+/-0.9	4.3+/-0.8	64+/-2
H-3	1509	3222	<1107	<1084	2629	2559
Gamma Isotopic						
Mn-54	<MDA	<MDA	15+/-5	<MDA	<MDA	176+/-11
Fe-59	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-58	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-60	<MDA	25+/-11	<MDA	<MDA	<MDA	344+/-16
Zn-65	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
I-131	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-134	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-137	<MDA	10+/-5	<MDA	<MDA	<MDA	19+/-6
Zr-95	<MDA	<MDA	<MDA	<MDA	4+/-2	<MDA
Ba,La-140	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-103	<MDA	<MDA	<MDA	<MDA	<MDA	17+/-4

Table 16. Analysis of surface water samples from July - December, 1985. Indicator site.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR
1985

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

Effluent channel
0.1 mile W

Collection Date	07-09-85	08-13-85	09-10-85	10-08-85	11-12-85	12-10-85
Gross Alpha-sol.	1.8+/-1.7	1.6+/-1.2	0.3+/-0.9	1.1+/-1.0	1.4+/-1.2	0.7+/-1.1
Gross Alpha-insol	0.5+/-0.7	2.3+/-1.1	0.3+/-0.6	1.0+/-0.7	0.6+/-0.7	-0.1+/-0.6
Gross Beta-sol.	4.2+/-1.3	9.4+/-1.6	6.3+/-1.4	5.0+/-1.3	4.6+/-1.3	3.3+/-1.3
Gross Beta-insol.	0.2+/-0.9	2.3+/-1.1	2.4+/-1.1	1.6+/-1.1	2.1+/-1.1	-0.1+/-0.9
H-3	-160+/-300	3000+/-300	170+/-300	230+/-300	280+/-310	10+/-310
Sr-89	-0.4+/-0.6	-1.2+/-0.4	-0.2+/-0.4	0.9+/-0.5	0.5+/-0.5	-1.0+/-0.5
Sr-90	0.9+/-0.6	1.0+/-0.4	0.8+/-0.4	0.2+/-0.5	0.09+/-0.5	0.8+/-0.5
I-131	-0.13+/-0.11	0.10+/-0.11	0.11+/-0.05	-0.07+/-0.05	-0.12+/-0.07	0.34+/-0.10
Gamma Isotopic						
Mn-54	-1+/-4	-1+/-5	-1+/-4	1+/-4	1+/-4	-3+/-7
Fe-59	4+/-10	1+/-9	7+/-9	5+/-9	2+/-8	4+/-13
Co-58	2+/-5	0+/-5	6+/-5	7+/-5	2+/-4	0+/-7
Co-60	0+/-5	6+/-7	-1+/-5	0+/-5	-1+/-5	0+/-8
Zn-65	1+/-10	-1+/-9	2+/-10	8+/-11	8+/-12	5+/-17
Cs-134	1+/-5	-1+/-6	-1+/-6	2+/-6	12+/-6	-1+/-8
Cs-137	-1+/-6	5+/-5	5+/-5	-1+/-5	1+/-6	0+/-8
Zr-95	-8+/-9	2+/-12	5+/-11	4+/-12	2+/-11	-7+/-16
Ba,La-140	-3+/-6	-3+/-6	-1+/-6	-4+/-7	-2+/-6	-2+/-7

Isotopes other than those reported were not detected.

LACBWR data

Effluent channel
0.1 mile W

Collection Date	07-09-85	08-13-85	09-10-85	10-08-85	11-12-85	12-10-85
Gross Alpha	<24	<28	<28	<35.1	<25.2	<22.1
Gross Beta	2.0+/-0.7	8.8+/-1.0	2.4+/-0.7	10.9+/-1.2	3.4+/-0.8	3.6+/-0.6
H-3	<1053	3218	2396	1472	2370	4364
Gamma Isotopic						
Mn-54	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Fe-59	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-58	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-60	<MDA	15+/-10	<MDA	<MDA	<MDA	<MDA
Zn-65	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
I-131	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-134	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-137	<MDA	13+/-4	<MDA	<MDA	<MDA	<MDA
Zr-95	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ba,La-140	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ru-103	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA

Table 17. Analysis of surface water samples from January - June, 1985. Control site - Lock & Dam #8.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR
1985

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

	Lock & Dam #8 0.7 miles N					
Collection Date	01-15-85	02-12-85	03-12-85	04-09-85	05-14-85	06-11-85
Gross Alpha-sol.	1.8+/-1.2	1.6+/-1.2	-0.1+/-0.8	0.7+/-0.9	0.7+/-1.3	1.3+/-1.5
Gross Alpha-insol	0.5+/-0.6	0.4+/-0.5	0.0+/-0.6	1.0+/-0.8	0.5+/-0.8	0.7+/-0.7
Gross Beta-sol.	3.7+/-1.3	4.1+/-1.3	5.1+/-1.3	3.9+/-1.3	4.9+/-1.3	5.1+/-1.4
Gross Beta-insol.	0.0+/-0.9	0.5+/-1.0	2.5+/-1.1	0.5+/-1.0	0.8+/-1.0	0.1+/-1.0
H-3	30+/-280	-30+/-290	-140+/-290	-200+/-310	90+/-290	-190+/-290
Sr-89	0.0+/-0.5	0.3+/-0.4	-0.06+/-0.7	-0.2+/-0.3	1.3+/-0.4	-0.6+/-0.6
Sr-90	0.0+/-0.6	0.0+/-0.4	0.08+/-0.6	0.3+/-0.3	0.5+/-0.4	1.0+/-0.6
I-131	0.03+/-0.15	0.11+/-0.18	0.28+/-0.14	0.18+/-0.12	-0.3[+/-0.14	-0.01+/-0.17
Gamma Isotopic						
Mn-54	3+/-2	0+/-4	-2+/-4	-3+/-4	-4+/-7	-4+/-7
Fe-59	-1+/-9	4+/-9	-5+/-7	3+/-9	-4+/-13	5+/-14
Co-58	0+/-6	-2+/-4	3+/-5	0+/-4	-3+/-7	-1+/-7
Co-60	4+/-4	-1+/-5	0+/-5	2+/-6	0+/-7	-3+/-7
Zn-65	0+/-9	6+/-10	4+/-10	7+/-11	2+/-15	8+/-17
Cs-134	8+/-4	4+/-5	5+/-5	1+/-5	-2+/-7	-1+/-7
Cs-137	2+/-4	4+/-5	5+/-5	1+/-5	-1+/-8	1+/-8
Zr-95	9+/-11	-1+/-10	-1+/-10	2+/-11	-6+/-15	-4+/-15
Ba,La-140	4+/-7	0+/-7	-4+/-6	-4+/-8	2+/-8	5+/-8

Isotopes other than those reported were not detected.

LACBWR data

	Lock & Dam #8 0.7 miles N					
Collection Date	01-15-85	02-12-85	03-12-85	04-09-85	05-14-85	06-11-85
Gross Alpha	<6.8	<14	<20	<19	<18	<25
Gross Beta	7.5+/-2.2	5.3+/-1.8	3.8+/-0.6	3.9+/-0.8	2.9+/-0.7	2.7+/-0.7
H-3	2264	<1115	<1107	<1084	<1104	<1075
Gamma Isotopic						
Mn-54	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Fe-59	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-58	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-60	<MDA	10+/-10	5.0+/-1.4	<MDA	<MDA	<MDA
Zn-65	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
I-131	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-134	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-137	8+/-7	<MDA	<MDA	<MDA	<MDA	<MDA
Zr-95	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ba,La-140	<MDA	<MDA	<MDA	<MJA	<MDA	<MDA
Nb-95	<MDA	<MDA	<MDA	<MDA	<MDA	4+/-2

Table 18. Analysis of surface water samples from July - December, 1985. Control site - Lock & Dam #8.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR
1985

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

	Lock & Dam #8 0.7 miles N					
Collection Date	07-09-85	08-13-85	09-10-85	10-08-85	11-12-85	12-10-85
Gross Alpha-sol.	1.1+/-1.4	1.2+/-1.1	0.6+/-1.0	1.1+/-1.1	0.5+/-0.9	2.3+/-1.4
Gross Alpha-insol	0.4+/-0.7	0.4+/-0.6	0.2+/-0.6	0.5+/-0.6	0.1+/-0.5	-0.4+/-0.6
Gross Beta-sol.	4.6+/-1.3	3.8+/-1.3	3.8+/-1.2	4.5+/-1.3	3.0+/-1.1	3.0+/-1.3
Gross Beta-insol.	0.5+/-1.0	0.2+/-0.9	2.5+/-1.1	0.7+/-1.0	1.3+/-1.0	0.1+/-1.0
H-3	180+/-300	-130+/-290	170+/-300	4+/-300	40+/-300	-120+/-310
Sr-89	-1.2+/-0.4	0.3+/-0.3	0.13+/-0.4	-0.12+/-0.4	-0.7+/-0.6	-1.0+/-0.5
Sr-90	0.9+/-0.4	0.2+/-0.3	0.17+/-0.4	0.19+/-0.4	0.3+/-0.6	0.9+/-0.5
I-131	0.03+/-0.11	-0.28+/-0.12	0.16+/-0.06	-0.07+/-0.05	-0.06+/-0.07	0.42+/-0.08
Gamma Isotopic						
Mn-54	-2+/-7	0+/-4	1+/-4	-3+/-7	-1+/-7	1+/-4
Fe-59	-3+/-13	-2+/-8	2+/-10	-8+/-15	-7+/-14	4+/-9
Co-58	-3+/-7	0+/-5	3+/-5	-3+/-7	3+/-7	0+/-4
Co-60	-2+/-8	-2+/-6	0+/-5	-1+/-7	1+/-8	3+/-6
Zn-65	5+/-15	2+/-10	4+/-11	7+/-17	2+/-15	9+/-11
Cs-134	-1+/-7	-1+/-5	-1+/-6	0+/-8	-1+/-9	6+/-6
Cs-137	-1+/-8	-1+/-5	0+/-5	1+/-8	-1+/-8	1+/-5
Zr-95	-5+/-15	5+/-11	5+/-11	-15+/-15	-2+/-16	4+/-12
Ba,La-140	3+/-8	-2+/-6	-4+/-7	0+/-8	3+/-8	-3+/-6

Isotopes other than those reported were not detected.

LACBWR data

	Lock & Dam #8 0.7 miles N					
Collection Date	07-09-85	08-13-85	09-10-85	10-08-85	11-12-85	12-10-85
Gross Alpha	<24	<22	<28	<35.1	<25.2	<22.5
Gross Beta	2.4+/-0.7	3.1+/-0.5	4.6+/-0.8	10.3+/-1.1	3.5+/-0.8	3.7+/-0.7
H-3	<1053	<1046	2396	1472	1650	2619
Gamma Isotopic						
Mn-54	<MDA	<MDA	<MDA	9.0+/-4.0	<MDA	<MDA
Fe-59	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-58	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-60	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Zn-65	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
I-131	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-134	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Cs-137	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Zr-95	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Ba,La-140	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA

Table 19. Analysis of fish samples for 1985.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR

1985

Measurements in units of pCi/kg (wet)

WI - Section of Radiation Protection data

Collection Date	03-26-85	03-26-85	06-05-85	06-05-85	09-26-85	09-26-85
Type	carp	walleye	walleye	carp	catfish	carp
Gamma Isotopic						
K-40	3200+/-700	3500+/-500	2900+/-600	2200+/-500	2700+/-500	2600+/-500
Mn-54	17+/-30	-3+/-20	20+/-30	-2+/-30	-3+/-20	2+/-20
Fe-59	50+/-90	-5+/-70	-18+/-110	-18+/-100	30+/-50	-4+/-60
Co-58	40+/-40	2+/-30	30+/-40	-4+/-40	6+/-30	7+/-30
Co-60	70+/-40	110+/-30	-3+/-40	-8+/-30	1+/-30	20+/-30
Zn-65	20+/-80	60+/-50	-14+/-80	10+/-70	60+/-60	4+/-60
Cs-134	-2+/-30	-1+/-19	-2+/-20	-2+/-20	-1+/-20	1+/-20
Cs-137	30+/-30	8+/-20	13+/-30	10+/-30	-4+/-20	-4+/-30

Isotopes other than those reported were not detected.

LACBWR data

Collection Date	03-26-85	03-26-85	06-05-85	06-05-85	09-26-85	09-26-85
Type	carp	walleye	walleye	carp	carp	catfish
Gamma Isotopic						
K-40	* a	* a	* a	* a	* a	* a
Mn-54	44+/-8	23+/-8	<13	<11	<10	<11
Fe-59	<20	<29	<29	<23	<21	<27
Co-58	<5.5	<12	<12	<11	<10	<8
Co-60	79+/-19	183+/-23	<28	<25	<25	<23
Zn-65	<21	<23	<20	<20	<20	<21
Cs-134	<11	<12	<12	<12	<12	<11
Cs-137	37+/-8	55+/-10	<15	<14	<11	<13
Ce-141	<MDA	<MDA	<MDA	24+/-9	<MDA	<MDA

* a - Analysis is not required.

Table 20. Analysis of fish samples for 1985.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR

1985

Measurements in units of pCi/kg (wet)

WI - Section of Radiation Protection data

Collection Date	10-22-85	10-22-85
Type	carp	walleye
Gamma Isotopic		
K-40	1000+/-300	1500+/-300
Mn-54	-3+/-14	-3+/-13
Fe-59	11+/-40	18+/-50
Co-58	-6+/-13	-12+/-17
Co-60	10+/-18	40+/-20
Zn-65	-5+/-30	15+/-30
Cs-134	5+/-13	-3+/-12
Cs-137	5+/-13	11+/-15

Isotopes other than those reported were not detected.

LACBWR data

Collection Date	10-22-85	10-22-85
Type	carp	walleye
Gamma Isotopic		
K-40	* a	* a
Mn-54	<6.94	<3.8
Fe-59	<12	<11
Co-58	<7.36	<4.2
Co-60	31+/-14	3+/-10
Zn-65	<16.8	<12.3
Cs-134	<8.1	<4.5
Cs-137	<9.5	<4.5
Ce-141	* a	* a
Nb-95	12+/-6	

* a - Analysis is not required.

Table 21. Analysis of bottom sediments for 1985.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LACBWR
1985

Measurements in units of pCi/kg (dry)

WI - Section of Radiation Protection data

Collection Date	06-05-85	06-05-85	06-05-85	10-16-85	10-16-85	10-16-85
Type	bottom sed.	bottom sed.	bottom sed.	bottom sed.	bottom sed.	bottom sed.
Location	outfall	boat launch	Lock & Dam #8	outfall #2	downstream	upstream
Analysis						
Gross beta (dry)	11000+/-4000	19000+/-4000	11000+/-4000	13000+/-4000	23000+/-5000	7000+/-4000
Gross alpha (dry)	800+/-4000	14000+/-7000	5000+/-5000	3000+/-4000	3000+/-5000	-500+/-3000
Gamma Isotopic						
Mn-54	30+/-30	50+/-30	16+/-14	180+/-70	-2+/-30	5+/-17
Co-58	-2+/-40	-5+/-40	-4+/-30	-4+/-110	20+/-40	3+/-20
Co-60	620+/-50	140+/-50	20+/-20	8620+/-170	110+/-40	2+/-19
Cs-134	-2+/-30	-2+/-30	19+/-18	560+/-90	30+/-30	-2+/-17
Cs-137	120+/-30	140+/-30	7+/-16	17600+/-200	160+/-40	17+/-15
K-40	6700+/-500	13900+/-800	5300+/-500	6300+/-500	13200+/-800	5900+/-400
Ra-226 * a	40+/-400	500+/-500	600+/-300	1900+/-1400	1200+/-600	200+/-300
Pb-214 * a	150+/-40	300+/-50	130+/-40	300+/-150	400+/-70	140+/-30
Bi-214 * a	200+/-50	340+/-60	160+/-40	1570+/-160	510+/-70	200+/-40
Tl-208 * a	110+/-70	360+/-80	200+/-50	160+/-190	420+/-100	170+/-50
Ac-228 * a	230+/-100	210+/-110	200+/-70	600+/-300	410+/-130	250+/-60

*a - Naturally occurring radioisotopes Ac-228 and Tl-208 are from the Thorium-232 decay series.
Ra-226, Pb-214, and Bi-214 are from the Uranium-238 decay series.
Isotopes other than those reported were not detected.

LACBWR data

Collection Date	06-05-85	06-05-85	06-05-85	10-16-85	10-16-85	10-16-85
Type	bottom sed.	bottom sed.	bottom sed.	bottom sed.	bottom sed.	bottom sed.
Location	outfall	boat launch	Lock & Dam #8	outfall #2	downstream	upstream
Analysis						
Gross beta (dry)	* b	* b	* b	* b	* b	* b
Gross alpha (dry)	* b	* b	* b	* b	* b	* b
Gamma Isotopic						
Mn-54	25+/-7	21+/-7	<MDA	267+/-24	21+/-7	10+/-3
Co-58	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
Co-60	777+/-21	139+/-17	13[illegible]/-10	9726+/-71	100+/-20	<MDA
Nb-95	20+/-7	26+/-8	<MDA	<MDA	24+/-10	<MDA
Cs-134	<MDA	<MDA	<MDA	868+/-28	<11	<6.2
Cs-137	147+/-9	173+/-13	19+/-5	21340+/-88	111+/-15	<6.2
K-40	* b	* b	* b	* b	* b	* b
Ra-226 * a	* b	* b	* b	* b	* b	* b
Pb-214 * a	* b	* b	* b	* b	* b	* b
Bi-214 * a	* b	* b	* b	* b	* b	* b
Tl-208 * a	* b	* b	* b	* b	* b	* b
Ac-228 * a	* b	* b		* b	* b	* b

* b - Analysis was not required.

Table 22. Analysis of milk samples for 1985.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION

LACBWR
1985

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

A. Malin - 2.1 miles NE
P. Malin - 1.0 miles NE
Pedretti - 1.4 miles SE

Collection date	01-15-85	02-12-85	03-12-85	04-09-85	05-14-85	06-11-85
Location	A. Malin	P. Malin	Pedretti	A. Malin	P. Malin	Pedretti
Isotope:						
I-131	-0.05+/-0.15	-0.05+/-0.17	0.24+/-0.14	-0.04+/-0.11	-0.38+/-0.12	0.32+/-0.15
Ba,La-140	0+/-4	5+/-5	7+/-6	2+/-5	-2+/-6	-2+/-6
Cs-134	4+/-6	3+/-7	-1+/-6	0+/-6	8+/-6	1+/-6
Cs-137	7+/-6	6+/-7	6+/-6	1+/-7	0+/-7	4+/-7
K-40	1480+/-190	1050+/-170	1410+/-170	1450+/-170	1560+/-180	1330+/-170
Sr-90	3.8+/-0.7	4.2+/-1.0	5.1+/-0.8	3.5+/-0.6	5.5+/-0.7	7.0+/-0.8

Collection date	07-09-85	08-13-85	09-10-85	10-08-85	11-12-85	12-10-85
Location	P. Malin	P. Malin	Pedretti	P. Malin	A. Malin	Pedretti
Isotope:						
I-131	-0.25+/-0.10	0.06+/-0.11	0.17+/-0.05	0.02+/-0.05	-0.20+/-0.07	-0.13+/-0.08
Ba,La-140	-2+/-6	0+/-7	-2+/-6	-3+/-6	-1+/-6	-5+/-5
Cs-134	2+/-6	-1+/-7	-1+/-7	3+/-5	6+/-5	-1+/-6
Cs-137	-1+/-7	4+/-6	8+/-6	-1+/-7	1+/-6	3+/-5
K-40	1520+/-190	1140+/-180	1470+/-180	1280+/-170	1290+/-180	1440+/-130
Sr-90	2.9+/-0.8	2.2+/-0.6	4.3+/-0.6	2.2+/-0.6	2.5+/-0.7	2.4+/-0.7

Isotopes other than those reported were not detected.

LACBWR data

Collection date	01-15-85	02-12-85	03-12-85	04-09-85	05-14-85	06-11-85
Location	A. Malin	P. Malin	Pedretti	A. Malin	P. Malin	Pedretti
Isotope:						
I-131	<5.9	<4.5	<4.5	<5.0	<5.5	<5.0
Ba,La-140	<22	<23	<22	<23	<26	<23
Cs-134	<5.7	<5.4	<4.8	<5.3	<6.9	<5.8
Cs-137	<6.1	15+/-5	<6.1	<6.8	<5.9	<6.7
K-40	* a	* a	* a	* a	* a	* a

Collection date	07-09-85	08-13-85	09-10-85	10-08-85	11-12-85	12-10-85
Location	P. Malin	P. Malin	Pedretti	P. Malin	A. Malin	Pedretti
Isotope:						
I-131	<4.5	<4.8	<2.1	<4.3	<1.9	<4.7
La-140	<6.1	<14	<5.4	<5.3	<4	<4.7
Cs-134	<5.1	<5.8	<2.7	<4.2	<3.8	<5.8
Cs-137	<5.4	1.2+/-7	<16	<6.2	30+/-13	9+/-7
K-40	* a	* a	* a	* a	* a	* a
Ba-140	<22	<27	<14	<23	<13	<22
Nb-95	<MDA	13+/-3	<MDA	<MDA	<MDA	<MDA
Co-57	<MDA	<MDA	<MDA	<MDA	18+/-16	21+/-12
Co-60	<MDA	<MDA	<MDA	<MDA	5+/-5	<MDA

* a - The isotope was not specifically analyzed for.

Table 23. Analysis of food products for 1985.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

LAC8WR

1985

Measurements in units of pCi/kilogram (wet)

WI - Section of Radiation Protection data

Collection Date	08-06-85
Type	food product
Location	A. Malin
Analysis	
Gross beta	2100+/-500
Gross alpha	-100+/-400
Gamma Isotopic	
9e-7	-16+/-50
K-40	2100+/-130
Co-58	-5+/-5
Co-60	10+/-7
Zr-95	-4+/-12
I-131	-13+/-9
Cs-134	-1+/-5
Cs-137	-1+/-5

Isotopes other than those reported were not detected.

LAC8WR data

Collection Date	08-06-85
Type	food product
Location	A. Malin
Analysis	
Gamma Isotopic	
Be-7	* a
K-40	3130+/-1950
Co-58	<7
Co-60	<17
Zr-95	<13
I-131	<8
Cs-134	<7
Cs-137	27+/-7

* a - The isotope was not specifically analyzed for.

DMB

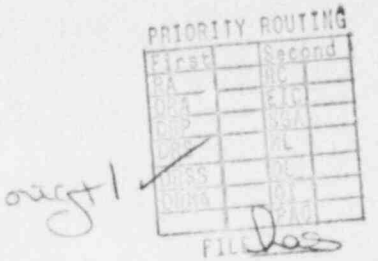
State of Wisconsin \ DEPARTMENT OF HEALTH AND SOCIAL SERVICES

DIVISION OF HEALTH
MAIL ADDRESS:
1 WEST WILSON STREET
P.O. BOX 309
MADISON, WISCONSIN 53701-0309

Phone: 608 - 273-5180

April 25, 1986

Mr. James G. Keppler 124
Regional Administrator
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
GLEN ELLYN IL 60137



Dear Mr. Keppler:

Enclosed are the annual environmental radioactivity reports for 1985 for the Kewaunee Nuclear Power Plant, Point Beach Nuclear Power Plant and the LaCrosse Boiling Water Reactor. These reports are being submitted in accordance with the reporting provisions of the U.S. Nuclear Regulatory Commission Contract #NRC 30-83-647.

Sincerely,

Lawrence J. McDonnell, Chief
Section of Radiation Protection

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Enclosures

APR 28 1986

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