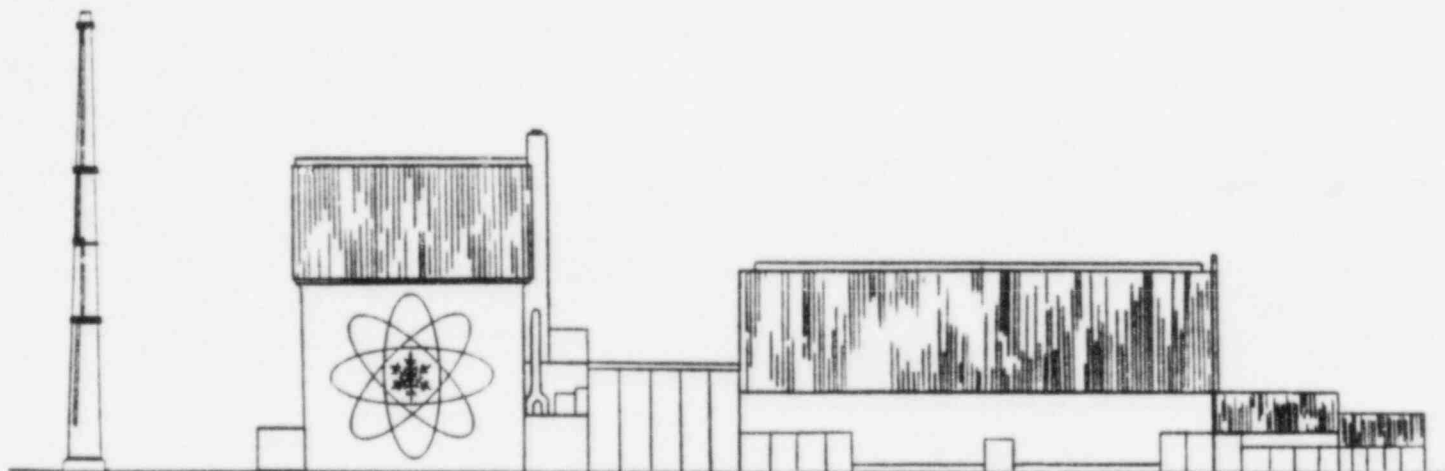


1984

RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE REPORT

JANUARY 1, 1984 through DECEMBER 31, 1984



**JAMES A. FITZPATRICK
NUCLEAR POWER PLANT**

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PDR ADOCK 05000333
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OPERATING LICENSE NO. DPR- 59
DOCKET NO. 50- 333

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NEW YORK POWER AUTHORITY
ANNUAL ENVIRONMENTAL OPERATING REPORT
PART B: RADIOLOGICAL REPORT

JANUARY 1, 1984 - DECEMBER 31, 1984

JAMES A. FITZPATRICK NUCLEAR POWER PLANT
FACILITY OPERATING LICENSE DPR-39
DOCKET NUMBER 50-333

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I-B PROGRAM OBJECTIVES

The objectives of the Radiological Environmental Monitoring Program are as follows:

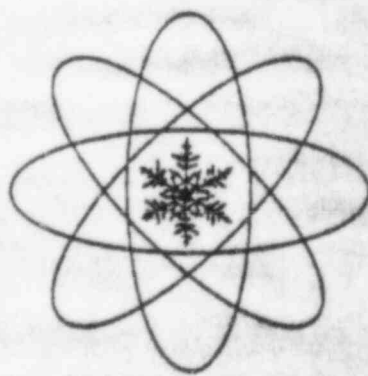
1. To determine and evaluate the effects of plant operation on the environs and to verify the effectiveness of the controls on radioactive material sources.
2. To monitor and evaluate natural radiation levels in the environs of the JAFNPP site.
3. To meet the requirements of applicable state and federal regulatory guides and limits.
4. To provide information by which the general public can evaluate the environmental aspects of nuclear power using data which is factual and unbiased.

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INTRODUCTION

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I-A INTRODUCTION

The New York Power Authority (NYPA) is the owner and licensee of the James A. FitzPatrick Nuclear Power Plant (JAFNPP) which is located on the eastern portion of the Nine Mile Point promontory approximately one-half mile due east of the Niagara Mohawk Power Corporation (NMPC) Nine Mile Point Nuclear Power Station (NMPNPS). The NMPNPS Unit #1 is located on the western portion of the site and is a boiling water reactor with a design capacity of 620 MWe. The NMPNPS has been in commercial operation since the fall of 1969. Located between the JAFNPP and NMPNPS, Nine Mile Point Unit #2 is under construction. NMPNPS Unit #2 will have generation capacity of 1,100 MWe and is expected to be completed in 1986. The JAFNPP is a boiling water reactor with a power output of 810 MWe (net). Initial fuel loading of the reactor core was completed in November of 1974. Initial criticality was achieved in late November, 1974 and commercial operation began in July of 1975.

The site is located on the southern shore of Lake Ontario in Oswego County, New York, approximately seven miles northeast of the city of Oswego, New York. Syracuse, New York is the largest metropolitan center in the area and is located 40 miles to the south of the site. The area consists of partially wooded land and shoreline. The land adjacent to the site is used mainly for recreational and residential purposes. For many miles to the west, east and south the country is characterized by rolling terrain rising gently up from the lake, composed mainly of glacial deposits. Approximately 34 percent of the land area in Oswego County is devoted to farming.

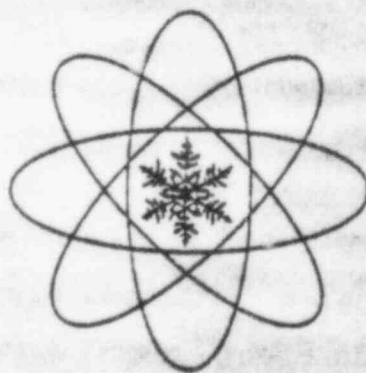
The Radiological Environmental Monitoring Program for the FitzPatrick Plant is a site program with responsibility for the program shared by the Power Authority and Niagara Mohawk. Similar Technical Specifications for radiological monitoring of the environment allows for majority of the sampling and analysis to be a joint undertaking. Data generated by the program is shared by the two facilities with review and publication of the data undertaken through each organization.

This report is submitted in accordance with Section 5.6.1 of Appendix B, to DPR-59, Docket 50-333. Environmental reports of this nature have been compiled and submitted in semiannual and annual reports since 1974. This report contains data from samples representing the period from January 1, 1984 to December 31, 1984.

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II



PROGRAM IMPLEMENTATION AND DESIGN

II PROGRAM IMPLEMENTATION AND DESIGN

To achieve the objectives listed in Section I-B, sampling and analysis are performed as outlined in Tables I and II in this section.

The sample collections for the radiological program are accomplished by a dedicated site environmental staff from both the James A. FitzPatrick Plant and the Nine Mile Point Station. The site staff is assisted by a contracted environmental engineering company, Ecological Analysts, Inc.(EA).

1. SAMPLE COLLECTION METHODOLOGY

A. Lake Water (surface water)

The two indicator stations are the respective inlet canals at JAFNPP and NMPNPS. These samples are composited using continuously running pumps which discharge into large holding tanks.

The control station sample is collected from the city of Oswego water intake. The sample is drawn from the intake prior to treatment and is composited in a large sample bottle.

Quarterly composite samples are made up from proportional aliquotes of monthly samples.

B. Air Particulate/Iodine

The air sampling stations are located in two rings surrounding the site. The onsite locations ring the terrestrial area around the plants inside the site boundary.

The onsite sampling network is composed of nine stations. The offsite air monitoring locations range six to 17 miles from the site and are composed of six stations. Air monitoring locations are shown on Figures 1 and 2 of Section VII.

The air particulate glass fiber filters are approximately two inches in diameter and are placed in sample holders in the intake line of a vacuum sampler. Directly down stream from the particulate filter is a 2 x 1 inch charcoal cartridge used to absorb airborne radiiodine. The samplers run continuously and the charcoal cartridges and particulate filters are changed on a weekly basis.

The particulate filters are composited on a monthly basis by location (offsite, onsite) after being counted individually for gross beta activity.

C. Milk

During the first two months of the 1984 grazing season, milk was collected from eight locations. During the remainder of the 1984 grazing season, milk samples were collected from seven locations. Six of these locations are considered indicator samples and the seventh is used as a control sample. Milk samples are collected in polyethylene bottles from the bulk storage tank at each sampled farm. Before the sample is drawn the tank contents are agitated from three to five minutes to assure a homogenous mixture of milk and butterfat. Two gallons are collected during the first week of each month from each of the farms. An additional one gallon is

d from each farm at mid month to make up the second half monthly composite. The complete composite is made up from Uon collected during the first week of the month and one from the mid month collection. The samples are frozen and l to the analytical contractor routinely within 36 hours of on in insulated shipping containers. The milk sampling lo- are found on Figure 4 of Section VII.

D. Poultry and Eggs

usually one kilogram of meat is collected from locations within le radius of the site. Periodic phone calls are made to the aughter houses to determine availability of slaughtered live- com within the sampling area. Whenever possible meat sam- e collected from locations previously used. Attempts are i collect a control sample located outside the 10 mile radius, th series of collections.

usually one kilogram of poultry and one kilogram of eggs are d from each of three locations within a 10 mile radius of the attempts are made to collect poultry and eggs at the same t the meat samples. The poultry and eggs are frozen and s in insulated containers. Whenever possible samples are o from previously sampled farms. Attempts are made to a control sample located outside the 10 mile radius, with eies of collections (see Section VII, Figure 5).

E. Flood Crops

Flood crops are collected during the late summer harvest at locations previously sampled, if available. One kilogram of the two types of fruits and/or vegetables from each of the locations within a 10 mile radius of the site are collected. Types of fruits and vegetables sampled depend on what is lo- cailable at the time of collection. Attempts are made to col- lect at least one broad leaf type vegetable from each location. The frid vegetables are chilled prior to shipping and shipped fr insulated containers. Attempts are made to collect a con- trole located outside the 10 mile radius for each type of sam- ple (Section VII, Figure 5).

F. Soiles

Soiles are required once every three years. Samples were col during 1983. Soil samples were taken at each of the 15 airoring stations at that time. No soil samples were collected du 1984.

G. Fisoles

Ave fish species are removed from the Nine Mile Point Aquatic EcoStudy monitoring collections during the spring and fall

collection periods. Samples are collected from a combination of the four onsite sample transects and one offsite sample transect (see Section VII, Figure 1). Available species are selected under the following guidelines:

- 1) 0.5 to 1 kilogram of edible portion only of a maximum of three species per location.
- 2) Samples composed of more than 1 kilogram of single species from the same location are divided into samples of 1 kilogram each prior to shipping. A maximum of three samples per species per location are used. Weight of samples are the edible portions only.

Selected fish samples are frozen immediately after collection and segregated by species and location. Samples are shipped frozen in insulated containers for analysis.

H. GAMMARUS

GAMMARUS (fresh water shrimp) samples are collected by EA personnel during the spring and fall season from two onsite locations and from one offsite location. Natural and artificial substrates are used to collect samples. The GAMMARUS samples are removed from the sampling gear, frozen and shipped to the analytical contractor in insulated shipping containers.

I. Mollusks

During the spring and fall seasons at two onsite locations and one offsite location benthic samples are collected. The mollusks are collected by divers and sorted. The tissue is removed from the shell, frozen and shipped for analysis in insulated containers.

J. Bottom Sediments

One kilogram of bottom sediment sample is collected at two onsite locations and one offsite location. Samples are collected at the same time and location as the mollusk samples, where possible, by a diver. The samples are placed in plastic bags, sealed and shipped for analysis in insulated containers.

K. Periphyton

Periphyton (fresh water algae) samples are collected in the spring and fall seasons from two onsite locations and one offsite location. Periphyton is collected from natural substrates. The periphyton is scraped from the substrates into vials, labeled, frozen and shipped in insulated containers for offsite analysis.

L. TLD (direct radiation)

Thermoluminescent dosimeters (TLD's) are used to measure direct radiation in the JAF/NMP-1 environment. The TLD stations are placed around the site using a two zone distribution. The first group of TLD's is located within the site boundary and are called "onsite" TLD's. The second set of TLD stations is the "offsite" stations, located at the offsite air monitoring stations and in areas of special interest such as population centers. Also included in the offsite group are the field control TLD's. A total of 45 TLD stations were used for the 1984 TLD program.

TLD's used during 1984 were rectangular Teflon wafers impregnated with 25 percent $\text{CaSO}_4:\text{Dy}$ phosphor. These were sealed in a polyethylene package to insure dosimeter integrity. The TLD packages are further protected by placement in plastic holders, or by tape sealing to supporting surfaces. The dosimeters are collected, replaced and evaluated on a quarterly basis.

TABLE I

SAMPLE COLLECTION AND ANALYSIS

SITE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

A. LAKE PROGRAM⁽¹⁾

<u>MEDIA</u>	<u>ANALYSIS</u>	<u>FREQUENCY</u> (4)	<u>LOCATION</u> (2)	
1. Fish	GelI, ⁸⁹ Sr & ⁹⁰ Sr	2/yr	2 onsite	1 offsite
2. Mollusks	GelI, ⁸⁹ Sr & ⁹⁰ Sr	2/yr	2 onsite	1 offsite
3. Gammarus	GelI, ⁸⁹ Sr & ⁹⁰ Sr	2/yr	2 onsite	1 offsite
4. Bottom Sediments	GelI, ⁹⁰ Sr	2/yr	2 onsite	1 offsite
5. Periphyton	GelI	2/yr	2 onsite	1 offsite
6. Lake Water	GB, GSA or GelI ³ H, ⁸⁹ Sr, ⁹⁰ Sr	M Comp. Qtr. Comp.	3(3)	

Notes:

- (1) Program continued for at least three years after the startup of James A. Fitzpatrick Nuclear Power Plant.
- (2) Onsite locations samples collected in the vicinity of discharges, offsite samples collected at a distance of at least five miles from site.
- (3) The three lake water samples to include Nine Mile Point Unit 1 intake water, James A. FitzPatrick intake water, and Oswego City water.
- (4) Samples of items 1 through 5 collected in spring and fall when available.

3. CHANGES TO THE 1984 SAMPLE PROGRAM

- A. Milk sample locations number 5 and number 45 were deleted from the milk sampling program in July of 1984. Several other milk sampling locations had been located, as a result of milch animal censuses conducted during 1983-84, that demonstrated greater radionuclide deposition potentials. Since locations 5 and 45 had lower potentials for deposition, as determined by D/Q values, these locations were deleted.
- B. Milk sample location number 60 was added to the milk sampling program in July of 1984. This location was added as a result of the milch animal censuses conducted during 1983-84. This location demonstrated average potentials for radionuclide deposition, as determined by D/Q values.
- C. Environmental radiation monitor C offsite was moved to environmental sampling station D-1 offsite on July 19, 1984 (1205 hours). This move was a result of repeated vandalism to environmental sampling station C offsite (the monitor detector was repeatedly stolen).

2. ANALYSIS PERFORMED

The analysis of the environmental samples is performed by Teledyne Isotopes (TI) and the James A. FitzPatrick Environmental Counting Laboratory (JAFECL). The following samples are analyzed at the JAFECL:

Air Particulate Filter - gross beta (weekly)

Air Particulate Filter Composites - gamma spectral analysis (monthly)

Airborne Radioiodine - gamma spectral analysis (weekly)

Surface Water Composites - gamma spectral analysis (monthly)

Special Samples (soil, etc.) - gamma spectral analysis (as collected)

The remainder of the sample analysis as outlined in Tables I and II in this section is performed by TI.

TABLE II

SAMPLE COLLECTION AND ANALYSIS

SITE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

B. LAND PROGRAM(1)

<u>MEDIA</u>	<u>ANALYSIS</u>	<u>FREQUENCY</u>	<u>NO. OF LOCATIONS</u>	<u>LOCATIONS</u>
1. Air Particulates	GB GSA	W M Comp. (6)	At least 10	9 onsite 6 offsite
2. Soil	GSA, ^{90}Sr	Every 3 years	15	9 onsite 6 offsite
3. TLD	Gamma Dose	Qtr.	20	14 onsite 6 offsite
4. Radiation Monitors	Gamma Dose	C	10	9 onsite 1 offsite
5. Airborne - ^{131}I	GSA	W	At least 10	9 onsite 6 offsite
6. Milk	I GSA, ^{90}Sr	M M Comp.	4(7)	(8)
7. Human Food Crops	GSA, ^{131}I	A	3	(8)
8. Meat, Poultry, Eggs	GSA Edible Portion	SA	3	(8)

Notes: (Cont.)

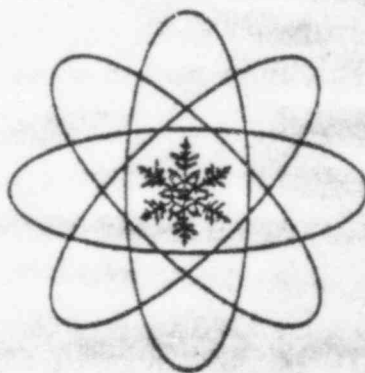
- (6) Onsite samples counted together, offsite counted together, any high count samples counted separately.
 (7) Frequency applied only during grazing season.
 (8) Samples to be collected from farms within a 10-mile radius having the highest potential concentrations of radionuclides.

Abbreviations:

M Comp. - Monthly composite of weekly or bi-weekly samples
 GB - Gross beta analysis
 GeLi - Gamma spectral analysis on a GeLi system (quantitative)
 GSA - Gamma spectral analysis on a NaI system (quantitative)

A - Annually BW - Bi-weekly (alternate wks.)
 W - Weekly Qtr. - Quarterly
 M - Monthly SA - Semiannually
 C - Continuous

III



SAMPLE SUMMARIES

III SAMPLE SUMMARIES

All sample data is summarized in table form. The tables are titled "Environmental Sample Data Summary" and use the following format:

- A. Sample medium.
- B. Type of analysis performed.
- C. Number of analyses performed.
- D. Range of detectable levels. The data column is labeled "Lower Limits of Detection". This wording indicates that inclusive data is based on 4.66 sigma of background.
- E. Mean value of the data, based on positive measured values*.
- F. Standard deviation, based on positive measured values. (The standard deviations represent the variability of measured results for different samples rather than single sample uncertainty*.)
- G. Maximum and minimum values.
- H. Range of the data, calculated by subtracting the minimum value from the maximum value.

* Only positive measured values are used in statistical calculations. The use of LLD's in these calculations would result in the means being biased high and the standard deviations being biased low.

ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Lake Periphyton pCi/g (wet)	Gamma Isotopic Control							
	Be-7	2	0.30 0.30	1.21	A	1.21	1.21	0.00
	K-40	2	NONE	1.50	0.50	1.05	1.14	0.71
	Mn-54	2	0.03 0.04	ALL LLD	-	-	-	-
	Co-60	2	0.006 0.009	ALL LLD	-	-	-	-
	Zr-95	2	0.07 0.10	ALL LLD	-	-	-	-
	Ru-106	2	0.33 0.43	ALL LLD	-	-	-	-
	Cs-137	2	0.08 0.08	0.09	A	0.09	0.09	0.00
	Co-144	2	0.27 0.34	ALL LLD	-	-	-	-
	Ra-226	2	0.57 1.00	ALL LLD	-	-	-	-
	Th-228	2	0.08 0.09	ALL LLD	-	-	-	-
	Cs-134	2	0.03 0.04	ALL LLD	-	-	-	-
	Ru-103	2	0.13 0.15	ALL LLD	-	-	-	-
	Co-58	2	0.06 0.09	ALL LLD	-	-	-	-
	Fe-59	2	0.17 0.19	ALL LLD	-	-	-	-
	Indicator							
	Ru-7	4	0.87 0.94	3.05	1.83	4.34	1.75	2.59
	K-40	4	NONE	2.85	1.71	4.45	0.44	4.01
	Mn-54	4	0.03 0.07	ALL LLD	-	-	-	-
	Co-60	4	0.05 0.08	ALL LLD	-	-	-	-
	Zr-95	4	0.06 0.10	ALL LLD	-	-	-	-
	Ru-106	4	0.21 0.45	ALL LLD	-	-	-	-
	Cs-137	4	NONE	0.27	0.04	0.31	0.21	0.10
	Co-144	4	0.25 0.40	ALL LLD	-	-	-	-
	Ra-226	4	0.64 1.40	ALL LLD	-	-	-	-
	Th-228	4	0.12 0.16	0.32	0.06	0.36	0.24	0.08
	Cs-134	4	0.04 0.06	ALL LLD	-	-	-	-
	Ru-103	4	0.06 0.12	ALL LLD	-	-	-	-
	Co-58	4	0.04 0.08	ALL LLD	-	-	-	-
	Fe-59	4	0.02 0.23	ALL LLD	-	-	-	-

A - ONLY ONE POSITIVE VALUE, NO STATISTICS POSSIBLE.

ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Lake Mollusk pCi/g (wet)	Gamma Isotope Control							
	Nb-95	2	0.01 0.04	ALL LLD	-	-	-	-
	Zn-65	2	0.02 0.05	ALL LLD	-	-	-	-
	K-40	2	0.46 0.48	0.39	A	0.39	0.39	0.00
	Mn-54	2	0.01 0.03	ALL LLD	-	-	-	-
	Co-60	2	0.008 0.015	ALL LLD	-	-	-	-
	Ra-226	2	0.18 0.57	ALL LLD	-	-	-	-
	Co-58	2	0.01 0.03	ALL LLD	-	-	-	-
	Ce-137	2	0.01 0.03	ALL LLD	-	-	-	-
	Cs-134	2	0.01 0.03	ALL LLD	-	-	-	-
	Po-59	2	0.03 0.07	ALL LLD	-	-	-	-
	Indicator							
	Nb-95	4	0.009 0.06	ALL LLD	-	-	-	-
	Zn-65	4	0.02 0.09	ALL LLD	-	-	-	-
Lake Mollusk pCi/g (wet)	K-40	4	0.53 1.10	0.35	0.09	0.41	0.28	0.13
	Mn-54	4	NONE	0.09	0.02	0.11	0.05	0.05
	Co-60	4	0.06 0.06	0.09	0.04	0.13	0.04	0.09
	Ra-226	4	0.24 0.78	0.22	A	0.22	0.22	0.00
	Co-58	4	0.007 0.05	ALL LLD	-	-	-	-
	Cs-137	4	0.007 0.05	0.022	A	0.022	0.022	0.00
	Cs-134	4	0.006 0.04	ALL LLD	-	-	-	-
	Po-59	4	0.02 0.10	ALL LLD	-	-	-	-
	Sr-89, Sr-90							
	Control							
	Sr-89	2	0.003 0.017	ALL LLD	-	-	-	-
	Sr-90	2	NONE	0.020	0.016	0.031	0.009	0.022
	Indicator							
	Sr-89	4	0.003 0.024	ALL LLD	-	-	-	-
	Sr-90	4	NONE	0.061	0.049	0.130	0.026	0.104

A - ONLY ONE POSITIVE VALUE, NO STATISTICS POSSIBLE.

ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (wells)	TYPE OF ANALYSIS PERFORMED AND NUCLEI	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Lake Bottom Sediment pCi/g (dry)	Gamma Isotopic Sr-90							
	Control							
	Hu-7	2	0.55 0.55	1.80	A	1.80	1.80	0.00
	K-40	2	NONE	0.65	2.10	11.20	0.10	3.10
	Co-60	2	0.04 0.05	ALL L.L.D.	-	-	-	-
	Nb-95	2	0.05 0.07	ALL L.L.D.	-	-	-	-
	Ca-137	2	0.07 0.07	0.42	A	0.42	0.42	0.00
	Ca-134	2	0.04 0.05	ALL L.L.D.	-	-	-	-
	Ra-226	2	1.00 0.09	ALL L.L.D.	-	-	-	-
	Mn-54	2	0.04 0.04	ALL L.L.D.	-	-	-	-
	Sr-90	2	NONE	0.047	0.040	0.075	0.010	0.056
	Indicator							
	Hu-7	4	0.24 0.62	0.40	A	8.40	0.40	0.00
	K-40	4	NONE	11.10	4.46	16.40	0.10	10.30
	Co-60	4	0.02 0.08	0.14	0.03	0.17	0.12	0.05
	Nb-95	4	0.03 0.09	ALL L.L.D.	-	-	-	-
	Ca-137	4	0.08 0.08	0.49	0.53	1.08	0.04	1.04
	Ca-134	4	0.03 0.08	ALL L.L.D.	-	-	-	-
	Ra-226	4	0.05 0.81	3.30	A	3.30	3.30	0.00
	Mn-54	4	0.05 0.06	0.038	A	0.038	0.038	0.00
	Sr-90	4	NONE	0.038	0.042	0.100	0.011	0.089

A - ONLY ONE POSITIVE VALUE, NO STATISTICS POSSIBLE.

ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Lake CHARMARTUS pCl/g (wt)	Gamma Isotopes Sr-89, Sr-90							
	Control							
	Co-60	3	0.11 4.40	ALL L.D.	-	-	-	-
	Rn-54	3	0.11 2.00	ALL L.D.	-	-	-	-
	Ca-137	3	0.11 5.00	ALL L.D.	-	-	-	-
	Ca-134	3	0.11 4.00	ALL L.D.	-	-	-	-
	Zn-65	3	0.25 11.0	ALL L.D.	-	-	-	-
	Sr-89	2	0.026 0.028	ALL L.D.	0.03	0.08	0.04	0.04
	Sr-90	3	NONE	0.06	-	-	-	-
	Co-58	3	0.13 5.00	ALL L.D.	-	-	-	-
	Fe-59	3	0.31 7.00	ALL L.D.	-	-	-	-
	Indicator							
	Co-60	6	0.07 19.0	ALL L.D.	-	-	-	-
	Rn-54	6	0.05 19.0	ALL L.D.	-	-	-	-
	Ca-137	6	0.06 17.6	ALL L.D.	-	-	-	-
	Ca-134	6	0.05 15.0	ALL L.D.	-	-	-	-
	Zn-65	6	0.12 32.0	ALL L.D.	-	-	-	-
	Sr-89	4	0.018 0.037	0.18	0.02	0.21	0.16	0.05
	Sr-90	4	NONE	ALL L.D.	-	-	-	-
	Co-58	6	0.06 15.0	ALL L.D.	-	-	-	-
	Fe-59	6	0.17 39.0	ALL L.D.	-	-	-	-

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ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Lako Fish pCi/g (wet)	Gamma Isotope Sr-89, Sr-90							
	Control	6	NONE	3.90	0.24	3.40	2.40	1.00
	K-40	6	0.008 0.005	ALL I.I.D	-	-	-	-
	Mn-54	6	NONE	0.622	0.000	0.028	0.015	0.023
	Ca-137	6	0.009 0.005	ALL I.I.D	-	-	-	-
	Ca-134	6	0.006 0.01	ALL I.I.D	-	-	-	-
	Co-58	6	0.002 0.003	ALL I.I.D	-	-	-	-
	Sr-89	6	0.001 0.002	ALL I.I.D	-	-	-	-
	Sr-90	6	0.009 0.005	ALL I.I.D	-	-	-	-
	Co-60	6	0.02 0.03	ALL I.I.D	-	-	-	-
	Fe-59	6	0.01 0.02	ALL I.I.D	-	-	-	-
	Zn-65	6						
	Indicator							
	K-40	12	NONE	3.13	0.21	3.50	2.60	0.90
	Mn-54	12	0.005 0.008	ALL I.I.D	-	-	-	-
	Ca-137	12	NONE	0.043	0.008	0.061	0.023	0.028
	Ca-134	12	0.005 0.01	ALL I.I.D	-	-	-	-
	Co-58	12	0.007 0.01	ALL I.I.D	-	-	-	-
	Sr-89	12	0.001 0.008	ALL I.I.D	-	-	-	-
	Sr-90	12	0.001 0.003	ALL I.I.D	-	-	-	-
	Co-60	12	0.005 0.009	ALL I.I.D	-	-	-	-
	Fe-59	12	0.02 0.03	ALL I.I.D	-	-	-	-
	Zn-65	12	0.01 0.02	ALL I.I.D	-	-	-	-

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ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Lake Water Analysis pCi/l	Gross Beta							
	Control	12	NONE	3.41	0.85	5.20	2.40	2.80
	Indicator	24	2.2 3.0	3.08	0.98	5.90	2.20	3.70
Lake Water Analysis pCi/l	Tritium							
	Control	4	210 300	205	21.2	320	190	30
	Indicator	8	120 210	282	98.1	370	110	260
Lake Water Analysis pCi/l	Sr-89							
	Control	4	1.10 2.00	ALL LLD	-	-	-	-
	Indicator	8	1.20 2.00	ALL LLD	-	-	-	-
Lake Water Analysis pCi/l	Sr-90							
	Control	4	0.59 1.00	0.72	A	0.72	0.72	0.00
	Indicator	8	0.36 0.90	0.88	0.31	1.30	0.80	0.50

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ENVIRONMENTAL SAMPLE DATA SUMMARY									
SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE	
Lake Water Analysis $\mu\text{Ci/l}$	Gamma Isotopic Control	12	4.95 5.84	ALL LLD	-	-	-	-	
	Co-144	12	6.92 1.20	ALL LLD	-	-	-	-	
	Ca-134	12	0.93 1.47	ALL LLD	-	-	-	-	
	Ca-137	12	2.58 5.21	ALL LLD	-	-	-	-	
	Zr-95	12	1.29 2.31	ALL LLD	-	-	-	-	
	Ni-95	12	1.02 2.14	ALL LLD	-	-	-	-	
	Co-58	12	1.05 1.47	ALL LLD	-	-	-	-	
	Mn-54	12	1.68 2.55	ALL LLD	-	-	-	-	
	Po-59	12	1.12 1.71	ALL LLD	-	-	-	-	
	Co-60	12							
	Indicator	24	4.62 7.17	ALL LLD	-	-	-	-	
	Ca-144	24	0.94 1.20	ALL LLD	-	-	-	-	
	Ca-134	24	0.92 1.50	ALL LLD	-	-	-	-	
	Ca-137	24	2.63 4.56	ALL LLD	-	-	-	-	
Airborne Particulate Analysis $\mu\text{Ci}/\text{m}^3$	Zr-95	24	1.29 3.32	ALL LLD	-	-	-	-	
	Ni-95	24	0.86 1.95	ALL LLD	-	-	-	-	
	Co-58	24	0.80 1.40	ALL LLD	-	-	-	-	
	Mn-54	24	1.65 2.92	ALL LLD	-	-	-	-	
	Po-59	24	1.09 1.65	ALL LLD	-	-	-	-	
	Co-60	24							
	Gross Beta Activity	312	NONE	0.026	0.007	0.051	0.013	0.038	
	Control	462	0.0001	0.025	0.008	0.058	0.0002	0.0578	
	Indicator								

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ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLEIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Airborne Particulate Analysis $\mu\text{Ci}/\text{m}^3 \times 10^{-3}$	Gamma Isotope							
	Control	12	0.16 0.55	0.73	0.49	1.07	0.38	0.69
	Co-60	12	0.14 0.43	ALL, LLD	-	-	-	-
	Mn-54	12	0.14 0.44	ALL, LLD	-	-	-	-
	Co-58	12	0.21 0.60	ALL, LLD	-	-	-	-
	Pb-95	12	0.37 1.16	ALL, LLD	-	-	-	-
	Zr-95	12	0.14 0.52	ALL, LLD	-	-	-	-
	Co-137	12	0.13 0.39	ALL, LLD	-	-	-	-
	Co-134	12	0.28 0.67	ALL, LLD	-	-	-	-
	Co-141	12	1.65 0.72	ALL, LLD	-	-	-	-
	Co-144	12	0.16 0.38	ALL, LLD	-	-	-	-
	Ru-103	12	NONE	116.8	19.2	156.0	91.0	65.0
	Ru-7	12						
	Indicator							
	Co-60	12	0.19 0.40	1.17	0.55	1.49	0.54	0.95
	Mn-54	12	0.11 0.24	ALL, LLD	-	-	-	-
	Co-58	12	0.14 0.31	ALL, LLD	-	-	-	-
	Pb-95	12	0.19 0.30	ALL, LLD	-	-	-	-
	Zr-95	12	0.32 0.73	ALL, LLD	-	-	-	-
	Co-137	12	0.13 0.27	0.18	A	0.16	0.18	0.00
	Co-134	12	0.13 0.52	ALL, LLD	-	-	-	-
	Co-141	12	0.24 6.41	ALL, LLD	-	-	-	-
	Co-144	12	0.58 1.14	ALL, LLD	-	-	-	-
	Ru-103	12	0.17 0.32	ALL, LLD	-	-	-	-
	Ru-7	12	NONE	98.3	17.6	122.0	61.0	61.0
Airborne Iodine Analysis $\mu\text{Ci}/\text{m}^3$	Gamma Analysis I-131							
	Control	312	0.006 0.068	ALL, LLD	-	-	-	-
	Indicator	464	0.005 0.068	ALL, LLD	-	-	-	-

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ENVIRONMENTAL SAMPLE DATA SUMMARY								
SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Environmental TLD Readings micro/Standard Month	Offsite TLD's	23	NONE	5.9	0.3	1.4	5.3	1.1
	First Quarter	23	NONE	5.0	0.5	6.2	2.8	2.3
	Second Quarter	22	NONE	7.3	0.5	8.2	6.2	2.0
	Third Quarter	23	NONE	5.5	0.5	6.6	4.2	2.4
	Fourth Quarter	23	NONE	5.9	1.0	8.2	3.9	4.3
	Year	91						
	Onsite Monitor TLD's (Excluding D-1 Onsite)	8	NONE	6.6	0.8	8.3	5.7	2.6
	First Quarter	8	NONE	5.6	0.8	7.5	4.6	2.9
	Second Quarter	8	NONE	7.8	1.0	8.9	4.8	3.1
	Third Quarter	8	NONE	6.0	0.8	7.3	4.7	2.6
Fourth Quarter	8	NONE	6.4	1.3	9.9	4.6	5.3	
Year	32							
Continuous Radiation Monitors mR/hr (Average Monthly Value)	Exposure Rate Location							
	Offsite C	12	NONE	0.020	0.004	0.027	0.015	0.012
	Onsite							
	D-1	12	NONE	0.019	0.005	0.027	0.013	0.014
	D-2	12	NONE	0.018	0.003	0.028	0.015	0.013
	E	12	NONE	0.017	0.001	0.020	0.015	0.005
	F	12	NONE	0.023	0.002	0.025	0.020	0.005
	G	12	NONE	0.020	0.003	0.025	0.015	0.010
	H	12	NONE	0.027	0.009	0.050	0.018	0.032
	I	12	NONE	0.019	0.002	0.022	0.015	0.007
	J	12	NONE	0.018	0.004	0.027	0.013	0.014
	K	12	NONE	0.018	0.003	0.024	0.015	0.009

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ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Milk Analysis μCi/l	I-131							
	Location							
	No. 4	8	0.17 0.30	ALL LLD	-	-	-	-
	No. 7	8	0.16 0.34	ALL LLD	-	-	-	-
	No. 5	2	0.18 0.19	ALL LLD	-	-	-	-
	No. 18	8	0.17 0.20	ALL LLD	-	-	-	-
	No. 45	2	0.19 0.29	ALL LLD	-	-	-	-
	No. 40 (Control)	8	0.16 0.23	ALL LLD	-	-	-	-
	No. 50	8	0.16 0.29	ALL LLD	-	-	-	-
	No. 55	8	0.17 0.33	ALL LLD	-	-	-	-
	No. 60	6	0.17 0.30	ALL LLD	-	-	-	-
Milk Analysis μCi/l	Cesium Isotope Sr-90							
	Location							
	No. 4	8	NONE	1491	165.6	1848	1316	536
	K-40	8	4.2 8.0	ALL LLD	-	-	-	-
	Ca-137	8	4.2 7.5	ALL LLD	-	-	-	-
	Ca-134	8	5.3 12.0	ALL LLD	-	-	-	-
	La-140	8	5.3 12.6	ALL LLD	-	-	-	-
	Ba-140	8	NONE	3.28	1.80	7.60	2.20	5.40
	Sr-90	8	NONE	1454	210.6	1760	1100	660
	No. 7	8	NONE	2.60	0.81	2.80	1.50	2.30
	K-40	8	4.4 7.9	ALL LLD	-	-	-	-
	Ca-137	8	4.3 7.6	ALL LLD	-	-	-	-
	Ca-134	8	4.3 14.0	ALL LLD	-	-	-	-
	La-140	8	4.3 14.0	ALL LLD	-	-	-	-
	Ba-140	8	4.3 14.0	ALL LLD	-	-	-	-
	Sr-90	8	NONE	2.60	0.81	2.80	1.50	2.30

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ENVIRONMENTAL SAMPLE DATA SUMMARY								
SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Milk Analysis pCi/l	Gamma Isotopic Sr-90 (cont.)							
	Location							
	No. 5							
	K-40	2	NONE	1175	100.0	1310	1040	270
	Cu-137	2	4.3 4.5	5.1	A	5.1	5.1	0.0
	Cu-134	2	3.0 4.2	ALL LLD	-	-	-	-
	La-140	2	5.2 7.3	ALL LLD	-	-	-	-
	Ba-140	2	5.2 7.3	ALL LLD	-	-	-	-
	Sr-90	2	NONE	1.85	1.49	2.00	0.80	2.10
	No. 16							
	K-40	8	NONE	1454	109.5	1670	1260	310
	Cu-137	8	4.7 8.0	ALL LLD	-	-	-	-
	Cu-134	8	4.4 8.0	ALL LLD	-	-	-	-
	La-140	8	5.0 22.0	ALL LLD	-	-	-	-
	Ba-140	8	5.0 22.0	ALL LLD	-	-	-	-
	Sr-90	8	NONE	3.18	0.97	5.00	1.90	3.10

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ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Alk Analysis pCi/l	Gamma Isotopes Sr-90 (cont.)							
	Location							
	No. 45							
	K-40	2	NONE	1335	304.1	1550	1120	430
	Ca-137	2	4.1 5.0	ALL LLD	-	-	-	-
	Ca-134	2	3.9 4.8	ALL LLD	-	-	-	-
	La-140	2	5.6 6.1	ALL LLD	-	-	-	-
	Ba-140	2	5.6 6.1	ALL LLD	-	-	-	-
	Sr-90	2	NONE	2.10	0.99	2.80	1.40	1.40
	No. 40 (Control)							
	K-40	8	NONE	1399	128.3	1500	1100	310
	Ca-137	8	4.4 8.4	ALL LLD	-	-	-	-
	Ca-134	8	4.0 7.5	ALL LLD	-	-	-	-
	La-140	8	5.5 12.0	ALL LLD	-	-	-	-
	Ba-140	8	5.5 12.0	ALL LLD	-	-	-	-
	Sr-90	8	NONE	2.14	0.60	2.90	1.30	1.60

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ENVIRONMENTAL SAMPLE DATA SUMMARY									
SAMPLE MEDIUM (wells)	TYPE OF ANALYSIS PERFORMED AND ISOTOPE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE	
Milk Analyzed 1/21/1	Gamma Isotopic Sr-90 (cont.)								
	Location								
	No. 50								
	K-40	0	NONE	1442	150.2	1680	1210	470	
	Cs-137	0	4.0 0.5	ALL I.I.D	-	-	-	-	
	Cs-134	0	3.8 7.0	ALL I.I.D	-	-	-	-	
	Ia-140	0	4.6 9.2	ALL I.I.D	-	-	-	-	
	Ia-140	0	4.6 9.2	ALL I.I.D	-	-	-	-	
	Sr-90	0	NONE	1.55	0.47	2.20	0.80	1.40	
	No. 55								
	K-40	0	NONE	1478	160.6	1750	1200	460	
	Cs-137	0	3.9 6.9	ALL I.I.D	-	-	-	-	
	Cs-134	0	3.0 8.8	ALL I.I.D	-	-	-	-	
	Ia-140	0	4.2 9.5	ALL I.I.D	-	-	-	-	
	Ia-140	0	4.2 9.5	ALL I.I.D	-	-	-	-	
	Sr-90	0	NONE	1.72	0.77	2.80	0.80	2.00	
	No. 60								
	K-40	6	NONE	1285	174.4	1610	1100	510	
	Cs-137	6	4.0 7.1	ALL I.I.D	-	-	-	-	
	Cs-134	6	3.7 6.9	ALL I.I.D	-	-	-	-	
	Ia-140	6	4.0 9.8	ALL I.I.D	-	-	-	-	
	Ia-140	6	4.0 9.8	ALL I.I.D	-	-	-	-	
	Sr-90	6	NONE	1.72	0.68	2.40	0.90	1.50	

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ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE ANALYSIS (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Meat & Poultry µCi/g (wet)	Gamma Isotope							
	Control							
	Co-60	4	0.020 0.020	ALL LLD	-	-	-	-
	K-40	4	NONE	3.0	0.3	3.6	2.8	0.7
	Cs-134	4	0.020 0.032	ALL LLD	-	-	-	-
	Cs-137	4	0.020 0.026	ALL LLD	-	-	-	-
	Co-58	4	0.020 0.046	ALL LLD	-	-	-	-
	Mn-54	4	0.010 0.028	ALL LLD	-	-	-	-
	Co-144	4	0.14 0.20	ALL LLD	-	-	-	-
	Be-7	4	0.25 0.57	ALL LLD	-	-	-	-
	Indicator							
	Co-60	12	0.010 0.020	ALL LLD	-	-	-	-
	K-40	12	NONE	3.1	0.5	3.6	2.6	1.2
	Cs-134	12	0.017 0.027	ALL LLD	-	-	-	-
	Cs-137	12	0.018 0.020	0.04	0.01	0.05	0.03	0.02
	Co-58	12	0.019 0.050	ALL LLD	-	-	-	-
	Mn-54	12	0.010 0.029	ALL LLD	-	-	-	-
	Co-144	12	0.12 0.24	ALL LLD	-	-	-	-
	Be-7	12	0.18 0.69	ALL LLD	-	-	-	-

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ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Chicken Eggs pCi/g (wet)	Gamma Isotope							
	Control							
	Co-60	2	0.004 0.020	ALL LLD	-	1.30	1.10	0.20
	K-40	2	NONE	1.20	-	-	-	-
	Cs-134	2	0.004 0.020	ALL LLD	-	-	-	-
	Cs-137	2	0.004 0.022	ALL LLD	-	-	-	-
	Co-58	2	0.005 0.030	ALL LLD	-	-	-	-
	Mn-54	2	0.004 0.020	ALL LLD	-	-	-	-
	Co-144	2	0.04 0.22	ALL LLD	-	-	-	-
	Bi-7	2	0.00 0.33	ALL LLD	-	-	-	-
	Indicator							
	Co-60	6	0.005 0.020	ALL LLD	-	1.30	1.00	0.30
	K-40	6	NONE	1.12	-	-	-	-
	Cs-134	6	0.004 0.017	ALL LLD	-	-	-	-
	Cs-137	6	0.004 0.018	ALL LLD	-	-	-	-
	Co-58	6	0.005 0.030	ALL LLD	-	-	-	-
	Mn-54	6	0.004 0.020	ALL LLD	-	-	-	-
	Co-144	6	0.04 0.17	ALL LLD	-	-	-	-
	Bi-7	6	0.04 0.26	ALL LLD	-	-	-	-

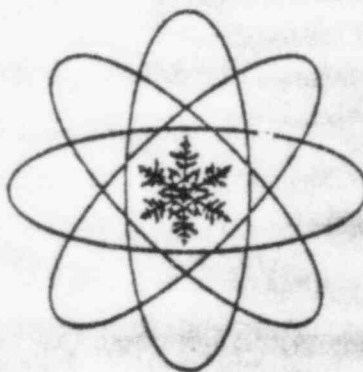
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ENVIRONMENTAL SAMPLE DATA SUMMARY

SAMPLE MEDIUM (units)	TYPE OF ANALYSIS PERFORMED AND NUCLIDE	NO. OF ANALYSIS PERFORMED	LOWER LIMITS OF DETECTION (range)	MEAN	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	RANGE
Produce pCi/g (wet)	Gamma Isotopic Control							
	K-40	2	NONE	3.25	2.05	4.70	1.80	2.90
	Cs-134	2	0.009 0.013	ALL LLD	-	-	-	-
	Cs-137	2	0.010 0.014	ALL LLD	-	-	-	-
	Ho-7	2	0.08 0.08	0.41	A	0.41	0.41	0.00
	Ce-144	2	0.08 0.09	ALL LLD	-	-	-	-
	Nb-95	2	0.009 0.013	ALL LLD	-	-	-	-
	Indicator							
	K-40	6	NONE	2.87	1.30	5.10	1.80	3.30
	Cs-134	6	0.006 0.014	ALL LLD	-	-	-	-
	Cs-137	6	0.007 0.017	ALL LLD	-	-	-	-
	Ho-7	6	0.05 0.15	ALL LLD	-	-	-	-
	Ce-144	6	0.05 0.11	ALL LLD	-	-	-	-
	Nb-95	6	0.006 0.015	ALL LLD	-	-	-	-
Produce pCi/g (wet)	I-131							
	Control	2	0.015 0.022	ALL LLD	-	-	-	-
	Indicator	6	0.011 0.033	ALL LLD	-	-	-	-

A - ONLY ONE POSITIVE VALUE, NO STATISTICS POSSIBLE.

IV



ANALYTICAL RESULTS

IV ANALYTICAL RESULTS

Sample Summaries

Environmental sample data is summarized by tables. Tables are provided for select sample media and contain data summaries based on quarterly mean values. Mean values are comprised of both positive and LLD values where applicable. These tables are entitled "Environmental Sample Summary".

TABLE 1
CONCENTRATIONS OF GAMMA EMITTERS IN PERIPHYTON SAMPLES
Results in Units of pCi/g (wet) \pm 2 sigma

COLLECTION SITE	NUCLIDES FOUND	JUNE 1984	AUGUST 1984
FitzPatrick (03)	Be-7	<0.87	1.75 \pm 0.82
	K-40	4.45 \pm 0.56	3.10 \pm 0.74
	Mn-54	<0.03	<0.06
	Co-58	<0.04	<0.08
	Fe-59	<0.15	<0.23
	Co-60	<0.05	<0.05
	Zn-65	<0.07	<0.12
	Cs-134	<0.04	<0.06
	Cs-137	0.29 \pm 0.04	0.28 \pm 0.06
	Ra-226	<0.64	<0.98
	Th-228	0.28 \pm 0.04	<0.12
	Others	<LLD	<LLD
Nine Mile Point (02)	Be-7	<0.94	4.34 \pm 1.04
	K-40	0.44 \pm 0.06	3.41 \pm 0.79
	Mn-54	<0.04	<0.07
	Co-58	<0.06	<0.06
	Fe-59	<0.02	<0.17
	Co-60	<0.05	<0.08
	Zn-65	<0.09	<0.14
	Cs-134	<0.05	<0.06
	Cs-137	0.21 \pm 0.05	0.31 \pm 0.08
	Ra-226	<0.91	<1.4
	Th-228	0.36 \pm 0.05	<0.16
	Others	<LLD	<LLD
Oswego (Control - 00)	Be-7	1.21 \pm 0.67	<1.30
	K-40	1.85 \pm 0.38	1.14 \pm 0.41
	Mn-54	<0.03	<0.04
	Co-58	<0.06	<0.09
	Fe-59	<0.19	<0.17
	Co-60	<0.03	<0.03
	Zn-65	<0.06	<0.07
	Cs-134	<0.03	<0.04
	Cs-137	0.09 \pm 0.03	<0.06
	Ra-226	<0.37	<1.0
	Th-228	<0.08	<0.09
	Others	<LLD	<LLD

TABLE 2
CONCENTRATIONS OF STRONTIUM-90 AND GAMMA EMITTERS IN BOTTOM SEDIMENT SAMPLES
Results in Units of pCi/g (dry) \pm 2 sigma

COLLECTION SITE	COLLECTION DATE	Sr-90	GAMMA EMITTERS			Ba-226	OTHERS
			K-40	Co-60	Cs-134	Cs-137	
PittsPatrick (03)	06/20/84	0.017 \pm 0.007	6.1 \pm 0.3	<0.019	<0.029	0.04 \pm 0.01	Mo-54 0.61 \pm 0.01 ALL OTHERS <110
	10/19/84	0.025 \pm 0.005	12.9 \pm 1.3	0.17 \pm 0.06	<0.046	0.35 \pm 0.06	<110
Nine Mile Point (02)	06/21/84	0.10 \pm 0.01	16.4 \pm 1.6	0.12 \pm 0.04	<0.054	1.08 \pm 0.11	<110
	10/19/84	0.011 \pm 0.005	9.3 \pm 1.2	<0.076	<0.076	<0.079	<1.2 <110
Oswego (Control - 00)	06/18/84	0.075 \pm 0.006	11.2 \pm 1.1	<0.042	<0.047	0.42 \pm 0.04	<110
	10/12/84	0.019 \pm 0.007	8.1 \pm 1.0	<0.052	<0.042	<0.068	<1.0 <110

TABLE 3

CONCENTRATIONS OF STRONTIUM-89 AND STRONTIUM-90 AND GAMMA EMITTERS IN MOLLUSK SAMPLES

Results in Units of pCi/g (wet) ± 2 sigma

COLLECTION SITE	COLLECTION DATE	GAMMA EMITTERS										Ba-226	OTHER
		Sr-89	Sr-90	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Ca-134	Ca-137		
FlaxPatch (02)	06/19/84	<0.015	0.058±0.003	0.28 ±0.08	0.06 ±0.01	<0.014	<0.033	0.04 ±0.01	<0.03	<0.012	0.022±0.011	<0.24	<11.0
	10/19/84	<0.003	0.028±0.001	<1.10	0.08 ±0.03	<0.047	<0.10	<0.059	<0.09	<0.041	<0.047	<0.76	<11.0
Nine Mile Point (02)	06/21/84	<0.024	0.13 ±0.01	0.41 ±0.06	0.11 ±0.01	<0.007	<0.017	0.11 ±0.01	<0.02	<0.006	<0.007	0.22 ±0.08	<11.0
	10/18/84	<0.003	0.026±0.001	<0.53	0.10 ±0.05	<0.038	<0.080	0.115±0.033	<0.06	<0.029	<0.034	<0.60	<11.0
Davego (Control - 00)	06/18/84	<0.017	0.031±0.002	0.39 ±0.08	<0.01	<0.010	<0.026	<0.008	<0.02	<0.010	<0.009	<0.18	<11.0
	10/12/84	<0.003	0.009±0.001	<0.46	<0.03	<0.027	<0.070	<0.015	<0.05	<0.030	<0.028	<0.57	<11.0

TABLE 4

CONCENTRATIONS OF STRONTIUM-89 AND STRONTIUM-90 AND GAMMA EMITTERS IN CAMBARIUS SAMPLES

Results in Units of pCi/g (wet) \pm 2 sigma

COLLECTION SITE		COLLECTION DATE	GAMMA EMITTERS									
			Sr-89	Sr-90	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Co-134	Co-137	OTHERS
FitzPatrick (01)		06/14/84 to 06/29/84	a	a	<8.9	<10.0	<22.0	<12.0	<8.7	<11.0	<11.0	<11.0
		07/16/84 to 08/13/84	<0.035	0.19 \pm 0.02	<0.05	<0.06	<0.17	<0.07	<0.12	<0.05	<0.06	K-40 2.25 \pm 0.54 ALL OTHERS <11.0
		08/08/84 to 09/11/84	<0.037	0.21 \pm 0.02	<0.06	<0.06	<0.21	<0.07	<0.15	<0.06	<0.06	K-40 1.90 \pm 0.39 ALL OTHERS <11.0
Nine Mile Point (02)		06/11/84 to 06/25/84	a	a	<18.0	<15.0	<38.0	<18.0	<32.0	<15.0	<17.0	<11.0
		07/16/84 to 08/06/84	<0.028	0.16 \pm 0.01	<0.07	<0.09	<0.21	<0.09	<0.16	<0.07	<0.07	K-40 1.36 \pm 0.51 ALL OTHERS <11.0
		08/08/84 to 09/04/84	<0.018	0.17 \pm 0.01	<0.08	<0.10	<0.24	<0.11	<0.18	<0.09	<0.08	K-40 1.42 \pm 0.72 ALL OTHERS <11.0
Onwego Control - 00)		06/14/84 to 06/29/84	a	a	<2.9	<5.0	<7.9	<4.4	<11.0	<4.9	<5.0	K-40 70.1 \pm 33.9 ALL OTHERS <11.0
		08/08/84 to 08/17/84	<0.028	0.08 \pm 0.01	<0.11	<0.13	<0.31	<0.12	<0.27	<0.12	<0.11	K-40 2.85 \pm 1.12 ALL OTHERS <11.0
		08/08/84 to 09/04/84	<0.026	0.037 \pm 0.005	<0.11	<0.13	<0.35	<0.11	<0.25	<0.11	<0.11	K-40 3.46 \pm 0.93 ALL OTHERS <11.0

a Insufficient sample for Sr-89 and Sr-90 analysis.

TABLE 5

CONCENTRATIONS OF STRONTIUM-89 AND STRONTIUM-90 AND GAMMA EMITTERS IN FISH SAMPLES

Results in Units of pCi/g (wet) \pm 2 sigma

SAMPLE DATE	SAMPLE TYPE	GAMMA EMITTERS							Zn-65	Cs-134	Cs-137	OTHERS	
		Sr-89	Sr-90	K-40	Mn-54	Co-58	Pb-59	Co-60					
June 1984	Brown Trout #1	<0.003	<0.001	3.4±0.3	<0.007	<0.008	<0.022	<0.007	<0.018	<0.007	0.055±0.009	ALL<LID	
	Brown Trout #2	<0.002	<0.001	3.2±0.3	<0.008	<0.010	<0.022	<0.009	<0.017	<0.009	0.039±0.008	ALL<LID	
	Lake Trout	<0.002	<0.001	2.6±0.3	<0.006	<0.007	<0.021	<0.006	<0.016	<0.006	0.033±0.007	ALL<LID	
	White Sucker	<0.002	<0.001	3.4±0.3	<0.005	<0.007	<0.024	<0.005	<0.013	<0.006	0.039±0.005	ALL<LID	
October 1984	Small Bass	<0.004	<0.002	3.1±0.3	<0.006	<0.009	<0.029	<0.006	<0.016	<0.007	0.041±0.007	ALL<LID	
	Lake Trout	<0.003	<0.001	3.0±0.3	<0.006	<0.010	<0.031	<0.007	<0.016	<0.007	0.035±0.006	ALL<LID	
	Brown Trout #1	<0.002	<0.001	3.4±0.3	<0.006	<0.008	<0.022	<0.007	<0.016	<0.006	0.048±0.007	ALL<LID	
	Brown Trout #2	<0.002	<0.001	3.2±0.3	<0.005	<0.007	<0.019	<0.006	<0.014	<0.005	0.041±0.006	ALL<LID	
October 1984	Lake Trout	<0.002	<0.001	2.7±0.3	<0.006	<0.007	<0.017	<0.006	<0.015	<0.007	0.037±0.006	ALL<LID	
	White Sucker	<0.005	<0.003	3.5±0.4	<0.006	<0.010	<0.032	<0.007	<0.018	<0.007	0.039±0.007	ALL<LID	
	Small Bass	<0.008	<0.003	3.3±0.3	<0.005	<0.008	<0.027	<0.005	<0.015	<0.006	0.049±0.006	ALL<LID	
	Lake Trout	<0.001	<0.001	2.7±0.3	<0.005	<0.008	<0.025	<0.005	<0.015	<0.010	0.045±0.006	ALL<LID	
OSMEGO													
June 1984	Brown Trout #1	<0.002	<0.001	3.2±0.3	<0.008	<0.009	<0.026	<0.009	<0.021	<0.009	0.032±0.007	ALL<LID	
	Brown Trout #2	<0.003	<0.001	2.6±0.2	<0.005	<0.006	<0.015	<0.005	<0.012	<0.005	0.031±0.005	ALL<LID	
	Lake Trout	<0.002	<0.001	2.9±0.3	<0.006	<0.007	<0.018	<0.006	<0.016	<0.006	0.037±0.007	ALL<LID	
	White Sucker	<0.003	<0.001	3.0±0.3	<0.006	<0.007	<0.020	<0.005	<0.015	<0.006	0.015±0.006	ALL<LID	
October 1984	Small Bass	<0.003	<0.002	3.4±0.3	<0.007	<0.010	<0.027	<0.008	<0.017	<0.008	0.038±0.007	ALL<LID	
	Lake Trout	<0.003	<0.001	3.1±0.3	<0.005	<0.008	<0.024	<0.005	<0.014	<0.006	0.037±0.006	ALL<LID	

TABLE 6
CONCENTRATIONS OF BETA EMITTERS IN LAKE WATER SAMPLES - 1984

Results in Units of pCi/l \pm 2 sigma

Station code	January	February	March	April	May	June
JAF Inlet	3.4 \pm 1.9	2.6 \pm 1.7	4.9 \pm 1.6	3.5 \pm 0.8	5.9 \pm 1.7	<2.2
NMP Inlet	<3.0	4.1 \pm 0.7	3.2 \pm 1.4	3.6 \pm 2.1	4.5 \pm 1.7	4.6 \pm 1.7
Raw City Water (control)	3.4 \pm 1.8	2.8 \pm 0.7	4.4 \pm 1.5	3.3 \pm 2.1	3.7 \pm 1.5	2.5 \pm 1.5
Station code	July	August	September	October	November	December
JAF Inlet	2.5 \pm 1.6	4.3 \pm 1.9	4.7 \pm 1.7	4.5 \pm 1.8	4.4 \pm 1.6	3.1 \pm 1.4
NMP Inlet	3.3 \pm 1.7	4.6 \pm 1.9	5.1 \pm 1.7	5.3 \pm 1.8	2.2 \pm 1.4	3.2 \pm 1.9
Raw City Water (control)	2.4 \pm 1.6	3.0 \pm 1.8	3.7 \pm 2.0	5.2 \pm 1.8	2.5 \pm 1.4	4.0 \pm 1.9

TABLE 7

CONCENTRATIONS OF TRITIUM AND STRONTIUM-89 AND STRONTIUM-90 IN LAKE WATER
(QUARTER COMPOSITE SAMPLES)Results in Units of pCi/l \pm 2 sigma

STATION CODE	PERIOD	DATE	TRITIUM	Sr-89	Sr-90
JAF INLET	First Quarter	01/04/84 to 04/03/84	370 \pm 140	<1.2	0.86 \pm 0.46
	Second Quarter	04/01/84 to 06/29/84	350 \pm 100	<1.9	<0.60
	Third Quarter	06/29/84 to 09/30/84	230 \pm 80	<1.8	0.80 \pm 0.41
	Fourth Quarter	09/30/84 to 01/02/85	290 \pm 70	<1.3	<0.36
NMP INLET	First Quarter	12/28/83 to 03/31/84	<210	<1.7	1.30 \pm 0.50
	Second Quarter	03/31/84 to 06/29/84	230 \pm 80	<1.6	<0.90
	Third Quarter	06/29/84 to 09/28/84	<120	<2.0	<0.80
	Fourth Quarter	09/28/84 to 12/31/84	340 \pm 80	<1.7	0.56 \pm 0.37
RAW CITY WATER (Control)	First Quarter	12/28/83 to 03/31/84	<210	<1.1	<1.00
	Second Quarter	03/31/84 to 06/29/84	<300	<2.0	<0.69
	Third Quarter	06/29/84 to 09/28/84	190 \pm 90	<1.5	0.72 \pm 0.48
	Fourth Quarter	09/28/84 to 12/31/84	220 \pm 80	<1.8	<0.59

TABLE 8

CONCENTRATIONS OF GAMMA EMITTERS IN LAKE WATER SAMPLES - 1984

Results in Units of pCi/l \pm 2 sigma

Station Code	Nuclide	January	February	March	April	May	June
OSWEGO CITY WATER (00, CONTROL)	Ra-226	15.9+11.3	<18.7	18.1+10.5	<24.4	<21.2	19.4+10.6
	Cs-134	<1.13	<0.99	<1.10	<1.20	<1.19	<1.19
	Cs-137	<0.93	<1.20	<1.03	<1.47	<1.05	<1.19
	Zr-95	<3.19	<2.58	<3.38	<4.01	<3.76	<3.86
	Nb-95	<1.83	<1.29	<1.45	<2.16	<1.72	<2.15
	Co-58	<1.45	<1.02	<1.47	<1.82	<1.48	<1.23
	Mn-54	<1.05	<1.09	<1.16	<1.28	<1.28	<1.22
	Fe-59	<2.10	<1.86	<1.66	<2.26	<1.98	<2.19
	Co-60	<1.53	<1.33	<1.20	<1.71	<1.25	<1.28
	K-40	<15.2	<14.4	12.2+6.8	15.0+11.2	7.6+7.0	<13.9
NINE MILE POINT (02, INLET)	Ra-226	<20.4	12.2+7.2	<19.4	<24.1	<20.3	<20.3
	Cs-134	<1.06	<1.03	<0.99	<1.24	<1.09	<1.19
	Cs-137	<1.12	<1.07	<1.18	<1.50	<1.10	<1.00
	Zr-95	<3.43	<2.63	<2.77	<3.38	<3.44	<3.67
	Nb-95	<1.67	<1.29	<2.13	<2.43	<1.80	<2.31
	Co-58	<1.33	<1.51	<1.47	<1.85	<1.63	<1.34
	Mn-54	<1.24	<1.04	<1.03	<1.26	<0.80	<0.86
	Fe-59	<2.34	<2.15	<1.92	<2.51	<1.75	<1.97
	Co-60	<1.50	<1.54	<1.25	<1.42	<1.33	<1.38
	K-40	<17.1	14.4+9.0	<13.8	<21.6	<15.4	<20.6
FITZPATRICK (03, INLET)	Ra-226	<19.5	<18.7	17.5+9.3	28.3+11.7	<21.0	<21.3
	Cs-134	<1.01	<0.97	<1.08	<1.15	<1.24	<1.14
	Cs-137	<0.96	<1.10	<1.09	<1.24	<1.19	<1.10
	Zr-95	<2.74	<2.93	<2.97	<3.33	<3.30	<3.29
	Nb-95	<1.68	<1.83	<1.57	<1.83	<1.66	<1.74
	Co-58	<1.16	<0.86	<1.23	<1.54	<1.42	<1.14
	Mn-54	<0.85	<1.04	<1.10	<0.99	<1.10	<1.22
	Fe-59	<1.93	<1.65	<2.53	<2.13	<2.04	<2.25
	Co-60	<1.47	<1.09	<1.20	<1.35	<1.36	<1.13
	K-40	<13.6	<13.0	<11.6	<14.1	<14.3	7.2+5.9

TABLE 8 (Cont'd)

CONCENTRATIONS OF GAMMA EMITTERS IN LAKE WATER SAMPLES - 1984

Results in Units of pCi/l \pm 2 sigma

Station Code	Nuclide	July	August	September	October	November	December
OSWEGO CITY WATER (00, CONTROL)	Ra-226	<20.6	15.5+7.5	<19.3	<21.3	<21.6	<23.0
	Ce-134	<1.08	<0.97	<0.85	<0.92	<1.17	<1.18
	Cs-137	<1.02	<1.29	<0.95	<1.07	<1.34	<1.33
	Zr-95	<3.25	<2.99	<2.90	<4.29	<5.21	<3.90
	Nb-95	<1.61	<2.26	<2.63	<2.34	<3.31	<2.63
	Co-58	<1.31	<1.23	<1.53	<1.63	<2.14	<1.72
	Mn-54	<1.11	<1.21	<0.99	<1.32	<1.47	<1.33
	Fe-59	<2.41	<2.46	<2.05	<1.88	<2.55	<2.26
	Co-60	<1.36	<1.12	<1.66	<1.52	<1.62	<1.63
	K-40	<12.3	<13.4	<12.2	<14.7	<19.8	10.3+7.4
NINE MILE POINT (02, INLET)	Ra-226	<20.6	19.1+12.4	<19.5	<21.2	<22.3	21.8+8.4
	Cs-134	<1.12	<1.02	<0.98	<1.04	<1.18	<0.94
	Cs-137	<1.31	<0.92	<1.05	<1.28	<1.26	<1.13
	Zr-95	<3.09	<3.35	<3.69	<4.02	<4.56	<3.56
	Nb-95	<1.83	<1.89	<2.03	<2.52	<3.32	<1.82
	Co-58	<1.30	<1.44	<1.09	<1.59	<1.81	<1.40
	Mn-54	<1.13	<1.12	<1.15	<1.16	<1.26	<1.06
	Fe-59	<2.09	<2.18	<1.73	<2.70	<2.60	<2.10
	Co-60	<1.42	<1.32	<1.62	<1.20	<1.62	<1.45
	K-40	<15.1	<13.4	<14.7	14.5+9.1	<16.9	<9.44
FITZPATRICK (03, INLET)	Ra-226	16.8+7.8	22.4+8.5	14.8+7.8	<19.1	<22.6	<20.3
	Cs-134	<1.10	<1.01	<1.08	<1.13	<1.26	<1.20
	Cs-137	<1.19	<1.11	<1.07	<1.23	<1.24	<1.31
	Zr-95	<2.99	<3.51	<3.27	<3.42	<4.20	<3.45
	Nb-95	<1.75	<1.86	<1.78	<2.25	<2.14	<1.89
	Co-58	<1.13	<1.20	<1.24	<1.37	<1.47	<1.74
	Mn-54	<0.90	<1.10	<0.87	<1.12	<1.40	<1.27
	Fe-59	<2.34	<2.34	<2.07	<2.20	<2.48	<2.92
	Co-60	<1.41	<1.36	<1.65	<1.48	<1.32	<1.38
	K-40	<13.1	<12.2	<13.1	<15.8	<17.6	13.2+8.2

TABLE 9
IMP/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFF SITE STATIONS
GROSS BETA ACTIVITY $\mu\text{Ci}/\text{m}^3 \pm 2 \text{ sigma}$

WEEK END DATE	C--OFF	D1--OFF	D2--OFF	E--OFF	F--OFF	G--OFF
04/01/10	0.036+0.004	0.037+0.004	0.036+0.004	0.037+0.004	0.030+0.004	0.030+0.004
04/01/17	0.033+0.004	0.038+0.004	0.042+0.005	0.036+0.004	0.034+0.004	0.035+0.004
04/01/24	0.044+0.004	0.041+0.004	0.036+0.004	0.036+0.004	0.037+0.004	0.035+0.004
04/01/31	0.020+0.004	0.023+0.003	0.023+0.003	0.022+0.003	0.024+0.003	0.024+0.003
04/02/7	0.024+0.003	0.025+0.003	0.023+0.003	0.024+0.003	0.024+0.003	0.022+0.003
04/02/14	0.028+0.004	0.031+0.003	0.029+0.003	0.027+0.003	0.030+0.003	0.030+0.003
04/02/22	0.019+0.003	0.020+0.003	0.020+0.003	0.021+0.003	0.019+0.003	0.014+0.002
04/02/20	0.027+0.004	0.025+0.003	0.029+0.004	0.023+0.003	0.020+0.004	0.031+0.004
04/03/06	0.019+0.003	0.017+0.003	0.016+0.003	0.017+0.003	0.016+0.003	0.020+0.003
04/03/13	0.030+0.004	0.030+0.004	0.034+0.004	0.031+0.004	0.034+0.004	0.032+0.004
04/03/20	0.022+0.004	0.024+0.003	0.020+0.003	0.023+0.003	0.026+0.004	0.026+0.004
04/03/27	0.020+0.004	0.016+0.003	0.015+0.003	0.019+0.003	0.023+0.004	0.023+0.004
04/04/03	0.017+0.004	0.014+0.003	0.017+0.003	0.016+0.003	0.019+0.004	0.015+0.003
04/04/10	0.015+0.003	0.014+0.003	0.017+0.003	0.016+0.003	0.014+0.003	0.017+0.003
04/04/17	0.020+0.004	0.016+0.003	0.023+0.004	0.017+0.003	0.020+0.004	0.020+0.004
04/04/24	0.019+0.004	0.017+0.004	0.010+0.004	0.016+0.004	0.019+0.004	0.016+0.004
04/05/01	0.010+0.003	0.022+0.003	0.017+0.003	0.021+0.003	0.010+0.003	0.010+0.003
04/05/08	0.017+0.003	0.010+0.003	0.017+0.003	0.017+0.003	0.017+0.003	0.021+0.003
04/05/15	0.015+0.003	0.015+0.003	0.019+0.003	0.010+0.003	0.017+0.003	0.019+0.003
04/05/22	0.017+0.003	0.017+0.003	0.010+0.003	0.020+0.003	0.024+0.003	0.021+0.003
04/05/30	0.020+0.003	0.020+0.003	0.019+0.003	0.020+0.003	0.020+0.003	0.020+0.003
04/06/05	0.015+0.003	0.014+0.003	0.017+0.003	0.017+0.003	0.017+0.003	0.019+0.003
04/06/12	0.037+0.004	0.034+0.004	0.038+0.004	0.026+0.003	0.040+0.004	0.039+0.004
04/06/19	0.017+0.003	0.013+0.002	0.010+0.003	0.015+0.003	0.015+0.003	0.010+0.003
04/06/26	0.022+0.003	0.019+0.003	0.022+0.003	0.022+0.003	0.020+0.003	0.020+0.003
04/07/03	0.021+0.003	0.019+0.003	0.020+0.003	0.021+0.003	0.023+0.003	0.017+0.003
04/07/10	0.025+0.004	0.024+0.003	0.025+0.003	0.027+0.003	0.021+0.003	0.026+0.003
04/07/17	0.035+0.004	0.032+0.004	0.030+0.004	0.031+0.004	0.033+0.004	0.032+0.004
04/07/24	0.029+0.004	0.024+0.003	0.024+0.003	0.024+0.003	0.029+0.003	0.025+0.003
04/07/31	0.024+0.004	0.025+0.003	0.025+0.003	0.026+0.003	0.033+0.004	0.020+0.003
04/08/07	0.045+0.005	0.037+0.004	0.030+0.004	0.039+0.004	0.040+0.004	0.026+0.003
04/08/14	0.032+0.004	0.022+0.003	0.029+0.003	0.029+0.003	0.027+0.003	0.028+0.003
04/08/21	0.024+0.004	0.021+0.003	0.023+0.003	0.021+0.003	0.020+0.003	0.020+0.003
04/08/28	0.023+0.003	0.026+0.003	0.027+0.003	0.023+0.003	0.024+0.003	0.022+0.003
04/09/05	0.030+0.004	0.030+0.003	0.030+0.003	0.020+0.003	0.025+0.003	0.025+0.003
04/09/11	0.021+0.004	0.010+0.003	0.022+0.003	0.022+0.003	0.021+0.003	0.023+0.003
04/09/18	0.020+0.003	0.022+0.003	0.020+0.003	0.022+0.003	0.020+0.003	0.022+0.003
04/09/25	0.034+0.004	0.029+0.003	0.033+0.004	0.032+0.004	0.030+0.003	0.033+0.004
04/10/2	0.021+0.006	0.025+0.003	0.051+0.021	0.022+0.003	0.023+0.003	0.020+0.003
04/10/10	0.041+0.004	0.031+0.003	0.032+0.004	0.029+0.003	0.034+0.003	0.034+0.004
04/10/16	0.042+0.005	0.036+0.004	0.042+0.004	0.042+0.005	0.039+0.004	0.042+0.004
04/10/23	0.035+0.004	0.033+0.004	0.032+0.003	0.030+0.004	0.029+0.003	0.032+0.004
04/10/30	0.034+0.004	0.030+0.003	0.031+0.003	0.033+0.004	0.035+0.004	0.030+0.003
04/11/06	0.019+0.003	0.023+0.003	0.024+0.003	0.021+0.003	0.022+0.003	0.021+0.003
04/11/14	0.024+0.003	0.023+0.003	0.024+0.003	0.025+0.003	0.020+0.003	0.023+0.003
04/11/20	0.024+0.004	0.023+0.003	0.021+0.003	0.025+0.003	0.023+0.003	0.022+0.003
04/11/27	0.031+0.004	0.029+0.003	0.025+0.003	0.029+0.003	0.035+0.003	0.029+0.003
04/12/4	0.026+0.004	0.029+0.003	0.027+0.003	0.026+0.003	0.031+0.003	0.032+0.004
04/12/11	0.020+0.004	0.032+0.004	0.020+0.003	0.032+0.004	0.031+0.003	0.034+0.004
04/12/18	0.032+0.004	0.030+0.003	0.029+0.003	0.030+0.003	0.035+0.004	0.035+0.003
04/12/27	0.040+0.004	0.033+0.003	0.031+0.003	0.033+0.003	0.035+0.003	0.035+0.003
05/01/3	0.032+0.004	0.032+0.003	0.020+0.003	0.027+0.003	0.027+0.003	0.034+0.005

TABLE 10

IMP/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ON SITE STATIONS
GROSS BETA ACTIVITY $\mu\text{Ci}/\text{m}^3 \pm 2 \text{ Sigma}$

WEEK END DATE	LOCATION								
	D1--DN	D2--DN	E--DN	F--DN	G--DN	H--DN	I--DN	J--DN	K--DN
04/01/9	0.030+0.004	0.037+0.005	0.035+0.004	0.035+0.004	0.030+0.004	0.036+0.004	0.035+0.004	0.040+0.005	0.041+0.005
04/01/16	0.036+0.003	0.047+0.005	0.040+0.004	0.044+0.004	0.038+0.004	0.024+0.003	0.041+0.004	0.058+0.006	0.042+0.004
04/01/23	0.050+0.005	0.049+0.006	0.047+0.005	0.050+0.005	0.049+0.005	0.041+0.004	0.040+0.004	0.051+0.005	0.033+0.004
04/01/30	0.023+0.003	0.042+0.006	0.026+0.003	0.027+0.004	0.030+0.004	0.025+0.003	0.027+0.004	0.026+0.003	0.025+0.004
04/02/6	0.026+0.003	0.030+0.004	0.025+0.003	0.032+0.004	0.026+0.004	0.023+0.003	0.016+0.003	0.026+0.003	0.024+0.004
04/02/13	0.020+0.003	0.034+0.005	0.020+0.003	0.032+0.004	0.036+0.004	0.034+0.004	0.022+0.003	0.020+0.003	0.034+0.006
04/02/21	0.018+0.003	0.030+0.004	0.023+0.003	0.024+0.003	0.021+0.003	0.019+0.003	0.023+0.003	0.020+0.003	0.023+0.003
04/02/27	0.027+0.004	0.023+0.004	0.025+0.004	0.023+0.004	0.020+0.004	0.021+0.004	0.026+0.004	0.026+0.004	0.022+0.004
04/03/05	0.010+0.004	0.020+0.004	0.020+0.003	0.018+0.003	0.019+0.003	0.020+0.004	0.026+0.004	0.024+0.004	0.017+0.003
04/03/12	0.030+0.004	0.034+0.005	0.033+0.004	0.031+0.004	0.036+0.004	0.025+0.003	0.033+0.004	0.011+0.002	0.032+0.004
04/03/19	0.022+0.004	0.037+0.005	0.033+0.004	0.024+0.004	0.026+0.004	0.021+0.004	0.024+0.004	0.021+0.004	0.029+0.004
04/03/26	0.016+0.004	0.013+0.004	0.015+0.003	0.017+0.003	0.014+0.003	0.014+0.003	0.012+0.003	0.014+0.003	0.017+0.004
04/04/02	0.015+0.004	0.017+0.004	0.016+0.003	0.015+0.003	0.019+0.004	0.015+0.003	0.019+0.003	0.020+0.004	0.021+0.004
04/04/09	0.010+0.004	0.019+0.005	0.017+0.004	0.021+0.004	0.017+0.004	0.017+0.004	0.020+0.004	0.015+0.003	0.015+0.004
04/04/16	0.022+0.004	0.019+0.005	0.019+0.004	0.022+0.004	0.017+0.004	0.023+0.004	0.014+0.004	0.010+0.004	0.010+0.004
04/04/23	0.016+0.004	0.012+0.004	0.014+0.004	0.010+0.003	0.014+0.003	0.012+0.003	0.013+0.004	0.000+0.000	0.015+0.004
04/04/30	0.014+0.003	0.021+0.004	0.020+0.003	0.018+0.003	0.019+0.003	0.018+0.003	0.015+0.003	\$	0.016+0.003
04/05/07	0.024+0.004	0.024+0.004	0.017+0.003	0.021+0.003	0.010+0.003	0.020+0.003	0.020+0.003	\$	0.015+0.003
04/05/14	0.016+0.003	0.017+0.004	0.017+0.003	0.016+0.003	0.019+0.003	0.022+0.003	0.017+0.003	\$	0.009+0.003
04/05/21	0.024+0.004	0.030+0.005	0.023+0.003	0.024+0.003	0.020+0.003	0.024+0.003	0.025+0.004	0.013+0.003	0.019+0.003
04/05/29	0.024+0.004	0.021+0.004	0.019+0.003	0.022+0.003	0.023+0.003	0.019+0.003	0.019+0.003	0.021+0.003	0.020+0.003
04/06/04	0.017+0.004	0.015+0.004	0.014+0.003	0.011+0.003	0.011+0.003	0.013+0.003	0.012+0.003	0.010+0.003	0.014+0.003
04/06/11	0.042+0.005	0.039+0.005	0.033+0.004	0.035+0.004	0.006+0.002	0.044+0.004	0.016+0.003	0.030+0.004	0.034+0.004
04/06/18	0.022+0.004	0.018+0.004	0.016+0.003	0.012+0.003	0.012+0.003	0.017+0.003	0.015+0.003	0.015+0.003	0.013+0.003
04/06/25	0.025+0.004	0.026+0.004	0.020+0.003	0.020+0.003	0.019+0.003	0.024+0.003	0.021+0.003	0.018+0.003	0.016+0.003
04/07/02	0.021+0.004	0.020+0.004	0.015+0.003	0.010+0.003	0.015+0.003	0.015+0.003	0.010+0.003	0.015+0.003	0.015+0.003
04/07/09	0.024+0.004	0.026+0.005	0.025+0.003	0.024+0.003	0.020+0.003	0.016+0.003	0.022+0.003	0.022+0.003	0.018+0.003
04/07/16	0.033+0.004	0.034+0.005	0.030+0.003	0.025+0.003	0.029+0.004	0.033+0.004	0.032+0.004	0.031+0.004	0.029+0.004
04/07/23	0.029+0.004	0.023+0.004	0.023+0.003	0.025+0.003	0.023+0.003	0.030+0.004	0.020+0.003	0.019+0.003	0.030+0.004
04/07/30	0.024+0.004	0.021+0.004	0.025+0.003	0.027+0.003	0.037+0.002	0.025+0.003	0.024+0.003	0.024+0.003	0.023+0.003
04/08/06	0.037+0.004	0.037+0.005	0.038+0.004	0.037+0.004	0.033+0.004	0.030+0.004	0.036+0.004	0.035+0.003	0.030+0.004
04/08/13	0.027+0.004	0.040+0.005	0.029+0.003	0.029+0.003	0.025+0.003	\$	0.022+0.003	0.026+0.003	0.034+0.004
04/08/20	0.025+0.004	0.029+0.004	0.019+0.003	0.022+0.003	0.016+0.003	0.023+0.003	0.020+0.003	0.020+0.003	0.020+0.003
04/08/27	0.023+0.003	0.023+0.004	0.022+0.003	0.022+0.003	0.010+0.003	0.021+0.003	0.017+0.003	0.010+0.003	0.020+0.003
04/09/04	0.026+0.003	0.030+0.004	0.024+0.003	0.015+0.002	0.019+0.003	0.013+0.002	0.015+0.002	0.021+0.002	0.026+0.003
04/09/10	0.026+0.003	0.025+0.004	0.022+0.003	0.022+0.003	0.020+0.003	0.016+0.003	0.024+0.003	0.021+0.003	0.020+0.003
04/09/17	0.021+0.003	0.026+0.004	0.023+0.003	0.022+0.003	0.019+0.003	0.016+0.003	0.015+0.003	0.020+0.003	0.025+0.003
04/09/24	0.032+0.004	0.020+0.004	0.020+0.003	0.033+0.004	0.031+0.004	0.023+0.003	0.019+0.003	0.042+0.005	0.041+0.006
04/10/01	0.027+0.004	0.031+0.005	0.024+0.003	0.023+0.003	0.025+0.003	0.019+0.003	0.015+0.003	0.021+0.003	0.025+0.003
04/10/9	0.029+0.003	0.031+0.004	0.026+0.003	0.027+0.003	0.025+0.003	0.023+0.003	0.017+0.003	0.023+0.003	0.027+0.003
04/10/15	0.038+0.005	0.039+0.005	0.040+0.004	0.035+0.004	0.037+0.004	0.026+0.004	0.019+0.003	0.035+0.004	0.032+0.004
04/10/22	0.035+0.004	0.039+0.005	0.035+0.004	0.036+0.004	0.030+0.004	0.026+0.003	0.030+0.003	0.030+0.003	0.030+0.004
04/10/29	0.020+0.004	0.027+0.004	0.020+0.003	0.027+0.003	0.020+0.003	0.020+0.003	0.029+0.003	0.020+0.003	0.029+0.003
04/11/05	0.019+0.003	0.021+0.004	0.020+0.003	0.019+0.003	0.020+0.003	0.013+0.003	0.006+0.002	0.010+0.003	0.019+0.003
04/11/13	0.026+0.003	0.027+0.004	0.026+0.003	0.029+0.003	0.026+0.003	0.021+0.003	0.013+0.002	0.020+0.003	0.027+0.003
04/11/19	0.025+0.004	0.027+0.005	0.025+0.003	0.025+0.003	0.027+0.004	0.002+0.002	0.020+0.003	0.026+0.003	0.026+0.004
04/11/26	0.033+0.004	0.027+0.004	0.027+0.003	0.025+0.003	0.027+0.003	0.022+0.003	0.019+0.003	0.025+0.003	0.026+0.003
04/12/3	0.031+0.004	0.031+0.004	0.036+0.004	0.031+0.004	0.034+0.004	0.024+0.003	0.027+0.003	0.029+0.003	0.028+0.003
04/12/10	0.026+0.003	0.021+0.004	0.027+0.003	0.032+0.004	0.026+0.003	0.025+0.003	0.011+0.002	0.029+0.003	0.020+0.003
04/12/17	0.033+0.004	(0.000)	0.031+0.003	0.034+0.004	0.044+0.006	0.010+0.003	0.022+0.003	0.031+0.003	0.029+0.003
04/12/26	0.037+0.003	\$	0.030+0.003	0.031+0.003	0.039+0.004	0.036+0.003	0.010+0.002	0.036+0.004	0.032+0.003
05/01/2	0.031+0.004	0.033+0.005	0.029+0.003	0.020+0.004	0.030+0.004	0.030+0.004	0.027+0.003	0.026+0.003	0.029+0.003

a 0.0002±0.008

b <0.0001

* PUMP NOT OPERATIONAL

TABLE 11
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF AIR PARTICULATE SAMPLES
1984
Results in Units of 10^{-3} pCi/m³ \pm 2 sigma

Nuclides	January	February	March	April	May	June
OFFSITE COMPOSITE						
Co-144	<1.85	<0.81	<0.72	<1.41	<1.31	<0.89
Co-141	<0.67	<0.34	<0.28	<0.50	<0.47	<0.35
Re-7	101 \pm 0.7	97 \pm 4.6	117 \pm 4.7	123 \pm 7.8	122 \pm 7.5	91 \pm 5.1
Ru-103	<0.29	<0.23	<0.16	<0.36	<0.33	<0.24
Cs-134	<0.39	<0.17	<0.13	<0.26	<0.16	<0.18
Cs-137	<0.52	<0.18	<0.14	<0.30	<0.38	<0.19
Zr-95	<1.16	<0.49	<0.37	<0.69	<0.69	<0.40
Nb-95	<0.50	<0.23	<0.21	<0.34	<0.42	<0.25
Co-58	<0.35	<0.17	<0.14	<0.28	<0.29	<0.15
Mn-54	<0.43	<0.20	<0.14	<0.25	<0.20	<0.17
Co-60	1.07 \pm 0.54	0.38 \pm 0.14	<0.19	<0.25	<0.42	<0.16
ONSITE COMPOSITE						
Co-144	<0.72	<0.87	<0.58	<1.01	<1.11	<0.93
Co-141	<0.37	<0.38	<0.24	<0.38	<0.41	<0.34
Re-7	95 \pm 2.9	86 \pm 4.6	96 \pm 3.6	114 \pm 6.6	120 \pm 6.4	102 \pm 5.5
Ru-103	<0.18	<0.32	<0.17	<0.24	<0.24	<0.20
Cs-134	<0.14	<0.19	<0.13	<0.19	<0.24	<0.14
Cs-137	<0.15	0.18 \pm 0.11	<0.13	<0.24	<0.25	<0.21
Zr-95	<0.41	<0.55	<0.32	<0.47	<0.54	<0.47
Nb-95	<0.23	<0.36	<0.19	<0.28	<0.33	<0.21
Co-58	<0.28	<0.31	<0.14	<0.21	<0.25	<0.19
Mn-54	<0.17	<0.24	<0.11	<0.22	<0.17	<0.20
Co-60	1.48 \pm 0.26	1.49 \pm 0.29	0.54 \pm 0.14	<0.30	<0.32	<0.21

TABLE 11 (cont.)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF AIR PARTICULATE SAMPLES
1984
Results in Units of 10^{-2} pCi/m³ \pm 2 sigma

Nuclides	July	August	September	October	November	December
OFFSITE COMPOSITE						
Ce-144	<1.42	<1.23	<1.32	<1.58	<1.18	<1.28
Ce-141	<0.52	<0.47	<0.53	<0.53	<0.44	<0.44
Be-7	158 \pm 6.8	138 \pm 7.5	120 \pm 7.6	131 \pm 7.7	107 \pm 6.7	98 \pm 6.8
Ru-103	<0.31	<0.26	<0.37	<0.38	<0.33	<0.34
Cs-134	<0.37	<0.23	<0.26	<0.29	<0.26	<0.24
Cs-137	<0.37	<0.27	<0.40	<0.29	<0.27	<0.34
Zr-95	<0.75	<0.69	<0.49	<0.78	<0.57	<0.57
Nb-95	<0.45	<0.35	<0.36	<0.38	<0.35	<0.42
Co-58	<0.20	<0.35	<0.37	<0.32	<0.44	<0.26
Mn-54	<0.28	<0.28	<0.32	<0.28	<0.33	<0.32
Co-60	<0.41	<0.38	<0.50	<0.55	<0.41	<0.37
ONSITE COMPOSITE						
Ce-144	<1.03	<0.80	<1.05	<0.83	<0.82	<1.14
Ce-141	<0.36	<0.29	<0.35	<0.30	<0.32	<0.36
Be-7	122 \pm 6.3	98 \pm 5.2	113 \pm 6.1	81 \pm 4.7	82 \pm 4.9	90 \pm 5.6
Ru-103	<0.24	<0.21	<0.23	<0.21	<0.21	<0.28
Cs-134	<0.15	<0.15	<0.18	<0.18	<0.18	<0.20
Cs-137	<0.22	<0.20	<0.24	<0.25	<0.24	<0.27
Zr-95	<0.51	<0.48	<0.52	<0.43	<0.42	<0.73
Nb-95	<0.30	<0.27	<0.22	<0.32	<0.27	<0.29
Co-58	<0.19	<0.17	<0.24	<0.24	<0.23	<0.27
Mn-54	<0.22	<0.13	<0.24	<0.21	<0.18	<0.23
Co-60	<0.24	<0.19	<0.40	<0.34	<0.22	<0.35

TABLE 12
HMP/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFF SITE STATIONS
I-131 ACTIVITY pCi/m³ \pm 2 sigma

WEEK END DATE	C--OFF	D1--OFF	D2--OFF	E--OFF	F--OFF	G--OFF
04/01/10	(0.024	(0.042	(0.042	(0.023	(0.022	(0.033
04/01/17	(0.010	(0.010	(0.010	(0.013	(0.019	(0.023
04/01/24	(0.023	(0.020	(0.012	(0.015	(0.018	(0.017
04/01/31	(0.017	(0.019	(0.014	(0.012	(0.017	(0.014
04/02/07	(0.021	(0.013	(0.017	(0.018	(0.014	(0.015
04/02/14	(0.017	(0.016	(0.012	(0.016	(0.012	(0.021
04/02/22	(0.022	(0.014	(0.014	(0.016	(0.016	(0.020
04/02/29	(0.022	(0.009	(0.020	(0.014	(0.019	(0.021
04/03/06	(0.006	(0.014	(0.014	(0.013	(0.018	(0.020
04/03/13	(0.017	(0.011	(0.012	(0.015	(0.017	(0.014
04/03/20	(0.012	(0.021	(0.019	(0.009	(0.018	(0.018
04/03/27	(0.018	(0.013	(0.017	(0.015	(0.013	(0.019
04/04/03	(0.020	(0.020	(0.020	(0.017	(0.014	(0.021
04/04/10	(0.016	(0.021	(0.017	(0.014	(0.017	(0.013
04/04/17	(0.022	(0.023	(0.019	(0.013	(0.023	(0.020
04/04/24	(0.017	(0.015	(0.020	(0.022	(0.015	(0.010
04/05/01	(0.016	(0.024	(0.013	(0.016	(0.013	(0.020
04/05/08	(0.022	(0.015	(0.017	(0.015	(0.012	(0.017
04/05/15	(0.023	(0.017	(0.013	(0.014	(0.022	(0.019
04/05/22	(0.012	(0.015	(0.014	(0.014	(0.021	(0.010
04/05/30	(0.013	(0.014	(0.010	(0.016	(0.010	(0.017
04/06/05	(0.021	(0.017	(0.016	(0.017	(0.021	(0.021
04/06/12	(0.010	(0.021	(0.018	(0.021	(0.010	(0.016
04/06/19	(0.020	(0.018	(0.018	(0.015	(0.012	(0.015
04/06/26	(0.017	(0.014	(0.017	(0.010	(0.016	(0.015
04/07/03	(0.027	(0.016	(0.021	(0.012	(0.021	(0.020
04/07/10	(0.026	(0.013	(0.012	(0.014	(0.013	(0.021
04/07/17	(0.016	(0.016	(0.023	(0.014	(0.013	(0.010
04/07/24	(0.024	(0.015	(0.019	(0.020	(0.020	(0.014
04/07/31	(0.023	(0.013	(0.015	(0.017	(0.021	(0.012
04/08/07	(0.021	(0.021	(0.015	(0.014	(0.015	(0.017
04/08/14	(0.024	(0.017	(0.013	(0.016	(0.021	(0.016
04/08/21	(0.014	(0.014	(0.019	(0.019	(0.015	(0.016
04/08/28	(0.020	(0.019	(0.022	(0.018	(0.018	(0.017
04/09/05	(0.020	(0.018	(0.013	(0.012	(0.019	(0.024
04/09/11	(0.017	(0.018	(0.021	(0.014	(0.021	(0.015
04/09/18	(0.016	(0.015	(0.018	(0.020	(0.015	(0.016
04/09/25	(0.024	(0.016	(0.017	(0.017	(0.016	(0.025
04/10/02	(0.052	(0.020	(0.052	(0.016	(0.023	(0.017
04/10/10	(0.015	(0.012	(0.016	(0.021	(0.009	(0.023
04/10/16	(0.024	(0.021	(0.016	(0.019	(0.020	(0.013
04/10/23	(0.020	(0.013	(0.012	(0.013	(0.017	(0.018
04/10/30	(0.013	(0.014	(0.014	(0.017	(0.019	(0.009
04/11/06	(0.013	(0.010	(0.017	(0.000	(0.009	(0.017
04/11/14	(0.010	(0.014	(0.009	(0.017	(0.016	(0.023
04/11/20	(0.027	(0.014	(0.019	(0.019	(0.022	(0.060
04/11/27	(0.064	(0.030	(0.040	(0.057	(0.056	(0.019
04/12/04	(0.010	(0.014	(0.017	(0.011	(0.021	(0.023
04/12/11	(0.025	(0.016	(0.018	(0.018	(0.014	(0.011
04/12/18	(0.015	(0.019	(0.019	(0.019	(0.022	(0.017
04/12/27	(0.020	(0.017	(0.012	(0.014	(0.020	(0.030
05/01/03	(0.036	(0.023	(0.019	(0.017	(0.021	

TABLE 13
IMP/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ON SITE STATIONS
I-131 ACTIVITY pCi/m³ ± 2 sigma

WEEK END DATE	LOCATION								
	D1--OH	D2--OH	E--OH	F--OH	G--OH	H--OH	I--OH	J--OH	K--OH
04/01/9	(0.019	(0.025	(0.021	(0.017	(0.020	(0.017	(0.026	(0.027	(0.025
04/01/16	(0.015	(0.026	(0.021	(0.018	(0.018	(0.019	(0.018	(0.024	(0.019
04/01/23	(0.026	(0.026	(0.023	(0.014	(0.019	(0.023	(0.013	(0.024	(0.018
04/01/30	(0.020	(0.020	(0.012	(0.015	(0.021	(0.019	(0.012	(0.019	(0.023
04/02/6	(0.015	(0.021	(0.014	(0.019	(0.021	(0.019	(0.022	(0.019	(0.013
04/02/13	(0.019	(0.025	(0.018	(0.016	(0.015	(0.014	(0.018	(0.018	(0.027
04/02/21	(0.017	(0.032	(0.015	(0.021	(0.020	(0.019	(0.018	(0.018	(0.016
04/02/27	(0.029	(0.027	(0.016	(0.018	(0.015	(0.019	(0.016	(0.022	(0.024
04/03/05	(0.016	(0.017	(0.019	(0.015	(0.011	(0.020	(0.022	(0.022	(0.023
04/03/12	(0.015	(0.026	(0.020	(0.017	(0.011	(0.017	(0.019	(0.015	(0.020
04/03/19	(0.014	(0.024	(0.017	(0.019	(0.016	(0.020	(0.016	(0.014	(0.018
04/03/26	(0.018	(0.022	(0.018	(0.018	(0.013	(0.023	(0.024	(0.018	(0.019
04/04/02	(0.016	(0.024	(0.019	(0.024	(0.015	(0.027	(0.018	(0.014	(0.019
04/04/09	(0.023	(0.025	(0.013	(0.008	(0.020	(0.025	(0.022	(0.017	(0.019
04/04/16	(0.022	(0.026	(0.020	(0.020	(0.020	(0.017	(0.016	(0.022	(0.013
04/04/23	(0.023	(0.029	(0.018	(0.016	(0.015	(0.011	(0.020	(0.022	(0.012
04/04/30	(0.016	(0.036	(0.020	(0.021	(0.022	(0.015	(0.021	#	(0.012
04/05/07	(0.019	(0.027	(0.020	(0.020	(0.014	(0.014	(0.013	#	(0.022
04/05/14	(0.019	(0.020	(0.016	(0.015	(0.019	(0.021	(0.021	#	(0.016
04/05/21	(0.024	(0.023	(0.015	(0.021	(0.022	(0.019	(0.026	(0.013	(0.018
04/05/29	(0.019	(0.020	(0.018	(0.014	(0.016	(0.021	(0.017	(0.017	(0.017
04/06/04	(0.019	(0.036	(0.014	(0.020	(0.019	(0.023	(0.023	(0.015	(0.024
04/06/11	(0.018	(0.022	(0.020	(0.019	(0.023	(0.029	(0.022	(0.024	(0.023
04/06/18	(0.028	(0.030	(0.016	(0.017	(0.024	(0.017	(0.019	(0.008	(0.019
04/06/25	(0.023	(0.026	(0.013	(0.019	(0.015	(0.025	(0.021	(0.018	(0.016
04/07/02	(0.029	(0.024	(0.018	(0.010	(0.014	(0.021	(0.015	(0.013	(0.024
04/07/09	(0.021	(0.034	(0.017	(0.011	(0.025	(0.023	(0.010	(0.015	(0.015
04/07/16	(0.023	(0.020	(0.014	(0.017	(0.027	(0.025	(0.020	(0.013	(0.018
04/07/23	(0.021	(0.029	(0.013	(0.017	(0.017	(0.017	(0.012	(0.015	(0.016
04/07/30	(0.020	(0.030	(0.017	(0.019	(0.023	(0.025	(0.020	(0.022	(0.010
04/08/06	(0.018	(0.019	(0.013	(0.017	(0.021	(0.022	(0.026	(0.016	(0.016
04/08/13	(0.022	(0.024	(0.017	(0.015	(0.018	(0.020	(0.019	(0.005	(0.020
04/08/20	(0.023	(0.033	(0.016	(0.016	(0.012	(0.013	(0.020	(0.016	(0.017
04/08/27	(0.014	(0.020	(0.014	(0.015	(0.014	(0.023	(0.022	(0.023	(0.022
04/09/04	(0.018	(0.037	(0.013	(0.018	(0.018	(0.019	(0.023	(0.014	(0.016
04/09/10	(0.024	(0.029	(0.010	(0.022	(0.018	(0.021	(0.016	(0.022	(0.013
04/09/17	(0.020	(0.015	(0.013	(0.012	(0.014	(0.017	(0.018	(0.015	(0.015
04/09/24	(0.019	(0.020	(0.012	(0.014	(0.020	(0.021	(0.011	(0.027	(0.033
04/10/01	(0.017	(0.033	(0.018	(0.014	(0.014	(0.014	(0.010	(0.016	(0.016
04/10/09	(0.019	(0.023	(0.014	(0.014	(0.016	(0.018	(0.012	(0.015	(0.017
04/10/15	(0.019	(0.025	(0.013	(0.020	(0.016	(0.020	(0.019	(0.015	(0.021
04/10/22	(0.019	(0.027	(0.011	(0.016	(0.024	(0.017	(0.017	(0.013	(0.023
04/10/29	(0.019	(0.022	(0.012	(0.013	(0.017	(0.012	(0.021	(0.017	(0.012
04/11/05	(0.021	(0.030	(0.017	(0.011	(0.017	(0.018	(0.016	(0.014	(0.015
04/11/13	(0.016	(0.029	(0.014	(0.017	(0.015	(0.017	(0.018	(0.017	(0.019
04/11/19	(0.022	(0.030	(0.021	(0.018	(0.016	(0.019	(0.014	(0.017	(0.017
04/11/26	(0.020	(0.046	(0.051	(0.049	(0.057	(0.042	(0.044	(0.041	(0.040
04/12/3	(0.021	(0.031	(0.024	(0.019	(0.017	(0.022	(0.013	(0.021	(0.019
04/12/10	(0.020	(0.027	(0.017	(0.018	(0.021	(0.020	(0.018	(0.023	(0.015
04/12/17	(0.019	(0.037	(0.012	(0.020	(0.044	(0.016	(0.024	(0.012	(0.021
04/12/24	(0.019	#	(0.019	(0.019	(0.018	(0.019	(0.015	(0.013	(0.018
05/01/2	(0.032	(0.040	(0.026	(0.032	(0.022	(0.031	(0.026	(0.022	(0.028

PUMP NOT OPERATIONAL

TABLE 14

DIRECT RADIATION MEASUREMENTS - QUARTERLY RESULTS (1984)

Results in Units of $\mu\text{rem}/\text{Std. Month} \pm 2 \text{ Sigma}$

STATION NUMBER	LOCATION	JANUARY THROUGH MARCH	APRIL THROUGH JUNE	JULY THROUGH SEPTEMBER	OCTOBER THROUGH DECEMBER	LOCATION (DIRECTION AND (DISTANCE))*
3	D1 on Site	12.9 \pm 1.2	11.3 \pm 0.6	13.2 \pm 1.4	8.3 \pm 0.3	0.2 miles @ 69°
4	D2 on Site	6.8 \pm 0.2	5.4 \pm 0.2	7.8 \pm 2.2	6.9 \pm 0.3	0.4 miles @ 140°
5	E on Site	6.7 \pm 0.1	5.3 \pm 0.1	8.0 \pm 0.5	5.8 \pm 0.2	0.4 miles @ 175°
6	F on Site	5.8 \pm 0.3	5.2 \pm 0.2	6.8 \pm 1.1	4.7 \pm 0.1	0.5 miles @ 210°
7	G on Site	5.6 \pm 0.7	4.6 \pm 0.2	6.9 \pm 1.5	5.0 \pm 0.1	0.7 miles @ 250°
8	C off Site	6.2 \pm 0.5	6.0 \pm 0.3	8.2 \pm 1.4	6.6 \pm 0.4	16.0 miles @ 42°
9	D1 off Site	6.2 \pm 0.3	4.9 \pm 0.1	7.4 \pm 0.1	5.3 \pm 0.2	11.4 miles @ 80°
10	D2 off Site	6.1 \pm 0.3	4.8 \pm 0.2	7.2 \pm 0.3	4.9 \pm 0.1	9.0 miles @ 117°
11	E off Site	5.8 \pm 0.3	5.5 \pm 0.2	7.0 \pm 0.5	5.6 \pm 0.5	7.2 miles @ 160°
12	F off Site	6.0 \pm 0.5	4.7 \pm 0.1	7.4 \pm 0.1	4.9 \pm 0.3	7.7 miles @ 190°
13	G off Site	6.3 \pm 0.5	4.6 \pm 0.1	7.8 \pm 0.8	5.8 \pm 0.1	5.3 miles @ 225°
14	DeMass Rd, SW Oswego-Control	6.4 \pm 0.3	5.6 \pm 0.2	7.2 \pm 0.3	6.1 \pm 0.2	12.8 miles @ 225°
15	Pole 66, W. Boundary-Bible Camp	5.3 \pm 0.4	3.9 \pm 0.4	6.2 \pm 0.1	4.2 \pm 0.1	0.9 miles @ 238°
18	Progress Center-Picnic Area	6.8 \pm 0.8	(1)	7.7 \pm 1.7	5.2 \pm 0.3	0.5 miles @ 268°
19	East Boundary-JAF, Pole 9	6.4 \pm 0.3	5.0 \pm 0.1	8.1 \pm 1.6	5.3 \pm 0.1	1.3 miles @ 81°
23	H on Site	8.3 \pm 0.4	7.5 \pm 0.3	9.9 \pm 1.4	7.3 \pm 0.3	0.8 miles @ 71°
24	I on Site	6.4 \pm 0.4	6.0 \pm 0.1	8.2 \pm 0.3	5.4 \pm 0.1	0.8 miles @ 98°
25	J on Site	6.4 \pm 0.4	4.8 \pm 0.2	8.0 \pm 0.7	5.4 \pm 0.2	0.9 miles @ 110°
26	K on Site	6.4 \pm 0.1	5.6 \pm 0.3	7.7 \pm 0.5	5.1 \pm 0.2	0.5 miles @ 132°
27	N. Fence, N. of Switchyard, JAF	18.4 \pm 2.1	19.2 \pm 1.3	19.4 \pm 1.0	12.6 \pm 0.3	0.4 miles @ 60°
28	N. Light Pole, N. of Screenhouse, JAF	37.0 \pm 3.0	36.7 \pm 3.6	32.9 \pm 1.3	21.5 \pm 1.4	0.5 miles @ 68°
29	N. Fence, N. of E. Side Screenhouse, JAF	43.9 \pm 5.1	40.7 \pm 3.8	34.4 \pm 0.6	29.1 \pm 1.2	0.5 miles @ 65°
30	N. Fence (NW) JAF	15.9 \pm 1.3	15.9 \pm 0.9	16.4 \pm 1.0	11.4 \pm 0.4	0.4 miles @ 57°
31	N. Fence (NW) NMP-1	23.8 \pm 1.4	22.9 \pm 1.5	24.4 \pm 1.2	21.7 \pm 0.4	0.2 miles @ 250°
39	East Fence, Rad. Waste-NMP-1	18.5 \pm 1.4	14.7 \pm 1.2	18.2 \pm 1.4	13.9 \pm 0.4	0.1 miles @ 292°
43	.9 mi Rt. 3 from Rt. 104B	6.1 \pm 0.2	6.2 \pm 0.4	7.9 \pm 0.5	6.0 \pm 0.4	9.4 miles @ 88°
44	Cor. Rt 3 and Kelly Drive	6.0 \pm 0.4	5.1 \pm 0.1	7.7 \pm 0.1	4.9 \pm 0.3	12.6 miles @ 64°

TABLE 14 (Cont'd)

DIRECT RADIATION MEASUREMENTS - QUARTERLY RESULTS (1984)

Results in Units of mrem/Std. Month \pm 2 Sigma

STATION NUMBER	LOCATION	JANUARY THROUGH MARCH	APRIL THROUGH JUNE	JULY THROUGH SEPTEMBER	OCTOBER THROUGH DECEMBER	LOCATION (DIRECTION AND (DISTANCE))*
45	Cor. Rt 64 and Rt. 35	6.1 \pm 0.5	5.3 \pm 0.0	8.1 \pm 0.4	5.3 \pm 0.4	7.6 miles @ 150°
46	Cor. Rt 176 and Black Creek Rd.	6.0 \pm 0.2	4.9 \pm 0.1	7.1 \pm 0.3	4.8 \pm 0.2	7.9 miles @ 178°
47	NE Shoreline (JAF)	13.5 \pm 0.9	11.7 \pm 0.3	15.3 \pm 0.4	9.6 \pm 0.2	0.6 miles @ 65°
48	.36 mi (N) on Access Rd. (JAF)	7.7 \pm 0.2	7.7 \pm 0.2	9.3 \pm 0.2	6.0 \pm 0.2	0.6 miles @ 92°
49	Phoenix, NY-Control	5.6 \pm 0.1	4.7 \pm 0.2	6.6 \pm 1.3	5.7 \pm 0.2	20.0 miles @ 165°
50	Lake Rd. West of J On-Site	6.5 \pm 0.0	5.3 \pm 0.1	7.5 \pm 0.1	4.9 \pm 0.3	0.7 miles @ 115°
51	Liberty & Bronson Sts., E of OSS	5.9 \pm 0.2	4.8 \pm 0.1	7.6 \pm 0.4	5.5 \pm 0.2	7.4 miles @ 233°
52	East 12th & Cayuga Sts., Osw. School	5.7 \pm 0.4	4.8 \pm 0.2	7.1 \pm 0.4	4.6 \pm 0.2	5.6 miles @ 227°
53	Broadwell & Chestnut Sts-Fulton H.S.	5.9 \pm 0.2	5.0 \pm 0.1	7.5 \pm 0.3	5.0 \pm 0.1	13.7 miles @ 183°
54	Liberty St. & Co. Rt. 16-Mexico H.S.	5.6 \pm 0.6	4.7 \pm 0.1	7.3 \pm 0.4	5.5 \pm 0.2	9.3 miles @ 115°
55	Gas Stations Co. Rt. 5-Pulaski	5.6 \pm 0.2	5.7 \pm 0.2	7.1 \pm 0.3	4.8 \pm 0.2	13.0 miles @ 75°
56	Rt. 104 - New Haven H.S. (SE Corner)	5.9 \pm 0.1	5.0 \pm 0.1	7.4 \pm 0.2	5.1 \pm 0.2	5.4 miles @ 120°
57	Co. Rt. 29-Miner Rd.(SE)-Lycoming, NY	6.2 \pm 0.3	4.8 \pm 0.2	6.8 \pm 1.0	4.9 \pm 0.3	1.9 miles @ 145°
58	Co. Rt. 1 - ALCAN (S of Entrance Rd.)	5.9 \pm 0.5	5.6 \pm 0.1	7.5 \pm 0.6	5.6 \pm 0.2	3.2 miles @ 220°
59	Environmental Lab - JAF	14.0 \pm 1.0	11.1 \pm 0.2	12.1 \pm 0.4	12.1 \pm 1.1	0.5 miles @ 95°
60	S. Shore (Fish Point) Little Sodus Bay, NY	5.7 \pm 0.3	4.7 \pm 0.2	7.2 \pm 0.4	4.6 \pm 0.3	21.0 miles @ 225°
61	700' N of #48 (On Access Rd.)-JAF	8.6 \pm 0.3	8.4 \pm 0.1	10.5 \pm 0.5	7.0 \pm 0.5	0.8 miles @ 83°
65	Dutch Ridge Rd. & Kerfien Rd.(SE)	6.0 \pm 0.5	4.8 \pm 0.1	(1)	4.8 \pm 0.6	7.8 miles @ 198°

(1) TLDs lost

* Direction and distance based on NMP-2 Reactor Centerline and Sixteen 22.5° degree sector grid.

TABLE 15
CONTINUOUS RADIATION MONITORS* (GM)

		mR/hr		
		FIRST HALF		
LOCATION	PERIOD 1984	MIN.	mR/hr	
			MAX.	AVG.
C Offsite**	01/10 to 02/07	0.012	0.022	0.015
	02/07 to 03/06	0.010	0.027	0.018
	03/06 to 04/03	0.010	0.028	0.018
	04/03 to 05/01	0.010	0.030	0.020
	05/01 to 05/27	0.016	0.030	0.020
	05/27 to 07/03	0.010	0.028	0.019
D ₁ Onsite	01/09 to 02/06	0.010	0.048	0.018
	02/06 to 03/05	0.012	0.027	0.019
	03/05 to 04/02	0.010	0.022	0.013
	04/02 to 04/30	0.013	0.042	0.026
	04/30 to 05/30	0.018	0.040	0.025
	05/30 to 07/06	0.010	0.028	0.019
D ₂ Onsite	01/09 to 02/06	0.012	0.025	0.015
	02/06 to 03/05	0.010	0.020	0.015
	03/05 to 04/02	0.012	0.028	0.016
	04/02 to 04/30	0.012	0.030	0.016
	04/30 to 05/30	0.014	0.020	0.018
	05/30 to 06/29	0.013	0.021	0.018
E Onsite	01/09 to 02/06	0.010	0.030	0.015
	02/06 to 03/05	0.010	0.022	0.017
	03/05 to 04/02	0.010	0.023	0.016
	04/02 to 04/30	0.012	0.024	0.016
	04/30 to 05/30	0.013	0.024	0.018
	05/30 to 07/02	0.013	0.026	0.018
F Onsite	01/09 to 02/06	0.015	0.035	0.022
	02/06 to 03/05	0.010	0.030	0.022
	03/05 to 04/02	0.014	0.028	0.021
	04/02 to 04/30	0.018	0.030	0.023
	04/30 to 05/30	0.013	0.031	0.020
	05/30 to 06/29	0.016	0.030	0.025

* Detectors are "bugged" to insure on scale readings.

** Monitor located at D1 off-site station after 07-19-84 because of repeated vandalism.

TABLE 15 (Cont'd)

CONTINUOUS RADIATION MONITORS* (GM)

mR/hr				
SECOND HALF				
LOCATION	PERIOD 1984	MIN.	mR/hr	
			MAX.	AVG.
C Offsite**	07/03 to 07/31	0.019	0.028	0.023
	07/31 to 08/28	0.013	0.055	0.027
	08/28 to 09/27	0.013	0.060	0.025
	09/27 to 10/25	0.010	0.047	0.020
	10/25 to 11/27	0.010	0.024	0.018
	11/27 to 12/27	0.010	0.022	0.015
D ₁ Onsite	07/06 to 07/30	0.010	0.025	0.013
	07/30 to 08/28	0.013	0.055	0.027
	08/28 to 09/28	0.012	0.029	0.018
	09/28 to 11/01	0.010	0.040	0.015
	11/01 to 11/30	0.013	0.030	0.021
	11/30 to 12/26	0.011	0.042	0.016
D ₂ Onsite	06/29 to 07/30	0.015	0.030	0.018
	07/30 to 08/28	0.013	0.030	0.018
	08/28 to 09/28	0.012	0.033	0.018
	09/28 to 10/31	0.014	0.029	0.017
	10/31 to 11/30	0.013	0.027	0.018
	11/30 to 12/26	0.012	0.060	0.028
E Onsite	07/02 to 07/30	0.010	0.028	0.018
	07/30 to 08/28	0.012	0.030	0.020
	08/28 to 09/28	0.012	0.050	0.017
	09/28 to 10/25	0.014	0.027	0.017
	10/25 to 11/30	0.010	0.024	0.018
	11/30 to 12/26	0.012	0.028	0.018
F Onsite	06/29 to 07/30	0.010	0.032	0.025
	07/30 to 08/28	0.010	0.035	0.025
	08/28 to 09/28	0.013	0.029	0.021
	09/28 to 10/31	0.010	0.040	0.025
	10/31 to 11/28	0.015	0.032	0.022
	11/28 to 12/26	0.015	0.050	0.020

* Detectors are "bugged" to insure on scale readings.

** Monitor located at D1 off-site station after 07-19-84 because of repeated vandalism.

TABLE 15 (Cont'd)
CONTINUOUS RADIATION MONITORS* (GM)

		mR/hr		
		FIRST HALF		
		mR/hr		
<u>LOCATION</u>	<u>PERIOD 1984</u>	<u>MIN.</u>	<u>MAX.</u>	<u>AVG.</u>
G Onsite	01/09 to 02/06	0.010	0.022	0.018
	02/06 to 03/05	0.010	0.023	0.019
	03/05 to 04/02	0.010	0.024	0.015
	04/02 to 04/30	0.016	0.030	0.020
	04/30 to 05/30	0.013	0.029	0.022
	05/30 to 06/29	0.012	0.034	0.024
H Onsite	01/09 to 02/06	0.015	0.050	0.018
	02/06 to 03/05	0.010	0.070	0.030
	03/05 to 04/02	0.010	0.030	0.019
	04/02 to 04/30	0.014	0.052	0.021
	04/30 to 05/30	0.017	0.030	0.022
	05/30 to 07/02	0.017	0.065	0.025
I Onsite	01/09 to 02/06	0.010	0.040	0.018
	02/06 to 03/05	0.013	0.021	0.015
	03/05 to 04/02	0.014	0.022	0.019
	04/02 to 04/30	0.014	0.028	0.018
	04/30 to 05/30	0.010	0.030	0.021
	05/30 to 07/02	0.010	0.028	0.022
J Onsite	01/09 to 02/06	0.010	0.020	0.015
	02/06 to 03/05	0.010	0.020	0.015
	03/05 to 04/02	0.010	0.019	0.013
	04/02 to 04/30	0.010	0.020	0.016
	04/30 to 05/30	0.010	0.020	0.015
	05/30 to 07/02	0.013	0.022	0.015
K Onsite	01/09 to 02/06	0.010	0.028	0.015
	02/06 to 03/05	0.010	0.030	0.017
	03/05 to 04/02	0.010	0.027	0.019
	04/02 to 04/30	0.012	0.030	0.020
	04/30 to 05/30	0.011	0.030	0.024
	05/30 to 06/29	0.010	0.030	0.022

* Detectors are "bugged" to insure on scale readings.

TABLE 15 (Cont'd)

CONTINUOUS RADIATION MONITORS* (GM)

mR/hr				
SECOND HALF				
LOCATION	PERIOD 1984	MIN.	mR/hr	
			MAX.	AVG.
G Onsite	06/29 to 07/30	0.013	0.032	0.020
	07/30 to 08/28	0.010	0.035	0.025
	08/28 to 09/28	0.010	0.045	0.022
	09/28 to 10/31	0.013	0.032	0.020
	10/31 to 11/29	0.013	0.041	0.019
	11/29 to 12/26	0.012	0.042	0.018
H Onsite	07/02 to 07/30	0.018	0.080	0.025
	07/30 to 08/28	0.010	0.100	0.027
	08/28 to 09/28	0.018	0.110	0.050
	09/28 to 10/29	0.011	0.110	0.032
	10/29 to 11/30	0.017	0.089	0.032
	11/30 to 12/26	0.012	0.046	0.020
I Onsite	07/02 to 07/30	0.012	0.038	0.020
	07/30 to 08/28	0.012	0.034	0.017
	08/28 to 09/28	0.012	0.040	0.018
	09/28 to 10/29	0.012	0.034	0.020
	10/29 to 11/30	0.013	0.030	0.022
	11/30 to 12/26	0.013	0.043	0.020
J Onsite	07/02 to 07/31	0.010	0.028	0.017
	07/31 to 08/28	0.010	0.090	0.027
	08/28 to 09/28	0.010	0.090	0.025
	09/28 to 10/29	0.013	0.090	0.021
	10/29 to 11/30	0.010	0.040	0.021
	11/30 to 12/26	0.010	0.053	0.020
K Onsite	06/29 to 07/30	0.010	0.032	0.020
	07/30 to 08/28	0.010	0.031	0.017
	08/28 to 09/28	0.010	0.030	0.020
	09/28 to 10/29	0.010	0.023	0.016
	10/29 to 11/30	0.010	0.024	0.015
	11/30 to 12/26	0.010	0.033	0.015

* Detectors are "bugged" to insure on scale readings.

TABLE 16

CONCENTRATIONS OF IODINE-131 IN MILK

Results in Units of pCi/l \pm 2 sigma

Station*	May	June	July	August	September	October	November	December
16	<0.22	<0.23	<0.21	<0.26	<0.19	<0.21	<0.17	<0.26
4	<0.30	<0.18	<0.18	<0.29	<0.20	<0.23	<0.17	<0.26
45	<0.29	<0.19	-	-	-	-	-	-
5	<0.19	<0.18	-	-	-	-	-	-
7	<0.28	<0.16	<0.22	<0.34	<0.24	<0.19	<0.17	<0.27
40 (Control)	<0.23	<0.16	<0.19	<0.19	<0.19	<0.23	<0.17	<0.21
50	<0.29	<0.19	<0.16	<0.23	<0.21	<0.17	<0.17	<0.21
55	<0.33	<0.17	<0.18	<0.22	<0.28	<0.21	<0.17	<0.25
60	(a)	(a)	<0.17 ^(b)	<0.30	<0.28	<0.21	<0.19	<0.25

* Corresponds to sample locations listed on Figure 5, Section VII.

- Sampling station no longer required by Technical Specifications, therefore discontinued.

(a) No sample taken.

(b) Sampling resumed due to results of Spring 1984 Milch Animal Census.

TABLE 17
CONCENTRATIONS OF GAMMA EMITTERS IN MILK
(MONTHLY COMPOSITE SAMPLES)
Results in Units of $\mu\text{Ci/l} \pm 2 \text{ sigma}$

STATION*	MUTLIDES	05/07/84 to 05/21/84	06/04/84 to 06/18/84	07/05/84 to 07/22/84	08/06/84 to 08/20/84	09/10/84 to 09/24/84	10/01/84 to 10/15/84	11/05/84 to 11/26/84	12/03/84 to 12/17/84
No. 16	K-40	1350+140	1390+140	1260+130	1570+160	1500+150	1520+150	1530+150	1530+150
	Ca-134	<4.4	<7.1	<6.9	<6.9	<5.5	<7.3	<8.0	<7.4
	Ca-137	<5.7	<6.3	<5.7	<5.3	<5.8	<7.7	<8.0	<8.0
	Ba-140	<5.9	<9.3	<6.1	<8.1	<22.0	<12.0	<12.0	<8.7
	La-140	<5.9	<9.3	<6.1	<8.1	<22.0	<12.0	<12.0	<8.7
	Others	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0
No. 4	K-40	1490+150	1310+130	1590+160	1420+140	1840+180	1350+140	1490+150	1440+140
	Ca-134	<4.7	<4.8	<7.0	<5.7	<7.5	<4.4	<4.2	<4.9
	Ca-137	<5.3	<4.8	<6.7	<5.7	<8.0	<5.5	<4.2	<5.1
	Ba-140	<6.9	<6.9	<7.2	<8.1	<12.0	<7.9	<6.6	<5.3
	La-140	<6.9	<6.9	<7.2	<8.1	<12.0	<7.9	<6.6	<5.3
	Others	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0
No. 45	K-40	1550+150	1120+110	-	-	-	-	-	-
	Ca-134	<4.8	<3.9	-	-	-	-	-	-
	Ca-137	<5.0	<4.1	-	-	-	-	-	-
	Ba-140	<6.1	<5.6	-	-	-	-	-	-
	La-140	<6.1	<5.6	-	-	-	-	-	-
	Others	<11.0	<11.0	-	-	-	-	-	-
No. 5	K-40	1310+130	1040+100	-	-	-	-	-	-
	Ca-134	<3.9	<4.2	-	-	-	-	-	-
	Ca-137	<4.3	<4.5	-	-	-	-	-	-
	Ba-140	<5.2	<7.3	-	-	-	-	-	-
	La-140	<5.2	<7.3	-	-	-	-	-	-
	Others	<11.0	<11.0	-	-	-	-	-	-
No. 7	K-40	1320+130	1100+110	1260+130	1760+180	1550+160	1540+150	1530+150	1570+160
	Ca-134	<6.5	<6.6	<4.3	<7.6	<4.5	<6.7	<6.5	<5.4
	Ca-137	<7.0	<7.1	<4.4	<7.9	<5.8	<6.3	<5.0	<6.6
	Ba-140	<8.7	<8.6	<4.3	<14.0	<7.8	<8.3	<5.8	<5.4
	La-140	<8.7	<8.6	<4.3	<14.0	<7.8	<8.3	<5.8	<5.4
	Others	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0

* Corresponds to sample locations noted on Figure 5, Section VII.
- Sampling stations discontinued (not required by Environmental Technical Specifications).

TABLE 17 (cont.)
CONCENTRATIONS OF GAMMA EMITTERS IN MILK
(MONTHLY COMPOSITE SAMPLES)
Results in Units of $\mu\text{Ci/l} \pm 2 \text{ sigma}$

STATION*	MILK LINES	05/07/84 to 05/21/84	06/04/84 to 06/18/84	07/05/84 to 07/23/84	08/06/84 to 08/20/84	09/10/84 to 09/24/84	10/01/84 to 10/15/84	11/05/84 to 11/26/84	12/03/84 to 12/17/84
No. 40 (Control)	K-40	1200±120	1190±120	1490±150	1470±150	1430±140	1430±81	1490±150	1500±150
	Cs-134	<7.0	<5.1	<7.5	<7.5	<4.4	<5.6	<4.0	<5.8
	Cs-137	<6.6	<5.4	<8.4	<7.8	<4.4	<5.5	<4.6	<5.5
	Ba-140	<10.0	<7.3	<9.6	<12.0	<5.9	<7.4	<5.8	<5.5
	La-140	<10.0	<7.3	<9.6	<12.0	<5.9	<7.4	<5.8	<5.5
	Others	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0
No. 50	K-40	1400±140	1330±130	1210±120	1680±170	1560±160	1370±140	1560±160	1430±140
	Cs-134	<4.8	<4.6	<4.0	<4.8	<6.9	<3.8	<4.2	<7.0
	Cs-137	<4.7	<4.9	<4.2	<4.8	<6.2	<4.0	<4.2	<6.5
	Ba-140	<6.6	<6.4	<4.8	<7.3	<9.2	<7.1	<6.2	<7.5
	La-140	<6.6	<6.4	<4.8	<7.3	<9.2	<7.1	<6.2	<7.5
	Others	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0
No. 55	K-40	1750±180	1760±140	1290±130	1540±150	1590±160	1300±130	1430±140	1560±160
	Cs-134	<4.2	<4.3	<4.7	<5.0	<8.8	<4.0	<6.8	<3.9
	Cs-137	<4.6	<4.7	<4.7	<4.8	<3.9	<4.3	<6.9	<4.4
	Ba-140	<5.7	<5.5	<4.2	<6.9	<5.8	<6.2	<8.5	<4.8
	La-140	<5.7	<5.5	<4.2	<6.9	<5.8	<6.2	<8.5	<4.8
	Others	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0
No. 60	K-40	-	-	1290±130 ^(a)	1610±160	1100±110	1250±130	1180±120	1280±130
	Cs-134	-	-	<5.7	<6.9	<3.8	<6.8	<4.4	<3.7
	Cs-137	-	-	<5.8	<7.1	<4.0	<6.7	<4.6	<4.0
	Ba-140	-	-	<5.1	<9.8	<5.7	<8.4	<4.8	<4.0
	La-140	-	-	<5.1	<9.8	<5.7	<8.4	<4.8	<4.0
	Others	-	-	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0

* Corresponds to sample locations noted on Figure 5, Section VII.

- No sample taken.

(a) Sampling resumed as a result of Spring 1984 Milk Animal Census.

TABLE 18

CONCENTRATIONS OF STRONTIUM-90 IN MILK
(MONTHLY COMPOSITE SAMPLES)Results in Units of pCi/l \pm 2 sigma

Station*	May	June	July	August
16	2.7 \pm 0.7	5.0 \pm 0.8	3.1 \pm 0.8	2.5 \pm 0.9
4	2.5 \pm 0.7	2.7 \pm 0.6	2.3 \pm 1.3	3.5 \pm 0.6
45	1.4 \pm 0.6	2.8 \pm 0.8	-	-
5	0.8 \pm 0.6	2.9 \pm 0.7	-	-
7	1.5 \pm 0.6	2.3 \pm 0.7	3.1 \pm 0.6	2.2 \pm 0.8
40 (Control)	1.5 \pm 0.6	2.7 \pm 0.7	2.3 \pm 0.9	2.7 \pm 0.8
50	0.8 \pm 0.3	1.8 \pm 0.7	2.2 \pm 0.6	2.1 \pm 0.5
55	0.9 \pm 0.6	1.7 \pm 0.7	0.8 \pm 0.2	1.1 \pm 0.6
60	(a)	(a)	0.9 \pm 0.4 ^(b)	2.1 \pm 0.5

Station*	September	October	November	December
16	2.7 \pm 0.8	3.6 \pm 1.3	3.9 \pm 0.8	1.9 \pm 0.6
4	7.6 \pm 0.9	2.2 \pm 1.0	2.4 \pm 0.6	3.0 \pm 0.6
45	-	-	-	-
5	-	-	-	-
7	3.6 \pm 1.2	2.2 \pm 0.9	3.8 \pm 0.9	2.1 \pm 0.8
40 (Control)	2.9 \pm 1.0	1.7 \pm 0.7	1.3 \pm 0.8	2.0 \pm 0.9
50	1.4 \pm 0.7	1.6 \pm 0.4	1.2 \pm 0.8	1.3 \pm 0.8
55	2.7 \pm 0.8	1.8 \pm 0.6	2.8 \pm 1.0	2.0 \pm 0.7
60	1.5 \pm 0.7	1.0 \pm 0.4	2.4 \pm 0.8	2.4 \pm 1.0

* Corresponds to sample locations listed on Figure 5, Section VII.

- Sampling station no longer required by Environmental Technical Specifications.

(a) No sample taken.

(b) Sampling resumed due to results of Spring 1984 Milch Animal Census.

TABLE 19
MILCH ANIMAL CENSUS
SPRING 1984

<u>TOWN</u>	<u>NUMBER ON CENSUS MAP (1)</u>	<u>NUMBER OF MILCH ANIMALS</u>
Scriba	1 16* 2 3 6 26	None 39C ND 2C 1C None
New Haven	8 9 4* 45* 10 5* 11 7* 48***	3C 42C 65C 20C+1G(2) 33C 45C 39C 62C 2G(2)
Mexico	12 13 14 15 17 18 19 20 60* 50* 55* 21	68C 2C 65C 40C 45C 45C 40C None 40C 90C 52C 66C
Richland	22 23	42C 77C
Oswego	24	None
Hannibal	40**	30C
Volney	25	30C
<u>TOTALS:</u>		1110 Cows 3 Goats

C = Cows
 G = Goats
 * = Milk sample location
 ** = Milk sample control location
 *** = New location
 ND = Owner did not wish to participate
 (1) = References Figure 5
 (2) = Goats are not currently producing milk

TABLE 19 (Continued)
MILCH ANIMAL CENSUS
SUMMER 1984

<u>TOWN</u>	<u>NUMBER ON CENSUS MAP(1)</u>	<u>NUMBER OF MILCH ANIMALS</u>
Scriba	1	None
	16*	41C
	2	ND
	3	2C
	6	1C
	26	None
New Haven	8	50C
	9	43C
	4*	80C
	45*	None
	10	32C
	5*	45C
	11	30C
	7*	60C
	48	1G(2)
Mexico	12	75C
	13	2C
	14	62C
	15	43C
	17	48C
	18	45C
	19	40C
	20	None
	60*	38C
	50*	100C
	55*	45C
	21	60C
Richland	22	40C
	23	77C
Oswego	24	None
Hannibal	40**	32C
Volney	25	25C
<u>TOTALS:</u>		1096 Cows 1 Goat

- C = Cows
G = Goats
* = Milk sample location
** = Milk sample control location
*** = New location
ND = Did not wish to participate in the survey
(1) = References Figure 5
(2) = Goat is not currently producing milk

TABLE 20

CONCENTRATIONS OF GAMMA EMITTERS IN VARIOUS FOOD PRODUCTS

Results in Units of pCi/g(wet) \pm 2 sigma

COLLECTION SITE	SAMPLE DATE	DESCRIPTION	Be-7	K-40	Co-60	Cs-134	Cs-137	Others
A	5-10-84	Eggs	<0.08	1.12 \pm 0.11	<0.006	<0.007	<0.007	<LLD
B	6-6-84	Eggs	<0.04	1.04 \pm 0.76	<0.005	<0.005	<0.005	<LLD
C	5-8-84	Eggs	<0.05	1.15 \pm 0.12	<0.005	<0.005	<0.004	<LLD
D(control)	5-2-84	Eggs	<0.06	1.13 \pm 0.11	<0.004	<0.004	<0.004	<LLD
A	5-10-84	Poultry	<0.48	3.01 \pm 0.46	<0.016	<0.019	<0.015	<LLD
B	6-6-84	Poultry	<0.39	3.78 \pm 0.52	<0.023	<0.018	<0.021	<LLD
C	5-8-84	Poultry	<0.69	3.56 \pm 0.51	<0.022	<0.024	<0.039	<LLD
D(control)	5-2-84	Poultry	<0.57	3.45 \pm 0.50	<0.022	<0.026	<0.026	<LLD
E	5-17-84	Beef	<0.30	2.59 \pm 0.44	<0.021	<0.021	<0.021	<LLD
F	5-2-84	Beef	<0.41	3.24 \pm 0.51	<0.026	<0.027	<0.031	<LLD
G	5-25-84	Beef	<0.24	3.71 \pm 0.45	<0.017	<0.018	0.046 \pm 0.024	<LLD
H(control)	5-2-84	Beef	<0.28	2.93 \pm 0.40	<0.023	<0.020	<0.020	<LLD

(1) I-131 not in the radionuclide library.

TABLE 20 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN VARIOUS FOOD PRODUCTS

Results in Units of pCi/g(wet) \pm 2 sigma

COLLECTION SITE	SAMPLE DATE	DESCRIPTION	Ba-7	K-40	Co-60	Cs-134	Cs-137	Others
A	10-26-84	Eggs	<0.26	1.06 \pm 0.28	<0.013	<0.015	<0.016	<LLD
J	11-20-84	Eggs	<0.17	1.30 \pm 0.32	<0.014	<0.015	<0.016	<LLD
C	11-6-84	Eggs	<0.13	1.06 \pm 0.30	<0.018	<0.017	<0.012	<LLD
D(control)	11-5-84	Eggs	<0.33	1.09 \pm 0.33	<0.029	<0.029	<0.032	<LLD
A	11-26-84	Poultry	<0.26	3.65 \pm 0.45	<0.014	<0.022	<0.018	<LLD
J	11-20-84	Poultry	<0.20	2.57 \pm 0.40	<0.021	<0.019	<0.026	<LLD
C	11-6-84	Poultry	<0.18	2.78 \pm 0.45	<0.019	<0.017	<0.018	<LLD
D(control)	11-2-84	Poultry	<0.36	2.81 \pm 0.45	<0.029	<0.032	<0.026	<LLD
I	11-15-84	Beef	<0.19	2.55 \pm 0.40	<0.024	<0.021	0.032 \pm 0.016	<LLD
P	10-25-84	Beef	<0.28	2.88 \pm 0.43	<0.020	<0.020	<0.019	<LLD
K	11-9-84	Beef	<0.35	2.73 \pm 0.42	<0.031	<0.026	<0.027	<LLD
H(control)	11-8-84	Beef	<0.25	2.80 \pm 0.41	<0.023	<0.024	<0.022	<LLD

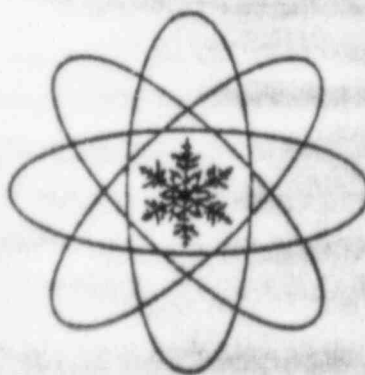
TABLE 20 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN VARIOUS FOOD PRODUCTS

Results in Units of pCi/g(wet) \pm 2 sigma

COLLECTION SITE	SAMPLE DATE	DESCRIPTION	Bc-7	K-40	I-131	Cs-134	Cs-137	Others
I	9-18-84	Cabbage	<0.079	1.85 \pm 0.19	<0.017	<0.009	<0.010	<LL
I	9-18-84	Squash	<0.086	2.20 \pm 0.22	<0.016	<0.010	<0.009	<LL
L	9-18-84	Swiss Chard	<0.150	5.06 \pm 0.56	<0.033	<0.016	<0.017	<LL
L	9-18-84	Tomatoes	<0.062	2.13 \pm 0.21	<0.013	<0.007	<0.008	<LL
N	9-18-84	Collard Greens	<0.100	3.83 \pm 0.38	<0.019	<0.012	<0.012	<LL
N	9-18-84	Tomatoes	<0.052	2.21 \pm 0.22	<0.011	<0.006	<0.007	<LL
62 M(control)	9-18-84	Swiss Chard	0.414 \pm 0.093	4.67 \pm 0.47	<0.022	<0.013	<0.014	<LL
M(control)	9-18-84	Tomatoes	<0.079	1.76 \pm 0.18	<0.015	<0.009	<0.010	<LL

v



DATA SUMMARIES AND CONCLUSIONS

V DATA SUMMARIES AND CONCLUSIONS

The results of the 1984 Radiological Environmental Monitoring Program are evaluated considering the natural processes of the environment and the aggregate of past data. A number of factors are considered in the course of this radiological data evaluation and interpretation. The interpretation of data can be made at several levels including trend analysis, population dose, risk estimates to the general population based on environmental concentrations, effectiveness of plant effluent controls and specific research areas, among others. An attempt has been made in this report not only to report the data collected during the 1984 sample program but also to assess the significance of the radionuclides detected in the environment. It is important to note that detection of an isotope is not of itself an indication of its environmental significance. Evaluation of the impact of the radionuclide in terms of potential increased dose to man, in relation to natural background, is necessary.

There are three separate groups of radionuclides that were detected in the environment during 1984. A few of these radionuclides could possibly fall into two of the three groups. The first of these groups is naturally occurring radionuclides. It must be realized that the environment contains a broad inventory of naturally occurring radioactive elements. Background radiation as a function of primordial radioactive elements and cosmic radiation of solar origin offers a constant exposure to the environment and man. These radionuclides, such as Th-232, Ra-226, Be-7 and especially K-40, account for a majority of the annual per capita background dose.

A second group of radionuclides that were detected are a result of the detonation of thermonuclear devices in the earth's upper atmosphere. The detonation frequency during the early 1950's produced a significant inventory of radionuclides found in the lower atmosphere as well as in ecological systems. A ban was placed on weapons testing in 1963 which greatly reduced the inventory through the decay of short lived radionuclides, deposition, and the removal (by natural processes) of radionuclides from the food chain such as by the process of sedimentation. Since 1963, several atmospheric weapons tests have been conducted by the People's Republic of China. In each case, the usual radionuclides associated with nuclear detonations were detected several months afterwards and then after a peak detection period, diminished to a point where most could not be detected. The last such weapons test was conducted in October of 1980. The resulting fallout or deposition from this test has influenced the background radiation in the vicinity of the site and was very evident in many of the sample medias analyzed during 1981. Calculations of the resulting doses to man from fallout related radionuclides in the environment show that the contribution from such nuclides in some cases (such as Sr-90 or Cs-137) is significant and second in intensity only to natural background radiation. Quantities of Nb-95, Zr-95, Ce-141, Ce-144, Ru-106, Ru-103, La-140, Cs-137, Mn-54 and Co-60 were typical in air particulate samples during 1981 and have a weapons test origin.

The third group of radionuclides detected in the environment during 1984 were those that could be related to operations at the site. These select radionuclides were detected in a few of the sample medias collected and at very low concentrations. Many of these radionuclides are a by-product of both nuclear detonations and the operation of light water reactors thus making a distinction between the two sources difficult, if not impossible, under the circumstances. The dose to man as a result of these radionuclides is small and significantly less than the radiation exposure from naturally occurring sources of radiation and from fallout.

Thus, a number of factors must be considered in the course of radiological data evaluation and interpretation. The evaluation and interpretation is made at several levels including trend analysis, dose to man, etc. An attempt has been made not only to report the data collected during 1984, but also to assess the significance of the radionuclides detected in the environment as compared to natural radiation sources. It is important to note that detected concentrations of radionuclides that are possibly related to operations at the site are very small and are not an indication of environmental significance. In regards to these very small quantities, it will be further noted that at such minute concentrations the assessment of the significance of detected radionuclides is very difficult. Therefore, concentrations in one sample that are two times the concentration of another, for example, are not significant overall. Moreover, concentrations at such low levels may show a particular radionuclide in one sample and yet not in another.

In Section V each sample medium is discussed. Concentrations of radionuclides detected and exposure to man are presented and scrutinized.

Section VI, titled HISTORICAL DATA, contains sample statistics from previous environmental sampling. The process of determining the impact (or lack of impact) of plant operation on the environment includes the scrutiny of past analytical data, a tool by which trends are discerned. The interpretation of historical data in this report is done to a limited degree. Because of the constant change in analytical sensitivities, as state-of-the-art detection capabilities improve, data comparisons become difficult. For example, minimum detection capabilities for the 1969 and 1974 analyses of environmental samples would be considered anomalous by 1984 standards.

LAKE PROGRAM

Tables 1 through 8 list the 1984 analytical results for the aquatic/lake water media sampled during the 1984 sampling program. Aquatic samples were obtained at a combination of four onsite locations. The transect designations used for the onsite sampling locations are NMPW (01), NMPP (02), JAF (03) and NMPE (04). Due to limited availability of certain required sample media, samples could not be obtained consistently at each of the same onsite transects sampled for other media. Offsite samples were collected in the vicinity of the Oswego Harbor (offsite - 00).

1. PERIPHYTON SAMPLES - TABLE 1

Periphyton is a common fresh water algae found throughout the Great Lakes and in almost all underwater aquatic systems. Periphyton in its simplest form is a single celled organism which colonizes the natural and artificial substrates found in the shore and near shore waters. Colonies of periphyton can be found from the shore zone to water depths which can be sufficiently penetrated by sunlight to support photosynthesis. Periphyton is dependent on sunlight and inorganic materials found in the lake to support life therefore putting it in the classification of a primary producer. Periphyton in its simplest form is the slimy coating which is found on most underwater surfaces and has a brown to green coloration. This organism is used as an indicator organism to help evaluate the possible effects of plant operation on the local aquatic environment on the lowest level of the food chain.

The collection and analysis of periphyton samples was performed twice during the 1984 sample program.

The first collection of periphyton was completed on June 29, 1984 and the second collection was completed on September 12, 1984. The gamma spectral analysis of periphyton samples showed detectable concentrations of Cs-137, Be-7, Th-228 and K-40. The four radionuclides detected in periphyton samples can be attributed to several sources. Each of the radionuclides detected can be placed in one of three groups. The first group of radionuclides is the result of plant operation. The second group of radionuclides is naturally occurring and is found in many living organisms as noted throughout this report. The third group of radionuclides is the result of past atmospheric nuclear weapons testing. Radionuclides with relatively long half-lives which fall into this third group are the result of atmospheric tests conducted over the past decades. The only fallout related radionuclide detected in 1984 periphyton samples was Cs-137. Cs-137 requires special consideration as this radioisotope of cesium is a common constituent of the background radiation due to fallout but can also be attributed to the operation of the plant. In 1981 six fallout radionuclides were detected in the periphyton samples. Of the six radionuclides detected in 1981, two, Ce-144 and Cs-137, were detected in 1982, and one, Cs-137, was detected in the 1984 samples. The other fallout radionuclides were not detected in 1982-84 because of their short half-lives (3.5 days to 368 days) which resulted in their decaying away to concentrations below that of the lower limits of detection (LLD) and as a result of ecological cycling.

The first set of periphyton samples collected on June 29, 1984 contained detectable concentrations of Be-7, K-40, Cs-137, and Th-228. The maximum detectable concentration for plant related radionuclides was 0.29 pCi/g (wet) for Cs-137. Cs-137 was detected in both the control (offsite) sample and the two indicator (onsite) samples with the maximum concentration, as noted above, present in the indicator sample.

The second collection of periphyton samples completed on September 12 showed a slight increase in the concentration of plant related radionuclides. The maximum detectable concentration of plant related radionuclides in the second or summer collection was 0.31 pCi/g (wet) for Cs-137. Cs-137 was not detected in the second collection at the control location as it was in the first collection (June 1984). The concentration of Cs-137 at the control location was less than 0.064 pCi/g (wet) LLD.

Three naturally occurring radionuclides were detected in the 1984 samples. K-40 was detected in all six samples both onsite and off-site. Be-7 was detected in two onsite samples and one offsite sample. Th-228 was detected in two of the onsite samples. The concentration of the naturally occurring radionuclides was consistent with levels detected in previous years' samples. A general increase in the concentrations of radionuclides in the second or late summer collection compared to the June collection was noted for the 1984 samples at the indicator locations. A similar increase in concentration in samples collected in late summer was also noted in 1980, 1981, 1982, and 1983. This increase in sample concentration may be due to the higher metabolic rate or increased growth of the periphyton community between the first and second collections. The Cs-137 detected in the 1984 samples were trace amounts and are attributed to both plant effluents and past weapons testing.

A dose to man calculation from the level of activity found in lake periphyton samples in the vicinity of the plant is difficult to make as periphyton is not directly in the human food chain. To best determine the resulting dose to man from the activity found in periphyton samples, calculations were made based on concentrations found in fish samples as fish represent the upper level of the food chain in which periphyton is a primary producer. Dose to man calculations based on concentrations found in fish and consumption rates are contained in Section V.5.

A review of past data shows Cs-137 concentrations in both indicator and control periphyton samples decreased slightly since the 1983 samples. Graphs depicting concentrations of Cs-137, Co-60, and Ce-144 are presented in Section VII.

2. BOTTOM SEDIMENT - TABLE 2

Bottom sediment samples were collected twice during the 1984 sampling program. Gamma spectral analyses and Sr-90 analyses were performed on each of the six samples and the results are presented in Table 2. Samples were collected in June and October in 1984 with the Oswego Harbor area (transect [00]) serving as the control location, Nine Mile Point Plant (transect [02]) and the FitzPatrick Plant (transect [03]) serving as the indicator or onsite sample locations.

Sr-90 was detected in each of the six 1984 samples. Cs-137 was detected in four of the six samples collected in 1984, which included three onsite samples and one offsite sample. Co-60 was detected in two of the six samples and Mn-54 was detected in one of the six 1984 samples.

The presence of Cs-137 in the lake bottom sediment can be attributed to the accumulation of fallout in the aquatic environment as a result of the detonation of nuclear devices in the atmosphere. The origin of Cs-137 in atmosphere testing can be demonstrated by sample results which show the presence of Cs-137 in control location sediment samples. The Cs-137 concentration for the control location was 0.42 pCi/g (dry). The Cs-137 concentrations for the indicator locations ranged from 1.08 pCi/g (dry) to 0.04 pCi/g (dry) with a mean concentration of 0.49 pCi/g (dry).

Co-60 was detected in two of the four indicator samples collected in 1984. Positive detections of Co-60 ranged from a minimum of 0.12 pCi/g (dry) to a maximum of 0.17 pCi/g (dry). The detected levels of Co-60 are relatively the same as the concentrations detected in 1983 when the minimum concentration was 0.10 pCi/g (dry) and the maximum value was 0.16 pCi/g (dry). The detection of Co-60 in sediment can be attributed to the operation of the plant. Co-60 was not detected in the control samples collected in 1984. The levels of Co-60 detected in the onsite samples are very small, and are near the lower limits of detection.

Manganese-54 was detected in only one of the four indicator samples collected in 1984. The one positive detection was made at the FitzPatrick (03) transect. The Mn-54 concentration for this one indicator location was 0.04 pCi/g (dry). The detection of Mn-54 in sediment can be attributed to the operation of the plant. Mn-54 was not detected in the control samples collected in 1984. The average LLD value for the control location was less than 0.04 pCi/g (dry) LLD. Thus, as can be seen from above, the Mn-54 concentration detected in the one onsite sample is very small, and at the lower limits of detection.

Strontium-90 was detected in all of the six Bottom Sediment samples collected in 1984. The presence of Sr-90 at the control and indicator locations is considered to be the result of weapons fallout. Sr-90 was also detected at both control and indicator sample locations

during 1978, 1979, 1980, 1981, and 1983, which is evidence that Sr-90 is attributable to weapons testing fallout. The mean 1984 control concentration for Sr-90 was 0.047 pCi/g (dry). The mean 1984 indicator concentration for Sr-90 was 0.038 pCi/g (dry). Variations in Sr-90 concentrations can be influenced by several factors including sediment type and chemical make-up. The presence of Sr-90 in many of the other control samples supports the fact that Sr-90 is ubiquitous throughout the environment.

The dose to man from bottom sediment is not of concern and cannot be directly calculated. Bottom sediment is not accessible to man and the radioactivity found in the sediment is shielded by the overlaying water column. To illustrate the impact of radioactivity in sediment samples with respect to the dose to man concept, the assumption can be made that at some future time bottom sediment could be introduced into the shoreline sediment through re-suspension and deposition. Assuming that the density of the sediment is 40 kg/m³ (dry) and using the average residence time on the shore of 47 hours per year for a teenager, the annual dose rate from a maximum indicator sample Cs-137 concentration of 1.08 pCi/g (dry) is calculated to be 0.0085 mrem per year whole body dose. The whole body dose from a Co-60 concentration of 0.17 pCi/g (dry) would be equal to 0.0054 mrem per year. The whole body dose from a Mn-54 concentration of 0.04 pCi/g (dry) would be equal to 0.0004 mrem per year. The resulting total whole body dose would be equal to 0.0143 mrem per year whole body. The contribution to the total whole body dose due to Sr-90 would be infinitesimal due to the fact that Sr-90 decays by a beta emission and has no associated strong gamma energy.

A review of past Cs-137 data illustrates that the mean concentration values for the indicator stations have dropped significantly from 1976 to 1979 with the general trend downward continuing from 1979 through 1982. The 1984 mean concentration of Cs-137 was slightly higher than the 1983 value. Since 1979, the mean value for the control station has been greater than the indicator stations with 1982 showing a change in the downward trend for Cs-137 concentrations at the control locations. However, the 1983-84 concentrations show a reverse in this situation. This change in trending for the Cs-137 concentrations may be the effect of the control location's close proximity to the Oswego River Outlet and a possible source of Cs-137 from deposition of Cs-137 from atmospheric nuclear testing onto the river watershed. The concentration of Co-60 in sediment samples has shown a similar downward trend to that of Cs-137 since 1977. The maximum Co-60 concentration in the indicator samples (mean) shows a consistent downward trend since 1977 that continued through 1981 with a slight increase in mean concentrations for 1982, and a leveling off for 1982-84. This increase is not significant and is within the bounds of statistical variation. Historical trends for concentrations of Cs-137 and Co-60 are presented in graphic form in Section VII.

3. MOLLUSK SAMPLES - TABLE 3

A total of six mollusk samples were collected in 1984 from a total of three general locations. Each sample was analyzed for gamma emitters using gamma spectral analysis and for Sr-90 using chemical separations and beta particle analysis. The results of the 1984 samples are presented on Table 3. As in past years the effort to collect mollusk samples of sufficient size has been of limited success in terms of sample volume collected. The collections in 1984 were productive and resulted in sample volumes in the 500 gram range which in some cases resulted in good sensitivities for the gamma spectral analysis, in particular for the indicator samples. Mollusk samples were successfully collected at the offsite (00) or control location and at the Nine Mile Point Plant (02) transect and the FitzPatrick (03) transect, for the indicator samples.

The results of the isotopic analysis of mollusk tissue detected the presence of six radionuclides. The nuclides detected consisted of two naturally occurring radionuclides (K-40 and Ra-226), three plant related radionuclides (Mn-54, Co-60, and Cs-137), and one radionuclide related to fallout from atmospheric nuclear testing (Sr-90). Detectable concentrations of Sr-90 were measured in each of six samples collected at both the onsite and offsite locations. The presence of Sr-90 in all the mollusk samples collected for the sample year was also observed in 1979, 1980, 1981, 1982, and 1983. The 1984 Sr-90 concentrations ranged from a maximum of 0.13 pCi/g (wet) to a minimum of 0.009 pCi/g (wet) with the control station mean equal to 0.020 pCi/g (wet) and the indicator mean equal to 0.061 pCi/g (wet). As in other sample media the presence of Sr-90 is considered to be the result of fallout from atmospheric nuclear testing. This determination is based on the fact that Sr-90 is consistently detected in control samples in previous years as noted above. Mn-54 was detected in each of the four onsite or indicator samples collected in 1984. Co-60 was detected in three of the four onsite samples, and Cs-137 was detected in only one of the onsite samples. The presence of Mn-54 and Co-60 in mollusk tissue can be attributed to the operation of the plant. The Cs-137 present in the mollusk tissue may also be attributed to the operation of the plant and/or fallout from atmospheric nuclear testing. The Mn-54, Co-60, and Cs-137 were not detected at the offsite or control locations.

The concentration of Mn-54 detected at the indicator locations ranged from a maximum of 0.11 pCi/g (wet) to a minimum of 0.06 pCi/g (wet). Co-60 concentrations ranged from a maximum of 0.115 pCi/g (wet) to a minimum of 0.040 pCi/g (wet). The one positive detection for Cs-137 was 0.022 pCi/g (wet).

The relatively high frequency for the detection of Co-60 and particularly Mn-54 in mollusk samples can be attributed to the phenomenon of bioaccumulation or concentration factors. The level of an element in a particular organism relative to the level or concentration of the same element in the organism's environment is known as the concen-

tration factor. Fresh water mollusk have an extremely high concentration factor of 300,000 (mean) for Mn-54 and 32,408 (mean) for Co-60*. Such high concentration factors would result in a rapid accumulation of manganese and cobalt activity in mollusk that are indigenous to the off shore area of the site.

Fresh water mollusk found in the vicinity of the site are not consumed by humans and are not a major component or level in the food chain if for no other reason other than the small population due to the unfavorable physical makeup of the lake bottom in the area. Because these fresh water mollusk are not considered edible there is no dose to man from the presence of the Mn-54, Co-60, or Cs-137 concentrations. As in past years an estimate can be made using substituted parameters for the purpose of putting into perspective the possible significance of Mn-54, Co-60, and Cs-137 concentrations detected in the mollusk samples. Using the average individual consumption of seafood of 1.0 kg/year for an adult, the dose resulting from ingestion of mollusks would be 0.00016 mrem/year to the whole body and 0.0015 mrem/year to the gastrointestinal tract for the maximum Mn-54 concentration of 0.11 pCi/g (wet). The dose resulting from the Co-60 concentration of 0.115 pCi/g (wet) would be 0.0005 mrem/year to the whole body and 0.0046 mrem/year to the gastrointestinal tract. The dose resulting from the Cs-137 concentration of 0.022 pCi/g (wet) would be 0.0016 mrem/year to the whole body and 0.00005 mrem/year to the gastrointestinal tract. The total maximum dose that would be received from the consumption of 1.0 kg of fresh water mollusk would be 0.00226 mrem to the whole body and 0.00615 mrem to the gastrointestinal tract. This calculated dose is extremely small and as noted above in reality would be equal to no dose, because of the zero consumption rate.

The concentrations of Mn-54 and Co-60 have shown a significant decline since 1976 when both radionuclides were detected at their maximum level. The concentration of Mn-54 detected in the 1984 samples shows a slight decrease from the 1983 values. The Co-60 concentration in the indicator samples showed a small increase from the levels detected in 1983. Co-60 concentrations in mollusk samples have remained relatively constant since 1977. Sr-90 concentrations in mollusk samples have remained stable since 1978 after a peak in 1976, with little change in the 1984 samples. Graphs of previous mollusk sample results for Mn-54, Co-60 and Sr-90 are presented in Section VII. Also found in Section VII is a physical description of the lake bottom in the vicinity of the site for reference to the suitability of the area for mollusk habitat.

* Eisenbud (1973)

4. GAMMARUS - TABLE 4

GAMMARUS samples were collected three times during the 1984 sample period in conjunction with mollusk, periphyton and bottom sediment. GAMMARUS are benthic or demersal dwelling organisms found in the general vicinity of the site and throughout Lake Ontario. GAMMARUS are sampled as an indicator organism whose major predator is the local fish population. GAMMARUS are generally found in periphyton and cladophora growth areas and are limited in their territorial ranges. Samples were collected at the control (00) location and at the NMPP (02) and JAF (03) transects. Sample collections were made over a two week period (or longer) in order to collect sufficient quantities of sample for acceptable analyses.

The first collection of GAMMARUS in the spring of 1984 (June 14, 1984 through June 29, 1984) yielded sample weights of only 1.7 g, 0.2 g, and 0.3 g respectively for the Oswego, NMPP, and JAF transects. It should be noted that GAMMARUS are normally less than 10 mm in size and require a large number to obtain a biomass of one gram of sample. The spring collection of GAMMARUS is also usually impeded by the cold lake water temperatures resulting in few GAMMARUS inhabiting the shoreline shallows.

These small sample weights were insufficient for Sr-89 and Sr-90 analysis, and yielded high analytical sensitivities for gamma spectral analysis. The JAF sample resulted in sensitivities of less than 12.0 pCi/g (wet) for Co-60 and less than 11.0 pCi/g (wet) for Cs-137. The NMPP sample resulted in sensitivities of less than 18.0 pCi/g (wet) for Co-60 and less than 17.0 pCi/g (wet) for Cs-137. The control sample (Oswego) resulted in sensitivities of less than 4.4 pCi/g (wet) for Co-60 and less than 5.0 pCi/g (wet) for Cs-137.

Because of the small quantities collected in the spring GAMMARUS collection, which were insufficient for Sr-89 and Sr-90 analysis, another sample was attempted before the late summer collection.

This resample GAMMARUS collection started on July 16, 1984 and ended on August 17, 1984. This collection yielded sample weights of 70.8 g, 57.5 g, and 52.6 g respectively for the NMPP, JAF, and Oswego transects. These sample weights were sufficient for good analytical sensitivities. This resample collection showed measurable concentrations of K-40 and Sr-90 only. K-40 was detected in all three of the sample locations. K-40 is a naturally occurring radionuclide.

Strontium-90 was also detected in each of the samples collected in both the indicator and control samples. As noted previously, similar detections of Sr-90 were made in mollusk samples. Strontium-90 is considered to be a background radionuclide because its origin is not related to the operation of the plant, but is attributed to fallout from atmospheric nuclear testing.

The analyses of the resample GAMMARUS collection showed no measurable concentrations of Co-60, Cs-134, Cs-137 or any other plant related radionuclides.

The late summer (August 8, 1984 through September 11, 1984) collection of GAMMARUS also provided sufficient quantities of this organism for good analytical sensitivities. The late summer collection again only showed measurable concentrations of K-40 and Sr-90. Both K-40 and Sr-90 were detected at all three sample locations. The analyses of the late summer GAMMARUS samples also showed no measurable concentrations of Co-60, Cs-134, Cs-137 or any other plant related radionuclides.

The absence of plant related radionuclides in GAMMARUS samples collected in 1984, and the lack of detectable concentrations from the previous years of 1980, 1981 (second collection only), and 1982 indicate that the presence of these nuclides in GAMMARUS organisms is not routine nor chronic. The dose to man as a direct result of concentrations of cobalt and cesium would be zero as GAMMARUS is not consumed by man. The importance of the activity in these organisms is only significant with respect to the passage of any radionuclides through the food chain to a trophic level which may impact man.

Historical data for GAMMARUS sample results shows that the Sr-90 concentration for the control location has steadily decreased since 1977 and seems to be leveling off. The Sr-90 concentration for the indicator locations also shows a downward trend and leveling, except for a peak in 1980. No definite trend can be determined for Cs-137 concentrations, however, as positive detections have been random in past years. Previous GAMMARUS data (Cs-137, Sr-89, Sr-90) is presented in Section VI, HISTORICAL DATA.

5. FISH - TABLE 5

A total of 18 required fish samples were collected in the spring season (June 1984) and in the fall season (October 1984). Collections were made utilizing gill nets at one offsite location greater than five miles from the site (Oswego Harbor area), and at two onsite locations in the vicinity of the Nine Mile Point Unit #1 (02), and the James A. FitzPatrick (03) generating facilities. The Oswego Harbor samples served as control samples while the NMP (02) and JAF (03) samples served as indicator samples. Samples were analyzed for gamma emitters, Sr-89, and Sr-90. Data is presented in the ANALYTICAL RESULTS section of the report on Table 5.

Analysis of the 1984 fish samples contained detectable concentrations of radionuclides related to past weapons testing and natural origins (naturally occurring). Small detectable concentrations of Cs-137 were found in all fish samples (including control samples). Detectable concentrations of K-40, a naturally occurring radionuclide, were also found in all fish samples collected for the 1984 program.

Spring fish collections were comprised of two separate species and nine individual samples. The two species represented one feeding type. Lake trout and brown trout are highly predacious and feed on significant quantities of smaller fish such as smelt, alewife, and other smaller predacious species. Because of the limited availability of species present in the catches, no bottom feeder species were collected in the spring samples.

Cs-137 was detected in all onsite and offsite samples for both species collected. Onsite samples showed Cs-137 concentrations to be slightly greater than control levels for some samples and slightly less than control levels for other samples. The concentrations detected are not significantly different from the control results and are therefore considered background. Cs-137 in lake trout samples ranged from 0.033 to 0.037 pCi/g (wet) and averaged 0.035 pCi/g (wet) for the indicator samples. Cs-137 in the control sample was 0.037 pCi/g (wet) for lake trout. Cs-137 in brown trout samples ranged from 0.039 to 0.055 pCi/g (wet) and averaged 0.046 pCi/g (wet) for the indicator samples. Cs-137 in the control samples ranged from 0.031 to 0.032 pCi/g (wet) and averaged 0.032 pCi/g (wet).

K-40 was detected in all of the spring samples collected. K-40 is a naturally occurring radionuclide and is not related to power plant operations. Detectable concentrations of K-40 in the indicator samples (lake trout and brown trout) ranged from 2.6 to 3.4 pCi/g (wet) and 2.4 to 3.2 pCi/g (wet) for the control samples. No other radionuclides were detected in any of the spring fish samples.

Fall sample collections were comprised of three separate species and nine individual samples. Three samples of lake trout, three samples of smallmouth bass, and three samples of white sucker were collected at a combination of two onsite sample locations (NMP and JAF) and

one offsite sample location (Oswego Harbor area). Samples were collected by gill net in October.

Cs-137 was detected in all nine samples including the three control samples. The detected concentrations were not significantly different from one another because of the extremely small quantities detected. Cs-137 in lake trout samples at the indicator locations ranged from 0.035 to 0.045 pCi/g (wet) and averaged 0.040 pCi/g (wet). The one lake trout sample from the control location had a Cs-137 concentration of 0.037 pCi/g (wet). Cs-137 in smallmouth bass samples at the indicator locations ranged from 0.049 to 0.061 pCi/g (wet) and averaged 0.055 pCi/g (wet). The one smallmouth bass sample from the control location had a Cs-137 concentration of 0.038 pCi/g (wet). Cs-137 in the white sucker samples at the indicator locations ranged from 0.039 to 0.039 pCi/g (wet) and averaged 0.039 pCi/g (wet). The one white sucker sample from the control location had a Cs-137 concentration of 0.015 pCi/g (wet).

K-40 was detected in all of the fall fish samples collected. Detectable concentrations of K-40 in the indicator samples (lake trout, smallmouth bass, and white sucker) ranged from 2.7 to 3.5 pCi/g (wet) and 3.1 to 3.4 pCi/g (wet) for the control samples. No other radionuclides were detected in any of the fall fish samples.

Sr-89 and Sr-90 concentrations for the spring and fall fish samples were all less than the minimum detectable level. Sr-89 and Sr-90 were not detected in any of the onsite or offsite locations.

Review of past environmental data indicates that the Sr-89 and Sr-90 concentrations have decreased steadily since 1976 for both the indicator and control locations to the present 1984 LLD levels. A general decline in detectable Sr-89 and Sr-90 results is most probably due to the result of the incorporation of these radionuclides with organic and inorganic substances through ecological cycling. In addition, Sr-89 has a relatively short half-life of 52 days.

The mean 1984 Cs-137 concentrations have decreased slightly from 1981 for the indicator samples and significantly from 1980 to 1976. Concentrations for these samples decreased from a level of 1.4 pCi/g (wet) in 1976 to a level of 0.043 pCi/g (wet) in 1984. Control sample results have also decreased from a level of 0.12 pCi/g (wet) in 1976 to a level of 0.032 pCi/g (wet) in 1984. Results from 1979 to 1984 have remained fairly consistent.

As noted for Sr-89 and Sr-90 above, the general decreasing trend for Cs-137 is most probably a result of ecological cycling. A significant portion of Cs-137 detected since 1976 in fish is a result for weapons testing fallout, and the general downward trend in concentrations will continue as a function of ecological cycling and nuclear decay.

Lake Ontario fish are considered an important food source by many, therefore, fish is an integral part of the human food chain. Based on the importance of fish in the local diet, a reasonable estimate of dose to man can be calculated. Assuming that the average adult consumes 6.9 kg of fish per year (Regulatory Guide 1.109) and the fish consumed contains an average Cs-137 concentration of 0.043 pCi/g (wet) (annual mean result of indicator samples for 1984), the whole body dose received would be 0.021 mrem per year. The critical organ in this case is the liver which would receive a calculated dose of 0.032 mrem per year. No doses are calculated here for Sr-89 and Sr-90 since these radioisotopes of strontium were not detected during 1984. The Cs-137 whole body and critical organ doses are conservative calculated doses associated with consuming fish from the Nine Mile Point area (indicator samples).

Conservative whole body and critical organ doses can be calculated for the consumption of fish from the control location as well. In this case the consumption rate is assumed to remain the same (6.9 kg per year) but the average annual Cs-137 mean concentration for the control samples is 0.032 pCi/g (wet). The calculated Cs-137 whole body dose is 0.016 mrem per year and the associated dose to the liver is 0.024 mrem per year.

In summary, the whole body and critical organ doses observed as a result of consumption of fish is small. Doses received from the consumption of indicator and control sample fish are approximately the same with the dose from control samples being slightly lower. Doses from both sample groups are considered in the range of background exposure rates.

Graphs of past Cs-137 and Sr-90 concentration can be found in Section VII.

6. LAKE WATER - TABLES 6, 7, AND 8

1984 lake water samples were analyzed monthly for gross beta and gamma emitters (using gamma spectral analysis). Sr-89, Sr-90, and tritium analyses were performed quarterly. Quarterly samples (i.e., Sr-89, Sr-90, and tritium) were composites of monthly samples.

The analytical results for the 1984 lake water sample program showed no evidence of plant related radionuclide buildup in the lake water in the vicinity of the site. Indicator samples were collected from the inlet canals at the Nine Mile Point Unit #1 and James A. FitzPatrick facilities. The control location samples were collected at the City of Oswego water treatment plant and consisted of raw lake water prior to treatment.

The gross beta annual mean activity for the indicator sample locations, Nine Mile Point Unit #1 and the James A. FitzPatrick inlet canals (3.98 pCi/liter), was slightly higher than the 1983 mean inlet canal results (3.34 pCi/liter). The Nine Mile Point Unit #1 canal samples were greater than the control samples for eight of the 12 monthly samples analyzed and ranged from 2.20 pCi/liter to 5.30 pCi/liter. The James A. FitzPatrick canal samples were greater than the control samples for seven of the 12 monthly samples analyzed and ranged from less than 2.2 pCi/liter to 5.90 pCi/liter. The control sample results ranged from 2.40 pCi/liter to 5.20 pCi/liter. The fluctuation in the gross beta canal sample results is due to the natural variation in concentration of naturally occurring radionuclides.

A reduction in gross beta activity since 1974 is primarily the result of improved analytical procedures and equipment and not necessarily to changes in plant operations. Although the past elevated gross beta concentration may be due in part to past weapons testing, it is difficult to determine what portion was due to improved instrumentation and what part was due to weapons testing. There were no significant changes or trends in gross beta activity on a monthly basis for 1984. (See historical data graphs Section VII.)

Gamma spectral analysis was performed on 36 monthly composite samples required by the Environmental Technical Specifications. Only one radionuclide was detected in the inlet canal samples. This radionuclide is naturally occurring and not plant related.

K-40, a naturally occurring radionuclide, was detected intermittently in both intake canals and the raw city water supply. K-40 was detected in two of the 12 monthly inlet canal samples at the James A. FitzPatrick inlet canal and ranged from 7.2 to 13.2 pCi/liter. The Nine Mile Point Unit #1 inlet canal samples also showed K-40 detected in two of the 12 monthly samples. The concentrations ranged from 14.4 to 14.5 pCi/liter. K-40 in the Oswego city water supply was detected in four of the 12 monthly samples, and ranged from 7.6 to 15.0 pCi/liter.

Quarterly samples for Sr-89 analysis were composites of the monthly samples. Sr-89 was not detected in any of the water samples taken from the City of Oswego water treatment plant, the James A. FitzPatrick inlet canal, or the Nine Mile Point inlet canal. The lower limit of detection values for the City of Oswego water treatment plant canal samples (control location) ranged from less than 1.10 pCi/liter to less than 2.00 pCi/liter (LLD). The lower limit of detection values for the indicator (James A. FitzPatrick inlet canal and Nine Mile Point inlet canal) locations ranged from less than 1.20 pCi/liter to less than 2.00 pCi/liter (LLD).

Quarterly samples for Sr-90 analysis were composites of the monthly samples as noted for the Sr-89 analysis. Sr-90 was detected in two of the four quarterly composites at both the James A. FitzPatrick and Nine Mile Point Unit #1 inlet canals. Sr-90 was detected in only one of the four quarterly composites at the City of Oswego water treatment plant or control location. At the control location, the Sr-90 concentration was 0.72 pCi/liter. Sr-90 in the Nine Mile Point inlet canal samples ranged from 0.56 to 1.30 pCi/liter and showed a mean value of 0.93 pCi/liter. The James A. FitzPatrick inlet canal samples showed Sr-90 ranging from 0.80 to 0.86 pCi/liter and a mean value of 0.83 pCi/liter. Sr-90, as detected in the 1984 water samples, is considered to be background Sr-90 as a result of past weapons testing.

Tritium samples, as noted above for Sr-89 and Sr-90, are quarterly samples that are a composite of the appropriate monthly samples. Tritium was detected in six of the eight indicator samples and two of the four control samples. The City of Oswego water treatment plant showed tritium concentrations ranging from 190 pCi/liter to 220 pCi/liter with a mean of 205 pCi/liter. Tritium concentrations for the James A. FitzPatrick inlet canal ranged from 110 pCi/liter to 370 pCi/liter and showed a mean concentration of 280 pCi/liter. Inlet canal samples taken at Nine Mile Point showed tritium concentrations ranging from 230 pCi/liter to 340 pCi/liter. The annual mean concentration was 285 pCi/liter.

Evaluation of past environmental data shows that gross beta concentrations in water samples have decreased significantly since 1977 at both the indicator sample locations (inlet canals) and at the control location (Oswego city water). As noted previously, however, the decrease is primarily a result of superior analytical instrumentation. Since 1973, gross beta levels have remained relatively constant at both indicator and control locations. Indicator annual means ranged from 15.8 pCi/liter in 1977 to 41.8 pCi/liter in 1978. For the period of 1978 through 1983, annual means ranged from 2.73 pCi/liter (1982) to 4.53 pCi/liter (1978). The indicator annual mean for 1984 was 3.98 pCi/liter. Control annual means also were relatively high during 1975 to 1977. During these years, the concentrations ranged from 45.33 pCi/liter (1975) to 10.9 pCi/liter (1977). Data from 1974 for the control location was deleted from this comparison because of questionable results. For the period 1978 through 1983, annual mean

gross beta concentration ranged from 2.42 pCi/liter (1982) to 3.55 pCi/liter (1978). The control annual mean for 1984 was 3.41 pCi/liter.

Review of previous data for Sr-89 demonstrates that results have been variable since 1975. Sr-89 for the indicator samples has ranged from not detected (1976, 1977, 1979, 1983, and 1984) to 0.78 pCi/liter (1981) and has been at relatively constant levels when detected. At the control locations, Sr-89 ranged from not detected (1975-1978, 1981, 1983, and 1984) to 1.4 pCi/liter (1980). During 1984, Sr-89 showed an annual mean of less than 1.60 pCi/liter (LLD) at the control location and less than 1.68 pCi/liter (LLD) at the indicator location. Sr-90 annual means have remained relatively consistent at both indicator and control sample locations since 1975. Mean results for the indicator samples ranged from not detected (1975 and 1976) to 1.08 pCi/liter (1982). Mean results at the control sample location ranged from not detected (1975-1978) to 2.04 pCi/liter (1982). The 1984 annual mean Sr-90 results for the indicator samples and control samples were 0.88 pCi/liter and 0.72 pCi/liter respectively.

Previous annual mean results for tritium at the indicator sample location has decreased slightly since 1976, with the exception of 1982. Sample results were available since 1974 through 1984 and showed a peak value of 641.0 pCi/liter (1982) and a minimum value of 234.0 pCi/liter (1979). The annual mean tritium result at the indicator locations for 1984 was 282.0 pCi/liter. This is a slight decrease from the value detected in 1983 (317.0 pCi/liter).

Mean tritium results at the control location have also decreased slightly since 1976. Mean annual results were available for 1974 through 1984. These results show that tritium at the control location ranged from not detected (1974) to 651.7 pCi/liter (1976). The annual mean tritium result at the control location for 1984 was 205.0 pCi/liter. This is a slight decrease from the 1983 value of 250.0 pCi/liter. The fact that tritium is a naturally occurring radioactive isotope of hydrogen which is produced in the upper atmosphere by cosmic radiation, as well as a product of reactor operation, accounts for the background level in the lake to vary slightly from year to year.

The impact, as expressed by a dose to man, is not assessed here since the primary pathway, in this case, is drinking water. The nearest source for drinking water is the City of Oswego water treatment plant which is the control location for the sampling program. The results of the control location are consistent with previous years' results and are representative of normal background radionuclide concentrations in lake water and regional drinking water that might be affected by the site.

Previous Lake Water data (tritium, Sr-89, Sr-90, and gross beta) is presented in Section VI, HISTORICAL DATA.

TERRESTRIAL PROGRAM

Tables 9 through 20 represent the analytical results for the terrestrial samples collected for the 1984 reporting period.

1. AIR PARTICULATE GROSS BETA - TABLES 9 and 10

Tables 9 and 10 contain the weekly air particulate gross beta results for the six offsite and nine onsite sample locations. The samples are counted at a minimum of twenty-four hours after collection to allow for the decay of naturally occurring radionuclides with short half-lives. A total of 312 offsite and 462 onsite samples were collected and analyzed during 1984. No significant levels of gross beta activity were observed in any of the samples. The offsite or control mean concentration for 1984 was 0.026 pCi/m³ while the indicator or onsite sample mean was equal to 0.025 pCi/m³. As noted, the onsite mean is about five percent lower than the offsite mean for the same sample period. This difference in mean concentration has been exhibited in the past 10 years with the exception of 1977 when a higher annual mean gross beta activity was observed for the onsite sampling stations. In these 10 years, the control stations' annual mean ranged from a minimum difference of 5.0 percent higher than the indicator observed in 1984 to a maximum difference of 28.6 percent higher, observed in 1978. The difference in offsite and onsite weekly and monthly mean values for gross beta could be the result of a combination of the many natural processes which can affect environmental concentrations. The most significant parameter that could possibly contribute to a depressed or lower concentration for the onsite stations would be location. The close proximity of onsite sampling stations to the lakeshore (Lake Ontario) would account for lower concentrations of naturally occurring radionuclides being collected on the sampling media. Surface winds from off the lake would contain less particulate matter and airborne gases than surface winds from adjacent land areas. The major component of gross beta concentrations are decay or daughter products of uranium and thorium and potassium-40. The concentrations of these nuclides in the ground level atmosphere are dependent upon the local geology and its chemical constituents. Thus surface winds of terrestrial origin have a potential for containing higher concentrations of naturally occurring radionuclides.

The observed increases and decreases in general gross beta activity can be attributed to changes experienced in the biosphere. As discussed above, the concentrations of the naturally occurring radionuclides in the lower limits of the atmosphere directly above the terrestrial portion of the earth are affected by time related processes such as wind direction, snow cover, soil temperature and soil moisture content. Very little change was noted in gross beta activity which corresponded with seasonal changes as has been observed in past years.

In general, gross beta activity in air samples has decreased significantly. The mean 1984 concentration for both offsite and onsite is six times lower than the mean concentration detected in 1981. This overall reduction in activity is directly attributable to the increased activity detected in 1981 as a result of fallout from an atmospheric nuclear test and subsequent return to background levels in 1983-84.

Co-60 release rates were well within four percent of the design objective of the plant as outlined in Section 2.3.B.2 of the Environmental Technical Specifications. These limits were consistent with past effluent rates when Co-60 was not detected.

Investigation of the occurrence demonstrated that the unused particulate filters were contaminated during handling prior to the installation of the filters in the environmental monitoring stations (refer to the 1983 report for a more detailed account of the investigation). The investigation concluded in early March of 1984 and corrective action was implemented at that time. It was concluded in the 1983 report that the March 1984 composite samples and subsequent samples could confirm the conclusions of the investigation. The results of the 1984 air particulate samples confirmed the results of the investigation.

During the months of January and February 1984, Co-60 was detected in both onsite and offsite composite samples. The concentrations detected were comparable to the December 1983 results. During March of 1984, Co-60 was detected only in the onsite composites. Co-60 was not detected in either onsite or offsite composite samples for the remainder of 1984 (April through December). It is believed with reasonable confidence that the December 1983 and January through March 1984 positive results for Co-60 were the result of contamination during handling prior to installation in the environment.

Assessment of the presence of fission product radionuclides in air particulate composite samples can be depicted by calculating doses to man as a result of inhalation. Co-60 and Cs-137 were the two fission product radionuclides detected in 1984. It was noted previously, however, that the presence of Co-60 was attributed to contamination during handling prior to actual field use. For the purposes of illustration, however, dose calculations can be performed assuming that the Co-60 results were actual field measurements.

Using the average adult inhalation rate of 8,000 m³/year or 667 m³/standard month (Regulatory Guide 1.109), and the mean concentration measured at the onsite sample stations, the following yearly doses can be calculated based on the amount of time the radionuclide was detected during the year:

Nuclide	Concentration (pCi/m ³)	No. Months Detected	Origin	Dose* (mrem/yr)
Cs-137	0.00018	1	Fallout/Plant	0.0000001
Co-60	0.00117	3	Plant	0.0017465
			Totals	0.0017466
			Plant	0.0017465
			Fallout/Plant	0.0000001

*Dose to the lung.

2. MONTHLY PARTICULATE COMPOSITES - TABLE 11

The air particulate filters collected weekly from each of the 15 air sampling stations are composited monthly by location (onsite/offsite). Each composite is analyzed for gamma emitters using gamma spectral analysis.

The results for the 24 monthly samples analyzed for the 1984 program showed positive detections for four radionuclides. Those radionuclides detected were Co-60 and Cs-137, in addition to Be-7 and K-40 which are both naturally occurring radionuclides. The four radionuclides measured in the 1984 composite samples can be divided into two categories, the first category is naturally occurring radionuclides. Be-7 was detected in each of the 24 composite samples both onsite and offsite. The mean value for Be-7 concentrations was 16 percent higher in the offsite composite samples than the onsite samples. Potassium-40 was detected in nine of the offsite and onsite monthly composite samples. The offsite annual mean was 21 percent higher than the onsite annual mean for K-40.

The second category of radionuclides detected are those which are plant related. Included here are Co-60 and Cs-137. Cs-137 was included here due to the fact that the Cs-137 may be a constituent of plant effluents. A review of 1984 Cs-137 sample data indicates that Cs-137 is most likely the result of past weapons testing and subsequent environmental levels of Cs-137 from fallout. Cs-137 was not detected in any of the offsite composite samples, but was detected in one of the onsite composite samples. The concentration of Cs-137 in this one onsite composite sample was 0.00018 pCi/m³. This can be compared to the LLD level of Cs-137 (less than 0.00018 pCi/m³) in the offsite composite sample from the same month. Co-60 was detected in three of the 12 onsite monthly composite samples and two of the 12 offsite monthly composite samples. The onsite Co-60 concentrations ranged from a maximum of 0.00149 pCi/m³ in February to a minimum of 0.00054 pCi/m³ in March of 1984. The mean Co-60 concentration for the onsite samples was 0.00117 pCi/m³. The offsite Co-60 concentrations ranged from a maximum of 0.00107 pCi/m³ in January to a minimum of 0.00038 pCi/m³ in February of 1984. The mean Co-60 concentration for the offsite samples was 0.00073 pCi/m³.

The presence of Co-60 has been noted in the past and can be a result of weapons testing, contamination during handling, and operations at the site.

The detectable Co-60 concentrations found during the months of January through March of 1984 in both onsite and offsite composite samples was a result of contamination during handling. The 1983 Annual Environmental Operating Report noted that during the month of December 1983, a marked increase in Co-60 concentrations was noted in both onsite and offsite composite samples. The detected concentrations were inconsistent with operations at the site. A review of plant gaseous effluent data for this period showed that the

3. AIRBORNE RADIOIODINE (I-131) - TABLES 12 AND 13

The results for Iodine-131 (charcoal cartridge) sampling and analyses are presented in Table 12 (Offsite) and Table 13 (Onsite).

During the 1984 sampling program airborne radioiodine was not detected in any of the 312 weekly samples collected from the six offsite sampling stations. In the 1,871 weekly offsite I-131 samples collected in 1979 through 1984, I-131 was only detected once (June 16, 1982). Offsite I-131 detections were also made in 1977 and 1978.

I-131 was also not detected in any of the 464 onsite samples analyzed in 1984. I-131, however, has been detected in the past at the onsite sample locations. In the 2,805 weekly onsite I-131 samples collected in 1979 through 1984, I-131 was detected in only 22 samples.

The end result of the 1984 I-131 sampling effort showed no significant impact due to the operation of the plant. Also during 1984, I-131 was not detected in any other environmental sample media including milk and green leafy vegetables.

The above table illustrates that the average calculated dose to man from plant related radionuclides is very small and of little biological significance.

For the purpose of illustration, the significance of the above doses can be brought into perspective by a comparison to the average annual population lung dose received from the combustion of natural gas used in cooking ranges and unvented heaters. This average annual population lung dose ranges from 2.0 mrem/yr to 5.0 mrem/yr (NCRP, No. 56). This represents a dose approximately 3,000 times greater than that received from plant effluents as noted above.

Graphic representations of air particulate composite Co-60 and Cs-137 concentrations for the year of 1984 and previous years are presented in Section VII.

As observed, the site boundary dose based on two available TLD locations was less than the average offsite dose for each of the four quarters in 1984. This is probably due to the difference in ground dose rates which are indicative of variable concentrations of naturally occurring radionuclides in soil and rock such as radium, uranium, thorium, and potassium. The difference could also result from statistical variation in the TLD readings, as the site boundary dose is based on a population of only eight individual readings per quarter (two TLD's).

TLD numbers 31 and 39 are located within the Nine Mile Point #1 restricted area near the radwaste facility and are influenced by the close proximity to the building. TLD numbers 27 through 30 and 47 are located within the restricted area of the James A. FitzPatrick radwaste facility and are influenced by the radwaste buildings. TLD number 59 is located near the restricted area of the FitzPatrick Plant stack and is influenced by the proximity to this structure. TLD numbers 3 and 4 are located at the construction site of Nine Mile Point #2. TLD's are subject to radiography at the Unit #2 site and to a much lesser extent the FitzPatrick facility.

Offsite TLD results remained fairly consistent for most TLD locations each quarter. Any slight variations in natural background radiation levels that were observed are most probably a result of increasing or decreasing emission rates for radon and thoron gases emanating from the ground. These emission rates are related to ground moisture content and other natural parameters.

Onsite TLD results remained fairly consistent except for TLD's located near radwaste facilities which may be affected by the frequency of radwaste processing and shipment. These TLD's include numbers 23, 24, 27, 28, 29, 30, 47, 48, and 61 at the James A. FitzPatrick facility and number 39 at the Nine Mile Point #1 facility. TLD numbers 3, 4, 41, and 62 are located at the Nine Mile Point #2 facility and were affected by the frequency of radiography at the construction site. Radiography is a common practice at construction sites in order to determine the quality of equipment welds such as pipes. TLD's located in areas near radiography work will show fluctuating doses as the amount of radiography performed is not consistent. TLD number 59 results were variable as a result of the operating mode of the James A. FitzPatrick facility. This TLD is located near the James A. FitzPatrick facility exhaust stack.

The results of 1984 showed no detectable impact from direct radiation measured outside the site boundary.

4. TLD (ENVIRONMENTAL DOSIMETRY) - TABLE 14

TLD's were collected once per quarter during the sample year. The TLD results are an average of four independent readings at each location and are reported in mrem per standard month. In 1984, TLD's for the most part were collected approximately on March 31, 1984, June 30, 1984, September 28, 1984, and January 4, 1985.

TLD results are organized into three groups for reporting purposes. The groups are onsite TLD's (defined as TLD's in the immediate proximity of the individual facilities, at points of interest), environmental station TLD's (a ring of TLD's surrounding the generating facilities as a group), and offsite TLD's (TLD's located off the site property or controlled area and ranging up to 20 miles from the site).

A net dose at the environmental station TLD's can be calculated simply by subtracting the mean standard month offsite doses from the mean standard month onsite environmental station doses*. Environmental station TLD's are arranged in a concentric circle and range in distance from the individual facilities from 1,500 to 2,000 feet. The net dose per mean standard month for each quarter is as follows:

<u>Quarter</u>	<u>Net Environmental Station Dose**</u>
1	0.63
2	0.52
3	0.52
4	0.29

The annual site property boundary dose for 1984 cannot be determined from the net environmental station dose since the property boundary extends out to approximately 0.75 miles from the site (i.e., beyond the concentric circle of environmental station TLD's). A general estimate can be made based on two available TLD's located at the site boundary. The net dose per standard month for each quarter can be calculated for these two locations (TLD numbers 19 and 15) east and west of the site. This calculation is conservative since it represents the shortest distance to populated areas.

<u>Quarter</u>	<u>Net Site Property Boundary Dose**</u>
1	- 0.08
2	- 0.59
3	- 0.18
4	- 0.49

*Location numbers 5, 6, 7, 23, 24, 25, and 26.

**Dose in mrem per standard month.

6. MILK - TABLES 16, 17, AND 18

Milk samples were collected from a combination of eight farms during the first two months of the 1984 grazing season, and from seven farms during the remainder of the 1984 grazing season and the following months of November and December. The grazing season is considered to be May through October. Two of the sample locations, numbers 5 and 45, were deleted from the milk sampling program as a result of the 1984 spring milch animal census. These locations were deleted in July. Sample location number 60 was added to the milk sampling program in July as a result of the 1984 spring milch animal census. Sample location descriptions are listed below.

<u>Location No.</u>	<u>Direction from Site</u>	<u>Distance from Site (miles)</u>
4	ESE	7.7
5	SSE	7.2
7	ESE	5.5
16	S	5.2
40	SW	15.3
45	SE	8.1
50	E	8.2
55	E	9.0
60	E	9.5

Milk samples were collected from each of the locations in the first half of the month and analyzed for I-131. At approximately mid month, a second milk collection was made at the same locations. The second collection was composited with an equal aliquot from each location sampled during the first collection. The composite samples were analyzed for gamma emitters and Sr-90. I-131, gamma isotopic, and Sr-90 results are found in the analytical results section.

The gamma spectral analysis of the monthly composite samples showed K-40 to be the most abundant radionuclide detected in the milk samples collected in 1984. K-40 was detected in every sample analyzed and ranged in concentration from 1,840 pCi/liter to 1,040 pCi/liter at the indicator locations and 1,500 pCi/liter to 1,190 pCi/liter at the control location. K-40 is a naturally occurring radionuclide and is found in many of the environmental medias sampled.

Sr-90 was also detected in all of the 58 milk samples collected during 1984. The mean Sr-90 concentration for the control location was 2.14 pCi/liter. The mean for all indicator locations (within 10 miles of the site) was 2.34 pCi/liter. The control and indicator sample means are similar. Sr-90 results for the indicator locations ranged from 7.60 pCi/liter to 0.80 pCi/liter. Control sample results ranged from 2.90 pCi/liter to 1.30 pCi/liter. The detection of Sr-90 in indicator and control locations at similar concentrations is indicative of background Sr-90 as a result of past weapons testing.

5. RADIATION MONITORS - TABLE 15

Environmental radiation monitors are located in 10 of the 15 air monitoring environmental stations. Each of the onsite environmental monitoring stations contains a radiation monitor and, in addition, the C offsite monitoring station contains a similar monitor.* The radiation monitors consist of a GM detector with an associated power supply, chart recorder, and trip unit. The monitor has an operating and recording range from 0.01 to 100 mrem/hr. Each radiation monitor has a small radioactive source mounted inside the detector casing to produce an on scale reading. The design intent of the monitors is to detect possible dose rates resulting from plume releases from the site. The monitors are not considered to be capable of high sensitivity environmental monitoring and do not detect minute fluctuation in levels of background radiation. Because of the relatively low sensitivity of the monitors (environmentally speaking) no comparisons are made between the radiation monitor readings and the readings from environmental TLD's.

*Due to repeated vandalism to C offsite environmental sampling station (the monitor detector was stolen several times), the radiation monitor was moved to D-1 offsite environmental sampling station on July 19, 1971.

The impact as a result of Cs-137 in 1984 milk samples is insignificant since no Cs-137 was detected during the 1984 milk sampling program.

The impact, as a result of Sr-90 in milk, due to plant operation, is extremely small if any since the mean result of the indicator results and the control results are approximately equal considering fluctuations in the background levels. The levels of Sr-90 detected in indicator as well as control samples is considered to be representative of background concentrations. In this regard, the resultant calculated doses would be approximately equal.

Iodine-131 was not detected in the 58 monthly milk samples analyzed for the 1984 program. No doses to man have been calculated due to the lack of positive detection. The detection of I-131 in milk samples has not been routine in the past. In past sampling programs, I-131 has been detected in milk samples in conjunction with fresh fallout from atmospheric nuclear testing.

Graphs of yearly milk sample results for Cs-137, Sr-90 and I-131, along with monthly (1984) Cs-137 results by station, are presented in Section VII.

Milk samples were collected and analyzed monthly for I-131. Iodine-131 was not detected during 1984 in any of the indicator or control samples. All 1984 I-131 milk results are reported as LLD.

Cs-137 was not detected in any of the 58 monthly samples analyzed in 1984. Annual means for the detection of Cs-137 at all locations are presented below.

<u>Location No.</u>	<u>Annual Mean (Cs-137)</u>
4	<5.66 pCi/l (LLD)
5	<4.4 pCi/l (LLD)
7	<6.3 pCi/l (LLD)
16	<6.4 pCi/l (LLD)
40 (control)	<6.0 pCi/l (LLD)
45	<4.5 pCi/l (LLD)
50	<4.9 pCi/l (LLD)
55	<4.8 pCi/l (LLD)
60	<5.4 pCi/l (LLD)

Annual mean Cs-137 values for each sampling location are not significantly different from one another. Location number 40 (control location) showed no detectable Cs-137 during 1984. This was also true for every indicator location. However, Cs-137 has been routinely detected in the past.

Examination of previous Cs-137 levels in milk samples shows that the annual mean for the indicator samples has decreased steadily since 1974. 1976 did show a decrease (7.8 pCi/liter) that was less than 1975 and 1977 (1975 was 20.6 pCi/liter and 1977 was 17.1 pCi/liter). 1974 through 1981 showed Cs-137 concentrations ranging from 26.1 pCi/liter in 1974 to 7.57 pCi/liter in 1981. The indicator mean for 1984 was less than 6.3 pCi/liter. Previous Cs-137 concentrations at the control location is only available from 1978 to 1983. Concentrations range from 3.73 pCi/liter in 1979 to 7.0 pCi/liter in 1981. The mean control result for 1984 was less than 6.0 pCi/liter (LLD result).

No other radionuclides were detected in milk samples during 1984 using gamma spectral analysis.

Previous Sr-90 data from the indicator locations shows that the annual mean Sr-90 concentrations have decreased slightly since 1974. Sr-90 ranged from 2.34 pCi/liter in 1984 to 7.16 pCi/liter in 1976. The 1984 annual mean for Sr-90 was 2.34 pCi/liter, which shows a slight decrease from the 1983 annual mean for Sr-90 of 2.81 pCi/liter. Strontium-90 concentrations at the control location are only available since 1978. The annual mean concentration ranged from 1.91 pCi/liter in 1983 to 5.88 pCi/liter in 1978. The 1984 annual mean for Sr-90 (control location) was 2.14 pCi/liter, and shows a slight increase from the 1983 annual mean for Sr-90 of 1.91 pCi/liter.

8. HUMAN FOOD PRODUCTS - TABLE 20

Human food product samples were comprised of meat, eggs, poultry, and vegetables. Collections for meat, poultry, and eggs were made in the spring and fall seasons. Samples of produce included vegetables with an attempt to sample at least one green leafy vegetable from each location. The collection of produce was performed in late summer or early fall. Three indicator locations were sampled for each type of media collected, in addition, a control location was sampled during each collection period. Indicator samples were collected within a 10 mile radius of the site in areas which would have a high potential for demonstrating possible effects of site operations. The ultimate factor controlling sample locations was the availability of required samples. Attempts were made to maintain prior sample locations where possible.

Meat

Spring meat collections were made at one offsite location (greater than 10 miles from the site) and at three onsite locations (less than 10 miles from the site). Spring meat collections showed detectable concentrations of K-40 in all samples. K-40 concentrations ranged from 2.6 pCi/g (wet) to 3.7 pCi/g (wet). K-40 is a naturally occurring radionuclide. Only one of the four spring meat samples showed detectable concentrations of Cs-137. The detected Cs-137 concentration was in the indicator or onsite sample. The Cs-137 result for this sample was 0.046 pCi/g (wet). Cs-137 was not detected in the control sample.

Cs-137 is detected in many environmental samples and is usually most prevalent in meat and fish, with respect to all the sample media collected. Cs-137 in meat samples is essentially a result of past weapons testing. Cesium is incorporated into meat tissue from feed sources. The results detected in the spring meat samples are very low concentrations and thus can appear in some samples and not in others. By review of the 1981 spring meat sample data, it is noted that Cs-137 appeared in the control samples (0.017 pCi/g [wet] and 0.024 pCi/g [wet]). Cs-137 was also found in the control sample during 1980 (0.01 pCi/g [wet]).

The one meat sample that showed a detectable concentration of Cs-137 (0.046 pCi/g [wet]) was slightly higher than the detected concentrations in control sample results during the spring of 1981. Because this result (0.046 pCi/g [wet]) is small, the impact or dose as a result of this concentration is insignificant and is addressed below.

No other radionuclides were detected in the spring meat samples using gamma spectral analysis.

Fall meat collections were made at one offsite and at three onsite sample locations. The fall samples showed detectable concentrations of K-40 in all samples. K-40 concentrations ranged from 2.6 pCi/g (wet) to 2.9 pCi/g (wet).

7. MILCH ANIMAL CENSUS - TABLE 19

The milch animal census is an estimation of the number of cows and goats within a 10 mile radius of the Nine Mile Point Site. A census is conducted twice per year, once in the spring and once in the summer. The census is conducted by sending questionnaires to previous milch animal owners and also by road surveys to locate any possible new owners. Questionnaires not responded to are followed up by telephone calls.

The number of milch animals located within the 10 mile radius of the site was estimated to be 1,080 cows and three goats for the spring 1984 census. One new location was found since the summer 1983 census. The number of cows decreased by 133 and the number of goats increased by three with respect to the 1983 summer census.

The 1984 summer census showed a total of 1,064 cows and one goat. No new locations were found since the spring 1984 census. The number of cows decreased by 16 and the number of goats decreased by two with respect to the 1984 spring census.

Eggs

Egg samples were collected in the spring (May 2-10, June 6, 1984) and in the fall (October 26, November 5-20, 1984). Samples were collected at three onsite locations (within 10 miles of the site) and at one offsite location (greater than 10 miles from the site). The only radionuclide detected during 1984 in egg samples was K-40. K-40 was detected in the spring samples at concentrations that ranged from 1.0 pCi/g to 1.2 pCi/g (wet). The fall samples showed K-40 concentrations that ranged from 1.1 pCi/g to 1.3 pCi/g (wet).

Poultry

Poultry samples were taken during the spring (May 2-10, June 6, 1984) and during the fall (October 26, November 5-20, 1984) at three onsite locations and one offsite location. The only radionuclide detected during 1984 in poultry samples was K-40. K-40 was detected in the spring samples at concentrations that ranged from 3.0 to 3.8 pCi/g (wet). The fall samples showed K-40 concentrations that ranged from 2.6 to 3.7 pCi/g (wet).

Fruits and Vegetables

Fruits and vegetables were obtained during the harvest season. Collections were made during September at three indicator locations and one control location. A successful attempt was made to collect one broadleaf and one non-broadleaf fruit or vegetable at each location. Broadleaf vegetables of cabbage, Swiss chard, and collard greens and non-broadleaf fruits and vegetables of tomatoes and squash were collected.

K-40 was detected in all broadleaf and non-broadleaf vegetables and fruits. Broadleaf vegetables (Swiss chard, cabbage and collard greens) showed concentrations of K-40 ranging from 1.8 pCi/g to 5.1 pCi/g (wet). An indicator sample had the highest concentration (5.1 pCi/g [wet]). Non-broadleaf fruits and vegetables showed concentrations of K-40 ranging from 1.8 to 2.2 pCi/g (wet). Again an indicator location had the highest K-40 concentration (2.2 pCi/g [wet]).

Be-7 was detected at the control sample location in Swiss chard. The detectable concentration of Be-7 was 0.41 pCi/g (wet). The concentration of Be-7 at the indicator sample location for Swiss chard was less than 0.15 pCi/g (wet).

No other radionuclides were detected in the 1984 collection of fruits and vegetables.

Cs-137 was again only detected in one of the four fall meat samples. The one meat sample that had a detectable concentration of Cs-137 was an indicator sample (less than 10 miles from the site). The detectable concentration of Cs-137 was 0.032 pCi/g (wet) and can be compared to the control sample result of less than 0.027 pCi/g (wet). This result is a very small concentration and, as noted above for the spring samples, is comparable to concentrations detected at control locations during 1981. These 1981 samples showed control Cs-137 concentrations of 0.017 and 0.024 pCi/g (wet) respectively. The impact of these small concentrations is discussed below.

No other radionuclides were detected in the fall meat samples using gamma spectral analysis.

The detection of Cs-137 in meat samples has been noted for all years since 1978 for indicator samples and since 1980 for control locations (control samples were not collected prior to 1980). The detected concentrations since 1978 at the indicator locations have been fairly consistent. These samples ranged from 0.021 to 0.039 pCi/g (wet). At the control locations, Cs-137 ranged from 0.01 to 0.021 pCi/g (wet). The indicator sample annual mean results have been slightly higher than the control sample annual mean results.

The historical detection of Cs-137 in meat at control and indicator sample locations is an indication of cesium production from weapons testing. During 1984, Cs-137 was not detected at the control sample locations although Cs-137 has been detected in the past (1981 for example) at control sample locations. As noted above, the concentrations detected are very small and the impact or dose to man is insignificant. An average annual dose to man can be calculated as a result of meat consumption from within 10 miles of the site (indicator sample results).

The average Cs-137 concentration in meat during 1984 was 0.039 pCi/g (wet). Assuming an adult consumption rate of 95 kg per year (Regulatory Guide 1.109), the annual dose to the whole body is 0.265 mrem per year. The critical organ dose is 0.404 mrem per year to the liver. This calculated dose is small and can be compared to an annual dose of 20 mrem per year to the critical organ (the gonads in this case) as a result of naturally occurring K-40 in the environment. The calculated whole body dose (0.265 mrem per year) and the calculated critical organ dose (0.404 mrem per year to the liver) can also be compared to the dose received from control sample results during 1981. During 1981, the annual mean concentration for the control meat samples was 0.021 pCi/g (wet). Using the same consumption factor of 95 kg per year, the annual whole body dose was 0.142 mrem per year and 0.217 mrem per year to the liver (critical organ dose). As noted above, the 1984 control samples did not show any Cs-137 above the lower limits of detection. However, Cs-137 in meat has historically been present. Because of the small concentrations noted here, cesium can be noted in some samples and not in other samples.

CONCLUSION

The Radiological Environmental Monitoring Program is conducted each year to determine the radiological impact of the James A. FitzPatrick Nuclear Power Plant on the local environment. As demonstrated by the analytical results of the 1984 program, the major radiological impact on the environment was the result of fallout from atmospheric nuclear testing.

Levels of natural background and the associated fluctuation in intensity are much more significant in terms of dose to man (normal background in the vicinity of the site is equal to 60 mrem/yr) than radiation levels in the environment associated with the operation of the plant.

Using the data presented in this report, and earlier reports as a basis, it can be concluded that no appreciable radiological environmental impact has resulted from the operation of the James A. FitzPatrick Nuclear Power Plant.

Review of past environmental data indicates that K-40 has been consistently detected in food crop samples. K-40 concentrations have fluctuated from one sample to another but the annual ranges have remained relatively consistent from year to year. Be-7 has been detected occasionally during the past on leafy vegetables (1978 through 1982).

Dose estimates are not performed here for fruits and/or vegetables since no other radionuclides with the exception of naturally occurring K-40 and Be-7 were detected.

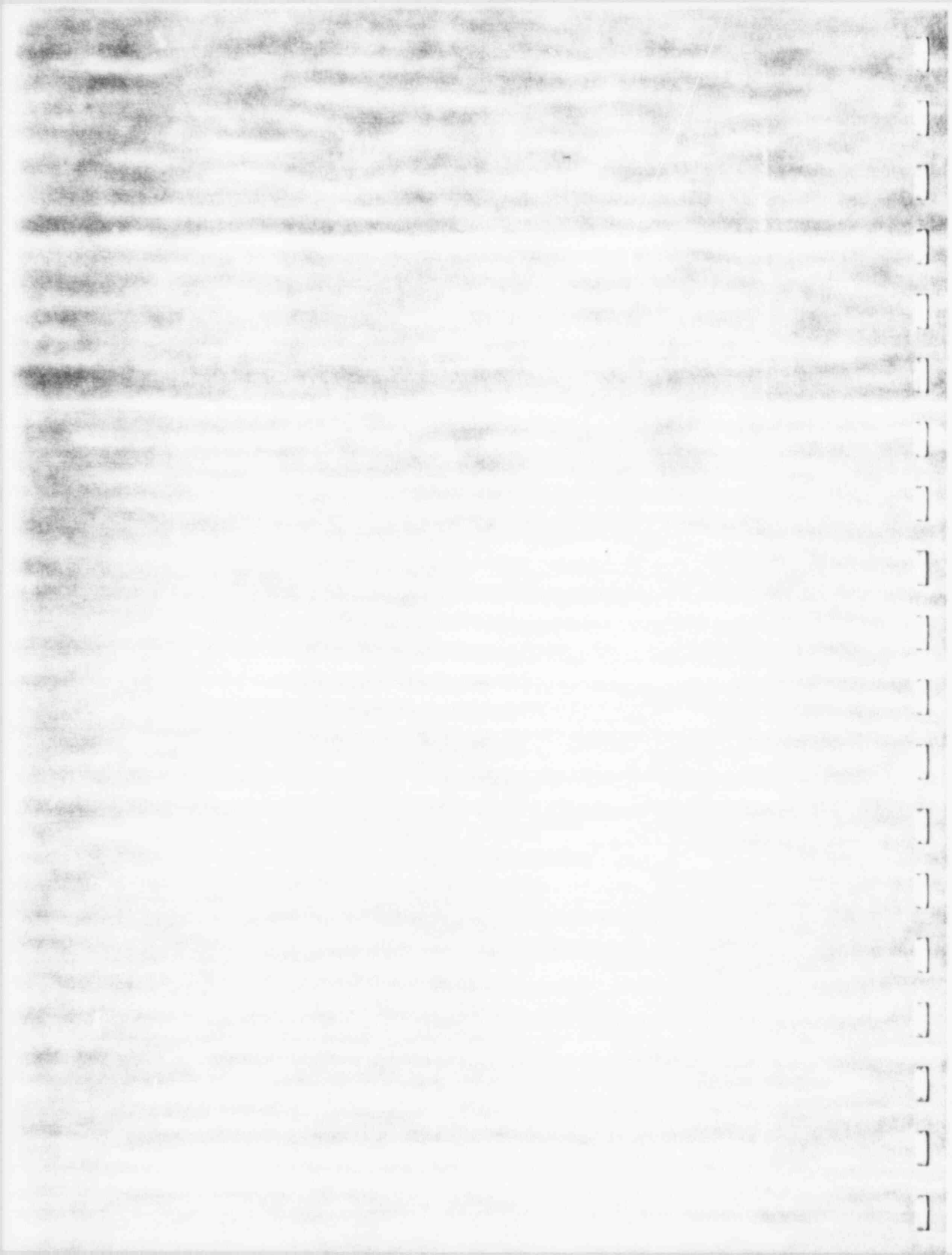
10. Environmental radiation monitor D-1 onsite was inoperable from August 5, 1984 (0630 hours) to August 8, 1984 (1307 hours). Inoperability was caused by an electrical malfunction.
11. The air sampling pump at the I onsite environmental sampling station was inoperable from August 20, 1984 (1025 hours) to August 23, 1984 (1107 hours). Inoperability was caused by pump mechanical problems.
12. The air sampling pump and environmental radiation monitor at the F onsite environmental sampling station were inoperable from August 30, 1984 (2205 hours) to September 4, 1984 (1121 hours). Inoperability was caused by an electrical malfunction.
13. The air sampling pump at C offsite environmental sampling station was inoperable from September 26, 1984 (1700 hours) to October 4, 1984 (1020 hours). Inoperability was caused by pump mechanical problems.
14. The air sampling pump at D-2 offsite environmental sampling station was inoperable from September 27, 1984 (1720 hours) to October 4, 1984 (1135 hours). Inoperability was caused by pump mechanical problems.
15. Environmental radiation monitor D-1 offsite was inoperable from November 26, 1984 (0730 hours) to November 27, 1984 (0830 hours). Inoperability was due to rapid chart paper advance. No high trips were indicated by the high trip light. The high trip light was verified to be operational. The chart paper ran out prior to its scheduled replacement date because the chart advance circuitry malfunctioned which resulted in the rapid chart paper advance. This was replaced by an instrumentation and control technician in the field. The chart paper was replaced and the monitor returned to normal operation on November 27, 1984 (0830 hours).
16. The air sampling pump and environmental radiation monitor at K onsite environmental sampling station was inoperable from November 29, 1984 (0030 hours) to November 30, 1984 (1600 hours). Inoperability was caused by a power outage due to a transformer failure.
17. The air sampling pump at D-2 onsite environmental sampling station was inoperable from December 10, 1984 (0909 hours) to December 17, 1984 (0845 hours). Inoperability was caused by a blown fuse.
18. The air sampling pump at G onsite environmental sampling station was inoperable from December 12, 1984 (1607 hours) to December 17, 1984 (1022 hours). Inoperability was caused by pump mechanical problems.
19. The air sampling pump at the D-2 onsite environmental sampling station was inoperable from December 17, 1984 (0930 hours) to December 27, 1984 (1030 hours). Inoperability was caused by pump mechanical problems.

EXCEPTIONS TO THE PROGRAM

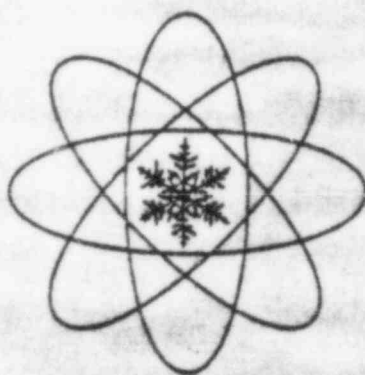
1. Environmental radiation monitor I onsite was inoperable from January 13, 1984 (0715 hours) to January 16, 1984 (1115 hours). Inoperability was caused by an electrical malfunction.
2. The air sampling pump at the K onsite environmental sampling station was inoperable from February 10, 1984 (1000 hours) to February 13, 1984 (1000 hours). Inoperability was due to an I&C technician's failure to restart the air sampling pump after environmental station maintenance.
3. The air sampling pump at the C offsite environmental sampling station was inoperable from March 6, 1984 (0930 hours) to March 7, 1984 (0930 hours). Inoperability was caused by pump mechanical problems.
4. The air sampling pump at the J onsite environmental sampling station was inoperable from April 18, 1984 (0958 hours) to May 17, 1984 (1415 hours). Inoperability was caused by pump mechanical problems. All spare air sampling pumps were also being repaired during this time interval, and were not available until May 17, 1984.
5. Environmental radiation monitor C offsite was inoperable from May 5, 1984 (2100 hours) to May 15, 1984 (0857 hours). Inoperability was caused by vandalism to the environmental station (the monitor detector was stolen).
6. Environmental radiation monitor C offsite was inoperable from May 22, 1984 (0937 hours) to May 26, 1984 (0745 hours). Inoperability was caused by an electrical malfunction.
7. Environmental radiation monitor C offsite was inoperable from May 27, 1984 (1045 hours) to June 4, 1984 (0830 hours). Inoperability was caused by vandalism to the environmental station (the monitor detector was stolen).
8. The spring collection of GAMMARUS did not contain sufficient quantities for Sr-89 and Sr-90 analysis as required by Table 4.3.1, Appendix B of the James A. FitzPatrick Nuclear Power Plant Environmental Technical Specifications. As required by plant procedures, three attempts were made to obtain sufficient quantities of GAMMARUS for analysis. The unavailability of GAMMARUS is most probably due to the unseasonably cold temperature of Lake Ontario and the delay of the spring lake turnover. Few GAMMARUS were inhabiting the shoreline shallows during the spring sampling season. Another sample collection of GAMMARUS will be attempted before the second sample collection in late August.
9. Environmental radiation monitor J onsite was inoperable from July 16, 1984 (0001 hours) to July 19, 1984 (1334 hours). Inoperability was caused by vandalism to the environmental station (the monitor detector was stolen).

REFERENCES

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11. Francis, C. W., Radiostrontium Movement in Soils and Uptake in Plants, Environmental Sciences Division, Oak Ridge National Laboratory, U.S. Department of Energy, 1978.
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13. Pochin, Edward E., Estimated Population Exposure from Nuclear Power Production and Other Radiation Sources, Organization for Economic Co-operation and Development, 1976.
14. ICRP Publication Number 29, Radionuclide Releases into the Environment: Assessment of Dose to Man, 1979.



VI



HISTORICAL DATA

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Periphyton Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.09	ONLY	ONE	DATA	POINT
1983	0.10	0.06	0.14	0.06	0.08
1982	0.05	0.01	0.06	0.04	0.02
1981	0.19	0.07	0.24	0.14	0.10
1980	0.03	0.01	0.04	0.02	0.02
1979	0.07	0.08	0.13	0.02	0.11
1978	0.04	0.03	0.063	0.023	0.04
1977	<MDL	---	---	---	---
1976	5.00	ONLY	ONE	DATA	POINT
1975	<MDL	---	---	---	---
1974	0.10	0.02	0.12	0.09	0.03
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Periphyton Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.27	0.04	0.31	0.21	0.10
1983	0.35	0.23	0.69	0.17	0.52
1982	0.14	0.16	0.38	0.05	0.33
1981	6.24	6.75	16.00	0.47	15.53
1980	0.09	0.05	0.15	0.04	0.11
1979	0.36	0.55	1.10	0.08	1.02
1978	0.11	0.06	0.19	0.05	0.14
1977	0.42	0.56	1.40	0.09	1.31
1976	2.60	1.38	4.10	1.40	2.70
1975	22.25	14.34	36.00	4.00	32.00
1974	5.18	3.73	8.44	1.72	6.72
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

VI HISTORICAL DATA

Sample Statistics from Previous Environmental Sampling

The mean, standard deviation, minimum value, maximum value, and range, were calculated for selected sample mediums and isotopes.

Special Considerations:

1. Sample data listed as 1969 was taken from the NINE MILE POINT, PREOPERATION SURVEY, 1969 and ENVIRONMENTAL MONITORING REPORT FOR NIAGARA MOHAWK POWER CORPORATION NINE MILE POINT NUCLEAR STATION, NOVEMBER, 1970.
2. Sample data listed as 1974 was taken from the NINE MILE POINT NUCLEAR STATION, ENVIRONMENTAL OPERATING REPORT. The 1974 data is pre-operational to the James A. FitzPatrick Nuclear Power Plant, which started commercial operation in November, 1974.
3. Sample data listed as 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, and 1983 was taken from the respective environmental operating reports for Nine Mile Point Nuclear Station and James A. FitzPatrick Nuclear Power Plant.
4. Only measured values were used for statistical calculations.

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Mollusks Sr-90 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.020	0.016	0.031	0.009	0.022
1983	0.035	0.007	0.04	0.03	0.01
1982	0.03	0.01	0.04	0.02	0.02
1981	0.046	0.008	0.052	0.040	0.012
1980	0.07	0.06	0.11	0.03	0.08
1979	0.07	0.05	0.10	0.02	0.08
1978	0.14	0.02	0.15	0.12	0.03
1977	0.23	0.21	0.38	0.08	0.30
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Mollusks Sr-90 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.061	0.049	0.130	0.026	0.104
1983	0.11	0.03	0.14	0.07	0.07
1982	0.10	0.02	0.12	0.07	0.05
1981	0.094	0.060	0.130	0.005	0.127
1980	0.11	0.03	0.14	0.07	0.07
1979	0.10	0.04	0.17	0.05	0.12
1978	0.14	0.03	0.18	0.10	0.08
1977	0.10	0.02	0.11	0.07	0.04
1976	0.51	ONLY	ONE	DATA	POINT
1975	0.17	0.04	0.19	0.14	0.05
1974	0.32	ONLY	ONE	DATA	POINT
1969 (PRE-OPERATIONAL)	0.12	0.17	0.24	0.01	0.23

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Mollusks Sr-89 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	<LLD	---	---	---	---
1978	0.02	ONLY	ONE	DATA	POINT
1977	<MDL	---	---	---	---
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Mollusks Sr-89 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	0.04	0.03	0.07	0.01	0.06
1978	0.05	0.03	0.07	0.03	0.04
1977	<MDL	---	---	---	---
1976	0.42	ONLY	ONE	DATA	POINT
1975	<MDL	---	---	---	---
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Bottom Sediment Sr-90 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.047	0.040	0.075	0.019	0.056
1983	0.14	ONLY	ONE	DATA	POINT
1982	<LLD	---	---	---	---
1981	0.027	0.007	0.032	0.022	0.01
1980	0.12	ONLY	ONE	DATA	POINT
1979	0.02	ONLY	ONE	DATA	POINT
1978	0.05	0.01	0.06	0.04	0.02
1977	<MDL	---	---	---	---
1976	<MDL	---	---	---	---
1975	<MDL	---	---	---	---
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Bottom Sediment Sr-90 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.038	0.042	0.100	0.011	0.089
1983	0.05	ONLY	ONE	DATA	POINT
1982	0.037	0.03	0.06	0.013	0.047
1981	0.011	0.007	0.02	0.005	0.015
1980	0.01	0.003	0.015	0.011	0.004
1979	0.02	0.20	0.05	0.01	0.04
1978	0.015	ONLY	ONE	DATA	POINT
1977	<MDL	---	---	---	---
1976	0.04	0.00	0.04	0.04	0.00
1975	0.29	0.27	0.65	0.03	0.62
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	0.08	ONLY	ONE	DATA	POINT

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Mollusks Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	<LLD	---	---	---	---
1978	<MDL	---	---	---	---
1977	<MDL	---	---	---	---
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Mollusks Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.022	ONLY	ONE	DATA	POINT
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	0.061	ONLY	ONE	DATA	POINT
1980	<LLD	---	---	---	---
1979	<LLD	---	---	---	---
1978	0.99	0.80	2.10	0.24	1.86
1977	<MDL	---	---	---	---
1976	0.18	ONLY	ONE	DATA	POINT
1975	<MDL	---	---	---	---
1974	0.26	ONLY	ONE	DATA	POINT
1969 (PRE-OPERATIONAL)	0.08	ONLY	ONE	DATA	POINT

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

GAMMARUS Sr-89 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	0.034	ONLY	ONE	DATA	POINT
1980	<LLD	---	---	---	---
1979	<LLD	---	---	---	---
1978	<MDL	---	---	---	---
1977	<MDL	---	---	---	---
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

GAMMARUS Sr-89 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	0.069	ONLY	ONE	DATA	POINT
1980	<LLD	---	---	---	---
1979	0.105	ONLY	ONE	DATA	POINT
1978	<MDL	---	---	---	---
1977	<MDL	---	---	---	---
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Bottom Sediment Cs-137 pCi/g (dry)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.42	ONLY	ONE	DATA	POINT
1983	0.24	0.08	0.29	0.18	0.11
1982	0.52	0.33	0.75	0.29	0.46
1981	0.26	0.23	0.42	0.10	0.32
1980	0.43	0.2	0.57	0.29	0.28
1979	0.47	0.10	0.54	0.40	0.14
1978	0.61	0.15	0.71	0.50	0.21
1977	0.68	0.08	0.73	0.62	0.11
1976	CMDL	---	---	---	---
1975	0.40	0.10	0.50	0.30	0.20
1974	0.11	ONLY	ONE	DATA	POINT
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Bottom Sediment Cs-137 pCi/g (dry)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.49	0.53	1.08	0.04	1.04
1983	0.33	0.11	0.43	0.18	0.25
1982	0.20	0.11	0.30	0.05	0.25
1981	0.23	0.04	0.27	0.19	0.08
1980	0.34	0.40	0.94	0.12	0.82
1979	0.44	0.45	1.00	0.13	0.87
1978	0.99	0.80	2.10	0.24	1.86
1977	2.27	1.90	4.10	0.31	3.79
1976	2.45	0.64	2.90	2.00	0.90
1975	0.83	0.86	3.50	0.20	3.30
1974	0.40	0.26	0.58	0.21	0.37
1969 (PRE-OPERATIONAL)	0.38	0.09	0.44	0.31	0.13

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

GAMMARUS Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	0.05	0.04	0.08	0.02	0.06
1978	0.028	ONLY	ONE	DATA	POINT
1977	<MDL	---	---	---	---
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

GAMMARUS Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	0.21	0.21	0.36	0.06	0.30
1982	<LLD	---	---	---	---
1981	4.7	4.67	9.0	1.4	6.6
1980	<LLD	---	---	---	---
1979	0.06	0.02	0.07	0.04	0.03
1978	0.05	0.00	0.05	0.05	0.00
1977	<MDL	---	---	---	---
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	0.21	ONLY	ONE	DATA	POINT
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

GAMMARUS Sr-90 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.06	0.03	0.08	0.04	0.04
1983	0.07	0.03	0.10	0.05	0.05
1982	0.09	ONLY	ONE	DATA	POINT
1981	0.099	0.066	0.146	0.052	0.094
1980	0.102	ONLY	ONE	DATA	POINT
1979	0.10	0.02	0.11	0.08	0.03
1978	0.14	0.01	0.14	0.13	0.01
1977	0.32	ONLY	ONE	DATA	POINT
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

GAMMARUS Sr-90 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.18	0.02	0.21	0.16	0.05
1983	0.18	0.03	0.21	0.16	0.05
1982	0.23	0.10	0.30	0.16	0.14
1981	0.193	0.058	0.274	0.138	0.136
1980	0.64	0.86	1.64	0.14	1.5
1979	0.19	0.01	0.20	0.17	0.03
1978	0.14	0.04	0.21	0.13	0.08
1977	0.40	0.46	0.73	0.08	0.65
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Fish Samples Sr-90 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	0.006	0.006	0.013	0.002	0.011
1981	<LLD	---	---	---	---
1980	0.005	0.002	0.007	0.002	0.005
1979	0.018	0.012	0.033	0.008	0.025
1978	0.010	0.004	0.015	0.004	0.011
1977	0.07	0.03	0.14	0.02	0.12
1976	0.25	0.27	0.81	0.05	0.76
1975	0.07	0.06	0.10	0.04	0.06
1974	0.07	0.02	0.09	0.04	0.05
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---
INDICATOR					

Fish Samples Sr-90 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	0.003	0.001	0.005	0.002	0.003
1981	0.002	ONLY	ONE	DATA	POINT
1980	0.006	0.005	0.013	0.003	0.010
1979	0.019	0.01	0.04	0.01	0.03
1978	0.013	0.006	0.025	0.004	0.021
1977	0.07	0.05	0.24	0.03	0.21
1976	0.28	0.48	2.20	0.05	2.15
1975	0.08	0.03	0.13	0.02	0.11
1974	0.23	0.69	2.30	0.01	2.29
1969 (PRE-OPERATIONAL)	0.23	0.17	0.51	0.30	0.21

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Fish Samples Sr-89 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	0.004	0.001	0.005	0.003	0.002
1981	0.015	0.001	0.015	0.014	0.001
1980	<LLD	---	---	---	---
1979	0.07	0.04	0.09	0.04	0.05
1978	<MDL	---	---	---	---
1977	0.04	0.01	0.05	0.03	0.02
1976	0.24	0.08	0.33	0.19	0.14
1975	<MDL	---	---	---	---
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Fish Samples Sr-89 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	0.004	0.001	0.004	0.003	0.001
1981	0.061	0.021	0.10	0.027	0.073
1980	<LLD	---	---	---	---
1979	<LLD	---	---	---	---
1978	0.01	0.001	0.015	0.014	0.001
1977	0.07	0.05	0.24	0.03	0.21
1976	0.27	0.15	0.41	0.12	0.29
1975	<MDL	---	---	---	---
1974	<MDL	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Lake Water Gross Beta pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	3.41	0.85	5.20	2.40	2.80
1983	2.98	1.74	7.92	1.47	6.45
1982	2.4	0.43	3.2	1.8	1.4
1981	3.24	1.27	5.8	1.9	3.9
1980	2.60	0.50	3.48	1.87	1.61
1979	3.05	0.85	4.80	2.10	2.70
1978	3.55	1.58	6.10	0.50	5.60
1977	10.9	14.5	49.3	2.50	46.8
1976	42.48	50.62	189.00	4.90	184.10
1975	45.33	52.79	160.00	1.00	159.00
1974	4.85	0.07	4.90	4.80	0.10
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Lake Water Gross Beta pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	3.98	0.98	5.90	2.20	3.70
1983	3.34	1.59	7.90	0.57	7.33
1982	2.7	0.73	4.7	1.3	3.4
1981	2.98	1.19	5.4	1.2	4.2
1980	3.10	0.63	5.10	2.35	2.75
1979	3.24	1.06	6.30	2.00	4.30
1978	4.53	2.62	11.10	0.60	10.50
1977	15.80	21.00	87.00	1.00	86.00
1976	41.76	55.23	192.00	1.10	190.90
1975	13.24	17.08	80.00	0.60	79.40
1974	31.71	20.22	60.00	6.30	53.70
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Fish Samples Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.032	0.009	0.038	0.015	0.023
1983	0.050	0.009	0.060	0.040	0.020
1982	0.047	0.009	0.055	0.027	0.028
1981	0.043	0.016	0.062	0.028	0.034
1980	0.059	0.032	0.110	0.029	0.081
1979	0.04	0.01	0.06	0.03	0.03
1978	0.09	0.05	0.20	0.04	0.16
1977	0.13	ONLY	ONE	DATA	POINT
1976	0.12	ONLY	ONE	DATA	POINT
1975	<MDL	---	---	---	---
1974	0.43	0.37	0.94	0.09	0.85
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Fish Samples Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.043	0.008	0.061	0.033	0.028
1983	0.050	0.009	0.060	0.030	0.030
1982	0.050	0.008	0.064	0.034	0.030
1981	0.061	0.021	0.10	0.027	0.073
1980	0.061	0.029	0.100	0.030	0.070
1979	0.10	0.14	0.55	0.02	0.53
1978	0.08	0.02	0.10	0.03	0.07
1977	0.29	0.21	0.79	0.13	0.66
1976	1.4	1.67	3.90	0.50	3.40
1975	1.38	0.22	1.70	1.10	0.60
1974	0.57	0.82	4.40	0.08	4.32
1969 (PRE-OPERATIONAL)	0.06	0.04	0.13	0.01	0.12

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Lake Water Sr-90 pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.72	ONLY	ONE	DATA	POINT
1983	0.89	0.08	0.97	0.82	0.15
1982	2.04	2.18	5.30	0.75	4.55
1981	0.68	0.176	0.868	0.484	0.384
1980	1.10	0.00	1.10	1.10	0.00
1979	0.80	0.26	1.10	0.60	0.50
1978	CMDL	---	---	---	---
1977	CMDL	---	---	---	---
1976	CMDL	---	---	---	---
1975	CMDL	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Lake Water Sr-90 pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.88	0.31	1.30	0.80	0.50
1983	0.83	0.21	1.10	0.60	0.50
1982	1.08	0.88	3.07	0.40	2.67
1981	0.74	0.08	0.805	0.597	0.208
1980	1.00	0.20	1.20	0.80	0.40
1979	0.84	0.34	1.30	0.40	0.90
1978	0.80	0.30	1.10	0.40	0.70
1977	1.00	ONLY	ONE	DATA	POINT
1976	CMDL	---	---	---	---
1975	CMDL	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Lake Water Sr-89 pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	1.4	0.07	1.4	1.3	0.1
1979	0.70	0.14	0.80	0.60	0.20
1978	<MDL	---	---	---	---
1977	<MDL	---	---	---	---
1976	<MDL	---	---	---	---
1975	<MDL	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Lake Water Sr-89 pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	0.61	ONLY	ONE	DATA	POINT
1981	0.78	ONLY	ONE	DATA	POINT
1980	0.70	ONLY	ONE	DATA	POINT
1979	<LLD	---	---	---	---
1978	0.70	0.10	0.80	0.60	0.20
1977	<MDL	---	---	---	---
1976	<MDL	---	---	---	---
1975	0.30	ONLY	ONE	DATA	POINT
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Air Particulate Gross Beta pCi/m ³	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.026	0.007	0.051	0.013	0.039
1983	0.024	0.009	0.085	0.007	0.078
1982	0.033	0.012	0.078	0.011	0.067
1981	0.165	0.135	0.549	0.016	0.533
1980	0.056	0.04	0.291	0.009	0.282
1979	0.077	0.086	0.703	0.010	0.693
1978	0.14	0.13	0.66	0.01	0.650
1977	0.07	0.03	0.140	0.016	0.124
1976	0.051	0.031	0.240	0.004	0.236
1975	0.085	0.060	0.294	0.008	0.286
1974	0.121	0.104	0.808	0.001	0.807
1969 (PRE-OPERATIONAL)	0.374	0.087	0.540	0.130	0.410

INDICATOR

Air Particulate Gross Beta pCi/m ³	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.025	0.008	0.058	0.000	0.058
1983	0.023	0.009	0.062	0.003	0.059
1982	0.031	0.012	0.113	0.001	0.112
1981	0.151	0.128	0.528	0.004	0.524
1980	0.045	0.03	0.207	0.002	0.205
1979	0.058	0.06	0.271	0.001	0.270
1978	0.10	0.09	0.34	0.01	0.33
1977	0.106	0.07	0.326	0.002	0.324
1976	0.047	0.032	0.191	0.002	0.189
1975	0.067	0.055	0.456	0.001	0.455
1974	0.111	0.114	0.855	0.003	0.852
1969 (PRE-OPERATIONAL)	0.320	0.090	0.520	0.130	0.390

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Lake Water Tritium pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	205	21.2	220	190	30
1983	250.0	21.8	280	230	50
1982	165.0	94.7	307	112	195
1981	293.3	49.3	357	211	146
1980	257.3	38.5	290	211	79
1979	258.7	73.7	308	174	134
1978	303.8	127.5	490	215	275
1977	407.5	97.4	530	300	230
1976	651.7	251.0	929	440	489
1975	362.5	72.8	414	311	103
1974	---	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Lake Water Tritium pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	282	98.1	370	110	260
1983	317.0	116.9	560	190	370
1982	641.0	891.1	2780	194	2586
1981	258.3	76.9	388	183	205
1980	263.0	95.4	457	150	307
1979	234.0	40.7	286	176	110
1978	389.4	119.9	560	253	307
1977	450.0	67.2	530	380	150
1976	513.0	250.3	889	297	592
1975	334.8	122.5	482	124	358
1974	440.0	84.9	500	380	120
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Milk Samples I-131 pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	1.41	ONLY	ONE	DATA	POINT
1979	<LLD	---	---	---	---
1978	<MDL	---	---	---	---
1977	NO DATA	---	---	---	---
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Milk Samples I-131 pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	4.9	4.23	8.80	0.40	8.40
1979	<LLD	---	---	---	---
1978	0.19	ONLY	ONE	DATA	POINT
1977	0.20	0.14	0.22	-0.40	0.62
1976	3.20	7.81	45.00	0.02	44.98
1975	0.37	0.60	2.99	0.01	2.98
1974	1.23	0.44	2.00	0.70	1.30
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Environmental TLD's Quarterly Reading mrem/Standard Month Offset*	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	5.87	1.00	8.20	3.90	4.30
1983	5.54	0.364	7.17	4.21	2.96
1982	5.12	0.691	6.95	3.79	3.16
1981	4.72	0.685	6.63	3.24	3.39
1980	4.57	0.614	6.06	3.12	2.94
1979	REPORTED	AS	MREM/OTR	PRIOR TO	1980
1978					
1977					
1976					
1975					
1974					
1969 (PRE-OPERATIONAL)					

INDICATOR

Environmental TLD's Quarterly Reading mrem/Standard Month Onsite Monitors*	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	6.42	1.26	9.90	4.60	5.30
1983	6.23	0.91	8.97	5.03	3.94
1982	5.82	1.24	9.13	3.87	5.26
1981	5.24	0.73	7.45	4.09	3.36
1980	DATA	NOT	COMPARABLE	DUE TO	CHANGES
1979	IN TLD	LOCATIONS			
1978					
1977					
1976					
1975					
1974					
1969 (PRE-OPERATIONAL)					

*See Clarification on Environmental Sample Statistical Analysis Table, Section III.

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Human Food Crops I-131 pCi/g (wet) Produce	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	NO	CONTROL	DATA	PRIOR TO	1980
1978					
1977					
1976					
1975					
1974					
1969 (PRE-OPERATIONAL)					

INDICATOR

Human Food Crops I-131 pCi/g (wet) Produce	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	<LLD	---	---	---	---
1978	<MDL	---	---	---	---
1977	<MDL	---	---	---	---
1976	<MDL	---	---	---	---
1975	<MDL	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Milk Samples Cs-137 pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	7.0	ONLY	ONE	DATA	POINT
1980	<LLD	---	---	---	---
1979	3.73	0.29	3.9	3.4	0.5
1978	5.83	1.98	7.8	2.4	5.4
1977	NO	CONTROL	DATA	PRIOR TO	1978
1976					
1975					
1974					
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Milk Samples Cs-137 pCi/l	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	5.10	ONLY	ONE	DATA	POINT
1982	6.26	4.41	18.0	3.1	14.9
1981	7.57	5.95	29.0	4.3	24.7
1980	9.7	4.9	21.0	4.0	17.0
1979	9.4	8.0	40.0	2.7	37.3
1978	9.9	7.1	33.0	3.4	29.6
1977	17.1	3.9	22.0	11.0	11.0
1976	7.8	3.7	13.2	4.0	9.2
1975	20.6	7.8	36.0	6.0	30.0
1974	26.1	10.5	61.0	13.0	48.0
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Eggs Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	NO	CONTROL	DATA	PRIOR TO	1980
1978					
1977					
1976					
1975					
1974					
1969 (PRE-OPERATIONAL)					

INDICATOR

Eggs Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	<LLD	---	---	---	---
1978	<MDL	---	---	---	---
1977	<MDL	---	---	---	---
1976	<MDL	---	---	---	---
1975	<MDL	---	---	---	---
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Human Food Crops Cs-137 pCi/g (wet) Produce	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	<LLD	---	---	---	---
1979	NO	CONTROL	DATA	PRIOR TO	1980
1978					
1977					
1976					
1975					
1974					
1969 (PRE-OPERATIONAL)					

INDICATOR

Human Food Crops Cs-137 pCi/g (wet) Produce	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	<LLD	---	---	---	---
1980	0.033	2.26	0.06	0.004	0.056
1979	<LLD	---	---	---	---
1978	0.01	ONLY	ONE	DATA	POINT
1977	<MDL	---	---	---	---
1976	<MDL	---	---	---	---
1975	<MDL	---	---	---	---
1974	0.142	0.09	0.34	0.04	0.30
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Meat Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	<LLD	---	---	---	---
1983	<LLD	---	---	---	---
1982	<LLD	---	---	---	---
1981	0.021	0.005	0.024	0.017	0.007
1980	0.01	ONLY	ONE	DATA	POINT
1979	NO	CONTROL	DATA	PRIOR TO	1980
1978					
1977					
1976					
1975					
1974					
1969 (PRE-OPERATIONAL)					

INDICATOR

Meat Cs-137 pCi/g (wet)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	0.04	0.01	0.05	0.03	0.02
1983	0.02	0.01	0.04	0.01	0.03
1982	0.034	0.026	0.08	0.02	0.06
1981	0.036	0.021	0.068	0.023	0.045
1980	0.02	0.013	0.042	0.009	0.033
1979	0.03	0.021	0.07	0.01	0.06
1978	0.021	0.011	0.04	0.013	0.027
1977	<MDL	---	---	---	---
1976	<MDL	---	---	---	---
1975	0.10	0.00	0.10	0.10	0.00
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

Soil Samples Sr-90 pCi/g (dry)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	NO	SAMPLES	REQUIRED	IN	1984
1983	0.18	0.09	0.32	0.10	0.22
1982	NO	SAMPLES	REQUIRED	IN	1982
1981	NO	SAMPLES	REQUIRED	IN	1981
1980	0.063	0.065	0.19	0.008	0.182
1979	NO	SAMPLES	REQUIRED	IN	1979
1978	NO	SAMPLES	REQUIRED	IN	1978
1977	0.21	0.07	0.29	0.13	0.16
1976	NO DATA	---	---	---	---
1975	0.13	0.10	0.26	0.04	0.22
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

Soil Samples Sr-90 pCi/g (dry)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	NO	SAMPLES	REQUIRED	IN	1984
1983	0.18	0.18	0.47	0.03	0.44
1982	NO	SAMPLES	REQUIRED	IN	1982
1981	NO	SAMPLES	REQUIRED	IN	1981
1980	0.074	0.052	0.140	0.008	0.132
1979	NO	SAMPLES	REQUIRED	IN	1979
1978	NO	SAMPLES	REQUIRED	IN	1978
1977	0.40	0.13	0.65	0.17	0.48
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	0.27	0.06	0.34	0.23	0.11
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

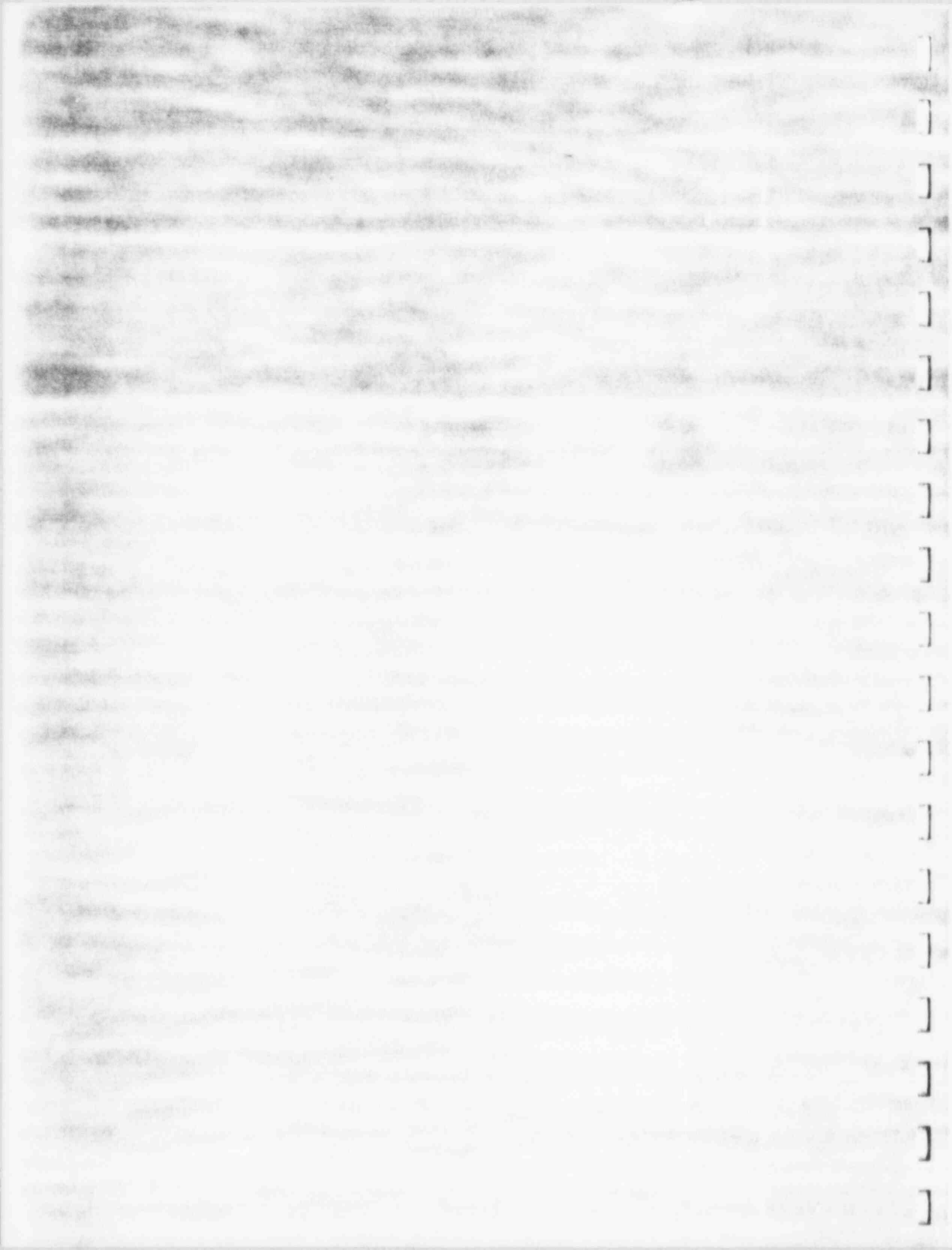
HISTORICAL ENVIRONMENTAL SAMPLE DATA

CONTROL

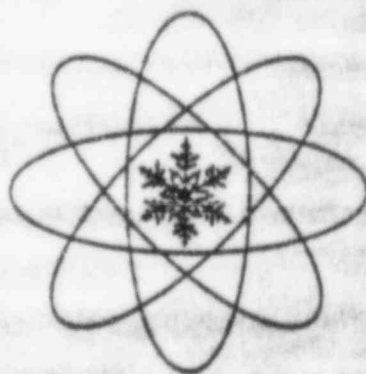
Soil Samples Cs-137 pCi/g (dry)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	NO	SAMPLES	REQUIRED	IN	1984
1983	0.67	0.49	1.46	0.20	1.26
1982	NO	SAMPLES	REQUIRED	IN	1982
1981	NO	SAMPLES	REQUIRED	IN	1981
1980	1.20	0.91	2.90	0.41	2.49
1979	NO	SAMPLES	REQUIRED	IN	1979
1978	NO	SAMPLES	REQUIRED	IN	1978
1977	1.17	0.48	2.00	0.70	1.30
1976	NO DATA	---	---	---	---
1975	1.07	0.21	1.30	0.90	0.40
1974	NO DATA	---	---	---	---
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---

INDICATOR

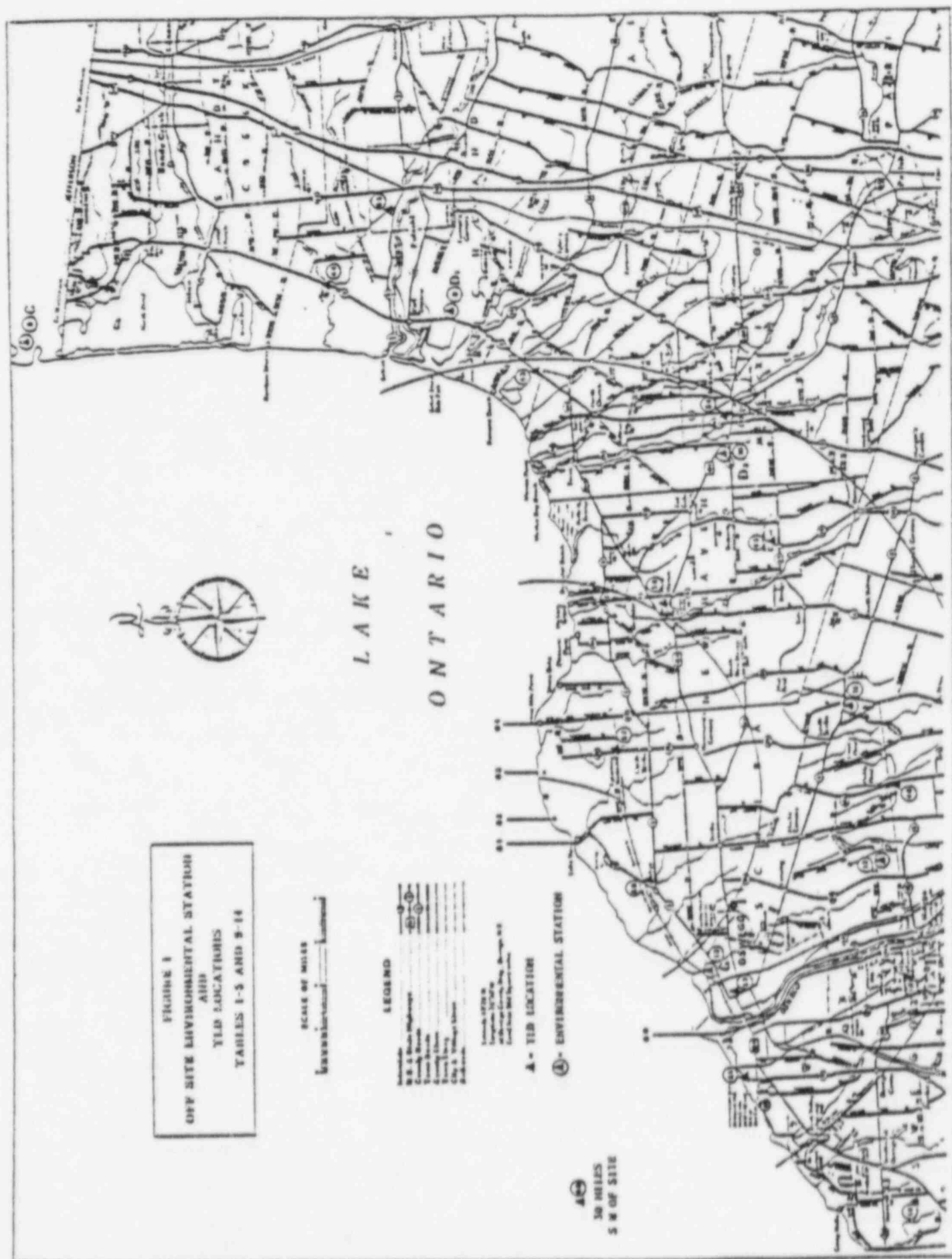
Soil Samples Cs-137 pCi/g (dry)	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	RANGE
1984	NO	SAMPLES	REQUIRED	IN	1984
1983	0.42	0.41	1.19	0.07	1.12
1982	NO	SAMPLES	REQUIRED	IN	1982
1981	NO	SAMPLES	REQUIRED	IN	1981
1980	1.26	0.61	2.1	0.29	1.81
1979	NO	SAMPLES	REQUIRED	IN	1979
1978	NO	SAMPLES	REQUIRED	IN	1978
1977	1.03	0.62	2.00	0.30	1.70
1976	NO DATA	---	---	---	---
1975	NO DATA	---	---	---	---
1974	1.03	1.18	2.80	0.40	2.40
1969 (PRE-OPERATIONAL)	NO DATA	---	---	---	---



VII



FIGURES AND MAPS



VII FIGURES AND MAPS

1. DATA GRAPHS

This section includes graphic representation of selected sample results.

For graphic representation, results less than the MDL or LLD were considered to be at the MDL or LLD level of activity. MDL and LLD values were indicated where possible.

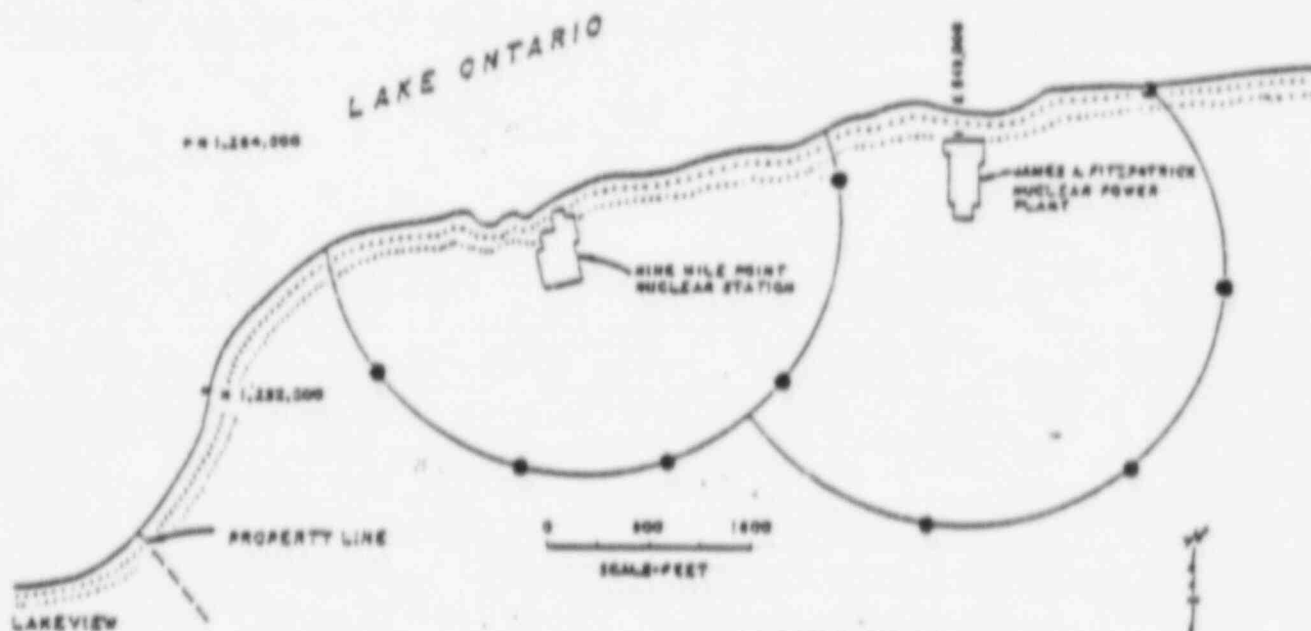
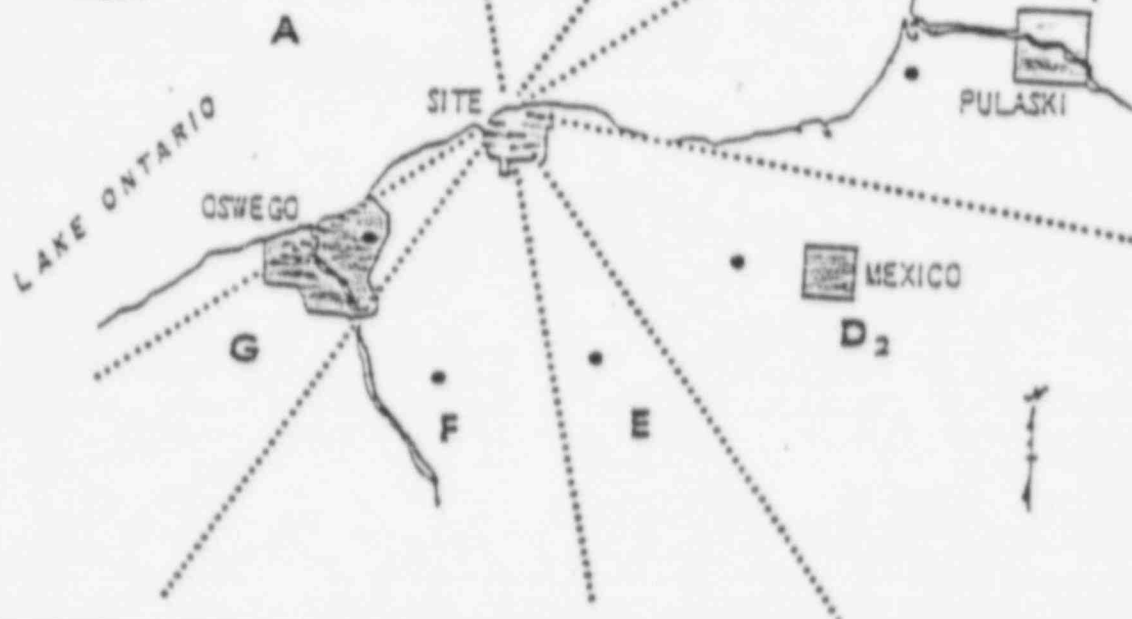
2. SAMPLE LOCATIONS

Sample locations referenced as letters and numbers on analysis results tables are plotted on maps.

FIGURE 2
OFFSITE MONITORING
STATION LOCATIONS

● MONITOR STATION

1 0 5
MILES

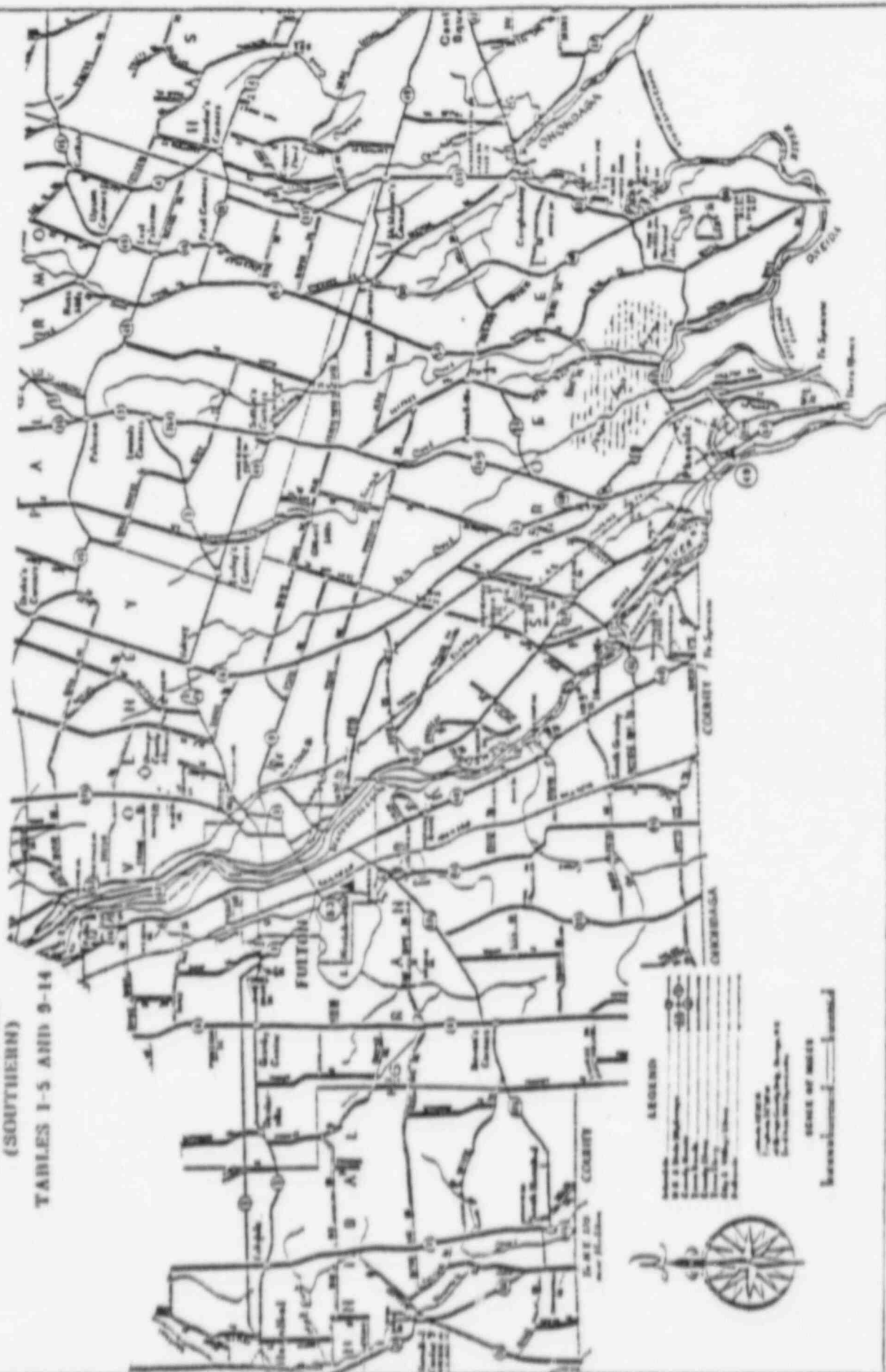


● EXISTING MONITORING STATIONS

ON-SITE RADIOLOGICAL MONITORING
STATIONS

MONITORING STATIONS LOCATED AT
1000 FT. RADIUS FROM STACKS

FIGURE 1-A
OFF SITE ENVIRONMENTAL STATION
AND
TLD LOCATIONS
(SOUTHERN)
TABLES 1-5 AND 9-14



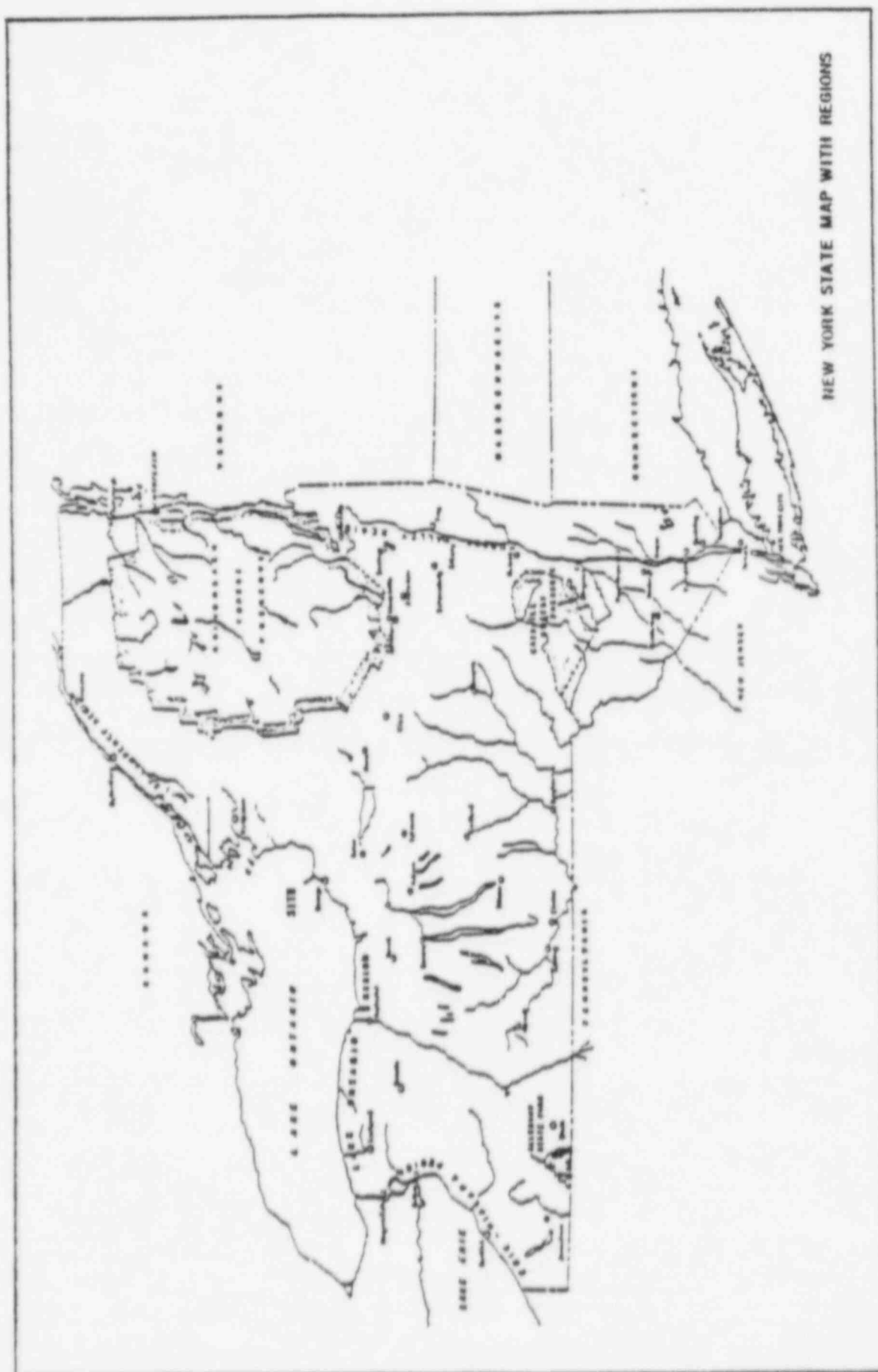
Site Map

LAKE ONTARIO

FIGURE 3
ON SITE ENVIRONMENTAL STATION
AND
TLD LOCATIONS
TABLES 1-8 AND 9-16



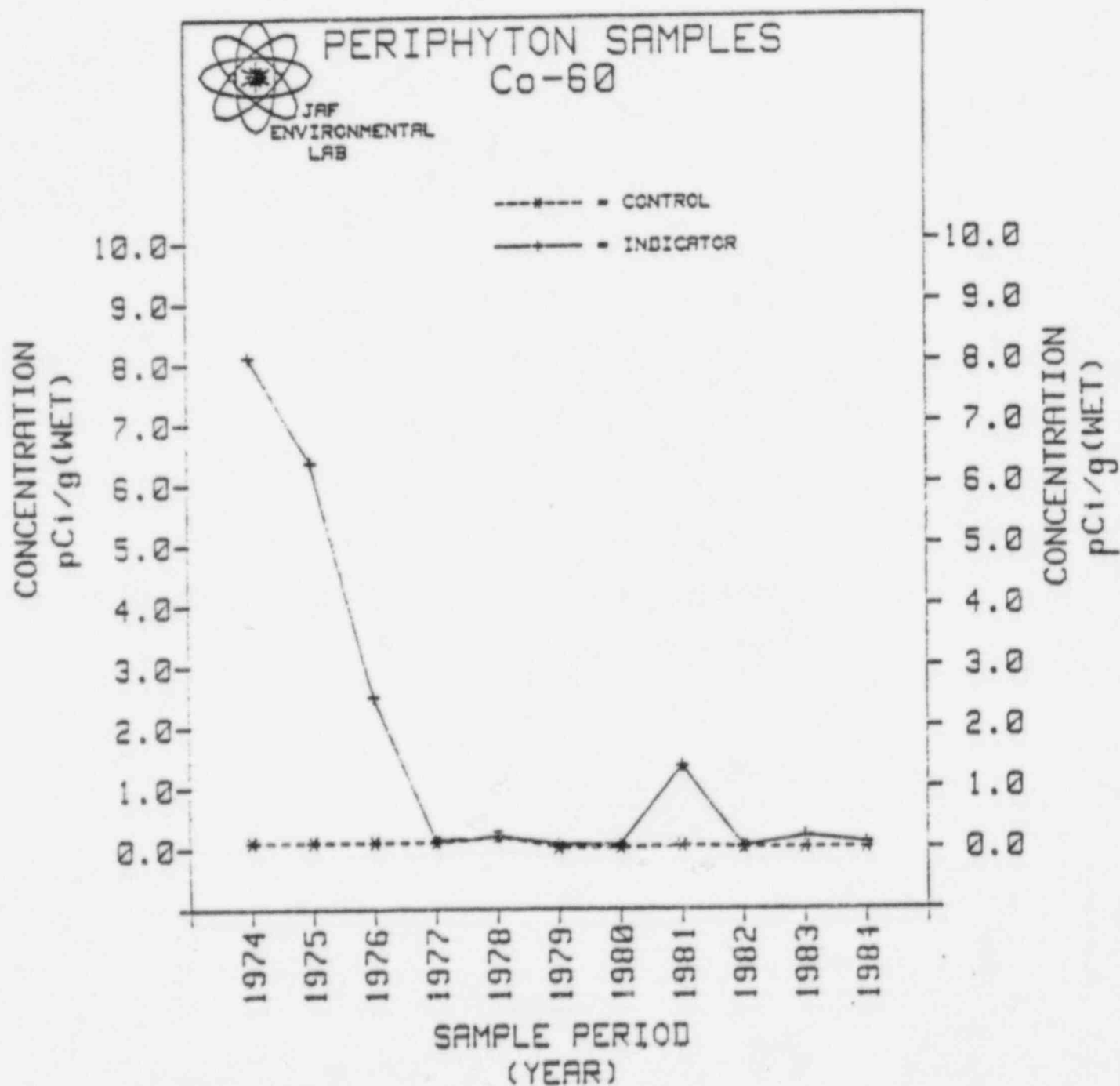
FIGURE 6



NEW YORK STATE MAP WITH REGIONS



FIGURE 8



CONTROL VALUES 1974 TO 1979 ARE MDL's; 1980 TO 1984 ARE LLD's

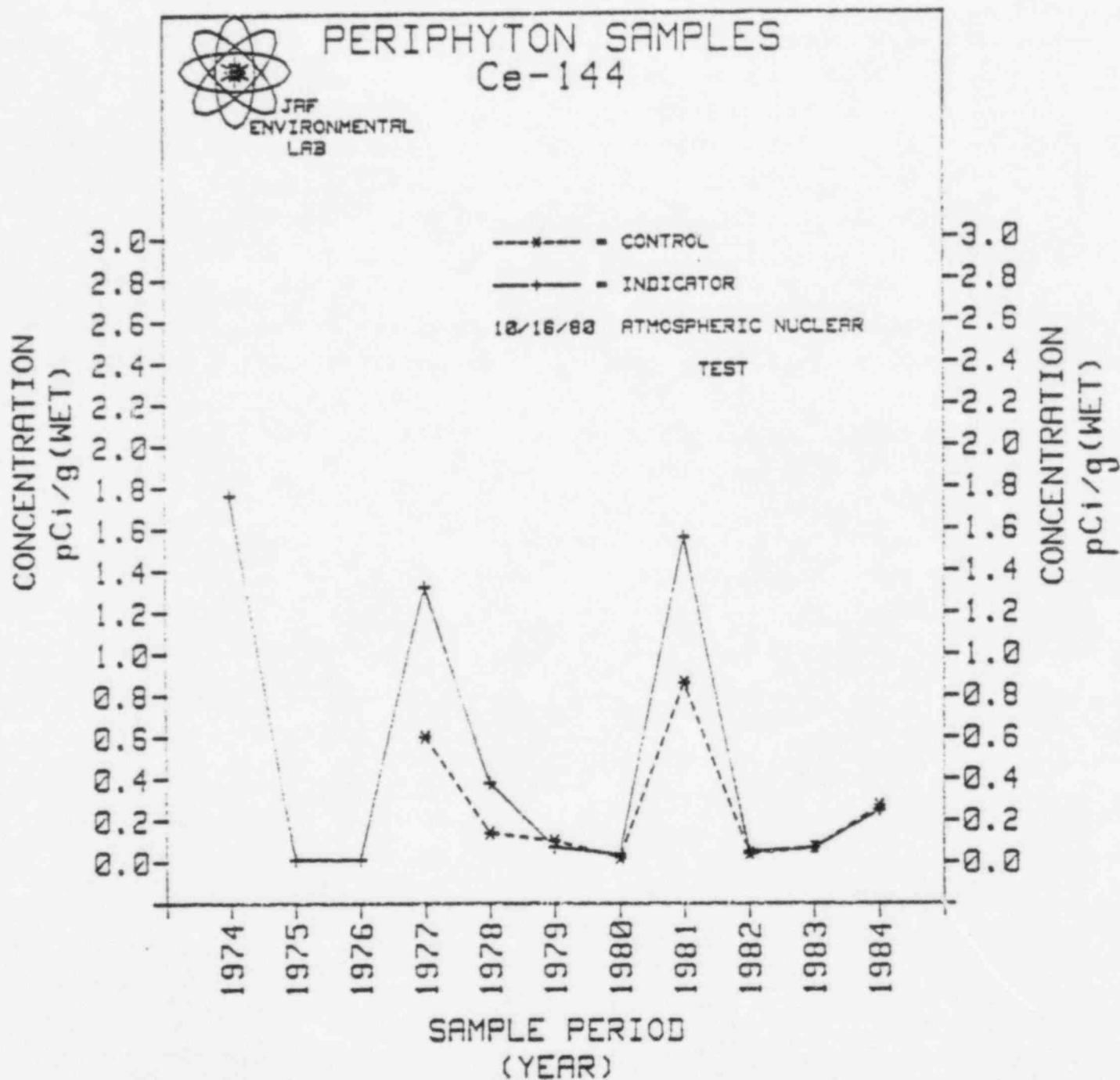
FIGURE 7

Composition of Bottom Sediment Determined by Visual Examination
at Benthic Sampling Stations in the Vicinity of Nine Mile Point, 1978

Depth Contour (ft)	Transect	Description*	Comments
10	NMPW	100% bedrock	
	NMPP	70% boulders, 20% rubble, 10% gravel	Some algae on rocks
	FITZ	80% boulders, 10% gravel, 10% sand	Some algae
	NMPE	70% boulders, 20% gravel, 10% sand	Some algae
20	NMPW	50% bedrock, 50% rubble	
	NMPP	50% boulders, 30% rubble, 20% gravel	All lying on bedrock
	FITZ	50% boulders, 20% rubble, 20% gravel, 10% sand	
	NMPE	40% bedrock, 30% boulders, 25% gravel, 5% sand	
30	NMPW	100% bedrock	Some rubble
	NMPP	100% bedrock	Some boulders
	FITZ	80% bedrock	Some sand
	NMPE	100% bedrock	Some rubble and sand
40	NMPW	50% bedrock, 30% sand, 20% rubble	
	NMPP	80% boulders, 20% bedrock	
	FITZ	50% bedrock, 30% rubble, 20% boulders,	
	NMPE	100% bedrock	Some scattered sand
60	NMPW	100% bedrock	
	NMPP	80% boulders, 10% rubble, 10% gravel	
	FITZ	80% bedrock, 20% boulders	Some rubble
	NMPE	80% bedrock, 20% rubble	Some sand

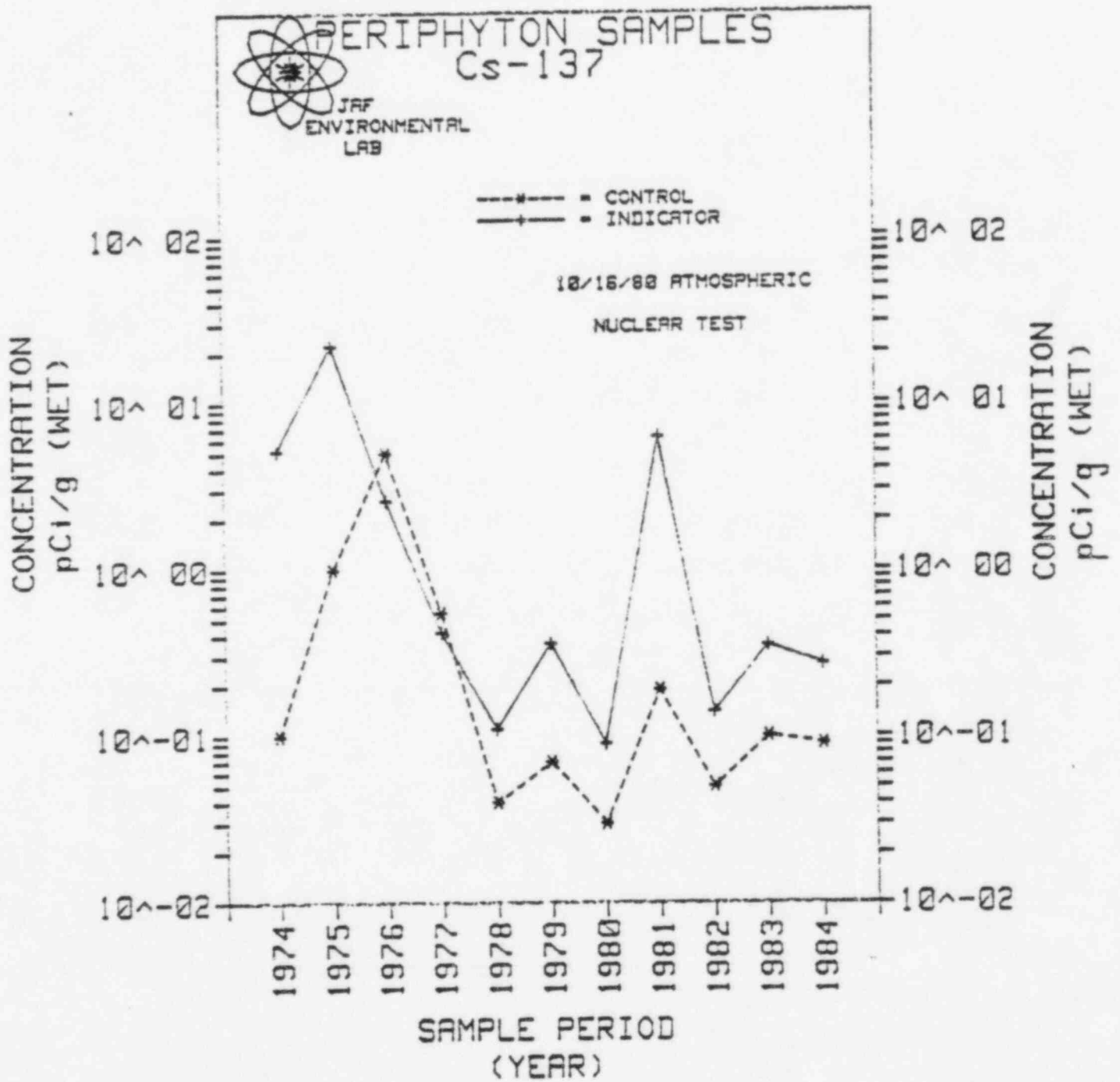
* Description based on USEPA (1973) field evaluation method for categorizing soils.

FIGURE 10



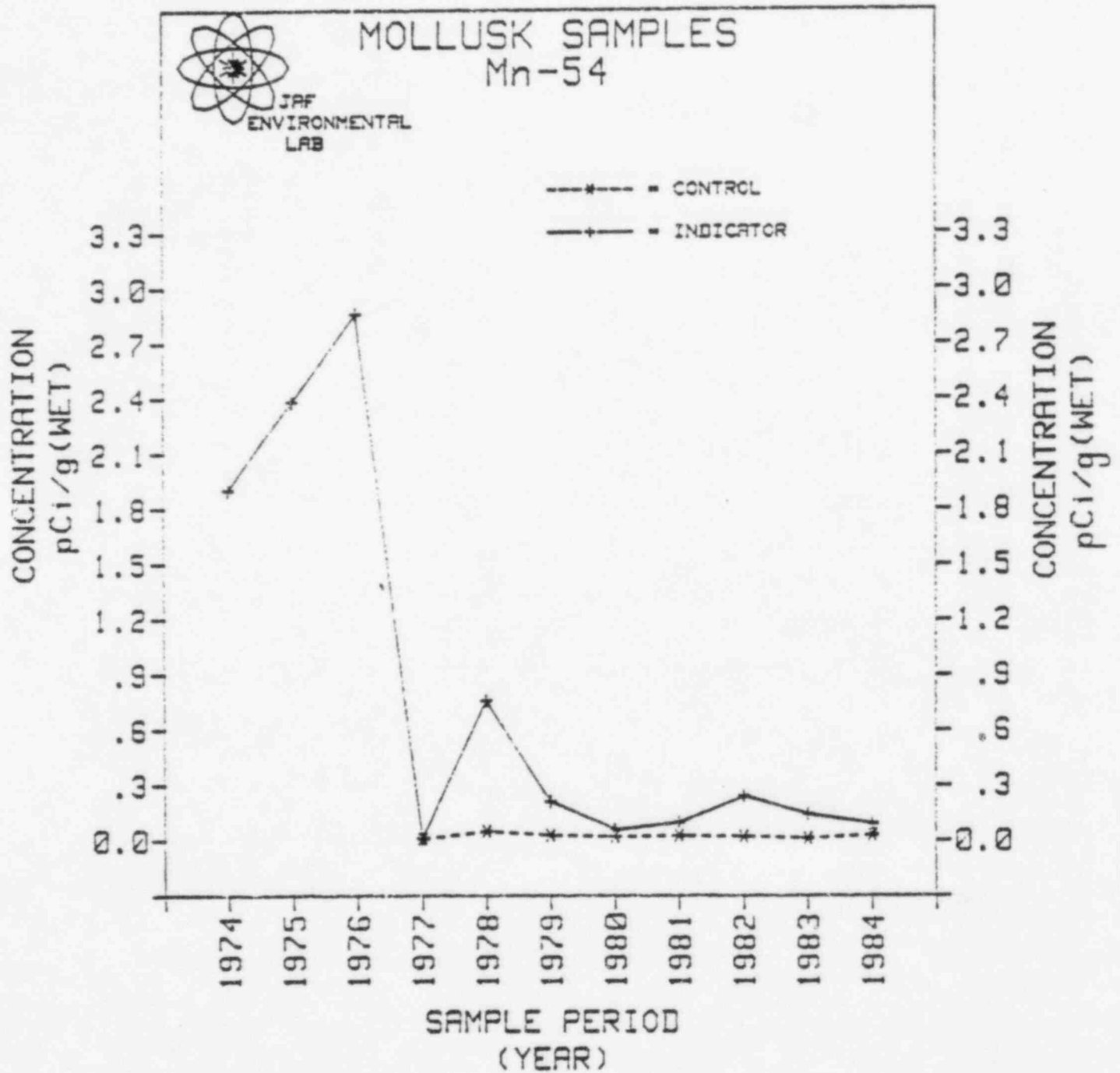
NO CONTROL DATA FOR 1974-1976
 CONTROL YEARS 1977-1979 ARE MDL's; 1980-1984 ARE LLD's
 INDICATOR YEARS 1974-1979 ARE MDL's; 1980-1984 ARE LLD's

FIGURE 9



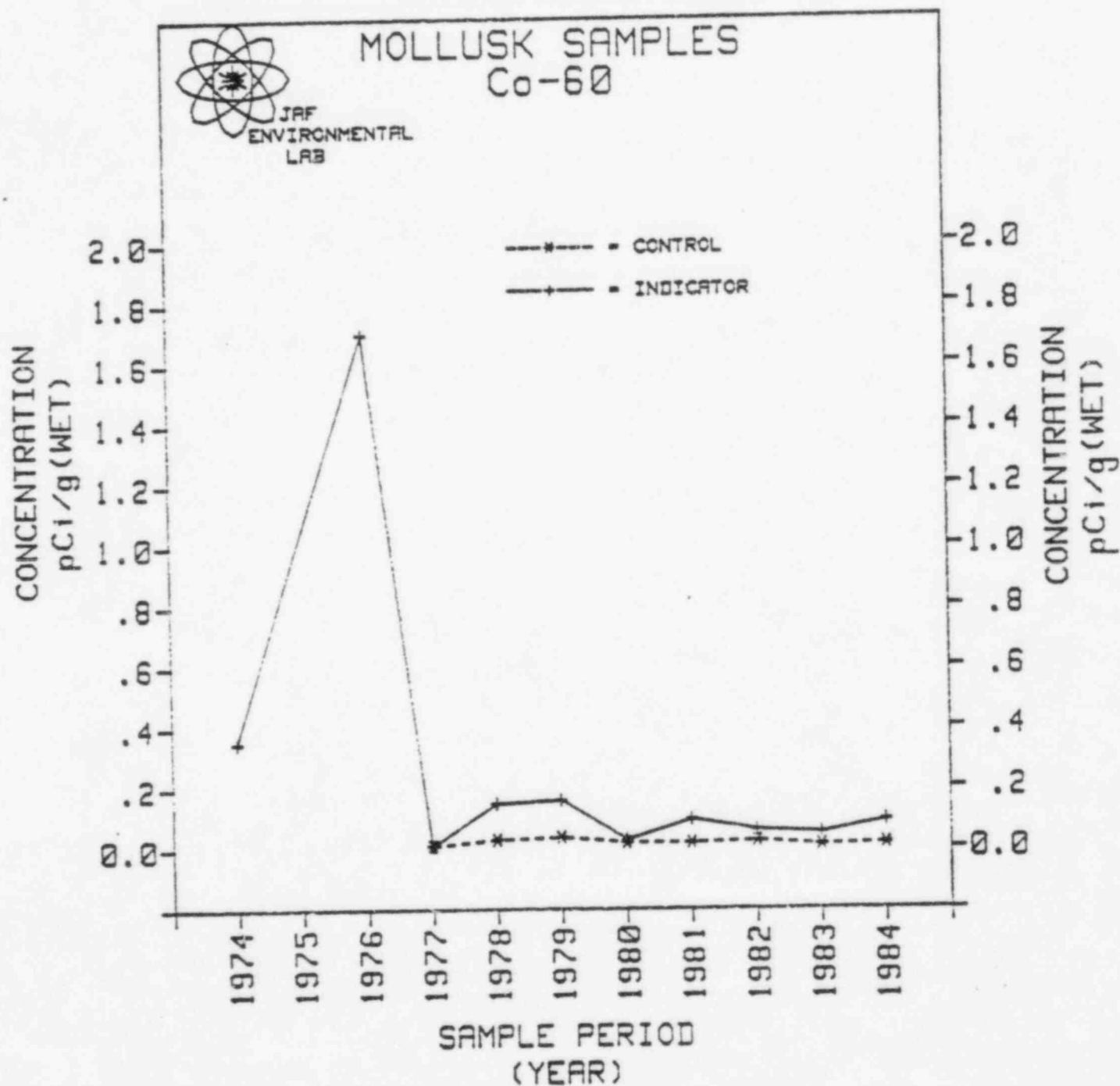
CONTROL VALUES 1975 & 1977 ARE MDL's

FIGURE 12



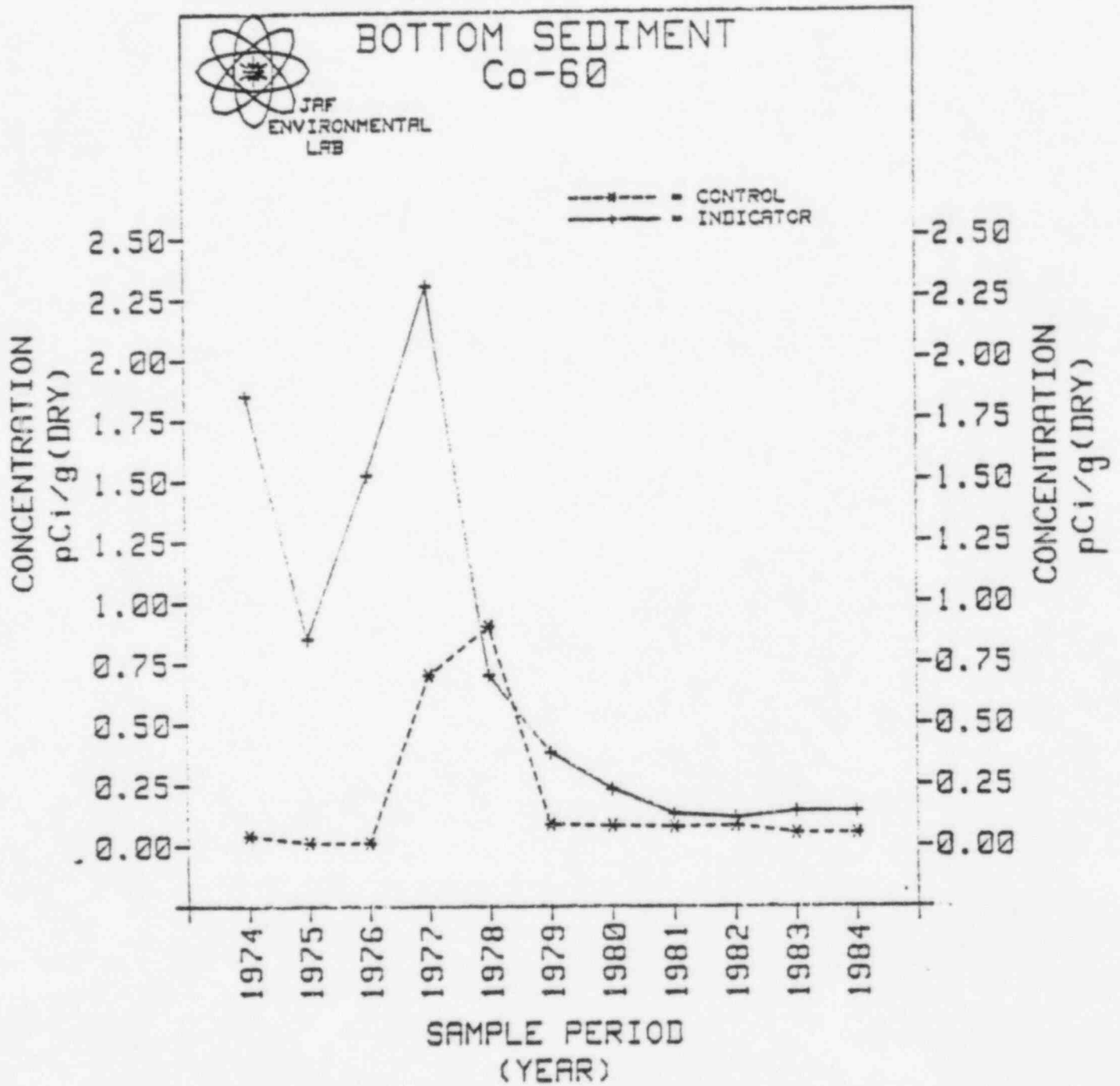
NO CONTROL DATA FOR 1974, 1975, 1976
 CONTROL YEARS 1977-1979 ARE MDL's; 1980-1984 ARE LLD's
 INDICATOR YEARS 1977-1979 ARE MDL's

FIGURE 11



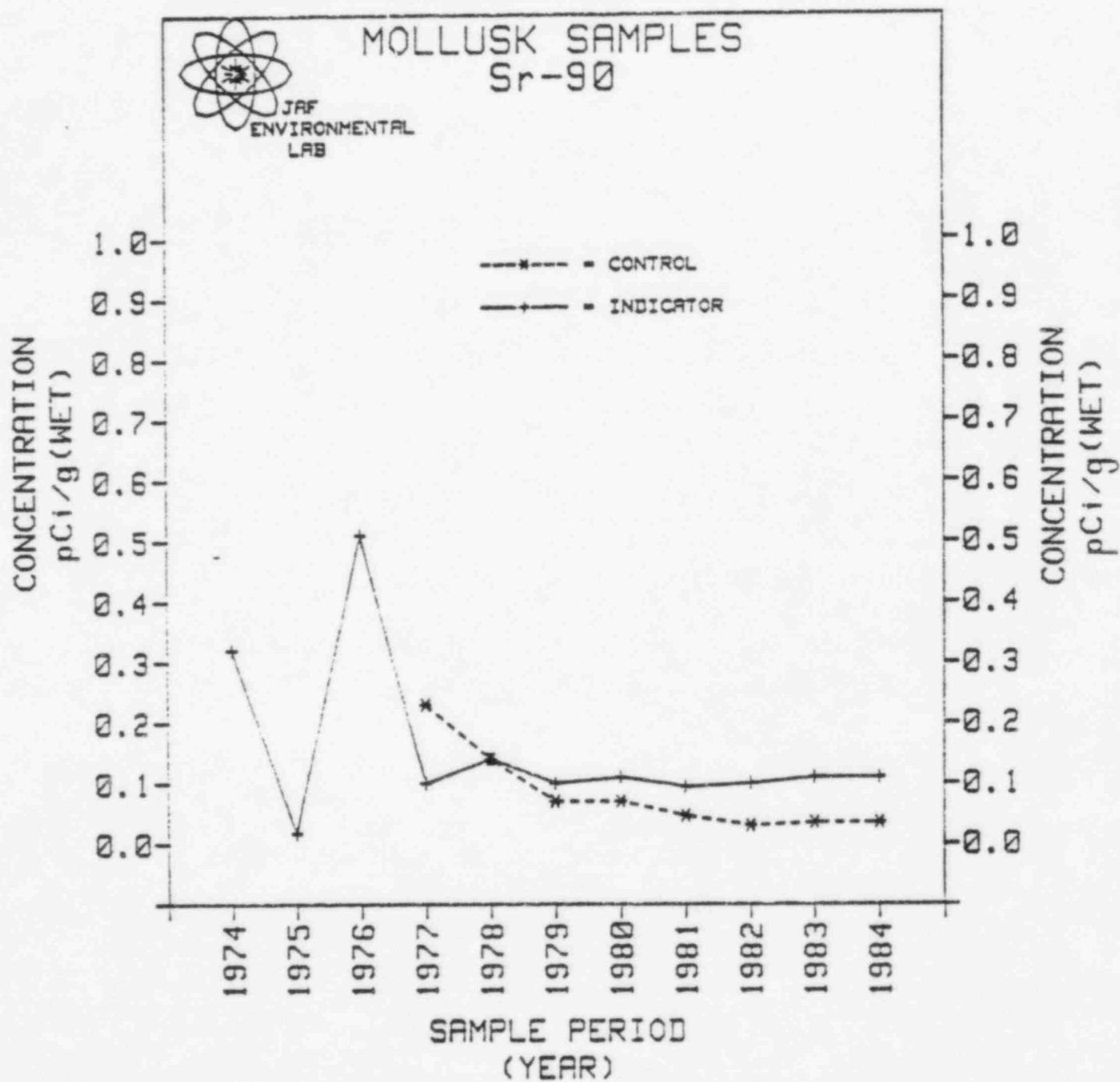
NO CONTROL DATA FOR 1974-1976
 NO INDICATOR DATA FOR 1975
 CONTROL YEARS 1977-1979 ARE MDL's; 1980-1984 ARE LLD's
 INDICATOR YEAR 1977 IS MDL

FIGURE 14



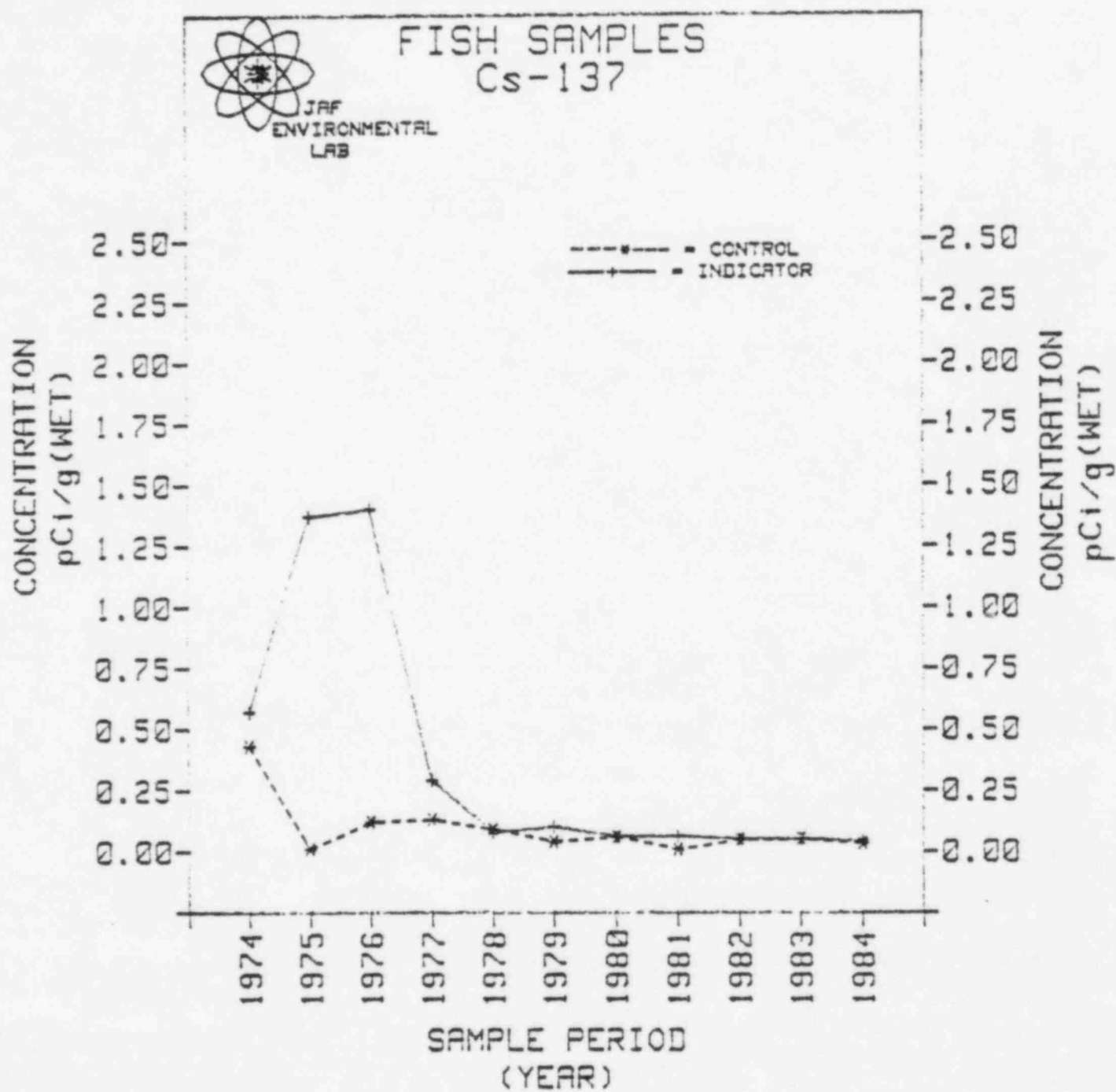
CONTROL DATA FOR YEARS 1975-1976, 1978-1979 ARE MDL's; 1980-84 ARE LLD's

FIGURE 13



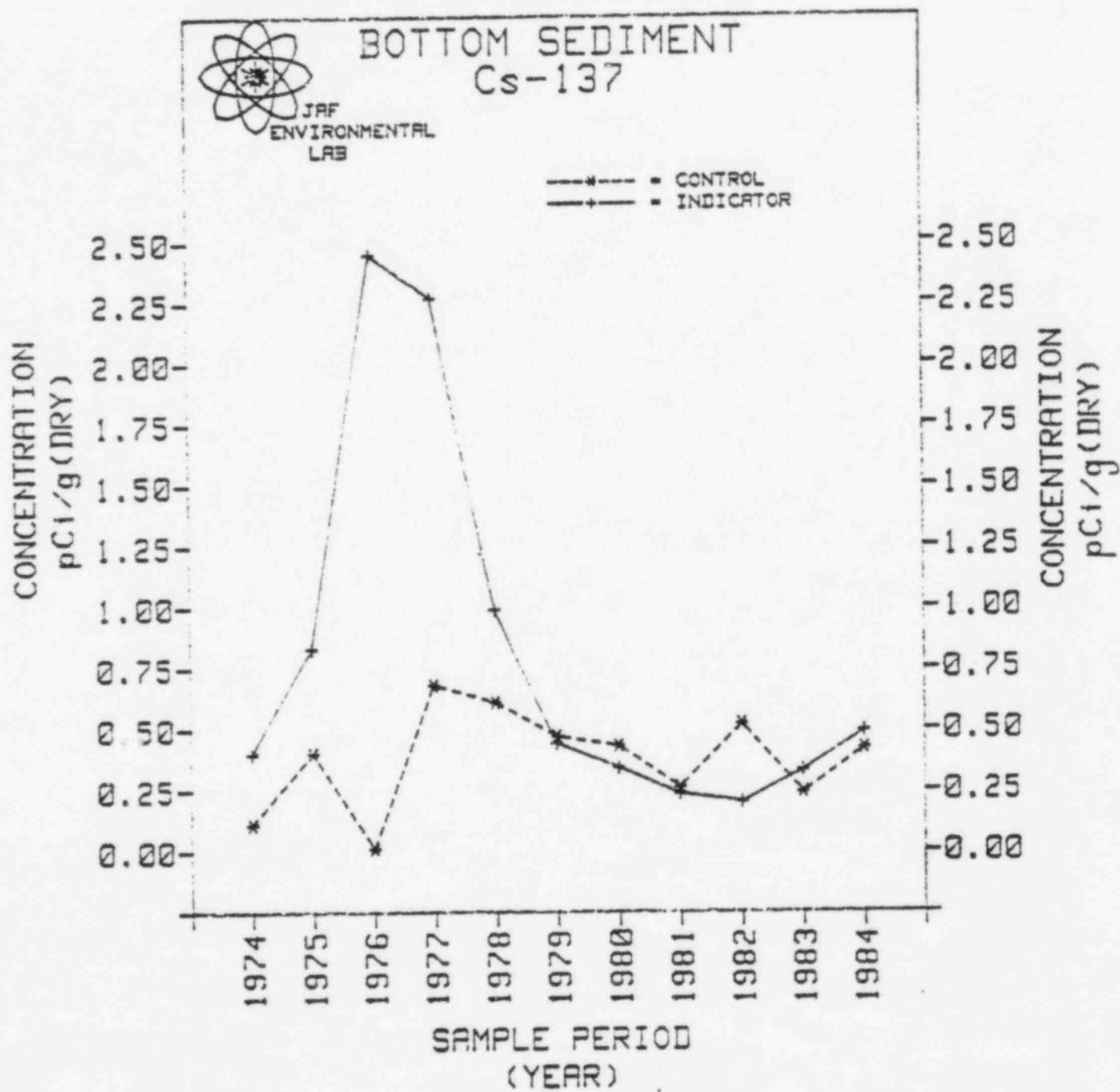
NO CONTROL DATA FOR YEARS 1974-1976

FIGURE 16



CONTROL DATA FOR 1975 IS MDL; 1981 IS LLD

FIGURE 15



CONTROL DATA FOR 1976 IS MEL

FIGURE 18

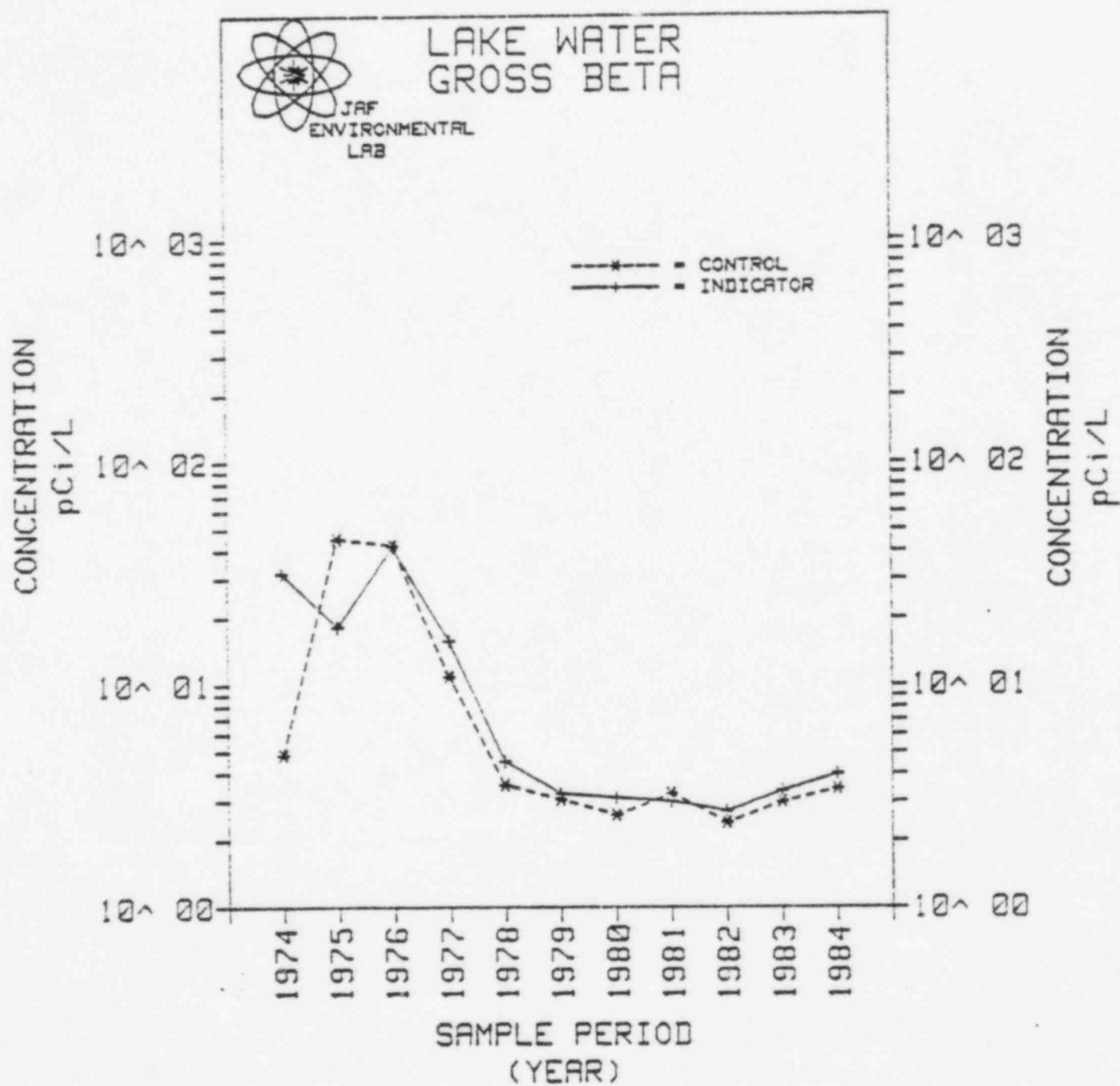
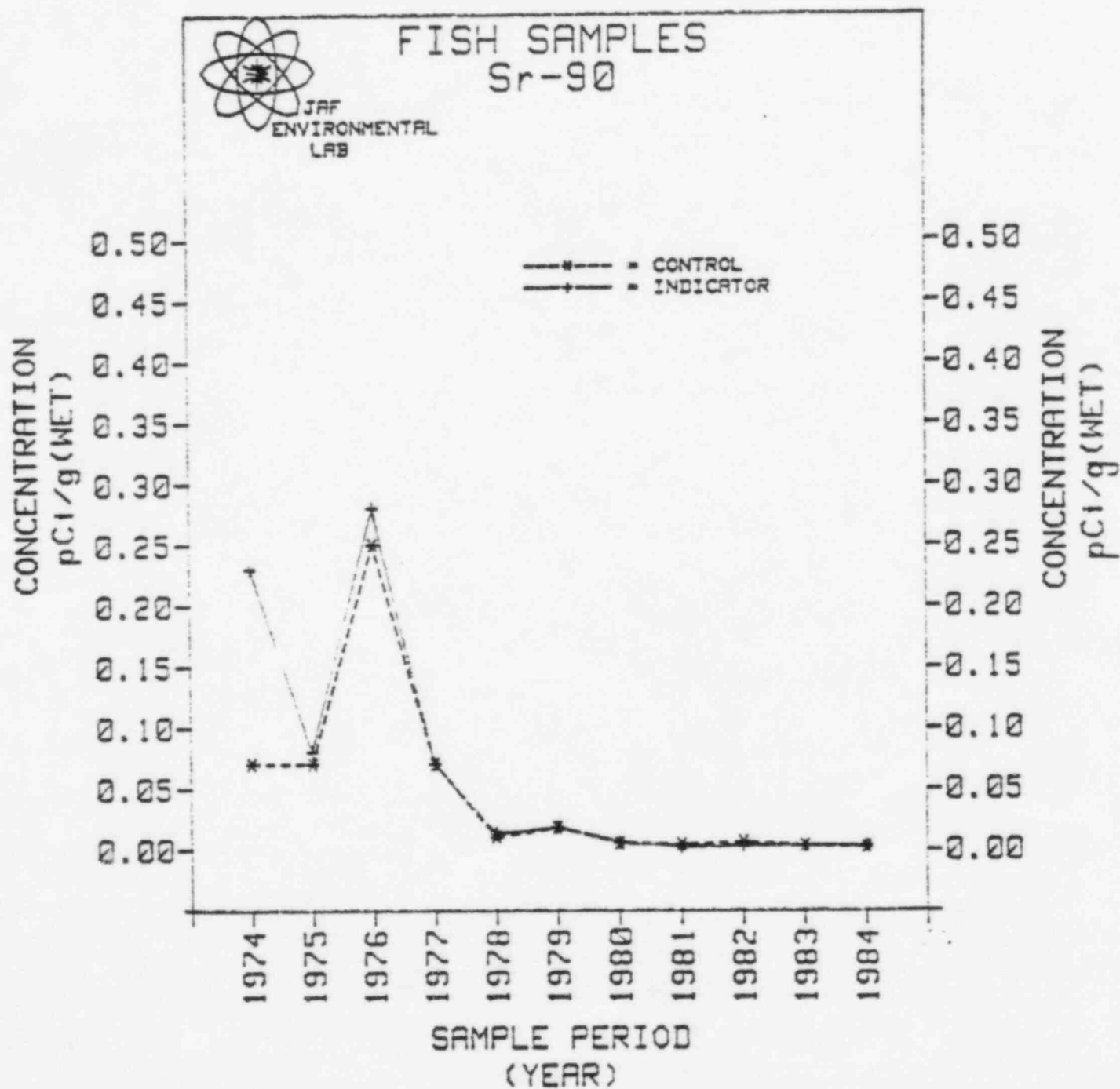


FIGURE 17



CONTROL DATA FOR 1981, 1983, 1984 ARE LLD
INDICATOR DATA FOR 1983-84 ARE LLD

FIGURE 20

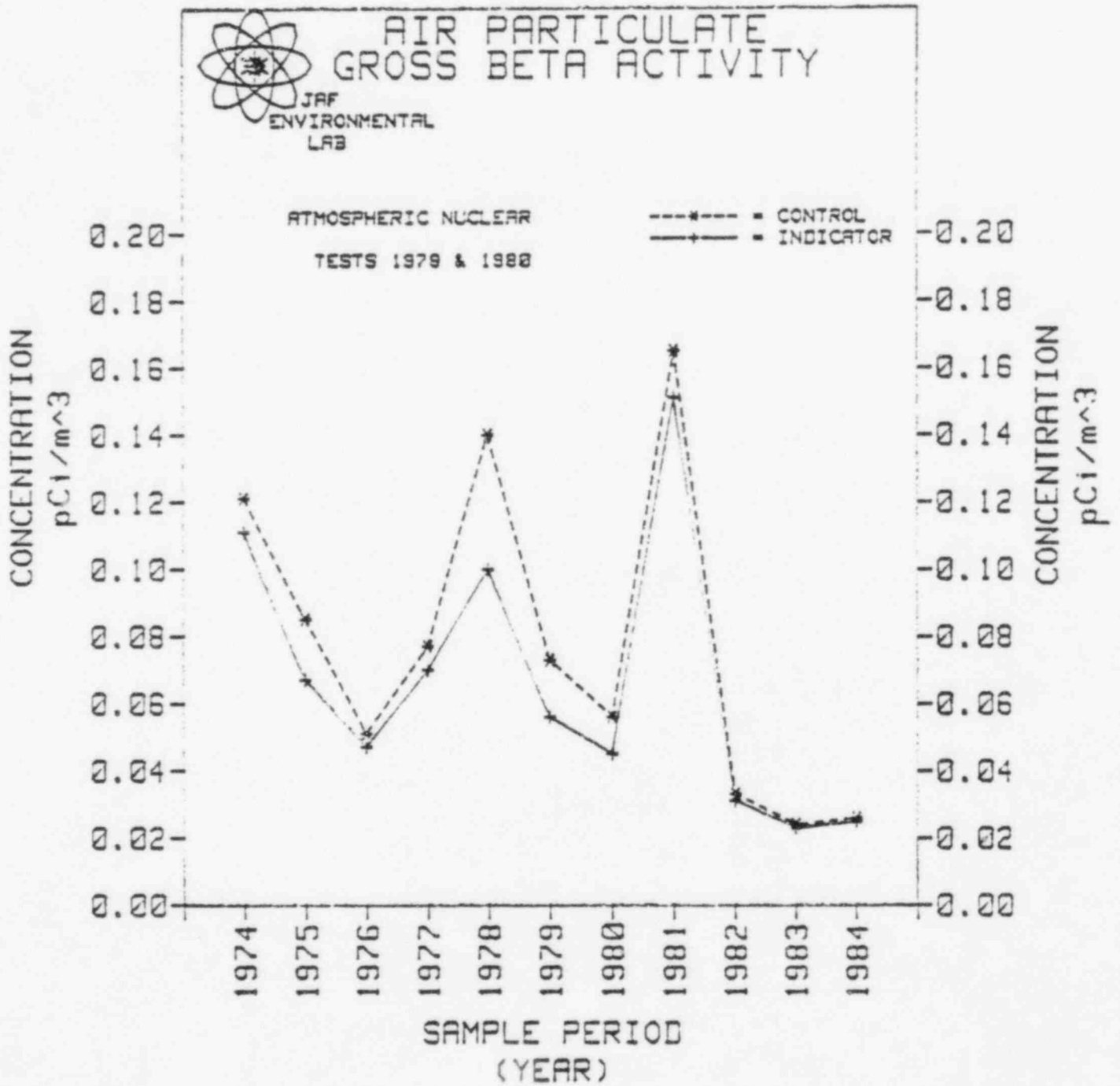
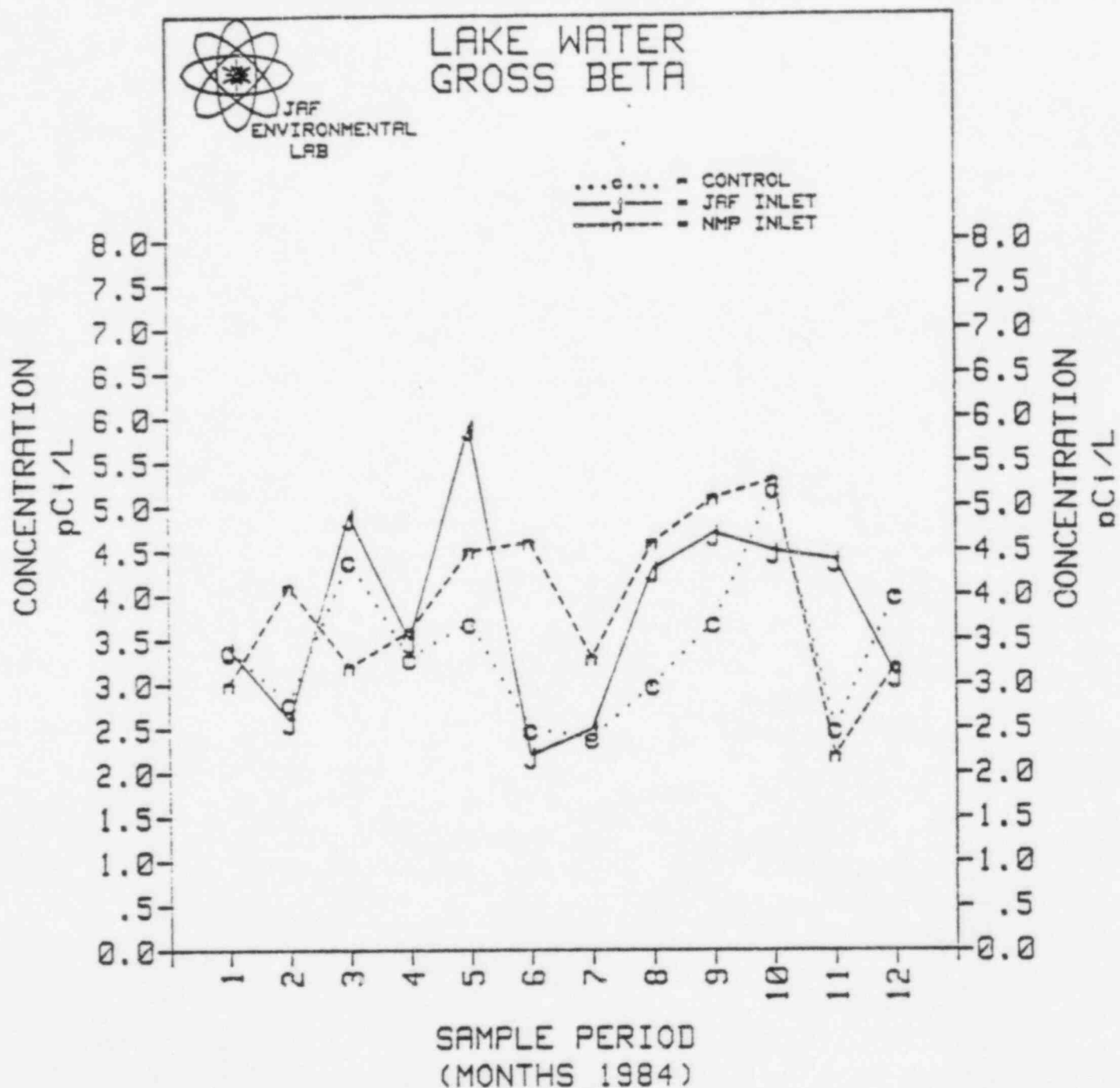


FIGURE 19



INDICATOR VALUE N FOR MONTH 1 IS LLD
 INDICATOR VALUE J FOR MONTH 6 IS LLD

FIGURE 22

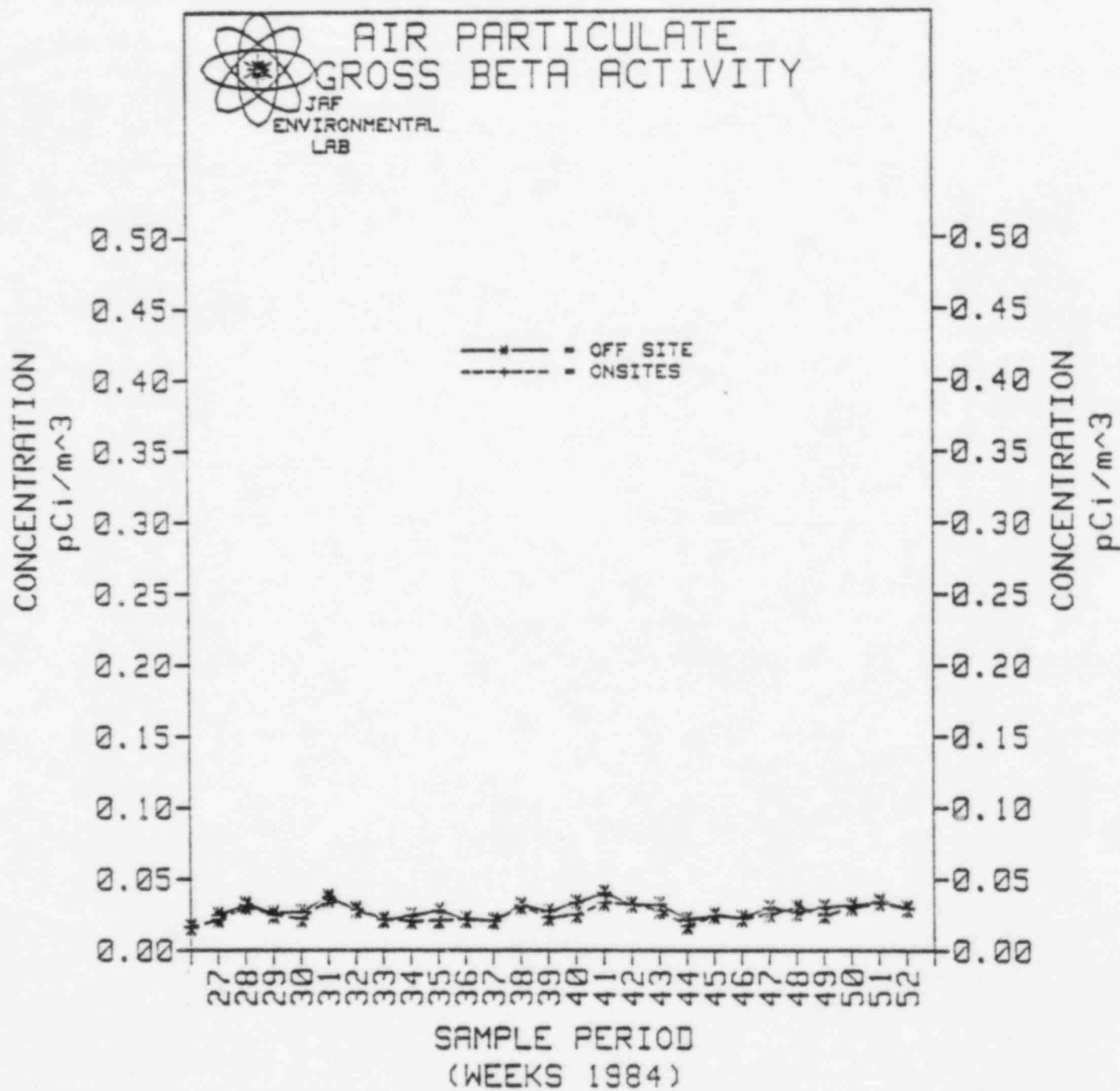


FIGURE 21

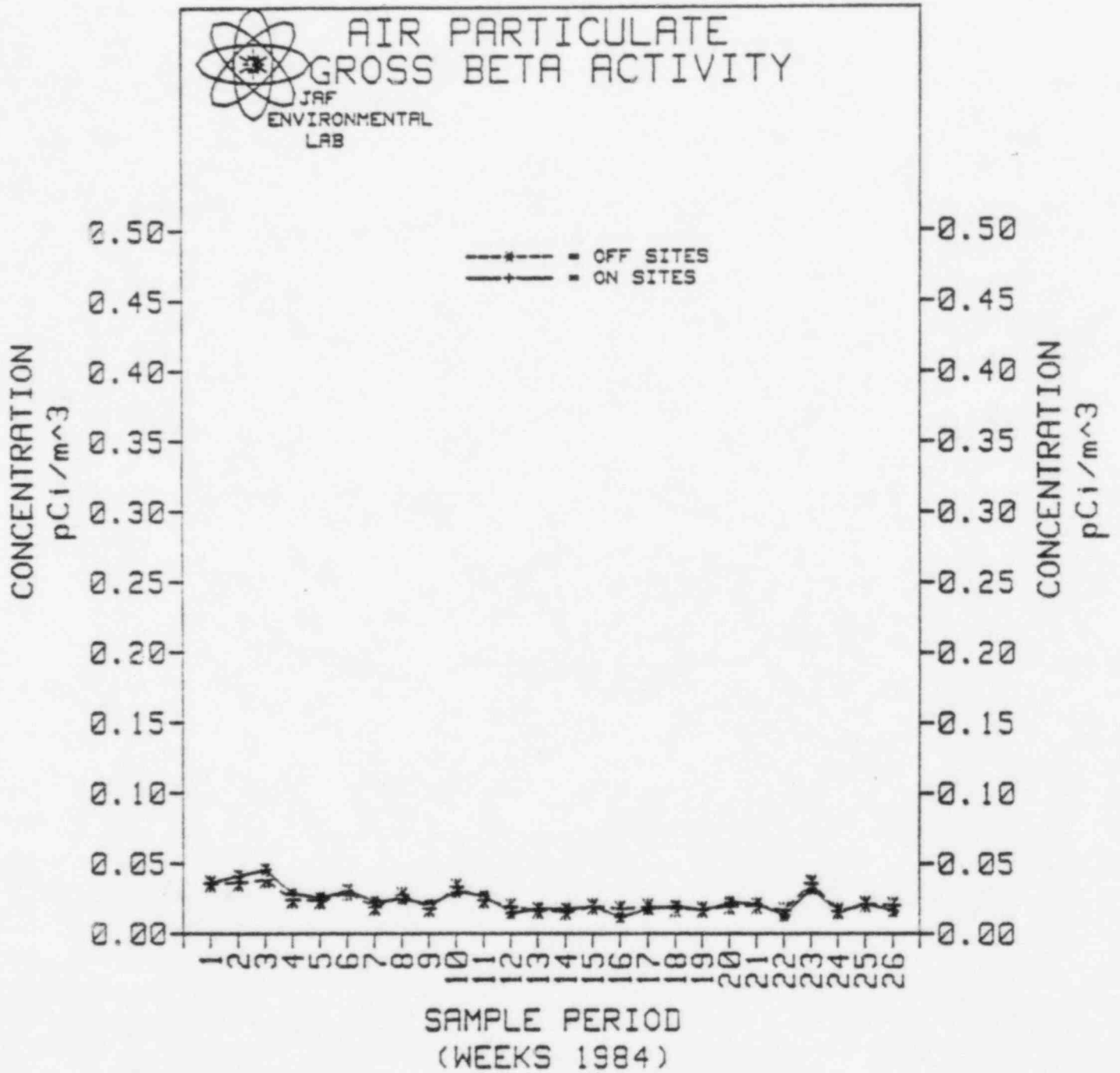
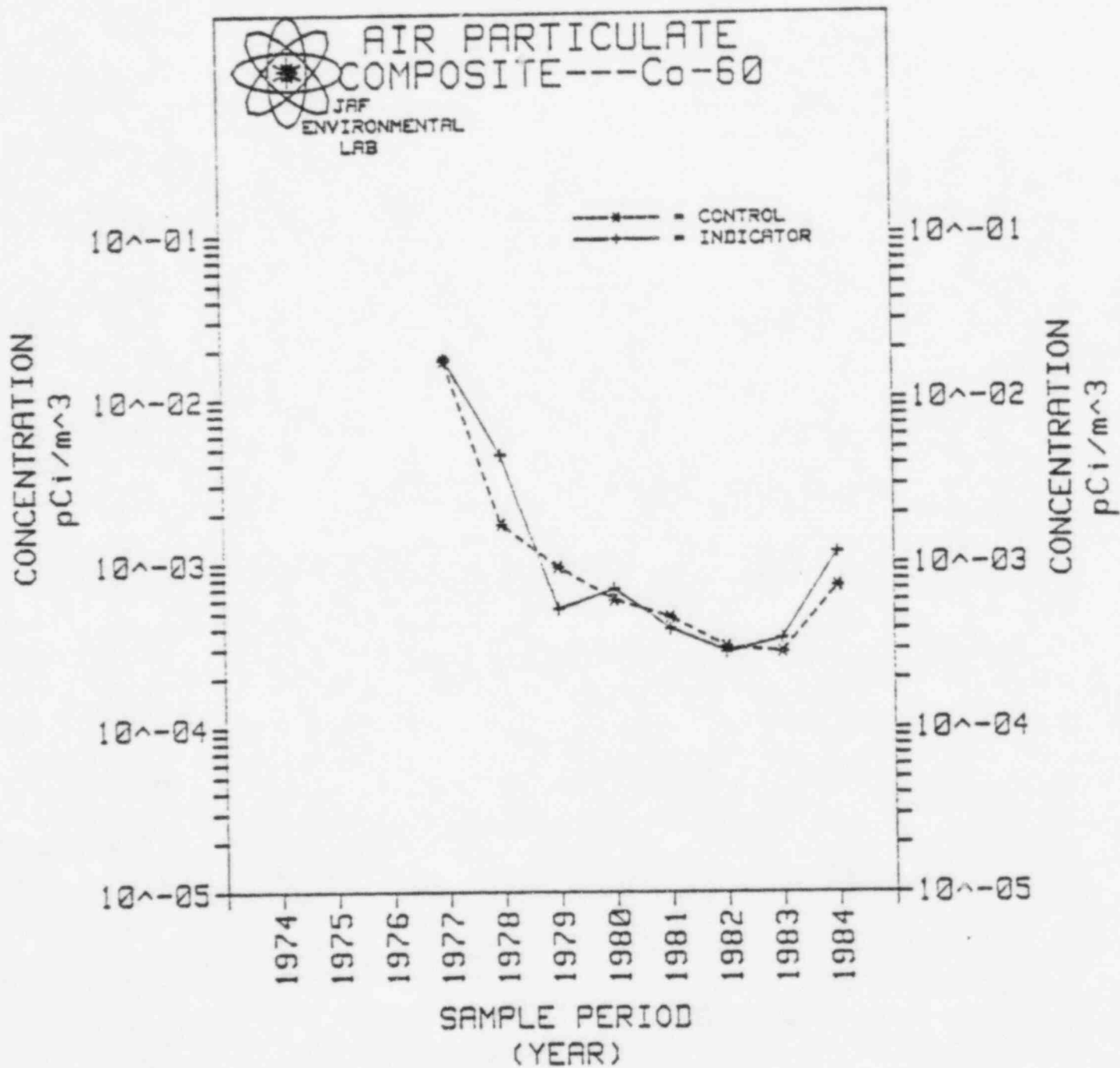


FIGURE 24



NO DATA FOR YEARS PRIOR TO 1977

FIGURE 23

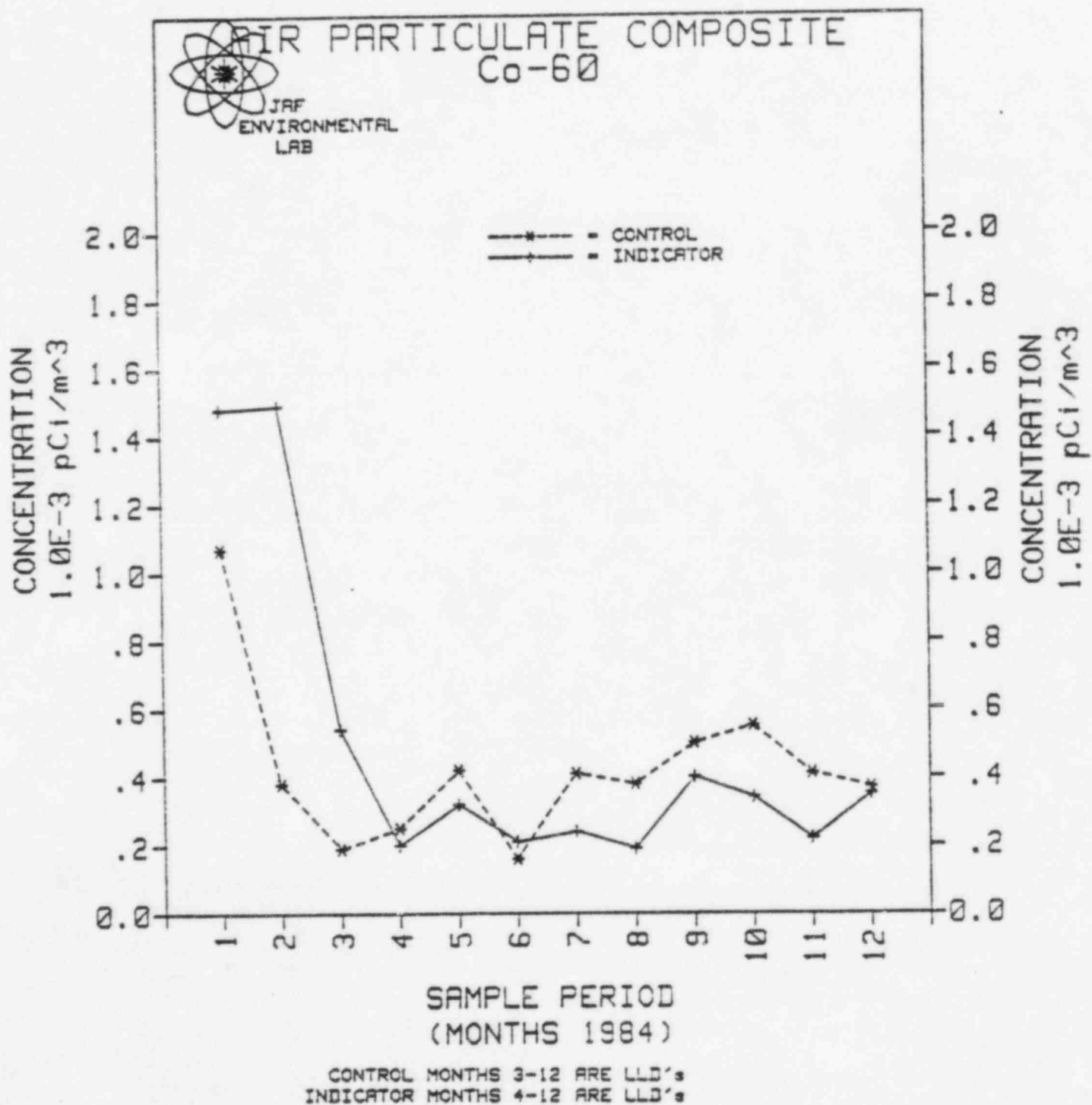
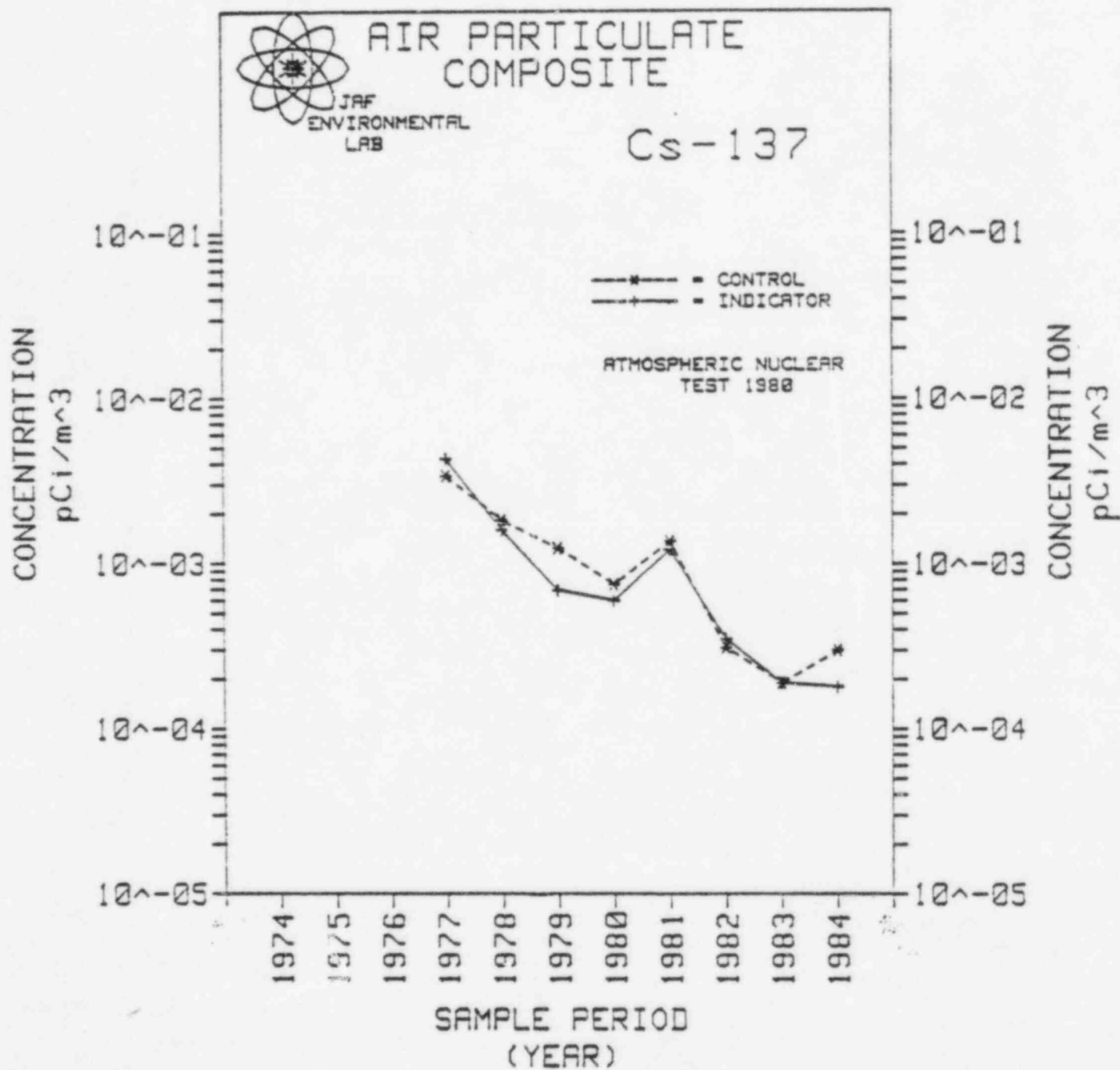


FIGURE 26



NO DATA FOR YEARS PRIOR TO 1977
 CONTROL YEAR 1984 IS LLD

FIGURE 25

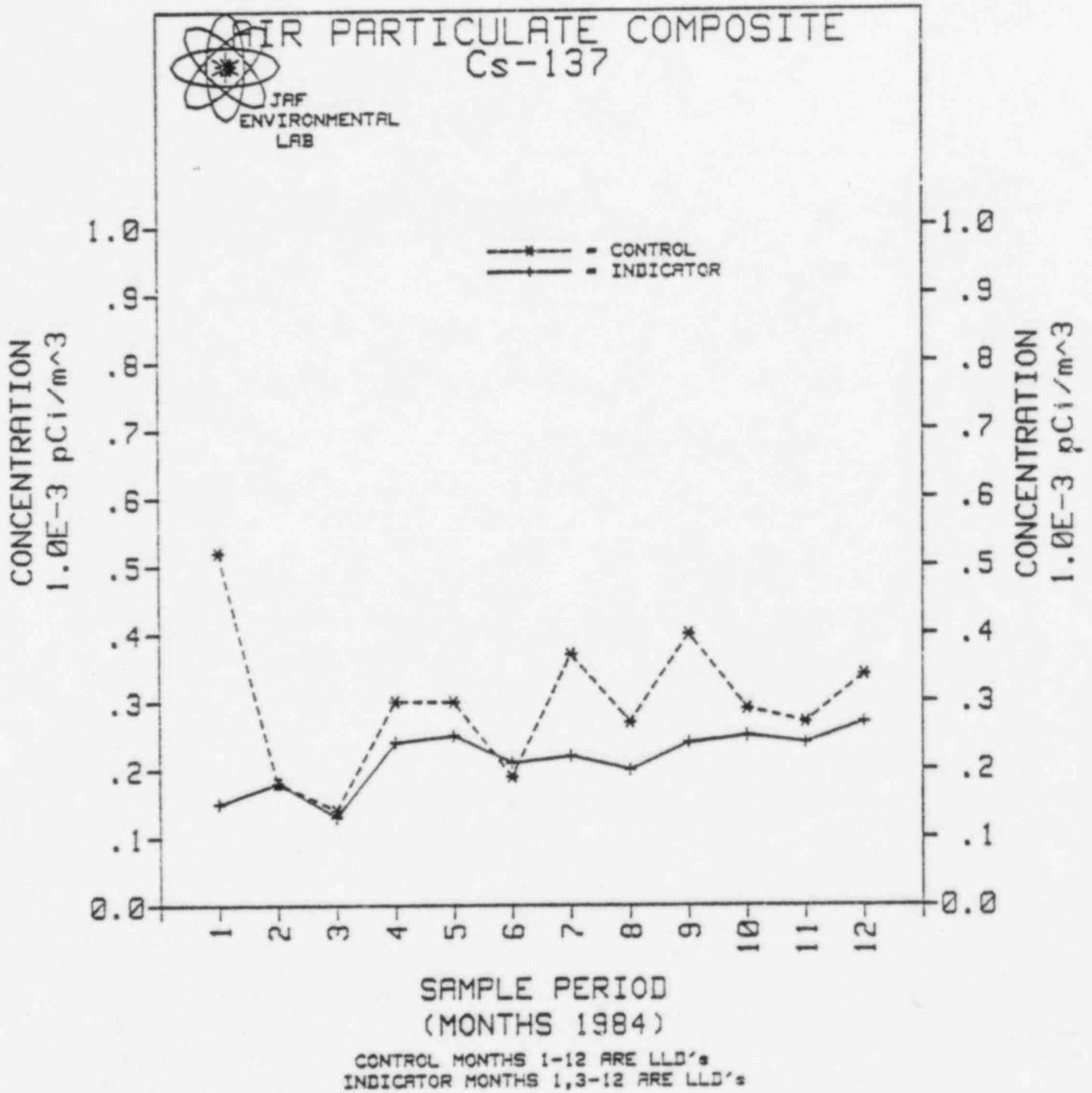
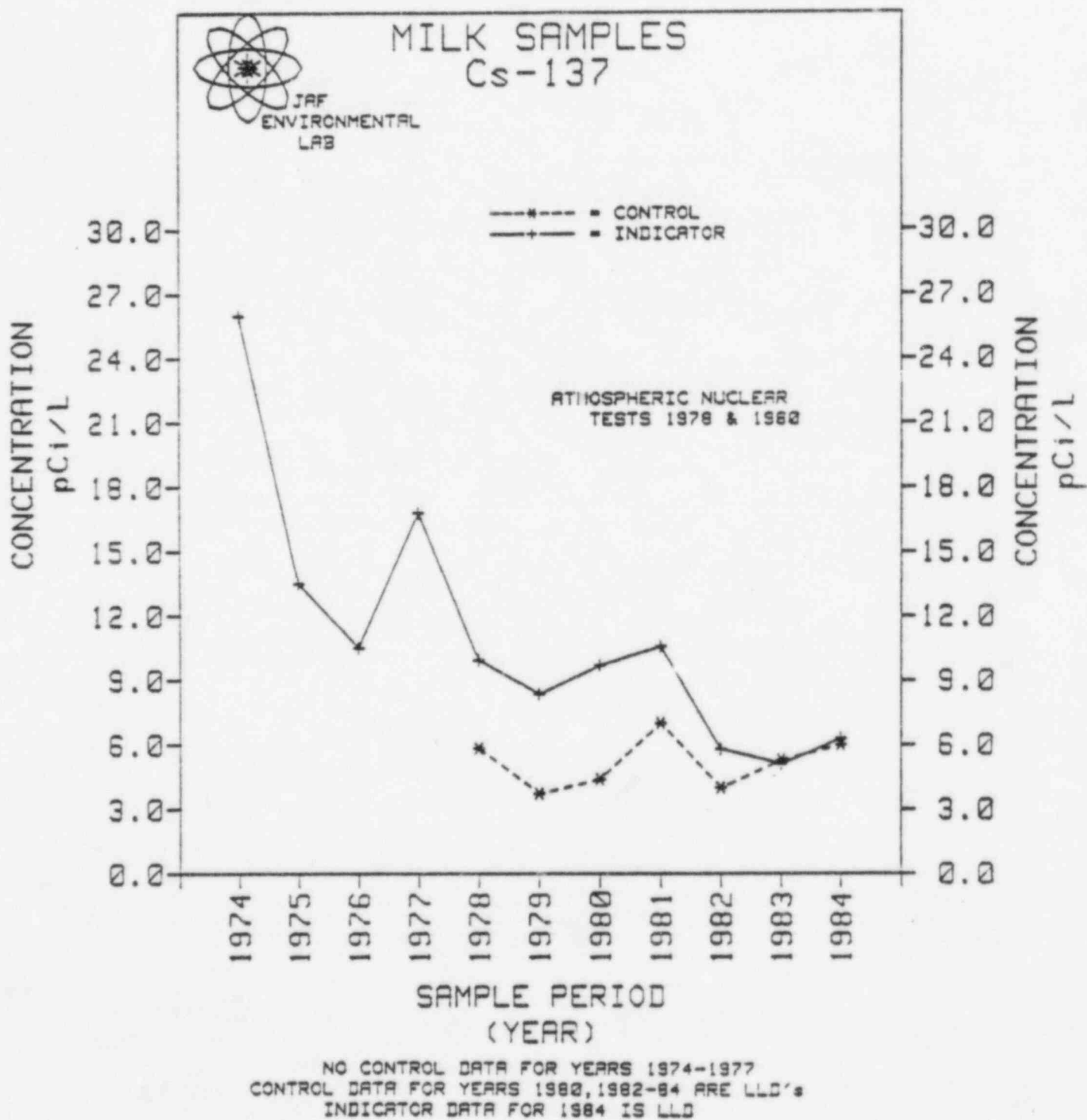


FIGURE 27



1

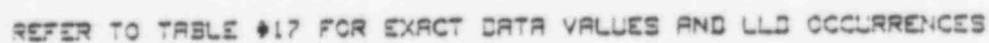
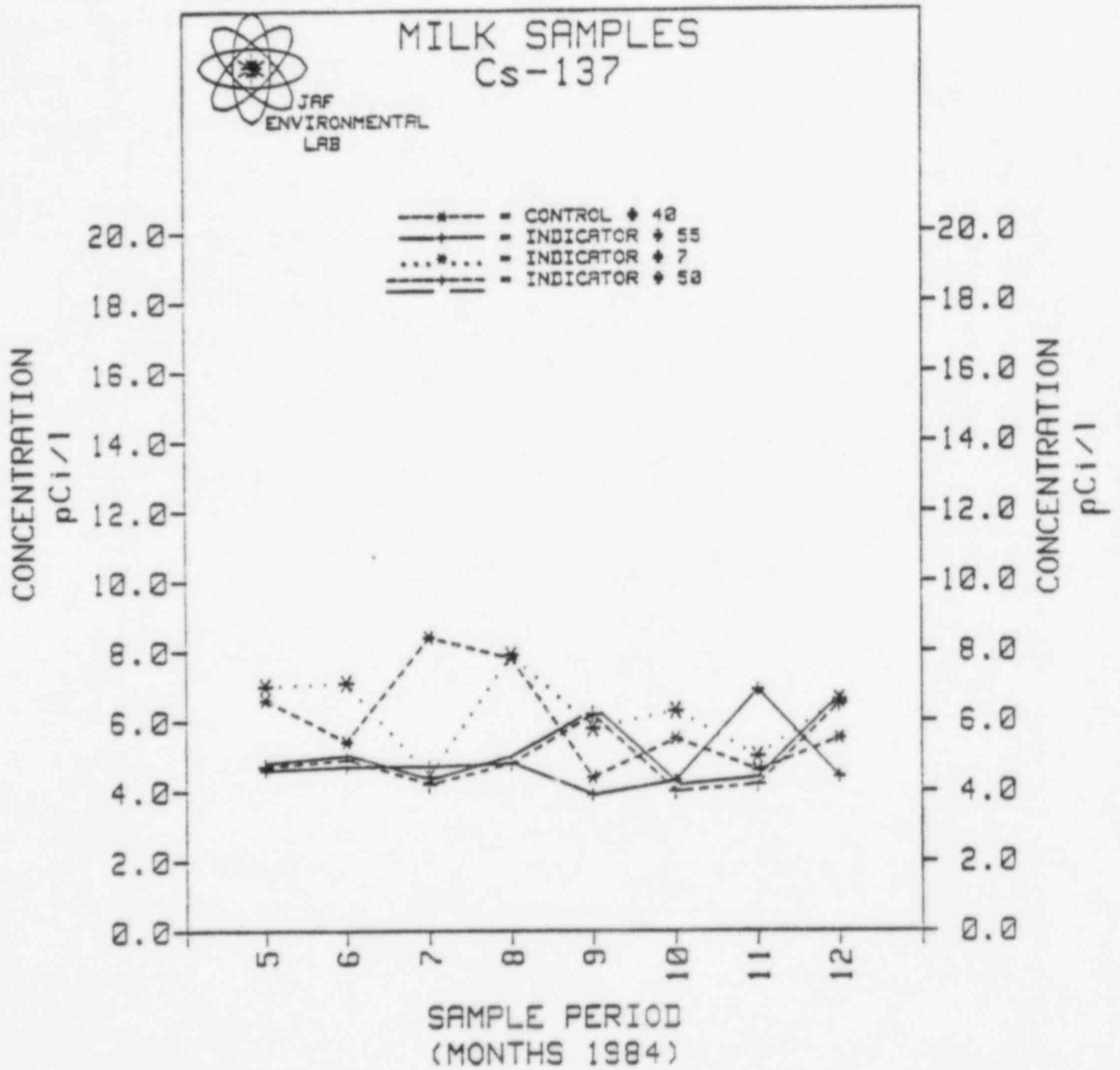
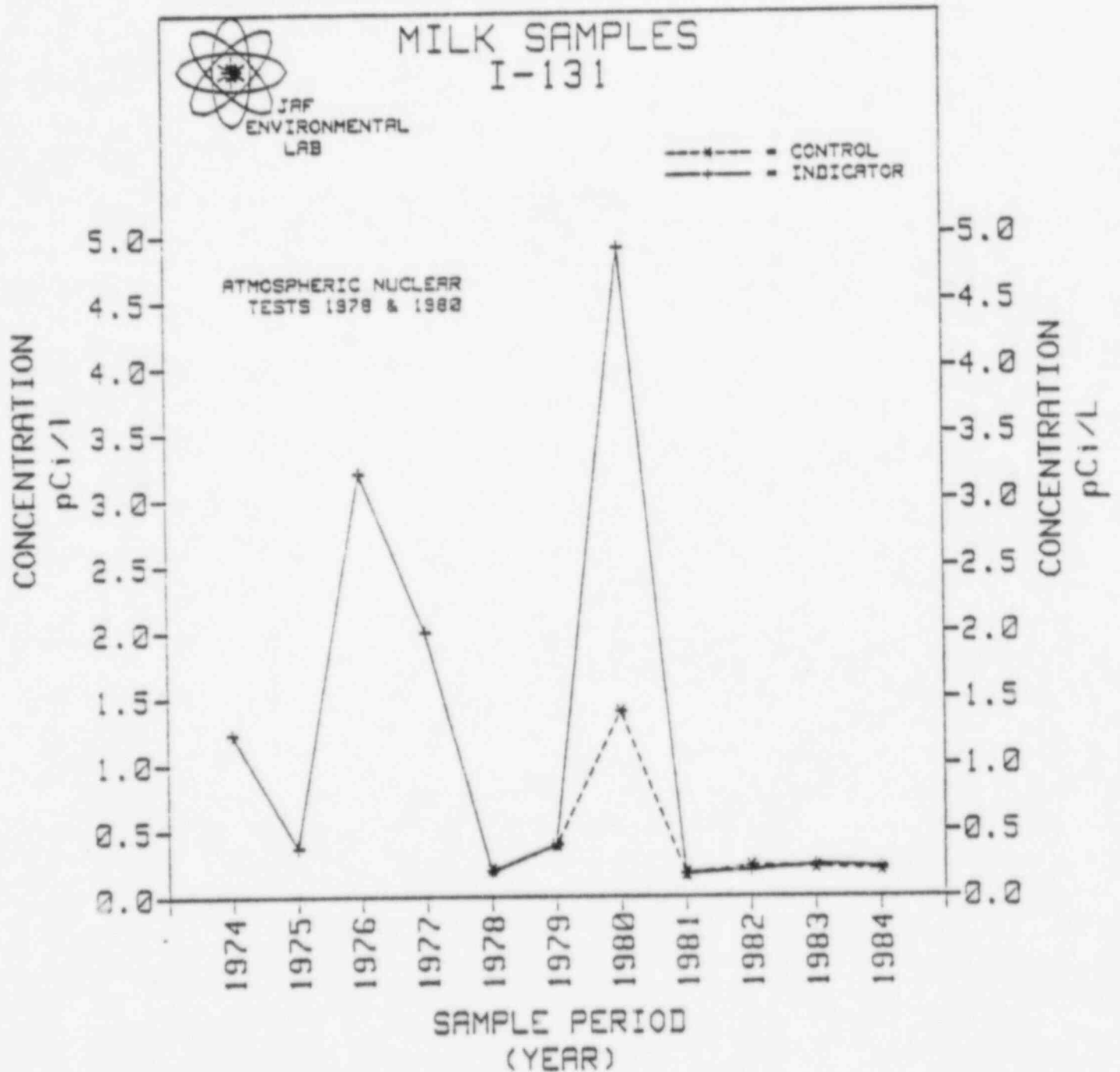


FIGURE 29



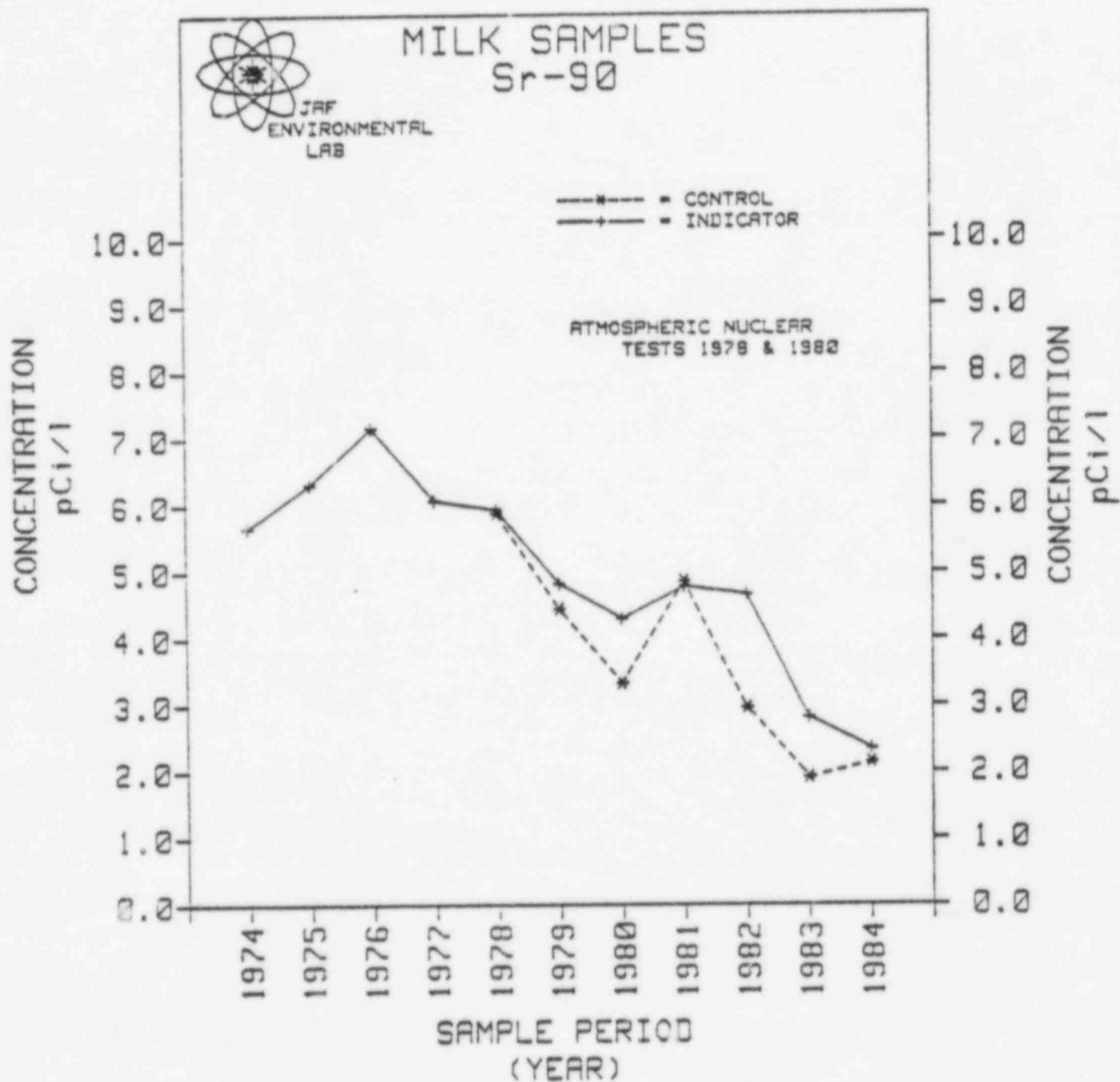
REFER TO TABLE #17 FOR EXACT DATA VALUES AND LLD OCCURRENCES

FIGURE 30



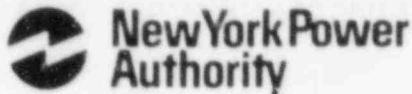
NO CONTROL DATA FOR 1974-1977
 CONTROL DATA FOR 1978-79 ARE MCL's; 1981-84 ARE LLD's
 INDICATOR DATA FOR 1979 IS MCL; 1981-84 ARE LLD's

FIGURE 31



NO CONTROL DATA FOR YEARS 1974-1977

James A. FitzPatrick
Nuclear Power Plant
P.O. Box 41
Lycoming, New York 13093
315 342 3840



Harold A. Glovier
Resident Manager

March 28, 1985
JAFP-85-0299

United States Nuclear
Regulatory Commission
Region 1
631 Park Avenue
King Of Prussia, Pennsylvania 19406

Attention: Thomas E. Murley
Regional Administrator

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT RADIO-
LOGICAL ENVIRONMENTAL SURVEILLANCE REPORT FACILITY
OPERATING LICENSE DPR-59, DOCKET NO. 50-333

Gentlemen:

In accordance with the United States Nuclear Regulatory Com-
mission Guide 10.1, we submit the 1984 Annual Environmental
Operating Report, Part B: Radiological Report. Distribution
for this report is in accordance with Regulatory Guide 10.1.

A handwritten signature of Harold A. Glovier in dark ink.

HAROLD A. GLOVIER

HAG:JAS:jaa

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