UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DAIRYLAND POWER COOPERATIVE	)	Docket No. 50-409
	)	(FTOL Proceeding)
	)	
(La Crosse Boiling Water Reactor)	)	

APPLICANT'S RESPONSE
TO
LICENSING BOARD QUESTIONS

Dairyland Power Cooperative (Dairyland or DPC), the applicant for the conversion of Provisional Operating License No. DPR-45 to a full term operating license (FTOL) in the above-captioned proceeding, hereby submits its response to the questions attached to the Atomic Safety and Licensing Board's Memorandum and Order Setting Prehearing Conference, dated May 21, 1980, as follows:

Question 1

With respect to Contention 2A, regarding off-gas emissions, there appear to be some discrepancies in the radiological release figures provided in the FES. The Staff's evaluation of releases of radioactive material in gaseous effluents is based on the period 1978-79, whereas the Applicant's higher estimates for noble gases, I-131 and particulates are based on actual releases during early 1977. On the other hand, EPA estimates that releases of I-131 may be considerably higher (FES, p. A-10). The Board desires a reconciliation of these estimates and, in any event,

> a listing of actual annual releases of gaseous effluents (particularly I-131) throughout the life of the plant. The Board also wishes an explanation of why the years used by the Staff (1978-79) as a basis for estimates are more appropriate than those used by the Applicant or EPA, which apparently reflect higher release va'-es. Please describe in detail any mechanical oı operational changes in the facility which may justify using the years chosen by the Staff.
>
> In making its calculation of estimated radiological releases, the Staff apparently used the parameters appearing in Table 3.6-1, including a plant capacity factor of .71. The .71 factor was based on 9 years past operation at 0.5 and 21 years projected operation at a factor of 0.8. In projecting for the future, why should not on.y the future projected factor (0.8) be used? (In any event, is 0.8 a realistic projection?)

DPC Response to Question 1

The NRC Staff utilized actual releases from LACBWR during the period 1978-79 as the basis for the projected releases of radioactive material in gaseous effluents provided in the FES. The releases during 1978-79 occurred after the completion of extensive modifications to the off-gas treatment system. DP 's earlier e timate of radiological releases was based upon actual releases during early 1977 prior to the implementation of these modifications. Inasmuch as the releases during 1978-79 are more representative of present and future operating conditions at LACBWR they provide a more accurate basis for projecting future releases. The EPA comment in the FES recommends that the NRC Staff factor in actual releases during periods of operation in developing release estimates, particularly in situations where the actual releases are lower than prior estimates. This the Staff has done.

By letter dated June 13, 1980, DPC provided the Licensing Board with copies of the LACBWR Effluent Reports and Environmental Monitoring Reports for the years 1972-1979. In addition, a graph showing actual I-131 releases from LACBWR for the years 1972 through 1979 is provided in Figure 1. The graph shows that during the years 1978 and 1979, the actual I-131 atmospheric releases from LACBWR decreased by a factor of approximately 15.0 compared to the I-131 releases during 1977, and decreased by a factor of 16.0 compared to the average total I-131 atmospheric release for the years 1972 through 1977.

The primary reason for the reduced I-131 release during 1978-1979 was the completion of modifications to the offgas treatment system in 1978 referred to earlier. This augmented offgas system is described on Page 3-13 of the FES. A simplified drawing of the gaseous waste and ventilation systems is provided in Figure 3.6-2 of the FES. Basically, the augmented offgas system handles air ejector gases from the main condenser. The augmented system includes a catalytic recombiner, two in-series 1600 ft^3 waste gas storage tanks, and an additional combination HEPA filter and charcoal absorber. This system allows increased holdup and decay of shorter lived noble gases prior to release to the 350-foot stack. Additional I-131 removal is also achieved by the charcoal absorber. Further, the combined removal of H_2O with the recombiner systems and added charcoal absorber increases the holdup and decay of halogens (including I-131) prior to release to the stack. The net result of using this system is a reduction in the atmospheric release of fission gases, including I-131.

The projected capacity factor of 0.71 was based on 9 years past operation at 0.5 and 21 years projected operation at a factor of 0.8. While a 0.8 capacity factor can be achieved, a more realistic projection for plant capacity factor in the future would be 0.7 with a range from 0.63 to 0.78. The Staff utilized 0.71 in calculating its estimates.

Question 2

With respect to Contention 2B, regarding occupational exposure of workers, the FES includes a number of figures which appear to call for further explanation. For instance, it lists 156 man-rems/year as the average LACBWR occupational exposure for the years 1970-1978 (§ 5.5.2, p. 5-12). In contrast, it lists 600 man-rems/year/reactor unit as general past exposure experience (without defining which reactors and which years are included) (*Id.*). At the spent fuel pool hearing, however, the Staff testified that the annual worker exposures of LACBWR ranged from about 110 to 240 man-rems (Shea, direct testimony, p. 4, fol. Tr. 893). Moreover, the Staff's Environmental Impact Appraisal prepared in conjunction with the spent fuel pool expansion proceeding suggested that occupational exposures with the additional spent fuel might be 1% higher than earlier annual man-rem exposures (EIA, § 8.1.2).

The Board wishes to be provided with a listing of the annual man-rem occupational exposures at LACBWR throughout its operation and an explanation for any years during which exposures were significantly above the predicted average of 156 man-rems. The Board also wishes to be provided with an analysis of man-rem exposures at reactors of varying sizes and an explanation as to how the predicted occupational exposure of 156 man-rems may be considered ALARA in view of the relatively small size of LACBWR and the relatively lower number of employees at LACBWR compared to larger reactors. In addition, the Board wishes to be advised why average occupational exposures at Big Rock Point, Nine Mile Point, and Oyster Creek have apparently been lower than at LACBWR and whether measures used at those plants might possibly be adopted at LACBWR.

DPC Response to Question 2

NUREG-0594 contains data concerning the following exposure parameters for all operating commercial nuclear power plants in the United States: (1) total man-rem, (2) average rem/man, and (3) man-rem per megawatt year, for the years 1971 through 1978. The data for relatively smaller BWR's (i.e., LACBWR, Big Rock Point, Nine Mile Point, and Oyster Creek) are presented in Table 1. In addition, the total man-rem for these four power plants for the years 1971-1978 are plotted in Figure 2. Table 2 provides the total man-rem ranges for the four plants for years 1971-1978.

Table 1 indicates that LACBWR's average total man-rem for the years 1971 to 1978 is lower than the three other small BWR's compared. LACBWR's 9-year average is 178 man-rem, whereas Big Rock Point is 238 man-rem, Nine Mile Point is 578 man-rem, and Oyster Creek is 1006 man-rem.

The man-rem variances, as shown in Table 2, for LACBWR and Big Rock Point (the two smallest BWR's) for the years 1971-1978 are relatively small. LACBWR has a range of 111 to 234 man-rem/year, and Big Rock Point has a range of 175 to 334 man-rem/year. There is no indication of a man-rem increase with plant age for either LACBWR or Big Rock Point. However, Table 2 shows that man-rem variances for Nine Mile Point and Oyster Creek (two 600 MWe BWR's) for the years 1971-1978 are relatively large. Nine Mile Point has a range of 195 to 1383 man-rem/year, and Oyster Creek has a range of 240 to 1614 man-rem/year. In the case of Oyster Creek, as well as larger BWR plants, there appears to be an indication of man-rem increases with plant age as reported in NUREG-0594.

Table 1 indicates that LACBWR's average rem/man is slightly higher than that of Big Rock Point's average rem/man from 1971-1978. In the same analysis, both LACBWR and Big Rock Point have higher average rem/man exposures than Nine Mile Point and Oyster Creek. The reason larger BWR's seem to have a reduced average rem/man is because of staffing conditions and exposure "averaging." In other words, larger BWR's, like Nine Mile Point and Oyster Creek utilize numerous temporary employees, especially during refueling outages, to perform radiation related maintenance work, whereas the smaller BWR's, like LACBWR and Big Rock Point, rely mainly on permanent employees to perform maintenance work during outages. This means that the larger BWR's may have a larger pool of radiation workers, allowing them to achieve lower average rem/man exposures.

Some BWR plants also appear to monitor the exposures of non-radiation workers (e.g., secretaries, guards, janitors, vendors, and truck drivers, etc.), and include their numbers in their average rem/man exposure averaging concept. LACBWR does not do this, but includes only radiation workers in average exposure computation. This practice of monitoring exposures of non-radiation workers and including them in exposure averaging would tend to reduce the average rem/man of larger BWR's as compared to LACBWR. NUREG-0594 also indicates that the man-rem/megawatt year figures for LACBWR are comparable to those for Big Rock Point and Oyster Creek in light of their higher MWe capacity.

LACBWR's occupational exposures also meet ALARA requirements in comparison with other smaller BWR's. As Regulatory Guide 8.8 states: "Merely controlling the maximum dose to individuals is not sufficient; the collective dose to the group (man-rem) also must be kept ALARA;" moreover, "restricting the doses to individuals at a fraction of the applicable limit would be inappropriate if such action would result in the exposure of more persons to radiation and increase the total man-rem dose."

While LACBWR may expose 100 workers to 180 man-rem for an average rem/man of 1.8 rem/year, other larger BWR's may expose 1,000 workers to 700 man-rem for an average rem/man of 0.7 rem/year, and dual-unit large BWR plants may expose 4,000 workers to 2,000 man-rem for an average rem/man of 0.5 rem/year. LACBWR's occupational exposure is ALARA, as documented in the FES.

Board Question 3

With regard to Contention 8, concerning environmental radiological monitoring, the FES suggests that the monitoring which is being provided is that required by Regulatory Guide 1.21 (see FES § 6.4). The latest revision of that Guide apparently is dated June 1974. However, the Board is aware that the Department of Health, Education and Welfare, Public Health Service, commented critically on the operational off-site radiological monitoring program (FES, p. A-4) and that the Staff declined to respond to those comments (FES, § 11.6, p. 11-8). The Board is also aware that new and additional guidelines for environmental radiological monitoring have recently been developed and provided to both licensees and operating license applicants. See Branch Technical Position (BTP), Revision 1 (November 1979) of Radiological Assessment Branch, provided to licensees by letter from W. P. Gammill, dated November 27, 1979, and to operating license applicants by letter from Steven A. Varga, dated December 21, 1979. (This BTP apparently updates Regulatory Guide 4.8, which was referred to in the DES but has been deleted from the FES.)

The Board wishes to be provided with a complete description of the environmental radiological monitoring program and apprised as to whether, and if so in what manner, DPC will comply with the requirements of the foregoing BTP, Revision 1, the Board should be provided with explanations as to why particular provisions of the BTP, Revision 1, are not to be followed.

DPC Response to Question 3

A description of the environmental monitoring program employed by DPC in connection with the operation of LACBWR is contained in the environmental monitoring reports provided to the Licensing Board on June 13, 1980. A general description of the program is also contained in DPC's Environmental Report. It is DPC's understanding that the comment by the Public Health Service on the DES concerned the lack of detail in the DES on the environmental monitoring program rather than the adequacy of the program itself.

NRC Regulatory Guide 1.21 deals with effluent monitoring. The DPC environmental monitoring program for LACBWR conforms with the requirements of Regulatory Guide 4.8 as well as the Branch Technical Position (BTP), Revision 1 (Nov. 1979) of the NRC Staff. Radiological Assessment Branch, as described in some detail in Dr. Branagan's Affidavit submitted in support of the NRC Staff's Motion for Summary Disposition, dated June 6, 1980. An outline of the DPC environmental monitoring program, listing the type, frequency, location and analysis for each sample taken is contained in Tables 3 and 4. The sampling locations are shown on Figure 3.

Board Question 4

> With reference to the impacts on aquatic biota, the Board wishes to be provided with a summary listing of the LACBWR environmental studies to date, including the time that the studies were carried out and their content. Explain the discrepancy between the range in annual commercial fish catches described in § 2.7 of the FES (p. 2-14), and the data provided in Table 2.7-2. Is the large decline in fish catch in Pond 9 since 1974 significant, and how does this square with statements made in the second paragraph of § 10.1.2? Before construction and operation of

LACBWR, were living specimens of the Higgins' pearly eye mussel found in Thief Slough or other areas nearby?

DPC Response to Question 4

In addition to the radioactive effluent and environmental monitoring reports and other information related to the updating of the ER provided to the Board on June 13, 1980, the following additional environmental studies relating to LACBWR have been performed:

(a) Studies to Determine the Aquatic Ecological Impacts of Thermal Discharges at the Genoa Generating Station. Wapora, Inc., G. Johnston, 1975.

This study was conducted from July 1974 to July 1975. The following parameters were investigated: water temperature, dissolved oxygen, color, turbidity, phytoplankton, zooplankton, macroinvertebrates, fisheries -- general population distribution, intake structure study, entrainment and impingement.

This study was accepted by the Wisconsin DNR. No changes in operation were recommended.

(b) LACBWR Cooling Water Intake Structure - 316(b), Wapora, Inc., George Johnston, 1976.

This study documented in detail the effect of LACBWR on entrainment and intake structure impingement. The results of this study were accepted by the Wisconsin DNR and no changes to facility operation were deemed necessary.

(c) George L. Johnston, Mussel Survey of Thief Slough at Mile 678 on the Mississippi River near Genoa, Wisconsin, 1978. 11 p. and appendix.

This survey documented the mussel population in Thief Slough. Nineteen different mussels were found in Thief Slough using brailing and diving techniques downstream from the LACBWR discharge. No endangered Higgin's Pearly Eye mussel (Lampsilis higgins) were found.

(d) DPC Environmental Studies 1978, Vol. 2. The study contains survey data on fisheries in the vicinity of the Genoa site.

The sentence in § 2.7 of the FES describing the range of pounds of commercial fish caught should read from 451,659 to 1,485,637, rather than 886,595 to 1,485,637.

Insofar as the decline in commercial fish catch in pool 9 since 1974 is concerned, the catch is largely a function of effort. The Wisconsin DNR data on pool 9 commercial fishing indicates that the seining gear units used in pool 9 between 1974 and 1978 dropped significantly (i.e., from 173,000 to 45,000). The weight of commercial fish reported is primarily a function of the pounds of carp, buffalo and drum collected. These species are collected mostly by seining. The reason for the drop in poundage is due to the decline in seining effort in those years. In any event, DPC does not believe that there is any correlation between the reduction in poundage and the operation of LACBWR and concurs with the conclusion contained in § 10.1.2 of the FES.

DPC is unaware of any living specimens of the Higgin's Pearly Eye mussel being found before construction of LACBWR in Thief Slough or nearby. No surveys were made by DPC before construction. A review of the literature reveals no documentation of this mussel in the vicinity of the facility. A survey in 1978 of the Upper Mississippi River by Dr. Samuel Fuller found the endangered Higgin's Eye Pearly mussel primarily near Hudson on the St. Croix River and Prairie du Chien on the Mississippi River. See Fuller, S.L.H., 1978. Freshwater mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: observations at selected sites within the 9-foot channel navigation project on behalf of the United States Army Corps of Engineers. The Academy of Natural Sciences of Philadelphia Division of Limnology and Ecology, No. 78-33:1-401.

Board Question 5

> In its comments on the DES, the Environmental Protection Agency indicated that, although LACBWR's cooling system in general is in conformance with the requirements of EPA regulations, the combined discharges of LACBWR and the neighboring Genoa-3 coal-fired facility result in chlorine levels exceeding those recommended by the Wisconsin Department of Natural Resources (FES, p. A-6). Apparently, LACBWR itself does not chlorinate (Id., pp. 5-20, A-7), so that the entire chlorine discharge emanates from Genoa-3. If this be so, the Board wishes to be apprised as to whether there is any action which could be taken with respect to LACBWR which could reduce the levels of chlorine emitted from the combined, common discharge. How could EPA's recommendation that "chlorination procedures be evaluated" be carried out? Is a proceeding involving an operating license for LACBWR the proper forum in which to undertake such an inquiry?

DPC Response to Question 5

As noted in the Board's question, the need for chlorination arises in connection with the discharge from the Genoa-3 coal fired facility, rather than the discharge from LACBWR. Chlorination of the combined discharge from the two facilities is regulated by, and complies with, the guidelines of the Wisconsin Department of Natural Resources. During one month in 1976, temporary operational difficulties with the chlorine control system at Genoa-3 resulted in the exceeding of the DNR recommended levels. The combined discharge has met the recommended DNR levels ever since and there is no reason to believe that it will not continue to meet these levels in the future. This topic is also discussed in the December 12, 1979 letter from DPC to NRC provided to the Board on June 13, 1980. DPC does not believe that there is any need for further evaluation of the chlorination procedures at this time.

Board Question 6

In responding to an EPA comment concerning the use of any materials containing PCBs, the Staff indicated that the Applicant had stated that materials containing PCBs are not presently used on the site and there are no plans to use any such materials in the future (FES, § 11.5.12, p. 11-8). The Board wishes to be advised whether, if the Applicant's plans in this regard should change, the matter would be one regarded by the Applicant and/or Staff as falling within the purview of the first paragraph of the proposed license condition appearing in paragraph numbered 7 on p. ii of the FES.

Response to Board Question 6

There are no plans to use any materials containing PCB's at LACBWR. Dairyland Power Cooperative does have an operations manual governing PCB handling and storage at all of its sites and facilities. Further, DPC complies with applicable EPA requirements governing PCB handling and disposal. DPC has a Wisconsin DNR solid waste disposal license covering disposal of PCB's and if PCB's were ever used at LACBWR, they would be handled and disposed of in accordance with the terms of this license.

Board Question 7

> The Applicant has recently indicated that it plans to phase out operations of LACBWR in 1990. If various calculations in the FES were changed to reflect 10 more years of operation (instead of 20), what changes (if any) would result? (Among other things, changes in the amounts of radioactive effluents and in the need-for-power estimates might appear to be warranted, as well as resultant modifications to the cost-benefit balance.)

DPC Response to Board Question 7

DPC believes that the conclusions contained in the FES regarding the cost-benefit analysis would remain unchanged if LACBWR were phased out in 10 years rather than 20 years. On the benefit side, the DPC system need for the power produced by LACBWR and the enhanced system reliability provided by LACBWR during the period from 1980-1990 would remain unchanged even though any potential benefits in these areas would be foregone during 1990-2000. On the cost side, even though the annual environmental impacts associated with operation of LACBWR are minimal, the total impacts for 10 years operation would be approximately one half of those for 20 years operation. Thus, while the benefits associated with operating LACBWR during the period from 1990-2000 would have to be deleted from the cost-benefit balance, the costs associated with operation during the period would also have to be deleted. The cost-benefit balance would then be reduced to considering whether the benefits from continued operation of LACBWR during 1980-1990 (i.e., helping DPC meet its projected system needs, enhancing system reliability, reducing system dependence on coal, etc.) exceed the negligible environmental costs associated with operation during 1980-1990. The cost-benefit balance contained in the FES amply demonstrates that the cost-benefit balance would remain favorable regardless of which scenario is followed.

TABLE 1

OCCUPATIONAL EXPOSURE PARAMETERS AT FOUR SMALLER SINGLE UNIT BWR-TYPE NUCLEAR POWER PLANTS IN THE USA, 1971 TO 1978. (BASED ON NUREG-0594)

YEAR	SINGLE UNIT BWR NUCLEAR PLANTS											
	LACBWR (50 MWe)			BIG ROCK POINT BWR (71 MWe)			NINE MILE POINT BWR (610 MWe)			OYSTER CREEK BWR (620 MWe)		
	MAN REM	AVERAGE REM/MAN	MR PER MW-YR.	MAN REM	AVERAGE REM/MAN	MR PER MW-YR.	MAN REM	AVERAGE REM/MAN	MR PER MW-YR.	MAN REM	AVERAGE REM/MAN	MR PER MW-YR.
1971	158	0.72	5.0	184	0.7	4.1	195	0.2	0.6	240	0.8	0.5
1972	172	1.13	5.9	181	0.9	4.1	285	0.4	0.8	582	1.7	1.1
1973	221	1.41	9.1	285	1.2	5.6	517	1.0	1.3	1236	1.6	2.7
1974	139	1.21	3.7	276	1.0	6.6	824	1.1	2.1	984	1.1	2.3
1975	234	1.42	7.3	180	0.6	5.1	681	1.0	2.0	1132	0.9	3.0
1976	111	0.94	5.2	289	0.6	9.8	428	1.1	0.9	1078	0.7	2.4
1977	224	1.59	19.8	334	0.7	7.7	1383	1.3	4.0	1614	1.0	4.2
1978	168	0.90	7.6	175	0.6	3.6	314	0.6	0.6	1279	0.9	3.0
1979												
1980												
AVE.	178	X	8.0	238	X	5.8	578	X	1.5	1006	X	2.4

TABLE 2

RANGES OF TOTAL MAN-REM EXPOSURES FOR SELECTED SMALL BWR'S FOR THE YEARS 1971-1978

BWR PLANT	RATED MWe	TOTAL MAN REM RANGE (1971 TO 1978)	AVERAGE MAN-REM (1971-1978)
LA CROSSE BWR	50	111-234	178
BIG ROCK POINT	71	175-334	238
NINE MILE POINT	610	195-1383	578
OYSTER CREEK	620	240-1614	1006

TABLE 3

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Locations**	Sampling and Collection Frequency	Type of Frequency of Analysis
1. AIRBORNE			
a. Radioiodine and Particulates	Locations #4, #6, #15, #16, #17, #18, and #22	Continuous operation of sampler with sample collection as required by dust loading but at least once per 7 days.	Radioiodine canister. Analyze at least once per 7 days for I-131. Particulate sampler. Analyze for gross beta radioactivity ≥ 24 hours following filter change. Perform gamma isotopic analysis on each sample when gross beta activity is > 10 times the mean of control sample. Perform gamma isotopic analysis on composite (by location) sample at least once per 92 days.
2. DIRECT RADIATION	Locations #1-#21 ≥ 2 dosimeters at each location.	At least once per 92 days.	Gamma dose. At least once per 92 days.

**Sample locations are shown on Figure 1 in Enclosure 3.

This table was taken from Proposed Changes to Technical Specifications in a letter from Frank Linder, General Manager of Dairyland Power Cooperative, to Dennis L. Ziemann dated August 4, 1979.

TABLE 3 -- cont.

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Locations**	Sampling and Collection Frequency	Type and Frequency of Analysis
3. WATERBORNE			
a. Surface	Locations #15, #27 and #30	Composite* sample collected over a period of ≤ 31 days.	Gamma isotopic analysis of each composite sample. Tritium analysis of composite sample at least once per 92 days.
b. Ground	Locations #6 and #29	At least once per 92 days.	Gamma isotopic and tritium analyses of each sample.
c. Drinking	Locations #24 and #31	Sample collected at least every 31 days.	Gross beta and gamma isotopic analysis of each sample. Tritium analysis of composite sample at least once per 92 days.
d. Sediment from Shoreline	Locations #22, #27, and #30	At least twice per year.	Gamma isotopic analysis of each sample.

*Composite samples shall be collected by collecting an aliquot during at least three batch effluent discharges.

**Sample locations are shown on Figure 1 of Enclosure 3.

TABLE 3 -- cont.

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Locations**	Sampling and Collection Frequency	Type and Frequency of Analysis
4. INGESTION			
a. Milk	Locations #17, #18, and #23	At least once per 15 days when animals are on pasture; at least once per 31 days at other times.	Gamma isotopic and I-131 analysis of each sample.
b. Fish and Invertebrates	Locations #15 or #26 and #30 or #27 or #28	One sample in season, or at least once per 184 days if not seasonal. One sample of each of the following species at two locations: 1. Carp 2. Catfish	Gamma isotopic analysis on edible portions.
c. Food Products	Locations #17, #16 or #23, and #18	At time of harvest. One sample of each of the following classes of food products: 1. Legumes 2. Feed Grains 3. Garden Vegetables	Gamma isotopic analysis on edible portion.
	Location #17	At time of harvest. One sample of broad leaf vegetation.	Gamma isotopic analysis.

**Sample locations are shown on Figure 1 of Enclosure 3.

TABLE 4

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD)*

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg,wet)	Milk (pCi/l)	Food Products (pCi/kg,wet)	Sediment (pCi/kg,dry)
gross beta	4 [b]	1×10^{-2}				
^{3}H	2000(1000 [b])					
^{54}Mn	15		130			
^{59}Fe	30		260			
$^{58,60}Co$	15		130			
^{65}Zn	30		260			
$^{95}Zr\text{-}Nb$	15					
^{131}I	1	7×10^{-2}		1	60 [c]	
$^{134,137}Cs$	15(10 [b]), 18	1×10^{-2}	130	15	80	150
$^{140}Ba\text{-}La$	15			15		

*This table was taken from Proposed Changes to Technical Specifications in a letter from Frank Linder, General Manager of Dairyland Power Cooperative, to Dennis L. Ziemann (NRC/NRR) dated August 14, 1979.

TABLE 4 -- cont.

TABLE NOTATION

a - 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 radio-chemical separation):

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

WHERE:

LLD is the lower limit of detection as defined above (as pCi 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 transformation)

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

2.22 is the number of transformation per minute per picocurie

Y is the fractional 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

The value of s_b used in the calculation of the LLD for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., potassium-40 in milk samples.

TABLE 4 -- cont.

TABLE NOTATION

Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors will be identified and described in the Annual Radiological Environmental Operating Report.

b - LLD for drinking water.

c - LLD for leafy vegetables.

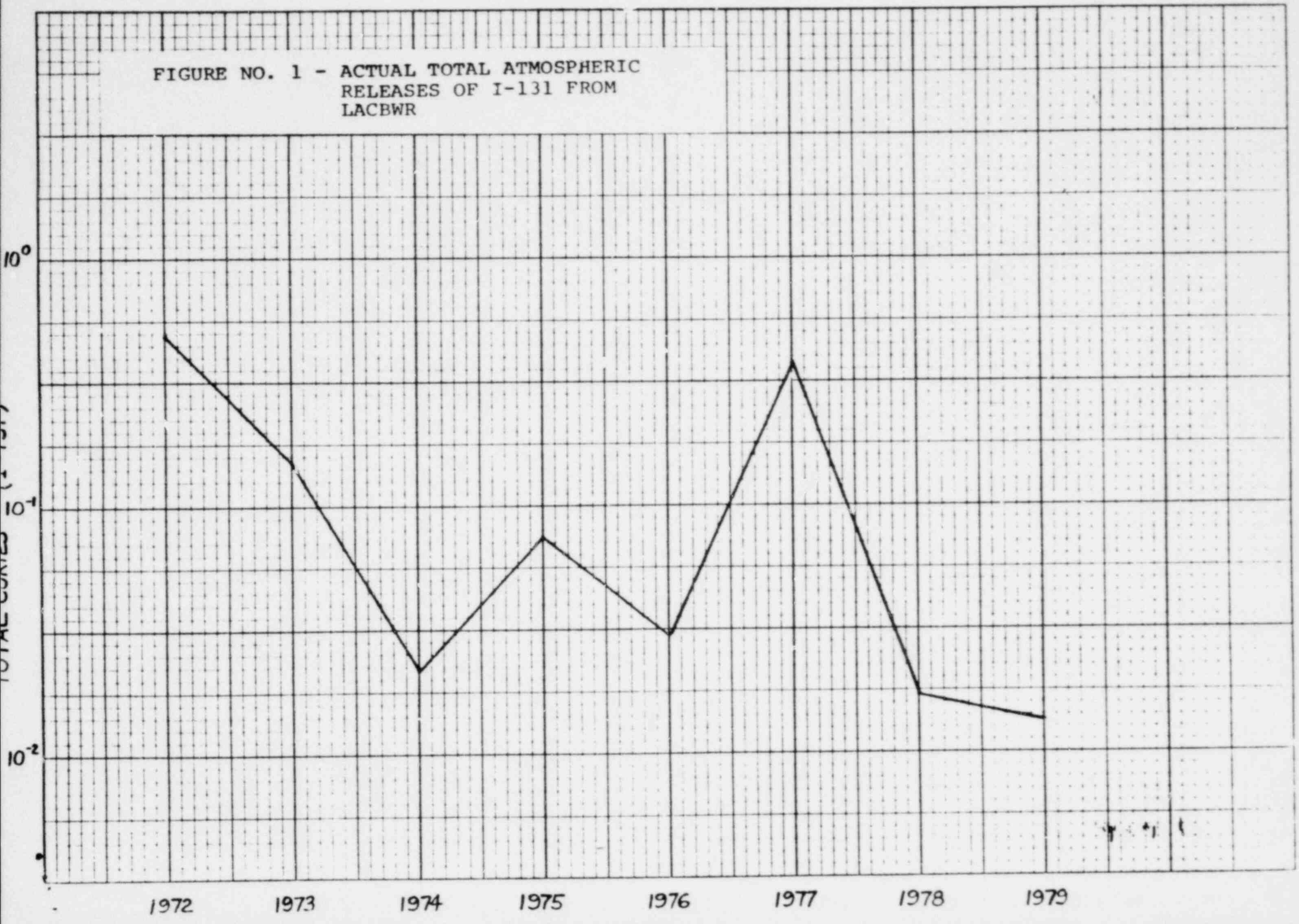
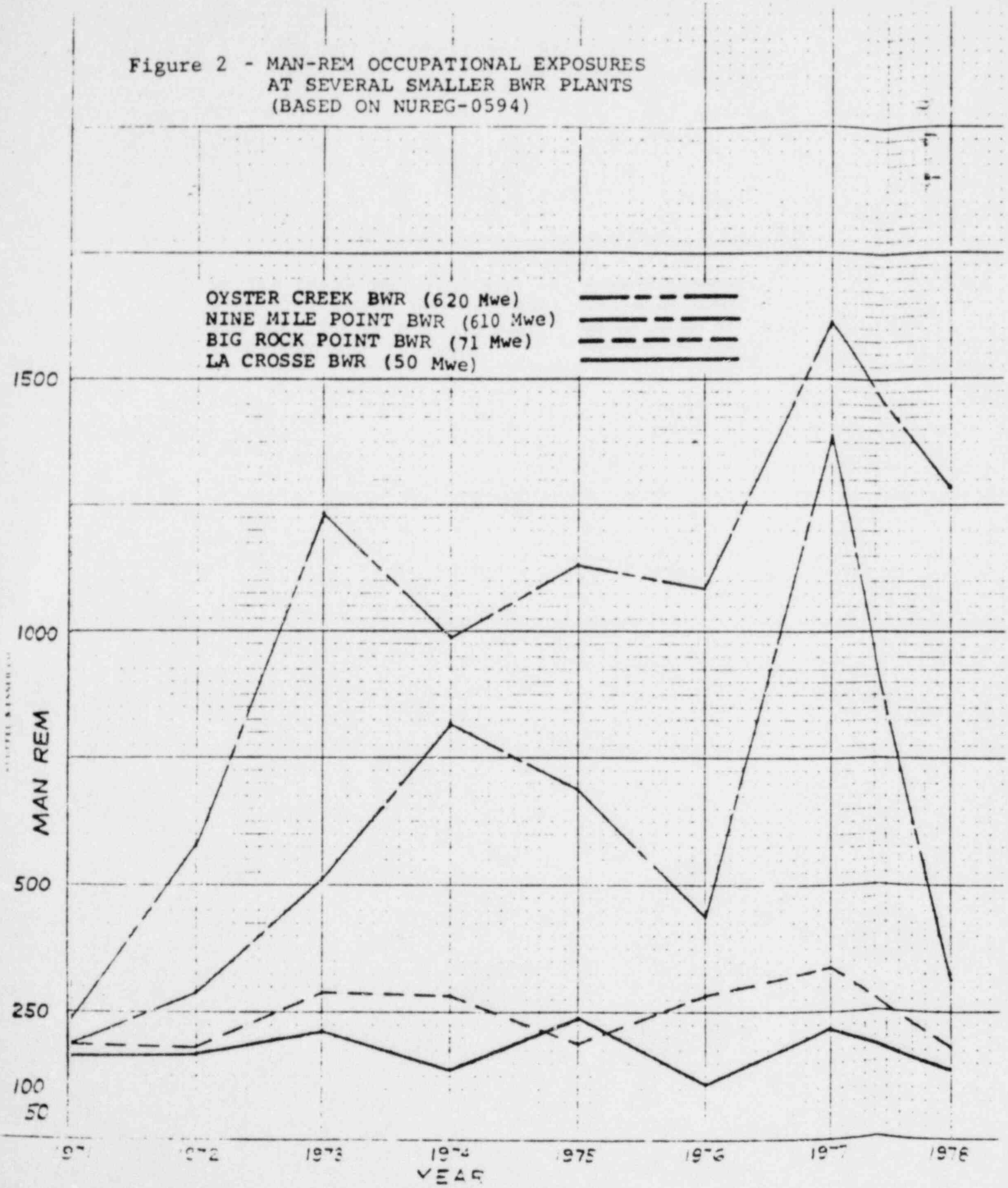
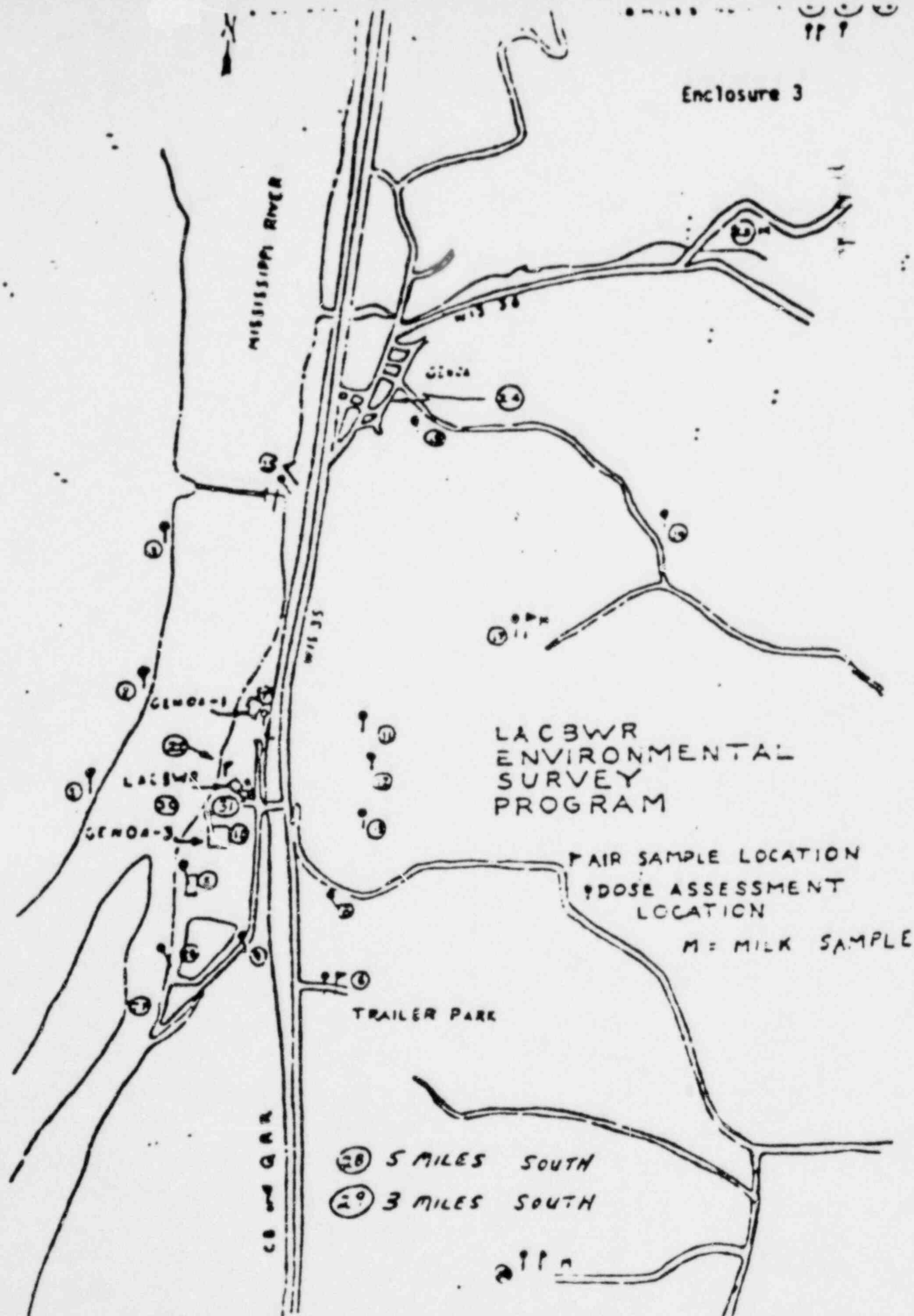


FIGURE NO. 1 - ACTUAL TOTAL ATMOSPHERIC RELEASES OF I-131 FROM LACBWR

Figure 2 - MAN-REM OCCUPATIONAL EXPOSURES AT SEVERAL SMALLER BWR PLANTS (BASED ON NUREG-0594)



Enclosure 3



Radiological Environmental Monitoring Sample Locations

Figure 3

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 50-409
DAIRYLAND POWER COOPERATIVE	)	(FTOL Proceeding)
	)	
(La Crosse Boiling Water Reactor)	)	

AFFADAVIT OF THOMAS A. STEELE
REGARDING ASLB QUESTIONS
SUBMITTED ON MAY 21, 1980

My name is Thomas A. Steele. I am an employee of Dairyland Power Cooperative. I am responsible for the preparation of Dairyland Power Cooperative's LACBWR Environmental Report and subsequent questions. I am authorized to answer the Board's questions. This affidavit was prepared by me, or under my supervision. It is true and correct to the best of my belief. My professional qualifications are attached to this affidavit.

Thomas A. Steele
Thomas A. Steele

Subscribed and sworn to
before me this 11th day of
July, 1980.

Ann Malone
Notary Public

My commission expires 2-26-84

Thomas A. Steele
Professional Qualifications

I am Director of Environmental Affairs for Dairyland Power Cooperative.

My formal education consists of a B.S. from the University of Wisconsin-River Falls in 1961, and an M.S. from the University of Washington, Seattle, in 1963.

Before joining Dairyland Power Cooperative in 1968, I was employed as a Health Physicist for Argonne National Laboratory, Argonne, Illinois from 1963 - 1968. At Argonne I was responsible for radiation protection at various facilities including the CP-5 Reactor, Zero Power Plutonium Reactors, Plutonium Fuel Fabrication facility and Zero Gradient Synochron. While at Argonne, I published papers on personnel dosimetry and radiation protection associated with plutonium fuel fabrication.

Since joining Dairyland Power Cooperative in 1968, I was Health & Safety Engineer at LACBWR until 1971, where the LACBWR radiation protection program and environmental survey program were developed under my supervision. Since 1971, I have been Director of Environmental Affairs for Dairyland Power Cooperative. I organized and developed the Environmental Department for Dairyland, which is responsible for environmental and regulatory functions associated with Dairyland Power Cooperative's generation and transmission system.

I am certified by the American Board of Health Physics and have served on various industry and power pool committees.

Thomas A. Steele

DOCKETED
USNRC
JUL 1 4 1980
Office of the Secretary
Docketing & Service
Branch

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
DAIRYLAND POWER COOPERATIVE	)	Docket No. 50-409
	)	Full-Term
(La Crosse Boiling Water Reactor)	)	Operating License

CERTIFICATE OF SERVICE

Service has on this day been effected by personal delivery or first class mail on the following persons:

Charles Bechhoefer, Esq., Chrm.
Atomic Safety and Licensing
Board Panel
U S. Nuclear Regulator
Commission
Washington, D.C. 20555

Mr. Ralph S. Decker
Route 4
Box 190D
Cambridge, Maryland

Dr. George C. Anderson
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U.S. Nuclear Regulatory
Commission
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Colleen Woodhead, Esquire
Office of Executive Legal Director
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Kevin P. Gallen

for O. S. Hiestand, Jr.

Dated: July 11, 1980