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ROCHESTER GAS AND ELECTRIC CORPORATION • 89 EAST AVENUE, ROCHESTER, N.Y. 14649-0001

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April 30, 1990

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

Subject: Annual Radiological Environmental Operating Report
R.E. Ginna Nuclear Power Plant
Docket No. 50-244

Gentlemen:

The enclosed information is being submitted in accordance with the requirement of Technical Specification Section 6.9.1.3.

This information is a summary of all analyses performed as part of the Radiological Environmental Monitoring requirements of Sections 3.16 and 4.10 of the R.E. Ginna Technical Specifications.

From the data collected, there does not appear to be any measurable effect on the environment from the operation of the R.E. Ginna plant.

Very truly yours,

Robert C. Mecredy
Division Manager
Nuclear Production

Enc.



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# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

R.E. Ginna Nuclear Plant

Rochester Gas & Electric

Docket No. 50-244

TABLE OF CONTENTS

LIST OF TABLES

## LIST OF MAPS



## LIST OF TREND PLOTS

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[illegible]

RADIOLOGICAL ENVIRONMENTAL SURVEY

January - December 1989

## 1.0 SUMMARY

During the year of 1989, there were no measurable influences determined from radioactive effluent releases. Routine measurements are taken in the areas surrounding the R.E. Ginna Nuclear Power Plant to determine if man-made radio-activity is not being released at a level that would cause an influence to the environs surrounding the plant. Samples are collected on an established schedule for regular testing to determine if measurable levels of activity exist that may be attributed to the operation of the plant. The information obtained from measurements of these environmental samples is compared to the calculated levels of potential activity at the sampling locations from normal plant releases as determined by monitors within the plant effluent streams.

Samples of water, air, fallout, fish, vegetation, milk and direct radiation are collected from locations near the plant that were determined to be at the point of highest concentration from releases through the plant and containment vents and from additional locations at distances ranging out to eighteen miles. Reference samples for background measurements are collected concurrently from locations calculated to have radioactivity concentrations less than 1% of those from the closer sampling locations. These background samples provide continuous background data which makes it possible to distinguish between significant radioactivity introduced into the environment from the operation of the plant and that introduced from other sources.

During 1989, 1402 samples were obtained and analyzed for beta and gamma emitters through gross activity counting techniques and gamma spectroscopy. These total 871 air samples, 294 water samples, 16 fish samples, 9 vegetation samples, 56 milk samples and 156 thermoluminescent dosimeter measurements. As part of a required quality control program, 13 EPA Interlaboratory Comparison Studies samples (comparable to normal samples taken by the environmental program) were analyzed and reported.

A summary of the data collected indicating the results of all data for indicator and control locations is given in Table 1-1.

Table 1-1
ROCHESTER GAS AND ELECTRIC CORPORATION
ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
R.E. GINNA NUCLEAR POWER PLANT DOCKET NO. 50-244
WAYNE, NEW YORK REPORTING PERIOD 1989

| PATHWAY SAMPLED (UNIT OF MEASUREMENT) | TYPE AND TOTAL NUMBER OF ANALYSES | LLD | INDICATOR LOCATIONS MEAN (1) RANGE | LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION | LOCATION WITH HIGHEST ANNUAL MEAN MEAN (1) RANGE | CONTROL LOCATIONS MEAN (1) RANGE |
|---|---|---|---|---|---|---|
| AIR: PARTICULATE (pCi/Cu.M.) | GROSS BETA 621 | 0.003 | 0.022 (362/362)<br>0.003 - 0.084 | ONSITE LOCATION #5<br>160 M 185 | 0.025 (51/51)<br>0.007 - 0.084 | 0.020 (259/259)<br>0.007 - 0.075 |
| | GAMMA SCAN 48 | (2) | < LLD (0/28) | ———— | ———— | < LLD (0/20) |
| IODINE | GAMMA SCAN 202 | 0.02-0.08 | <LLD (0/102) | ———— | ———— | < LLD (0/100) |
| DIRECT RADIATION: (3) TLD (mR/QUARTER) | GAMMA 154 | 5.0 | 19.2 (66/66)<br>16 - 23 | ONSITE LOCATION #20<br>680 M 165 | 21.2 (4/4)<br>19.4 - 23.2 | 16.6 (84/84)<br>14 - 21 |
| WATER: DRINKING (pCi/LITER) | GROSS BETA 72 | 1.2 | 2.25 (72/72)<br>1.24 - 5.13 | WELL "B"<br>640 M 150 | 2.81 (10/10)<br>1.42 - 4.23 | ———— |
| | GAMMA SCAN 42 | (2) | Ra-226 24 (5/42)<br>16 - 39 | WELL "B"<br>640 M 150 | 25 (11/11)<br>16 - 39 | ———— |
| | IODINE 33 | 0.24 | < LLD (0/33) | ———— | ———— | ———— |
| SURFACE (pCi/LITER) | GROSS BETA 162 | 1.2 | 1.94 (111/111)<br>1.24 - 6.24 | DEER CREEK<br>200 M 135 | 2.97 (11/11)<br>1.71 - 6.24 | 2.08 (51/51)<br>1.27 - 4.47 |
| | GAMMA SCAN 46 | (2) | Ra-226 18 (1/12) | DEER CREEK<br>200 M 135 | ———— | < LLD (0/12) |
| | IODINE 44 | 0.24 | < LLD (0/33) | ———— | ———— | < LLD (0/11) |
| RAINFALL (pCi/sq.M/day) | GROSS BETA 60 | 1.2 | 5.39 (24/24)<br>1.40 - 14.5 | STATION #3<br>420 M 110 | 6.11 (12/12)<br>1.44 - 13.3 | 5.74 (36/36)<br>1.25 - 20.3 |
| MILK: (pCi/LITER) | IODINE 56 | 0.24 | <LLD (0/38) | ———— | ———— | <LLD (0/18) |
| | GAMMA SCAN 56 | (2) | < LLD (0/38) | ———— | ———— | < LLD (0/18) |
| FISH: (pCi/Kg) | GAMMA SCAN 16 | (2) | Cs-137 22 (7/7)<br>15 - 29 | DISCHARGE PLUME | ———— | 36 (9/9)<br>12 - 61 |
| VEGETATION: (pCi/Kg) | GAMMA SCAN 9 | (2) | <LLD (0/6) | ———— | ———— | < LLD (0/3) |

(1) Mean and range based on detectable measurements only. Fraction of detectable measurements at specified locations in parentheses.
(2) Table of LLD values attached for gamma scan measurements.
(3) One direct radiation location has been deleted from this summary since it was affected by the contaminated equipment storage location 50 meters away. The average reading at this location is 44 mR/Quarter during 1989.

## 2.0 SURVEILLANCE PROGRAM

### 2.1 Regulatory Limits

The Technical Specification requirements for the radiological environmental monitoring program are:

Monitoring Program

The radiological environmental monitoring program shall be conducted as specified in Table 3.16-1 at the locations given in the ODCM.

If the radiological environmental monitoring program is not conducted as specified in Table 3.16-1, prepare and submit to the Commission, in the Annual Radiological Environmental Operating Report, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence. (Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal availability, or to malfunction of automatic sampling equipment. If the latter, efforts shall be made to complete corrective action prior to the end of the next sampling period.)

If milk or fresh leafy vegetable samples are unavailable for more than one sample period from one or more of the sampling locations indicated by the ODCM, a discussion shall be included in the Semiannual Radioactive Effluent Report which identifies the cause of the unavailability of samples and identifies locations for obtaining replacement samples. If a milk or leafy vegetable sample location becomes unavailable, the locations from which samples were unavailable may then be deleted from the ODCM, provided that comparable locations are added to the environmental monitoring program.

Land Use Census

A land use census shall be conducted and shall identify the location of the nearest milk animal and the nearest residence in each of the 16 meteorological sectors within a distance of five miles.

An onsite garden located in the meteorological sector having the highest historical D/Q may be used for broad leaf vegetation sampling in lieu of a garden census; otherwise the land use census shall also identify the location of the nearest garden of greater than 500 square feet in each of the 16 meteorological sectors within a distance of five miles. D/Q shall be determined in accordance with methods described in the ODCM.

Interlaboratory Comparison Program

Analyses shall be performed on applicable radioactive environmental samples supplied as part of an interlaboratory comparison program which has been approved by NRC, if such a program exists.

2.2 Regulatory Fulfillment

The fulfillment of the Technical Specification requirements shall be demonstrated when:

Specification

The radiological environmental monitoring samples shall be collected pursuant to Table 3.16-1. Acceptable locations are shown in the ODCM. Samples shall be analyzed pursuant to the requirements of Tables 3.16-1 and 4.10-1.

A land use census shall be conducted annually (between June 1 and October 1).

A summary of the results obtained as part of the required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report.

2.3 Deviations from the Sampling Schedule

Deviations from the sampling schedule are allowed when samples are unavailable due to hazardous conditions, seasonal variations or malfunction of automatic sampling equipment. There were five deviations from the sampling schedule during 1989, but, the minimum number of samples required in Tech Spec Table 3.16-1 were collected.

These deviations were:

a. Automatic sampling equipment for the Discharge Canal failed and had to be replaced. During the time the unit was out of service, grab samples were obtained each day and composited.

b. The February and November Tap samples were omitted from the schedule.

c. Gamma scans were omitted during May, June and July for some water samples while the environmental Ge(Li) detector was returned to the manufacturer for repair. The required gamma scans were done on an alternate Ge(Li) detector used for Primary System counting. Several milk samples were held until the repaired counting equipment was returned. The LLDs achieved were higher than normal, but within the required values.

d. The well sample for December was omitted when the pump became frozen during cold weather and no sample could be obtained.

e. One indicator fish sample was not obtained for the second half of the year. Only three different species of fish were caught during several attempts to fulfill the requirement of four.

[illegible]

## TECHNICAL SPECIFICATION TABLE 3-16.1

## RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| Exposure Pathway and/or Sample | Number of Samples & Sample Locations | Sampling and Collection Frequency | Type and Frequency of Analysis |
|---|---|---|---|
| 1. AIRBORNE | | | |
| a. Radioiodine | 2 indicator<br>2 control | Continuous operation of sampler with sample collection at least once per 10 days. | Radioiodine canister. Analyze within 7 days of collection of I-131. |
| b. Particulate | 7 indicator<br>5 control | Same as above | Particulate sampler. Analyze for gross beta radioactivity $\geq$ 24 hours following filter change. Perform gamma isotopic analysis on each sample for which gross beta activity is > 10 times the mean of offsite samples. Perform gamma isotopic analysis on composite (by location) sample at least once per 92 days. |
| 2. DIRECT RADIATION | 18 indicator<br>10 control<br>11 placed greater than 5 miles from plant site | TLDs at least quarterly. | Gamma dose quarterly. |

TECHNICAL SPECIFICATION TABLE 3-16.1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| Exposure Pathway and/or Sample | Number of Samples & Sample Locations | Sampling and Collection Frequency | Type and Frequency of Analysis |
|---|---|---|---|
| 3. WATERBORNE | | | |
| a. Surface | 1 control (Russell Station)<br>1 indicator (Condenser Water Discharge) | Composite* sample collected over a period of ≤ 31 days. | Gross beta and gamma isotopic analysis of each composite sample. Tritium analysis of one composite sample at least once per 92 days. |
| b. Drinking | 1 indicator (Ontario Water District Intake) | Same as above | Same as above |

*Composite sample to be collected by collecting an aliquot at intervals not exceeding 2 hours.

TECHNICAL SPECIFICATION TABLE 3-16.1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| Exposure Pathway and/or Sample | Number of Samples & Sample Locations | Sampling and Collection Frequency | Type and Frequency of Analysis |
|---|---|---|---|
| 4. INGESTION | | | |
| a. Milk | 1 control<br>3 indicator<br>June thru October<br>each of 3 farms | At least once per 15 days. | Gamma isotopic and I-131 analysis of each sample. |
| | 1 control<br>1 indicator<br>November thru May<br>one of the farms | At least once per 31 days. | Gamma isotopic and I-131 analysis of each sample. |
| b. Fish | 4 control<br>4 indicator (Off shore at Ginna) | Twice during fishing season including at least four species. | Gamma isotopic analysis on edible portions of each sample. |
| c. Food Products | 1 control<br>2 indicator (On site) | Annual at time of harvest. Sample from two of the following:<br>1. apples<br>2. cherries<br>3. grapes | Gamma isotopic analysis on edible portion of sample. |
| | 1 control<br>2 indicator (On site garden or nearest offsite garden within 5 miles in the highest D/Q meteorological sector) | At time of harvest. One sample of:<br>1. broad leaf vegetation<br>2. other vegetable | Gamma isotopic analysis on edible portions of each sample. |

The maximum LLD values as defined by Tech Specs Table 4.10-1 are:

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

a. LLD for drinking water

b. Total for parent and daughter

## LLD TABLE NOTATION

The LLD is the smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

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

$$LLD = \frac{4.66\ Sb}{E\ V\ 2.22\ Y\ \exp[(-\Delta t)\lambda]}$$

where

LLD is the lower limit of detection as defined above (as pCi per unit mass or volume)

Sb is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute)

E is the counting efficiency (as counts per disintegration)

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

2.22 is the number of disintegrations per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

$\lambda$ is the radioactive decay constant for the particular radionuclide

$\Delta t$ is the elapsed time between sample collection and counting

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

Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally, background fluctuations, unavoidably small sample sizes, the presence of interferring nuclides, or other uncontrollable circumstances may render these LLDs unachievable.

Table 2-1

LOWER LIMIT OF DETECTION (LLD)

| | Air Filters(a) pCi/M$^3$ (minimium sple. 3500 M$^3$/Qtr.) | Water pCi/liter (sample of 3.5 liters) | | Milk pCi/liter (sample of 3.5 liters) | Fish pCi/kg (ave. sample 2 kg) | Vegetation(a) pCi/kg (ave. sample 2 kg) |
|---|---|---|---|---|---|---|
| Ave. Decay(c) | 55 days | 0.5 d | 8 days | 0.5 d | 6 days | 0.5 days |
| Be-7 | 0.025 | 28 | 31 | | | |
| K-40 | 0.012 | | | | | |
| Cr-51 | 0.035 | 29 | 35 | | 220 | 95 |
| Mn-54 | 0.002 | 3 | 3 | | 10 | 10 |
| Fe-59 | 0.005 | 5 | 6 | | 30 | 20 |
| Co-58 | 0.002 | 3 | 3 | | 10 | 10 |
| Co-60 | 0.002 | 4 | 4 | 4 | 10 | 13 |
| Zn-65 | 0.004 | 6 | 6 | | 25 | 22 |
| Zr-95 | 0.005 | 6 | 6 | | 24 | 17 |
| Nb-95 | 0.004 | 3 | 3 | | 18 | 10 |
| Ru-103 | 0.004 | 3 | 3 | | 18 | 12 |
| Ru-106 | 0.014 | 28 | 28 | | 95 | 100 |
| I-131 | 0.03 (b) | 4 Gamma<br>0.24 Beta | | 10 Gamma<br>0.24 Beta | 15 | 12 |
| Cs-134 | 0.002 | 3 | 3 | | 10 | 10 |
| Cs-137 | 0.002 | 4 | 5 | 4 | 11 | 12 |
| BaLa-140 | 0.064 | 4 | 17 | 4 | 12 | 10 |
| Ce-141 | 0.05 | 7 | 8 | | 40 | 25 |
| Ce-144 | 0.09 | 30 | 30 | | 100 | 100 |
| Ra-226 | | 7 | 7 | | 20 | 20 |
| Beta | 0.004 | 1.2<br>(1 liter) | | | | |

(a) LLD value will vary due to different sample sizes.Data based on 1989 background sample spectra.

(b) Charcoal Cartridge

(c) Ave. decay normal period from midpoint of sampling period to counting time.

Table 2-2

DIRECTION AND DISTANCE TO SAMPLE POINTS
All directions given in degrees and all distances given in meters

Air Sample Stations

| | Direction | Distance |
|---|---|---|
| # 2 | 87 | 320 |
| # 3 | 110 | 420 |
| # 4 | 140 | 250 |
| # 5 | 185 | 160 |
| # 6 | 232 | 225 |
| # 7 | 257 | 220 |
| # 8 | 258 | 19200 |
| # 9 | 235 | 11400 |
| #10 | 185 | 13100 |
| #11 | 123 | 11500 |
| #12 | 93 | 25100 |
| #13 | 194 | 690 |

TLD Locations

| | Direction | Distance |
|---|---|---|
| # 2 | 87 | 320 |
| # 3 | 110 | 420 |
| # 4 | 140 | 250 |
| # 5 | 185 | 160 |
| # 6 | 232 | 125 |
| # 7 | 257 | 220 |
| # 8 | 258 | 19200 |
| # 9 | 235 | 11400 |
| #10 | 185 | 13100 |
| #11 | 123 | 11500 |
| #12 | 93 | 25100 |
| #13 | 292 | 230 |
| #14 | 292 | 770 |
| #15 | 272 | 850 |
| #16 | 242 | 900 |
| #17 | 208 | 500 |
| #18 | 193 | 650 |
| #19 | 177 | 400 |
| #20 | 165 | 680 |
| #21 | 145 | 600 |
| #22 | 128 | 810 |
| #23 | 107 | 680 |
| #24 | 90 | 630 |
| #25 | 247 | 14350 |
| #26 | 223 | 14800 |
| #27 | 202 | 14700 |
| #28 | 145 | 17700 |
| #29 | 104 | 13800 |
| #30 | 103 | 20500 |
| #31 | 263 | 7280 |
| #32 | 246 | 6850 |
| #33 | 220 | 7950 |
| #34 | 205 | 6850 |
| #35 | 193 | 7600 |
| #36 | 174 | 5650 |
| #37 | 158 | 6000 |
| #38 | 137 | 7070 |
| #39 | 115 | 6630 |
| #40 | 87 | 6630 |

Water Sample Locations

| | Direct | Dist. |
|---|---|---|
| Russell Station | 270 | 25600 |
| Ontario Water District Intake | 70 | 2200 |
| Circ Water Intake | 0 | 420 |
| Circ Water Discharge | 15 | 130 |
| Deer Creek | 105 | 260 |
| Well B | 150 | 640 |
| Tap | Onsite | Sink |
| Rainfall # 3 | 110 | 420 |
| Rainfall # 5 | 185 | 160 |
| Rainfall # 8 | 258 | 19200 |
| Rainfall #10 | 185 | 13100 |
| Rainfall #12 | 93 | 25100 |

Milk Sample Locations

| | Direct | Dist. |
|---|---|---|
| Farm A | 113 | 9500 |
| Farm B | 242 | 4400 |
| Farm C | 156 | 4400 |
| Farm D | 132 | 21600 |

Fish Samples

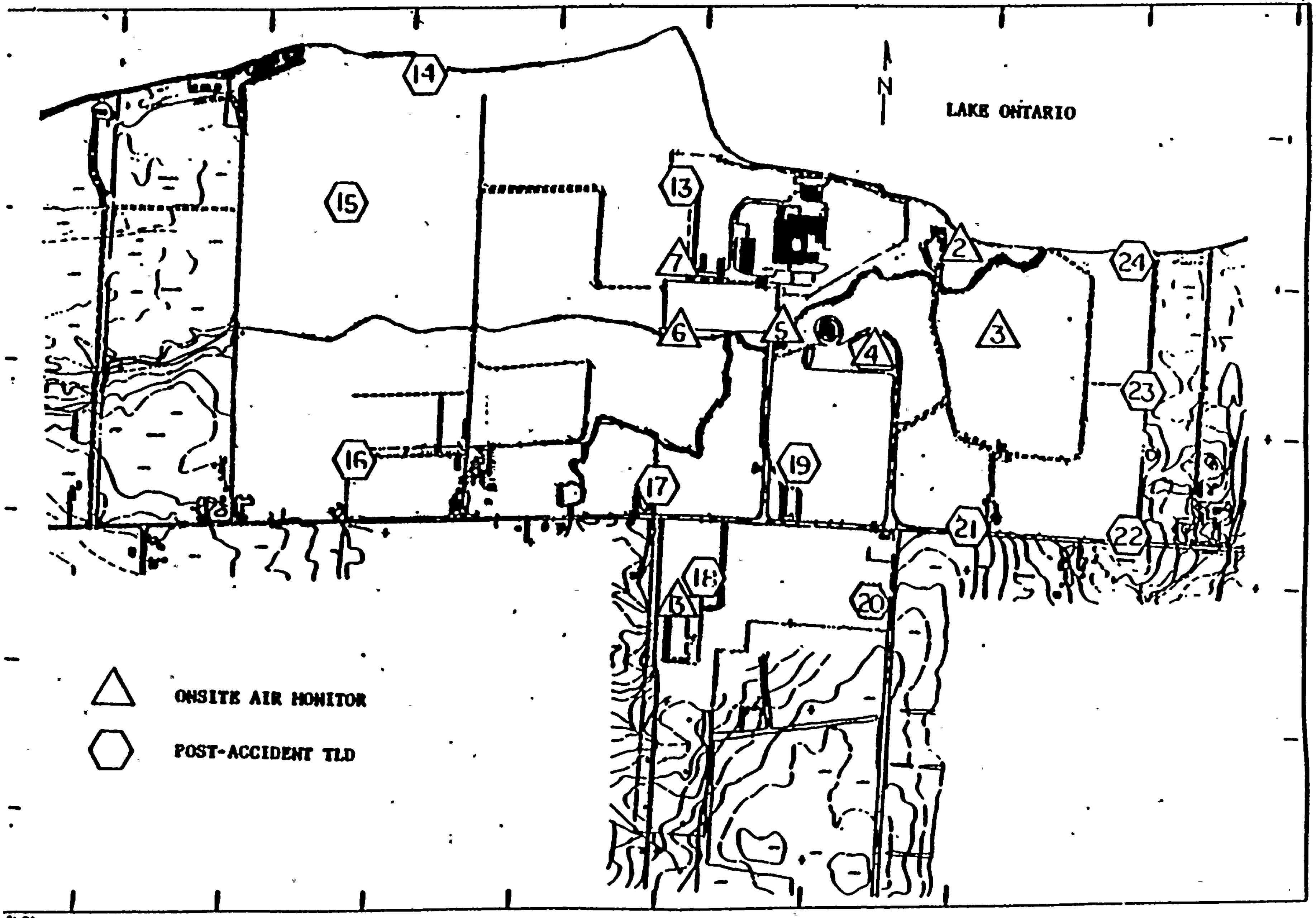
| | |
|---|---|
| Indicator Samples | Lake Ontario Discharge Plume |
| Background Samples | Russell Station |

Produce Samples

| | |
|---|---|
| Indicator Samples | Grown on property surrounding Plant |
| Background Samples | Purchased from farms > 10 miles |

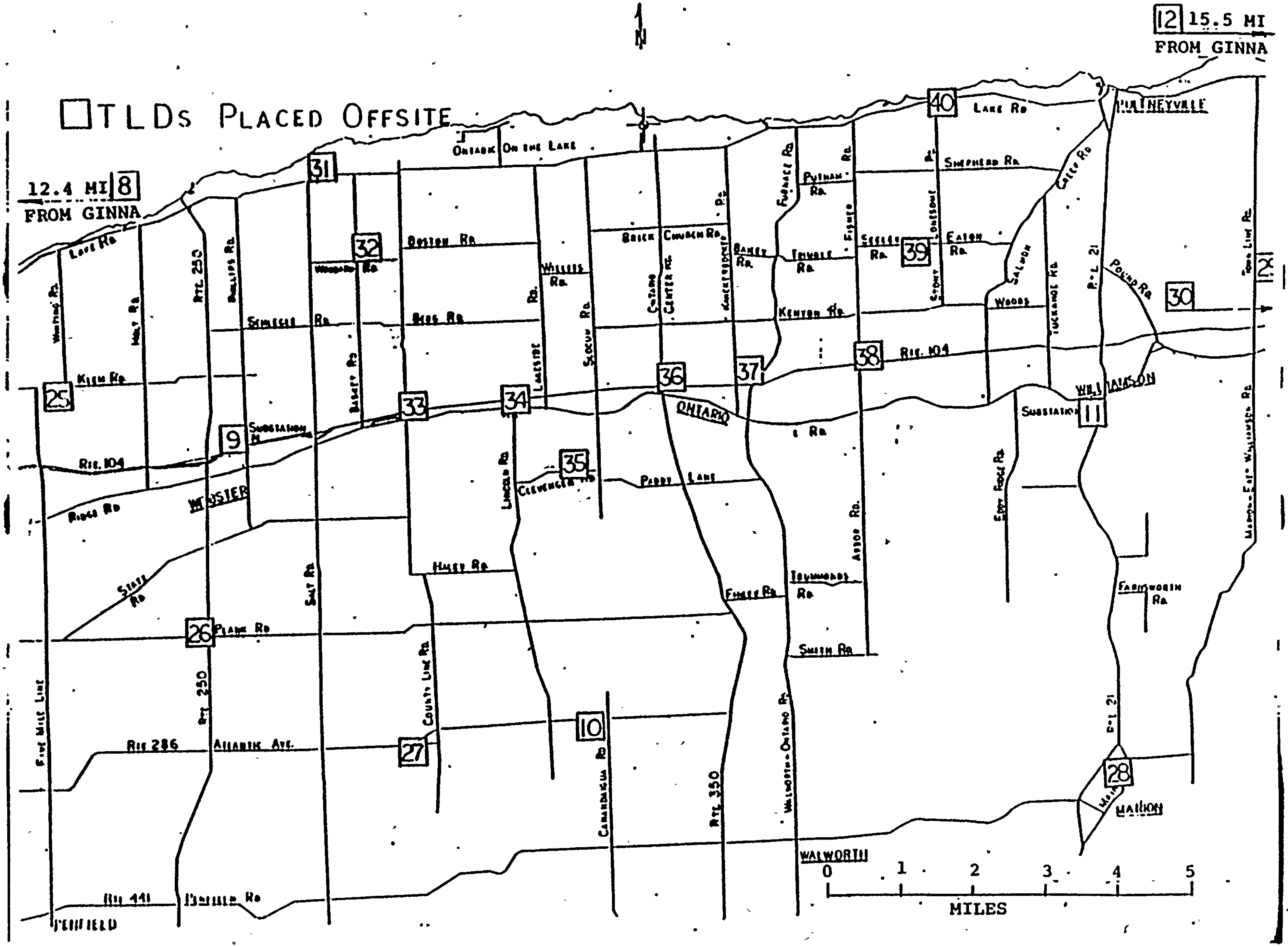
Map

Onsite Sample Locations



M 2-2

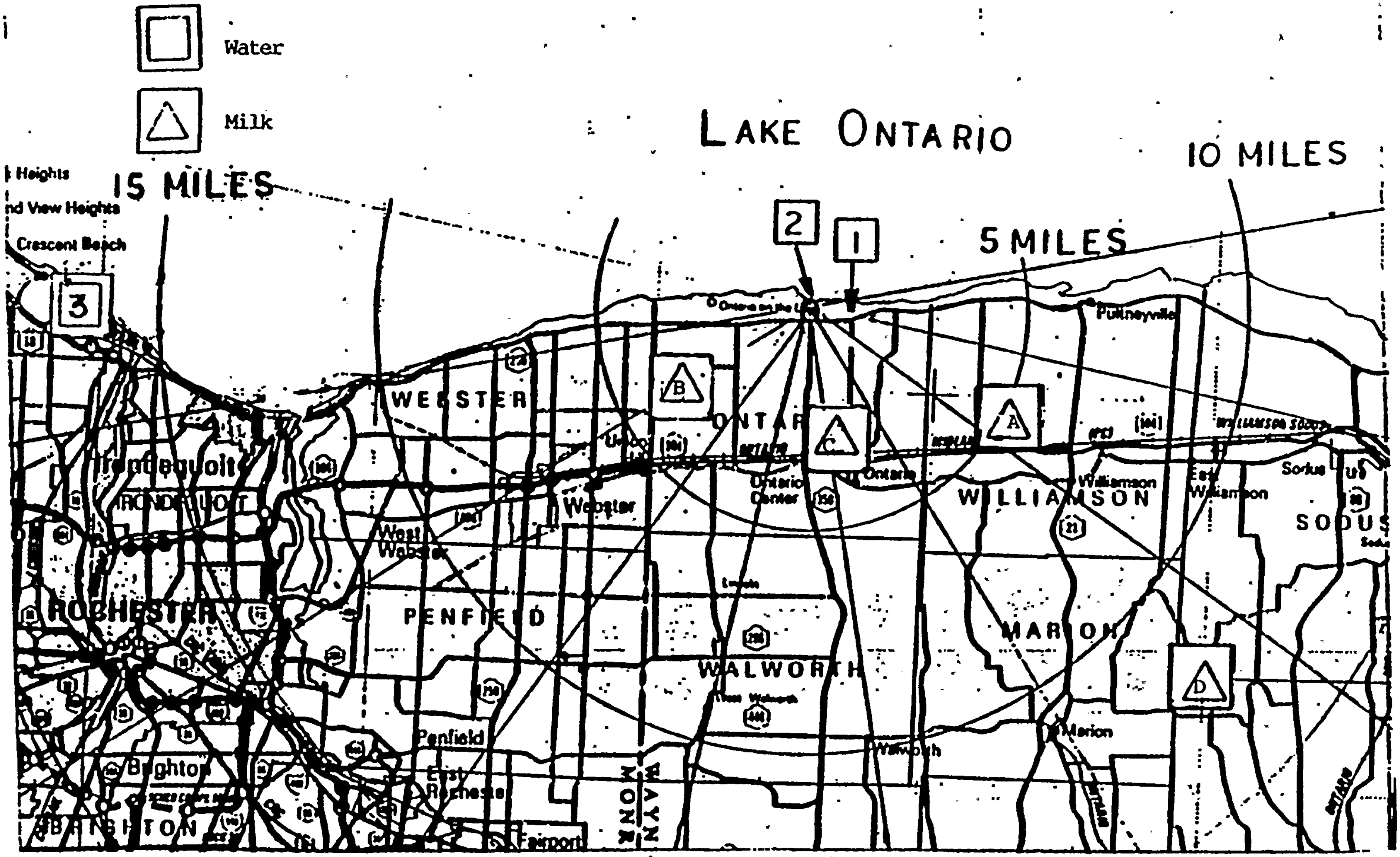
Offsite Sample Locations




- 14 -

Map 3

Water Sample and Milk Farm Locations



[illegible]

3.0 DATA SUMMARY

## 3.1 Analytical Results

The values listed on the following tables include the uncertainties stated as 2 standard deviations (95% confidence level).

Key Definitions

| | |
|---|---|
| Curie (Ci): | The quantity of any radionuclide in which the number of disintegrations per second is 37 billion. |
| Picocurie (pCi): | One millionth of a millionth of a curie or 0.037 disintegrations per second. |
| Cubic Meter ($M^3$): | Approximately 35.3 cubic feet. |
| Liter (L): | Approximately 1.06 quarts. |

Lower Limit of Detection

The Nuclear Regulatory Commission has requested that reported values be compared to the Lower Limit of Detection (LLD) for each piece of equipment. Table 2-1 is a listing of the LLD values for gamma isotopes using our Ge(Li) multichannel pulse height detector system. These values are before the correction for decay. An explanation of the calculation of the LLD is included before Table 2-1. Gross detection limits are as follows:

Beta:

| | |
|---|---|
| Air | 0.003 pCi/$M^3$ gross beta for 400 $m^3$ sample. |
| Water | 1.2 pCi/L gross beta for 1 liter sample. |
| Milk | 0.24 pCi/L iodine 131 for 4 liter sample. |
| Fallout | 1.1 pCi/$m^2$/day for 0.092 $M^2$ collection area. |

Gamma:

| | |
|---|---|
| Air | 0.03 pCi/$m^3$ iodine 131 on charcoal cartridge for 400 $M^3$ sample. |

Radiation 5 millirem/quarter for one quarter exposure (TLD).

3.2 Air Samples

Radioactive particles in air are collected by drawing approximately one cfm through a two inch diameter particulate filter. The volume of air sampled is measured by a dry gas meter and corrected for the pressure drop across the filter. The filters are changed weekly and allowed to decay for three days prior to counting to eliminate most of the natural radioactivity such as the short half-life daughter products of radon and thoron. The decay period is used to give a more sensitive measurement of long-lived man-made radioactivity.

A ring of 6 sampling stations is located on the plant site from 150 to 300 meters from the reactor near the point of the maximum annual average ground level concentration. In addition, there is a ring of 5 sampling stations located approximately 7 to 17 miles from the site that serve as background stations.

Based on weekly comparisons, there was no statistical difference between the on-site and the background radioactive particulate concentrations. The average concentrations for the on-site and background samples were 0.022 and 0.020 pCi/$M^3$ for the period of January to December, 1989. Maximum weekly concentrations for each station were less than 0.084 pCi/$m^3$.

The major airborne activities released from the plant are noble gases, tritium, radioiodines and carbon-14. Most of this activity is released in a gaseous form, however, some radioiodine is released as airborne particulate. For airborne particulates, the average calculated concentration of particulate at the site boundary due to measurable plant releases would be 2.9E-5 pCi/$M^3$ or 0.019% of the average release concentration of 0.16 pCi/$m^3$. The survey cannot detect such a concentration which is 1% of the LLD of 0.003 pCi/$m^3$.

Table 3-1 is a list of values for the on-site samplers. Table 3-2 is a list of values for the off-site samplers.

The particulate filters from each sampling location were saved and a 13 week composite was made. A gamma isotopic analysis was done for each sampling location and corrected for decay. The results of this analysis are listed in Tables 3-3 A to D.

Iodine cartridges are placed at four locations. These cartridges are changed and counted each week. A list of values for these cartridges is given in Table 3-4.

[illegible]

Trend plots of the 1989 air filter data with a comparison to the 1988 air filter data is included. The data indicating a higher trend during November and December is based on samples counted on alternate gross beta counting equipment while the environmental gross beta counting equipment was removed from service for repair. Additionally, a trend plot of the annual averages measured since 1968 is included to show the variation of data during the years that the R.E. Ginna Nuclear Power Plant has been operational. The peak activities measured correspond to the years when atmospheric tests of nuclear weapons were being conducted.

Table 3-1

On-Site Samplers
Results in pCi/m[3]

| Week of | Sta. #2 | Sta. #3 | Sta. #4 | Sta. #5 | Sta. #6 | Sta. #7 | Sta. #13A | On-Site Average |
|---|---|---|---|---|---|---|---|---|
| 1/6 | .025±.002 | .033±.002 | .032±.002 | .033±.002 | .032±.002 | .028±.002 | .027±.002 | .030 |
| 1/13 | .024±.002 | .025±.002 | .023±.002 | .026±.033 | .027±.002 | .022±.002 | .024±.002 | .024 |
| 1/20 | .023±.002 | .026±.002 | .025±.002 | .024±.003 | .024±.002 | .021±.002 | .021±.002 | .023 |
| 1/27 | .021±.002 | .026±.003 | .023±.002 | .022±.003 | .022±.002 | .021±.002 | .019±.002 | .022 |
| 2/3 | .026±.002 | .028±.003 | .029±.002 | .027±.003 | .028±.002 | .029±.002 | .023±.002 | .026 |
| 2/10 | .022±.002 | .026±.003 | .023±.002 | .026±.003 | .022±.002 | .023±.002 | .021±.002 | .023 |
| 2/17 | .018±.002 | .020±.003 | .020±.002 | .018±.003 | .019±.002 | .018±.002 | .016±.002 | .018 |
| 2/24 | .024±.002 | .027±.003 | .025±.002 | .027±.003 | .026±.002 | .023±.002 | .021±.002 | .025 |
| 3/3 | .017±.002 | .016±.003 | .027±.003 | .019±.003 | .019±.002 | .017±.002 | .016±.002 | .019 |
| 3/10 | .020±.002 | .024±.003 | .031±.003 | .025±.003 | .021±.002 | .020±.002 | .019±.002 | .023 |
| 3/17 | .020±.002 | .022±.003 | .020±.002 | .019±.003 | .020±.002 | .020±.002 | .020±.002 | .020 |
| 3/24 | .019±.002 | .019±.003 | .019±.002 | .018±.003 | .017±.002 | .018±.002 | .019±.002 | .018 |
| 3/31 | .008±.002 | .006±.003 | .014±.002 | .012±.003 | .011±.002 | .011±.002 | .012±.001 | .011 |
| 4/7 | .013±.002 | .013±.003 | .012±.003 | .007±.003 | .012±.002 | .010±.002 | .009±.001 | .011 |
| 4/14 | .015±.002 | .014±.003 | .013±.002 | .013±.002 | .015±.002 | .010±.002 | .014±.002 | .013 |
| 4/21 | .016±.002 | .012±.003 | .015±.002 | .013±.003 | .016±.002 | .013±.002 | .016±.002 | .014 |
| 4/28 | .010±.002 | .008±.003 | .011±.001 | .010±.003 | .010±.002 | .010±.002 | .013±.002 | .010 |
| 5/5 | .010±.002 | .014±.003 | .007±.001 | .011±.003 | .010±.003 | .006±.002 | .010±.001 | .010 |
| 5/12 | .003±.002 | <.003 | .004±.001 | <.003 | .005±.001 | .003±.001 | .007±.001 | .004 |
| 5/19 | .010±.002 | .012±.003 | .010±.001 | .009±.003 | .011±.001 | .008±.001 | .012±.001 | .010 |
| 5/26 | .015±.002 | .014±.003 | .017±.002 | .015±.003 | .017±.002 | .013±.002 | .016±.002 | .015 |
| 6/2 | .011±.002 | .013±.003 | .012±.001 | .015±.003 | .013±.001 | .011±.001 | .007±.001 | .012 |
| 6/9 | .014±.002 | .017±.003 | .016±.001 | .015±.003 | .016±.002 | .014±.002 | .015±.001 | .015 |
| 6/16 | .011±.003 | .012±.003 | .008±.001 | .010±.003 | .009±.001 | .008±.001 | .009±.001 | .010 |
| 6/23 | .010±.003 | .013±.003 | .011±.001 | .014±.003 | .011±.001 | .010±.001 | .010±.002 | .010 |
| 6/30 | .017±.002 | .018±.003 | .017±.002 | .022±.003 | .015±.002 | .012±.001 | .016±.002 | .017 |
| Maximum | .026 | .033 | .032 | .033 | .032 | .029 | .027 | |
| Average | .016 | .018 | .018 | .018 | .018 | .015 | .016 | |
| Minimum | .003 | .006 | .004 | .007 | .005 | .003 | .007 | |

Table 3-1 B

On-Site Samplers
Results in pCi/m3

| Week of | Sta. #2 | Sta. #3 | Sta. #4 | Sta. #5 | Sta. #6 | Sta. #7 | Sta. #13A | On-Site Average |
|---|---|---|---|---|---|---|---|---|
| 7/7 | .018±.002 | .019±.003 | .016±.001 | .020±.003 | .019±.002 | .013±.002 | .009±.002 | .016 |
| 7/14 | .024±.002 | .028±.003 | .022±.002 | .026±.003 | .022±.002 | .021±.002 | .017±.002 | .023 |
| 7/21 | .016±.002 | .018±.002 | .018±.002 | .024±.002 | .017±.002 | .016±.002 | .020±.002 | .018 |
| 7/28 | .021±.002 | .026±.003 | .022±.002 | .029±.003 | .021±.033 | .018±.002 | .020±.002 | .022 |
| 8/4 | .018±.002 | .019±.003 | .017±.001 | .020±.003 | .017±.002 | .015±.002 | .018±.002 | .018 |
| 8/11 | .016±.002 | .018±.003 | .017±.002 | .019±.003 | .028±.006 | .014±.002 | .015±.002 | .016 |
| 8/18 | .020±.002 | .021±.003 | .019±.002 | .027±.004 | .020±.002 | .018±.002 | .020±.002 | .021 |
| 8/25 | .017±.001 | .015±.003 | .017±.002 | .018±.003 | .017±.002 | .014±.002 | .015±.002 | .016 |
| 9/1 | .016±.001 | .019±.003 | .016±.002 | .021±.003 | .016±.002 | .011±.001 | .019±.002 | .017 |
| 9/8 | .022±.002 | .022±.003 | .020±.002 | .029±.004 | .025±.015 | .017±.002 | .020±.002 | .022 |
| 9/15 | .013±.001 | .013±.003 | .015±.002 | .018±.003 | .016±.002 | .013±.002 | .015±.002 | .015 |
| 9/22 | .019±.002 | .019±.003 | .017±.002 | .021±.004 | .016±.003 | .014±.002 | .014±.002 | .017 |
| 9/29 | .010±.001 | .006±.003 | .008±.002 | .011±.004 | .005±.003 | .008±.002 | .010±.002 | .008 |
| 10/6 | .017±.002 | .020±.003 | .017±.002 | .024±.004 | .016±.003 | .016±.002 | .016±.002 | .018 |
| 10/13 | .013±.001 | .011±.003 | .012±.002 | .016±.003 | .011±.003 | .011±.002 | .014±.002 | .013 |
| 10/20 | .012±.001 | .016±.003 | .014±.002 | .018±.003 | .008±.003 | .012±.002 | .015±.002 | .015 |
| 10/27 | .023±.002 | .023±.003 | .021±.002 | .030±.004 | .020±.003 | .020±.002 | .022±.002 | .023 |
| 11/3 | .033±.002 | .036±.004 | .031±.002 | .050±.005 | .030±.003 | .041±.002 | .048±.003 | .038 |
| 11/10 | .029±.002 | .043±.004 | .032±.002 | .050±.005 | .030±.004 | .038±.004 | .040±.002 | .038 |
| 11/16 | .067±.006 | .032±.003 | .032±.003 | .045±.004 | .032±.003 | .053±.005 | .036±.003 | .042 |
| 11/22 | .042±.002 | .037±.002 | .047±.003 | .038±.003 | .047±.004 | .044±.002 | .042±.003 | .042 |
| 11/30 | .022±.002 | .022±.002 | .025±.002 | .020±.005 | .023±.004 | .007±.002 | .025±.003 | .021 |
| 12/8 | .017±.002 | .019±.002 | .019±.002 | .020±.003 | .018±.004 | .017±.002 | .023±.003 | .019 |
| 12/15 | .055±.002 | .079±.002 | .058±.002 | .063±.003 | .055±.004 | .054±.002 | .058±.003 | .060 |
| 12/22 | .074±.002 | .053±.003 | .083±.003 | .084±.003 | .082±.004 | .075±.002 | .082±.003 | .076 |
| 12/29 | .047±.002 | .084±.002 | .068±.003 | .060±.003 | .052±.004 | .058±.002 | .059±.003 | .061 |
| | | | | | | | | |
| Maximum | .074 | .084 | .083 | .084 | .082 | .075 | .082 | |
| Average | .026 | .028 | .026 | .031 | .026 | .025 | .027 | |
| Minimum | .010 | .006 | .008 | .011 | .005 | .007 | .009 | |

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Table 3-2 A

Off-Site Samplers
Results in pCi/m$^3$

| Week of | Sta. #8 | Sta. #9 | Sta. #10 | Sta. #11 | Sta. #12 | Off-Site Average |
|---|---|---|---|---|---|---|
| 1/6 | .024±.002 | .030±.002 | .031±.002 | .027±.003 | .028±.002 | .028 |
| 1/13 | .029±.002 | .024±.002 | .026±.002 | .024±.002 | .023±.002 | .025 |
| 1/20 | .021±.002 | .021±.002 | .024±.002 | .025±.002 | (a) | .023 |
| 1/27 | .021±.002 | .020±.002 | .022±.002 | .022±.002 | .023±.002 | .022 |
| 2/3 | .026±.002 | .026±.002 | .027±.002 | .026±.002 | .024±.002 | .026 |
| 2/10 | .023±.002 | .024±.002 | .020±.002 | .023±.002 | .025±.002 | .023 |
| 2/17 | .018±.002 | .018±.002 | .021±.002 | .017±.002 | .019±.002 | .019 |
| 2/24 | .023±.002 | .023±.002 | .025±.002 | .024±.002 | .026±.002 | .024 |
| 3/3 | .017±.002 | .017±.002 | .018±.002 | .016±.002 | .017±.002 | .017 |
| 3/10 | .018±.002 | .019±.002 | .020±.002 | .016±.002 | .020±.002 | .019 |
| 3/17 | .020±.002 | .020±.002 | .020±.002 | .020±.002 | .019±.002 | .020 |
| 3/24 | .019±.002 | .018±.002 | .020±.002 | .019±.002 | .019±.002 | .019 |
| 3/31 | .015±.002 | .014±.002 | .013±.002 | .012±.002 | .014±.002 | .014 |
| 4/7 | .011±.002 | .012±.002 | .011±.001 | .010±.002 | .010±.002 | .011 |
| 4/14 | .016±.002 | .015±.002 | .015±.002 | .015±.002 | .016±.002 | .015 |
| 4/21 | .021±.002 | .019±.002 | .019±.002 | .018±.002 | .019±.002 | .019 |
| 4/28 | .015±.002 | .014±.002 | .015±.002 | .014±.002 | .015±.002 | .015 |
| 5/5 | .013±.002 | .013±.002 | .011±.001 | .010±.002 | .011±.002 | .012 |
| 5/12 | .009±.001 | .007±.002 | .008±.001 | .007±.002 | .008±.002 | .008 |
| 5/19 | .015±.002 | .014±.002 | .013±.001 | .016±.002 | .015±.002 | .015 |
| 5/26 | .019±.002 | .020±.002 | .018±.002 | .018±.002 | .019±.002 | .019 |
| 6/2 | .012±.001 | .017±.002 | .011±.001 | .015±.002 | .017±.002 | .014 |
| 6/9 | .016±.002 | .016±.002 | .015±.001 | .015±.002 | .014±.002 | .015 |
| 6/16 | .009±.001 | .009±.002 | .008±.001 | .007±.001 | .008±.001 | .008 |
| 6/23 | .010±.001 | .009±.002 | .011±.001 | .010±.002 | .011±.002 | .010 |
| 6/30 | .018±.002 | .015±.002 | .015±.001 | .013±.002 | .011±.002 | .014 |
| Maximum | .029 | .030 | .031 | .027 | .028 | |
| Average | .017 | .017 | .018 | .017 | .017 | |
| Minimum | .009 | .007 | .008 | .007 | .008 | |

(a) Filter torn or off-centered

[illegible]

[illegible]

[illegible]

Table 3-2 B

Off-Site Samplers
Results in pCi/m3

| Week of | Sta. #8 | Sta. #9 | Sta. #10 | Sta. #11 | Sta. #12 | Off-Site Average |
|---|---|---|---|---|---|---|
| 7/7 | .017±.002 | .016±.002 | .015±.001 | .014±.002 | .016±.002 | .016 |
| 7/14 | .018±.002 | .019±.002 | .019±.002 | .017±.002 | .013±.002 | .017 |
| 7/21 | .008±.001 | .017±.002 | .017±.002 | .017±.002 | .016±.002 | .015 |
| 7/28 | .023±.002 | .019±.002 | .018±.002 | .016±.002 | .017±.002 | .019 |
| 8/4 | .020±.002 | .016±.002 | .016±.001 | .016±.002 | .016±.002 | .017 |
| 8/11 | .016±.001 | .014±.002 | .015±.001 | .013±.002 | .011±.002 | .014 |
| 8/18 | .021±.002 | .021±.002 | .018±.002 | .017±.002 | .015±.002 | .018 |
| 8/25 | .016±.001 | .016±.002 | .017±.001 | .015±.002 | .015±.002 | .016 |
| 9/1 | .016±.002 | .017±.002 | .015±.001 | .014±.002 | .014±.002 | .015 |
| 9/8 | .020±.001 | .020±.002 | .020±.002 | .019±.002 | .017±.002 | .019 |
| 9/15 | .014±.001 | .009±.001 | .010±.001 | .012±.002 | .011±.001 | .012 |
| 9/22 | .019±.002 | .014±.002 | .015±.001 | .011±.002 | .012±.002 | .014 |
| 9/29 | .010±.001 | .009±.002 | .008±.001 | .007±.002 | .007±.002 | .008 |
| 10/6 | .016±.002 | .016±.002 | .016±.001 | .015±.002 | .014±.002 | .015 |
| 10/13 | .013±.001 | .014±.002 | .014±.001 | .020±.002 | .013±.002 | .015 |
| 10/20 | .015±.001 | .014±.002 | .014±.001 | .015±.002 | .012±.002 | .014 |
| 10/27 | .022±.002 | .021±.002 | .019±.002 | .019±.002 | .019±.002 | .020 |
| 11/3 | .034±.002 | .035±.002 | .038±.003 | .035±.003 | .033±.003 | .035 |
| 11/10 | .033±.002 | .025±.002 | .040±.002 | .036±.002 | .035±.002 | .034 |
| 11/16 | .030±.003 | .032±.003 | .039±.003 | .026±.003 | .031±.003 | .034 |
| 11/22 | .042±.002 | .052±.003 | .054±.003 | .046±.003 | .048±.003 | .048 |
| 11/30 | .020±.002 | .022±.003 | .023±.002 | .021±.002 | .019±.002 | .021 |
| 12/8 | .016±.002 | .018±.002 | .018±.002 | .017±.002 | .020±.002 | .018 |
| 12/15 | .045±.002 | .040±.002 | .045±.002 | .052±.002 | .049±.002 | .046 |
| 12/22 | .075±.002 | .063±.003 | .076±.002 | .073±.002 | .075±.003 | .072 |
| 12/29 | .057±.002 | .050±.002 | .056±.002 | .059±.002 | .054±.002 | .055 |
| | | | | | | |
| Maximum | .075 | .063 | .076 | .073 | .075 | |
| Average | .024 | .023 | .025 | .023 | .023 | |
| Minimum | .008 | .009 | .008 | .007 | .007 | |

Ta[illegible]3-3 A

13 Week Composite
Gamma Isotopic Analysis
Results in pCi/m$^3$
First Quarter

| | Sta 2 | Sta 3 | Sta 4 | Sta 5 | Sta 6 | Sta 7 | Sta 8 | Sta 9 | Sta 10 | Sta 11 | Sta 12 | Sta 13A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $Be^7$ | .083±.010 | <.026 | .097±.009 | .065±.013 | .072±.008 | .089±.011 | .079±.009 | .089±.012 | .077±.008 | .081±.010 | .083±.009 | .096±.009 |
| $K^{40}$ | .013±.010 | .085±.011 | .036±.005 | .078±.011 | .039±.005 | .048±.005 | .033±.004 | .047±.006 | .042±.006 | .043±.005 | .034±.006 | .025±.004 |
| $Cr^{51}$ | <.018 | <.035 | <.016 | <.035 | <.019 | <.021 | <.018 | <.024 | <.017 | <.024 | <.021 | <.020 |
| $Mn^{54}$ | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Fe^{59}$ | <.003 | <.005 | <.002 | <.004 | <.002 | <.003 | <.003 | <.004 | <.002 | <.001 | <.003 | <.003 |
| $Co^{58}$ | <.001 | <.002 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Co^{60}$ | <.001 | <.002 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Zn^{65}$ | <.002 | <.003 | <.002 | <.003 | <.001 | <.002 | <.001 | <.002 | <.002 | <.002 | <.002 | <.002 |
| $Zr^{95}$ | <.002 | <.003 | <.002 | <.004 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 |
| $Nb^{95}$ | <.002 | <.003 | <.002 | <.003 | <.002 | <.002 | <.002 | <.002 | <.001 | <.002 | <.002 | <.002 |
| $Ru^{103}$ | <.002 | <.003 | <.001 | <.003 | <.002 | <.002 | <.001 | <.002 | <.001 | <.002 | <.002 | <.002 |
| $Ru^{106}$ | <.007 | <.012 | <.006 | <.012 | <.006 | <.006 | <.006 | <.008 | <.005 | <.007 | <.007 | <.006 |
| $Cs^{134}$ | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Cs^{137}$ | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $BaLa^{140}$ | <.031 | <.064 | <.030 | <.064 | <.038 | <.042 | <.036 | <.049 | <.037 | <.050 | <.046 | <.041 |
| $Ce^{141}$ | <.003 | <.005 | <.002 | <.005 | <.003 | <.003 | <.003 | <.003 | <.002 | <.003 | <.003 | <.003 |
| $Ce^{144}$ | <.005 | <.008 | <.004 | <.008 | <.004 | <.005 | <.004 | <.005 | <.004 | <.005 | <.004 | <.004 |

All values given as < are less than LLD

Ta[illegible]3-3 B
13 Week Composite
Gamma Isotopic Analysis
Results in pCi/m$^3$
Second Quarter

| | Sta 2 | Sta 3 | Sta 4 | Sta 5 | Sta 6 | Sta 7 | Sta 8 | Sta 9 | Sta 10 | Sta 11 | Sta 12 | Sta 13A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $Be^{7}$ | .069±.011 | .118±.015 | .093±.008 | .107±.017 | .113±.011 | .087±.011 | .094±.007 | .108±.016 | .105±.010 | .077±.010 | .097±.012 | .089±.008 |
| $K^{40}$ | <.022 | .008±017 | <.015 | <.037 | <.018 | <.019 | <.016 | <.001 | <.014 | <.017 | <.016 | <.015 |
| $Cr^{51}$ | <.055 | <.085 | <.038 | <.093 | <.046 | <.049 | <.043 | <.067 | <.035 | <.043 | <.043 | <.032 |
| $Mn^{54}$ | <.001 | <.002 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Fe^{59}$ | <.006 | <.009 | <.005 | <.010 | <.005 | <.005 | <.005 | <.007 | <.004 | <.005 | <.005 | <.003 |
| $Co^{58}$ | <.002 | <.003 | <.001 | <.003 | <.002 | <.002 | <.002 | <.002 | <.001 | <.002 | <.002 | <.001 |
| $Co^{60}$ | <.002 | <.002 | <.001 | .003±.001 | <.001 | <.001 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 |
| $Zn^{65}$ | <.003 | <.004 | <.002 | <.005 | <.002 | <.002 | <.002 | <.003 | <.002 | <.002 | <.002 | <.002 |
| $Zr^{95}$ | <.004 | <.006 | <.003 | <.006 | <.003 | <.003 | <.003 | <.004 | <.002 | <.003 | <.003 | <.002 |
| $Nb^{95}$ | <.004 | <.006 | <.003 | <.007 | <.004 | <.004 | <.003 | <.005 | <.003 | <.003 | <.003 | <.003 |
| $Ru^{103}$ | <.004 | <.006 | <.002 | <.006 | <.003 | <.003 | <.003 | <.004 | <.002 | <.003 | <.003 | <.002 |
| $Ru^{106}$ | <.012 | <.018 | <.007 | <.019 | <.010 | <.008 | <.008 | <.011 | <.005 | <.008 | <.007 | <.005 |
| $Cs^{134}$ | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Cs^{137}$ | <.001 | <.003 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $BaLa^{140}$ | <.181 | <.268 | <.131 | <.316 | <.145 | <.181 | <.169 | <.262 | <.153 | <.199 | <.192 | <.151 |
| $Ce^{141}$ | <.007 | <.011 | <.005 | <.001 | <.006 | <.006 | <.005 | <.008 | <.004 | <.005 | <.005 | <.004 |
| $Ce^{144}$ | <.007 | <.012 | <.005 | <.013 | <.006 | <.006 | <.005 | <.008 | <.004 | <.005 | <.005 | <.004 |

All values given as < are less than LLD

Ta[illegible]3-3 C
13 Week Composite
Gamma Isotopic Analysis
Results in pCi/$m^3$
Third Quarter

| | Sta 2 | Sta 3 | Sta 4 | Sta 5 | Sta 6 | Sta 7 | Sta 8 | Sta 9 | Sta 10 | Sta 11 | Sta 12 | Sta 13A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $Be^{7}$ | .095±.006 | .007±.001 | .090±.007 | .136±.027 | .034±.089 | .032±.085 | .023±.064 | .095±.011 | .029±.082 | .076±.009 | .032±.092 | .067±.006 |
| $K^{40}$ | .002±.005 | <.001 | .005±.006 | .003±.022 | .002±.002 | .008±.008 | .007±.007 | .007±.007 | .008±.008 | .003±.007 | .008±.008 | .003±.004 |
| $Cr^{51}$ | <.014 | <.004 | <.023 | <.093 | <.037 | <.032 | <.028 | <.039 | <.029 | <.038 | <.039 | <.026 |
| $Mn^{54}$ | <.001 | <.001 | <.003 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Fe^{59}$ | <.002 | <.001 | <.003 | <.010 | <.004 | <.003 | <.003 | <.004 | <.003 | <.004 | <.003 | <.003 |
| $Co^{58}$ | <.001 | <.001 | <.001 | <.004 | <.001 | <.001 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 |
| $Co^{60}$ | <.001 | <.001 | <.001 | <.003 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Zn^{65}$ | <.001 | <.001 | <.001 | <.004 | <.002 | <.001 | <.001 | <.002 | <.001 | <.002 | <.002 | <.001 |
| $Zr^{95}$ | <.002 | <.001 | <.002 | <.006 | <.002 | <.002 | <.002 | <.003 | <.002 | <.003 | <.002 | <.002 |
| $Nb^{95}$ | <.001 | <.001 | <.002 | <.006 | <.003 | <.003 | <.002 | <.003 | <.002 | <.003 | <.003 | <.002 |
| $Ru^{103}$ | <.001 | <.001 | <.002 | <.006 | <.002 | <.002 | <.002 | <.003 | <.002 | <.002 | <.002 | <.002 |
| $Ru^{106}$ | <.005 | <.001 | <.006 | <.019 | <.007 | <.006 | <.005 | <.006 | <.005 | <.006 | <.006 | <.004 |
| $Cs^{134}$ | <.001 | <.001 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Cs^{137}$ | <.001 | <.001 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $BaLa^{140}$ | <.026 | <.009 | <.056 | <.257 | <.119 | <.118 | <.104 | <.166 | <.121 | <.174 | <.166 | <.116 |
| $Ce^{141}$ | <.002 | <.001 | <.003 | <.013 | <.004 | <.004 | <.003 | <.005 | <.003 | <.005 | <.005 | <.003 |
| $Ce^{144}$ | <.003 | <.001 | <.004 | <.016 | <.005 | <.004 | <.003 | <.004 | <.169 | <.004 | <.004 | <.003 |

All values given as < are less than LLD

## Table 3-3 D
## 13 Week Composite
## Gamma Isotopic Analysis
## Results in pCi/$m^3$
## Fourth Quarter

| | Sta 2 | Sta 3 | Sta 4 | Sta 5 | Sta 6 | Sta 7 | Sta 8 | Sta 9 | Sta 10 | Sta 11 | Sta 12 | Sta 13A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $Be^{7}$ | .080±.006 | .087±.008 | .081±.008 | .147±.017 | .079±.015 | .074±.007 | .085±.006 | .069±.009 | .082±.008 | .088±.007 | .075±.008 | .084±.008 |
| $K^{40}$ | .002±.006 | .001±.007 | .004±.007 | .009±.014 | <.004 | <.014 | <.011 | <.016 | .003±.006 | .003±.006 | <.015 | <.016 |
| $Cr^{51}$ | <.023 | <.029 | <.029 | <.058 | <.062 | <.030 | <.024 | <.032 | <.027 | <.030 | <.031 | <.035 |
| $Mn^{54}$ | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Fe^{59}$ | <.003 | <.003 | <.003 | <.006 | <.006 | <.003 | <.003 | <.003 | <.003 | <.003 | <.003 | <.004 |
| $Co^{58}$ | <.001 | <.001 | <.001 | <.002 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Co^{60}$ | <.001 | <.001 | <.001 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Zn^{65}$ | <.001 | <.0021 | <.002 | <.003 | <.003 | <.001 | <.001 | <.002 | <.001 | <.001 | <.001 | <.002 |
| $Zr^{95}$ | <.002 | <.002 | <.002 | <.004 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 |
| $Nb^{95}$ | <.002 | <.002 | <.002 | <.005 | <.005 | <.002 | <.002 | <.003 | <.002 | <.002 | <.003 | <.003 |
| $Ru^{103}$ | <.002 | <.002 | <.002 | <.004 | <.004 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 |
| $Ru^{106}$ | <.005 | <.007 | <.006 | <.012 | <.012 | <.006 | <.005 | <.006 | <.006 | <.005 | <.006 | <.006 |
| $Cs^{134}$ | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $Cs^{137}$ | <.001 | <.001 | <.001 | <.001 | <.002 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| $BaLa^{140}$ | <.065 | <.091 | <.082 | <.195 | <.215 | <.104 | <.085 | <.120 | <.105 | <.102 | <.119 | <.131 |
| $Ce^{141}$ | <.003 | <.004 | <.004 | <.007 | <.007 | <.004 | <.003 | <.004 | <.003 | <.004 | <.004 | <.004 |
| $Ce^{144}$ | <.003 | <.004 | <.004 | <.008 | <.008 | <.004 | <.003 | <.004 | <.003 | <.004 | <.004 | <.004 |

All values given as < are less than LLD

Table 3-4

Charcoal Cartridges Gamma Analysis for Iodine
Results in $pCi/m^3$

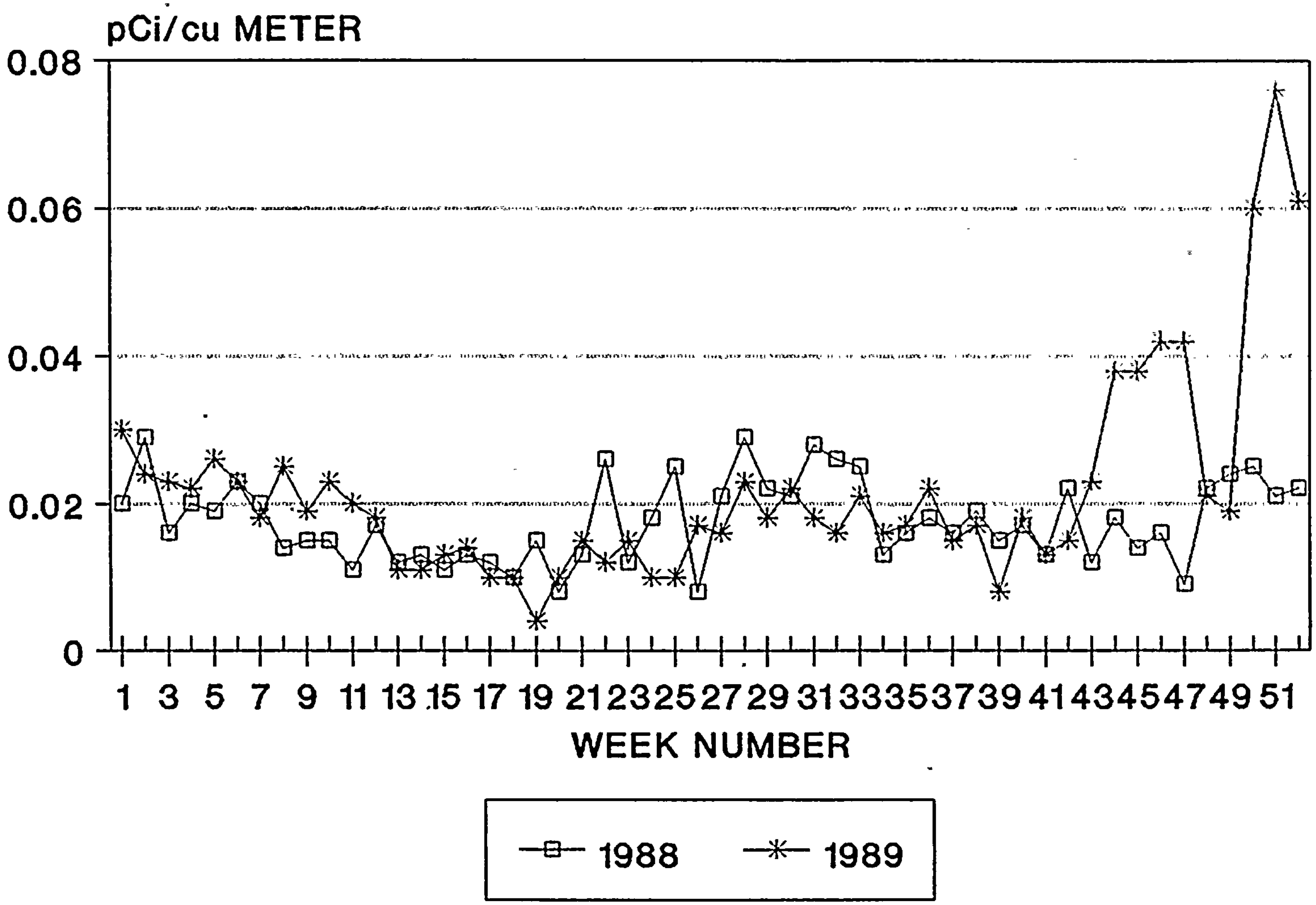
| Week of | Sta. #4 | Sta. #7 | Sta. #9 | Sta. #11 |
|---|---|---|---|---|
| 1/6 | <0.050 | <0.059 | <0.068 | <0.112 |
| 1/13 | <0.058 | <0.063 | <0.076 | <0.067 |
| 1/20 | <0.067 | <0.057 | <0.064 | <0.076 |
| 1/27 | <0.050 | <0.065 | <0.075 | <0.073 |
| 2/3 | <0.051 | <0.058 | <0.069 | <0.067 |
| 2/10 | <0.054 | <0.062 | <0.076 | <0.064 |
| 2/17 | <0.059 | <0.059 | <0.070 | <0.067 |
| 2/24 | <0.047 | <0.055 | <0.068 | <0.062 |
| 3/3 | <0.077 | <0.057 | <0.071 | <0.063 |
| 3/10 | <0.073 | <0.064 | <0.070 | <0.062 |
| 3/17 | <0.053 | <0.055 | <0.073 | <0.063 |
| 3/24 | <0.021 | <0.025 | (a) | (a) |
| 3/31 | <0.050 | <0.059 | <0.068 | <0.028 |
| 4/7 | <0.044 | <0.050 | <0.064 | <0.083 |
| 4/14 | <0.043 | <0.052 | <0.066 | <0.059 |
| 4/21 | <0.045 | <0.054 | <0.063 | <0.063 |
| 4/28 | <0.046 | <0.052 | <0.064 | <0.064 |
| 5/5 | <0.048 | <0.059 | <0.068 | <0.063 |
| 5/12 | <0.052 | <0.054 | <0.062 | <0.060 |
| 5/19 | <0.010 | <0.020 | <0.031 | <0.024 |
| 5/26 | <0.034 | <0.057 | <0.044 | <0.063 |
| 6/2 | <0.028 | <0.056 | <0.083 | <0.047 |
| 6/9 | <0.047 | <0.040 | <0.054 | <0.064 |
| 6/16 | <0.047 | <0.032 | <0.063 | <0.033 |
| 6/23 | <0.047 | <0.040 | <0.074 | <0.038 |
| 6/30 | <0.051 | <0.038 | <0.071 | <0.040 |
| 7/7 | <0.053 | <0.038 | <0.072 | <0.038 |
| 7/14 | <0.049 | <0.058 | <0.061 | <0.071 |
| 7/21 | <0.028 | <0.032 | <0.042 | <0.034 |
| 7/28 | <0.028 | <0.034 | <0.039 | <0.039 |
| 8/4 | <0.028 | <0.033 | <0.042 | <0.113 |
| 8/11 | <0.028 | <0.029 | <0.037 | <0.037 |
| 8/18 | <0.027 | <0.031 | <0.038 | <0.036 |
| 8/25 | <0.031 | <0.035 | <0.035 | <0.035 |
| 9/1 | <0.046 | <0.035 | <0.043 | <0.035 |
| 9/8 | <0.040 | <0.032 | <0.040 | <0.037 |
| 9/15 | <0.034 | <0.033 | <0.028 | <0.037 |
| 9/22 | <0.038 | <0.034 | <0.039 | <0.037 |
| 9/28 | <0.042 | <0.045 | <0.039 | <0.036 |
| 10/6 | <0.033 | <0.036 | <0.044 | <0.035 |
| 10/13 | <0.039 | <0.034 | <0.039 | <0.037 |
| 10/20 | <0.032 | <0.036 | <0.043 | <0.037 |
| 10/27 | <0.035 | <0.035 | <0.043 | <0.038 |
| 11/3 | <0.038 | <0.034 | <0.037 | <0.036 |
| 11/10 | <0.034 | <0.068 | <0.043 | <0.038 |
| 11/16 | <0.036 | <0.060 | <0.040 | <0.038 |
| 11/22 | <0.038 | <0.034 | <0.045 | <0.033 |
| 11/30 | <0.029 | <0.026 | <0.035 | <0.032 |
| 12/8 | <0.031 | <0.025 | <0.034 | <0.022 |
| 12/15 | <0.039 | <0.028 | <0.036 | <0.026 |
| 12/22 | <0.034 | <0.027 | <0.038 | <0.024 |
| 12/29 | <0.036 | <0.032 | <0.037 | <0.028 |

All values given as < are less than LLD

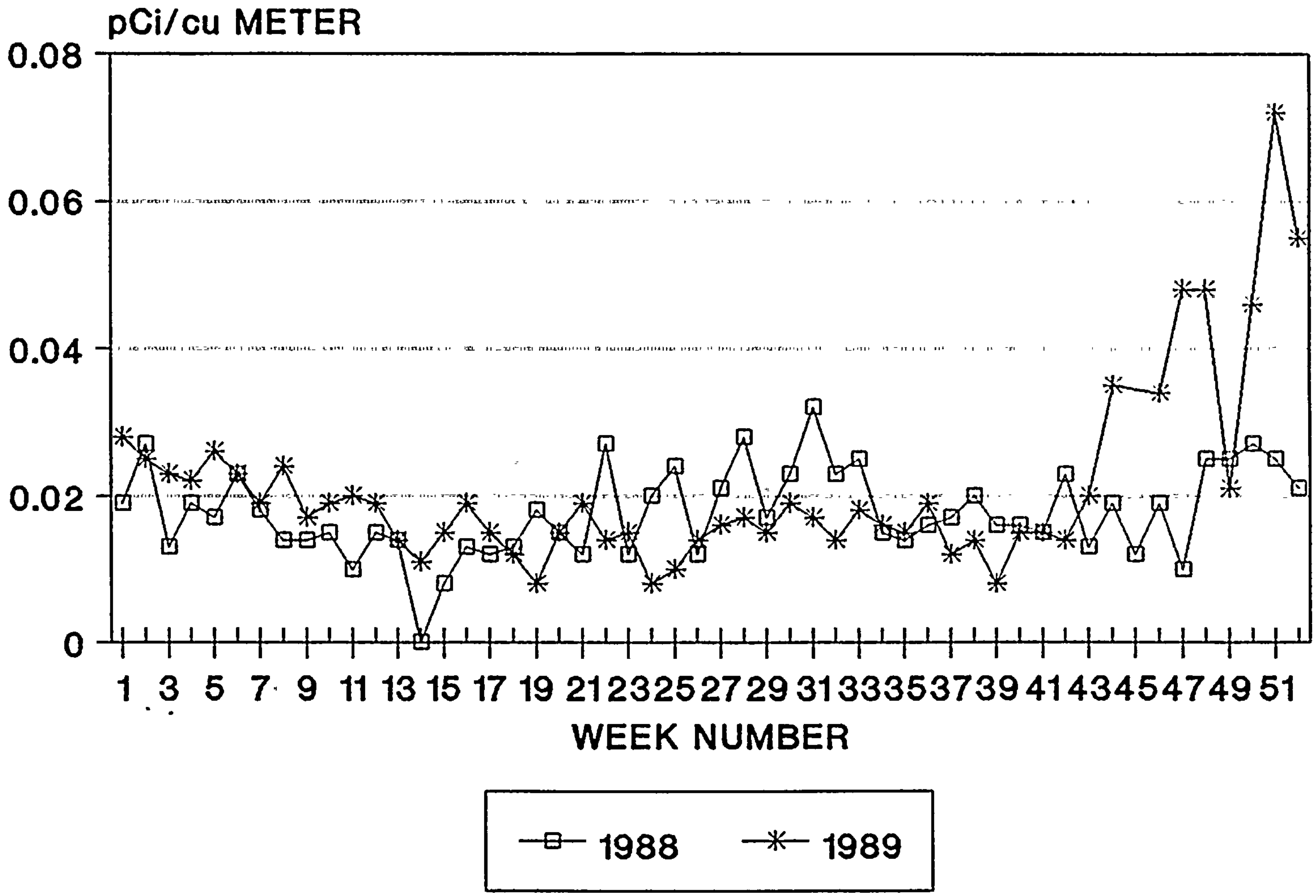
(a) Unit out of service

# ONSITE AIR MONITORS

GROSS BETA ANALYSIS
R. E. GINNA POWER STATION

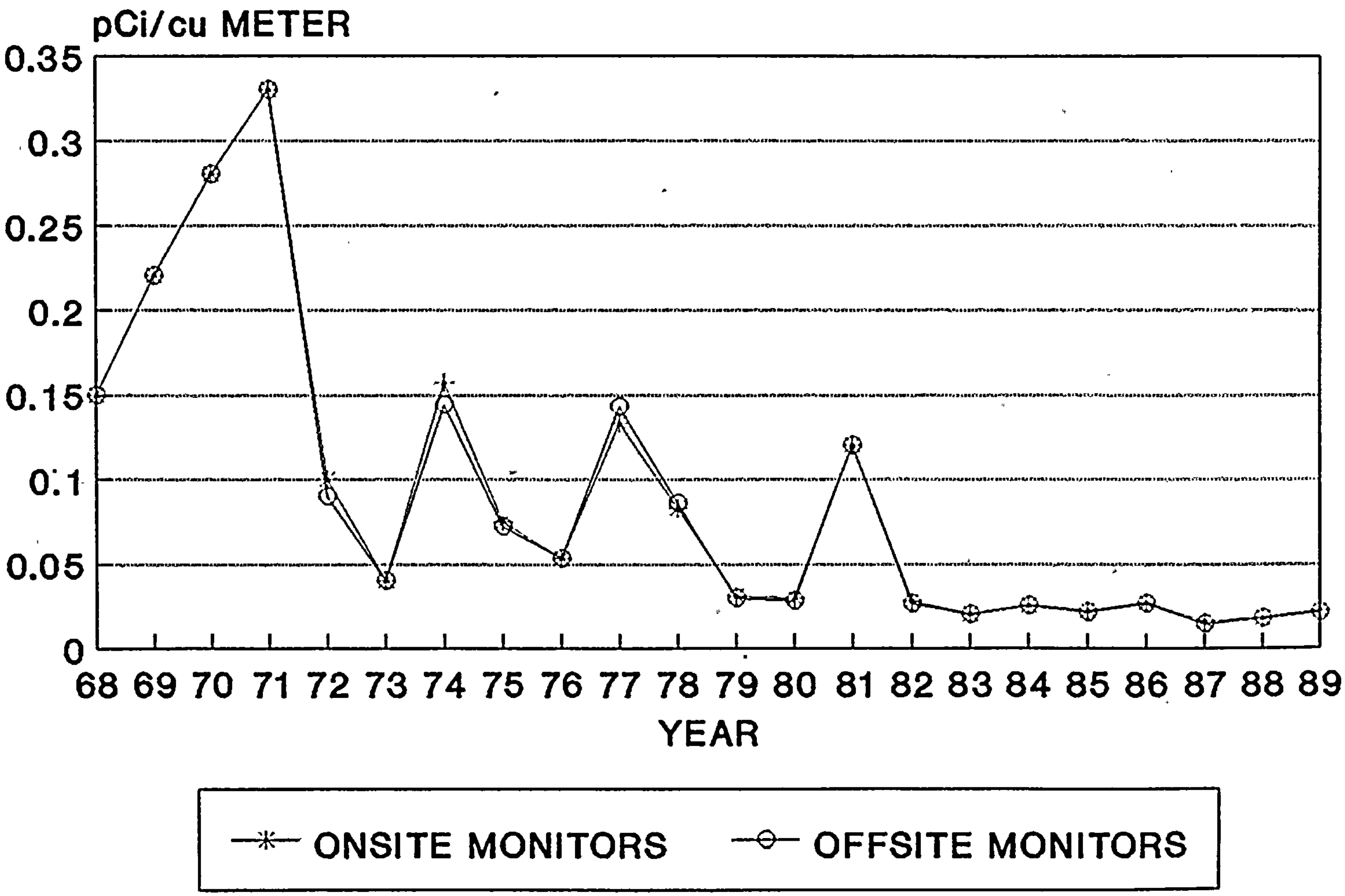


# OFFSITE AIR MONITORS
GROSS BETA ANALYSIS
R. E. GINNA POWER STATION



# ANNUAL TRENDING OF AIR ACTIVITY

**GROSS BETA ANALYSIS FOR 1968 - 1989**
**R. E. GINNA POWER STATION**




PEAKS ARE INDICATIVE OF NUCLEAR DETONATIONS IN THE ATMOSPHERE.

## 3.3 Water Samples

Water samples are collected on a regular schedule from locations surrounding the plant to demonstrate that there is no measurable influence or contamination of drinking or irrigation water from liquid effluent releases or deposition from gaseous effluent releases.

Composite samples are collected weekly from Lake Ontario, upstream (Russell Station) and downstream (Ontario Water District Plant - OWD), and analyzed for gross beta activity. There was no significant difference between the upstream and downstream sample concentrations. The yearly averages were 2.24 and 2.12 pCi/liter for the upstream and downstream samples respectively.

Weekly composite samples are taken from the plant circulating water intake (Circ, In) and discharge canal (Circ. Out). The yearly averages were 1.90 and 2.10 pCi/liter for the intake and discharge canal respectively. These are essentially the same as the upstream and downstream values of 2.01 and 2.12 pCi/liter as they fall within the $\pm$ 2 sigma error band and range of the measurement. The weekly composite samples of the OWD and discharge canal are combined into biweekly samples and a gamma isotopic analysis is performed.

For all batch releases, the average concentration in the discharge canal from the identified activity during 1989 was 0.13 pCi/liter. The normal 2 sigma variation in the activity calculation of composite samples is 0.85 pCi/liter or 7 times the average concentration added by releases from the plant.

Samples of tap water, the nearest well, and the creek which crosses the site are collected and analyzed monthly. The results show no indication of plant influence. Results for all beta analyses are listed in Table 3-5.

Gamma isotopic analysis is done on each monthly sample and each biweekly or monthly composite of weekly samples. These are listed in Tables 3-6 to 3-11 and separated by source of sample.

Trend plots are included to show the weekly upstream and downstream beta activities. A trend plot showing the annual average activity measured during the years 1968 to 1989 is included to show the data during the years the R.E. Ginna Nuclear Power Plant has been in operation. The peaks correspond to the years when atmospheric testing of nuclear weapons occurred.

## Fallout

Fallout is a term used to denote radioactive material settling from the atmosphere to the ground. At the sampling stations, the fallout settles as dust or is collected with rainfall by a funnel and bottle. There are two on-site sampling stations and three off-site. Fallout generally increases in the spring months due to transfer of fission products from the upper to the lower atmosphere in conjunction with increased rainfall. The onsite average and the offsite average were 5.39 and 5.74 pCi/$m^2$/day. Based on the two sigma error of the measurement, there was no significant difference between on-site and off-site samples for the period of January through December, 1989. Table 3-5C lists the values for fallout samples.

## Tritium Analysis

Tritium analysis is done on all water samples on a monthly basis. Composites are made from the weekly composites and a portion distilled for analysis to remove interfering elements or activity. Tritium data is given in Tables 3-12 A & B.

## Iodine Analysis

All monthly composite water samples except the fallout samples are analyzed for Iodine-131. The analysis is done by chemical separation using an added carrier solution and gross beta counting. The analysis allows the determination of Iodine-131 activity of < 1 pCi/liter. Iodine data is given in Table 3-13.

Table 3-5 A

1989 Environmental Water Samples Gross Beta Analysis
Results in pCi/L

| Week of | Russell | O.W.D. | Circ In | Circ Out | Deer Creek | Tap | Well 'B' |
|---|---|---|---|---|---|---|---|
| 1/1 | (a) | 2.62±.85 | 2.24±.80 | <1.20 | | | |
| 1/8 | 3.33±.93 | 2.50±.85 | 2.90±.88 | 2.67±.86 | | | |
| 1/15 | 2.69±.82 | 2.43±.83 | 1.97±.78 | 2.36±.79 | 3.38±.98 | 1.70±.77 | 3.33±.98 |
| 1/22 | 2.48±.77 | 2.78±.87 | 1.84±.78 | 2.17±.79 | | | |
| 1/29 | 3.80±.83 | 4.63±.91 | 3.26±.79 | 3.45±.82 | | | |
| 2/4 | 2.43±.79 | 3.04±.84 | 3.36±.86 | 2.53±.80 | | | |
| 2/12 | 2.84±.95 | 1.72±.68 | <1.20 | 4.96±.99 | (b) | (a) | (b) |
| 2/19 | 1.98±.72 | 1.78±.78 | 2.14±.77 | 3.04±.90 | | | |
| 2/26 | 2.35±.80 | 1.76±.75 | 1.46±.75 | 2.20±.80 | | | |
| 3/5 | 1.83±.80 | 2.31±.82 | 1.81±.78 | 2.08±.81 | | | |
| 3/12 | 2.45±.82 | 2.31±.80 | 1.60±.78 | 2.07±.79 | 3.33±.93 | | 3.13±.98 |
| 3/19 | 2.88±.86 | 2.16±.91 | 2.22±.75 | 2.06±.78 | | 1.71±.87 | |
| 3/26 | 1.32±.82 | 1.36±.74 | 1.63±.79 | 2.14±.81 | | | |
| 4/2 | 1.27±.80 | 2.50±.80 | 1.79±.80 | 1.76±.76 | | | |
| 4/9 | 2.76±.84 | 1.71±.83 | (a) | <1.20 | | | |
| 4/16 | 1.94±.79 | 1.90±.84 | <1.20 | 1.47±.86 | 1.82±.93 | 1.76±.78 | 1.49±.87 |
| 4/23 | 2.06±.71 | 1.51±.82 | 1.59±.81 | 1.89±.82 | | | |
| 4/30 | 2.67±.79 | 3.07±.85 | 1.73±.75 | 3.07±.85 | | | |
| 5/7 | 1.50±.72 | 1.26±.80 | 1.74±.81 | 2.39±.84 | | | |
| 5/14 | 4.47±.92 | 1.50±.82 | 1.94±.84 | 2.38±.87 | 3.00±.98 | | 2.27±.97 |
| 5/21 | 1.61±.83 | 2.49±.83 | 1.96±.78 | 2.41±.83 | | <1.20 | |
| 5/28 | 1.30±.76 | <1.20 | <1.20 | 1.79±.80 | | | |
| 6/4 | 1.30±.77 | 1.88±.81 | 1.48±.79 | 1.33±.78 | | | |
| 6/11 | 2.04±.82 | 1.71±.89 | <1.20 | 1.44±.80 | | | |
| 6/18 | 1.47±.76 | <1.20 | <1.20 | 1.53±.80 | 2.36±.92 | 1.47±.71 | 2.30±.92 |
| 6/25 | 2.22±.76 | 2.92±.82 | 3.37±.85 | (a) | | | |
| | | | | | | | |
| Maximum | 4.47 | 4.63 | 3.37 | 4.96 | 3.38 | 1.76 | 3.33 |
| Average | 2.28 | 2.18 | 1.92 | 2.22 | 2.78 | 1.56 | 2.50 |
| Minimum | 1.27 | 1.26 | 1.46 | 1.33 | 1.82 | 1.47 | 1.49 |

(a) Sample omitted.
(b) No sample due to weather conditions.
All values given as < are less than the LLD corrected for decay

Table 3-5 B

## 1989 Environmental Water Samples Gross Beta Analysis
## Results in pCi/L

| Week of | Russell | O.W.D. | Circ In | Circ Out | Deer Creek | Tap | Well 'B' |
|---|---|---|---|---|---|---|---|
| 7/2 | 1.61±.86 | 1.30±.77 | 1.56±.78 | 1.91±.76 | | | |
| 7/9 | 1.59±.86 | 1.96±.88 | 2.02±.86 | <1.20 | | | |
| 7/16 | (a) | 1.24±.72 | 1.41±.71 | 1.43±.71 | 2.22±.77 | 1.28±.82 | 1.42±.96 |
| 7/23 | 1.79±.72 | <1.20 | 1.54±.73 | 1.68±.73 | | | |
| 7/30 | 1.78±.75 | 1.96±.74 | 3.23±.80 | 1.38±.68 | | | |
| 8/6 | 1.97±.75 | 2.36±.80 | <1.20 | <1.20 | | | |
| 8/13 | <1.20 | 2.53±.87 | 1.88±.74 | 1.54±.69 | 1.71±.84 | 1.41±.70 | |
| 8/20 | 1.48±.76 | <1.20 | 1.70±.76 | 1.38±.70 | | | 2.66±.93 |
| 8/27 | <1.20 | 1.46±.70 | 1.28±.68 | 2.11±.75 | | | |
| 9/3 | 1.97±.75 | 1.24±.72 | 2.34±.78 | 1.71±.71 | | | |
| 9/10 | 1.39±.71 | <1.20 | 1.49±.73 | 1.54±.74 | | | |
| 9/17 | 1.88±.74 | 1.38±.72 | (a) | 2.70±.79 | 3.13±.92 | 1.87±.69 | 4.23±.98 |
| 9/24 | 1.56±.75 | 1.64±.75 | 2.55±.85 | 2.38±.76 | | | |
| 10/1 | 1.28±.70 | <1.20 | 1.69±.73 | 1.87±.74 | | | |
| 10/8 | <1.20 | 2.00±.78 | <1.20 | 1.58±.77 | 2.82±.93 | | |
| 10/15 | 1.32±.73 | 1.41±.77 | 1.53±.76 | 1.70±.77 | | <1.20 | 3.18±.94 |
| 10/22 | 1.94±.78 | 2.32±.80 | 1.49±.72 | 1.67±.73 | | | |
| 10/29 | <1.20 | <2.89 | <2.89 | <2.82 | | | |
| 11/5 | 2.44±1.27 | 5.13±1.37 | 2.82±1.28 | 4.21±.64 | | | |
| 11/12 | <2.91 | 4.04±1.50 | 1.59±1.44 | 1.57±1.42 | 6.24±1.54 | (a) | 4.05±1.55 |
| 11/19 | 2.47±1.47 | 2.96±1.43 | 2.03±1.38 | 1.88±1.34 | | | |
| 11/26 | 2.28±1.45 | 2.44±1.27 | <1.20 | 4.21±.66 | | | |
| 12/3 | 1.58±1.71 | 2.16±1.39 | 2.46±1.31 | 1.59±1.27 | | | |
| 12/10 | <1.20 | 3.23±.81 | 2.78±.77 | 3.20±.81 | 2.61±1.51 | 1.69±1.26 | (a) |
| 12/17 | 2.19±.88 | 2.04±.88 | 1.47±.72 | 1.24±.79 | | | |
| 12/24 | 1.98±.92 | <1.20 | 2.00±.83 | 1.74±.90 | | | |
| Maximum | 2.47 | 4.04 | 3.23 | 4.21 | 6.24 | 1.87 | 4.23 |
| Average | 1.74 | 2.07 | 1.89 | 1.98 | 3.12 | 1.49 | 3.11 |
| Minimum | 1.28 | 1.24 | 1.41 | 1.24 | 1.71 | 1.28 | 1.42 |

(a) Sample lost in sampling or processing

All values given as < are less than the LLD corrected for decay

Table 3-5 C

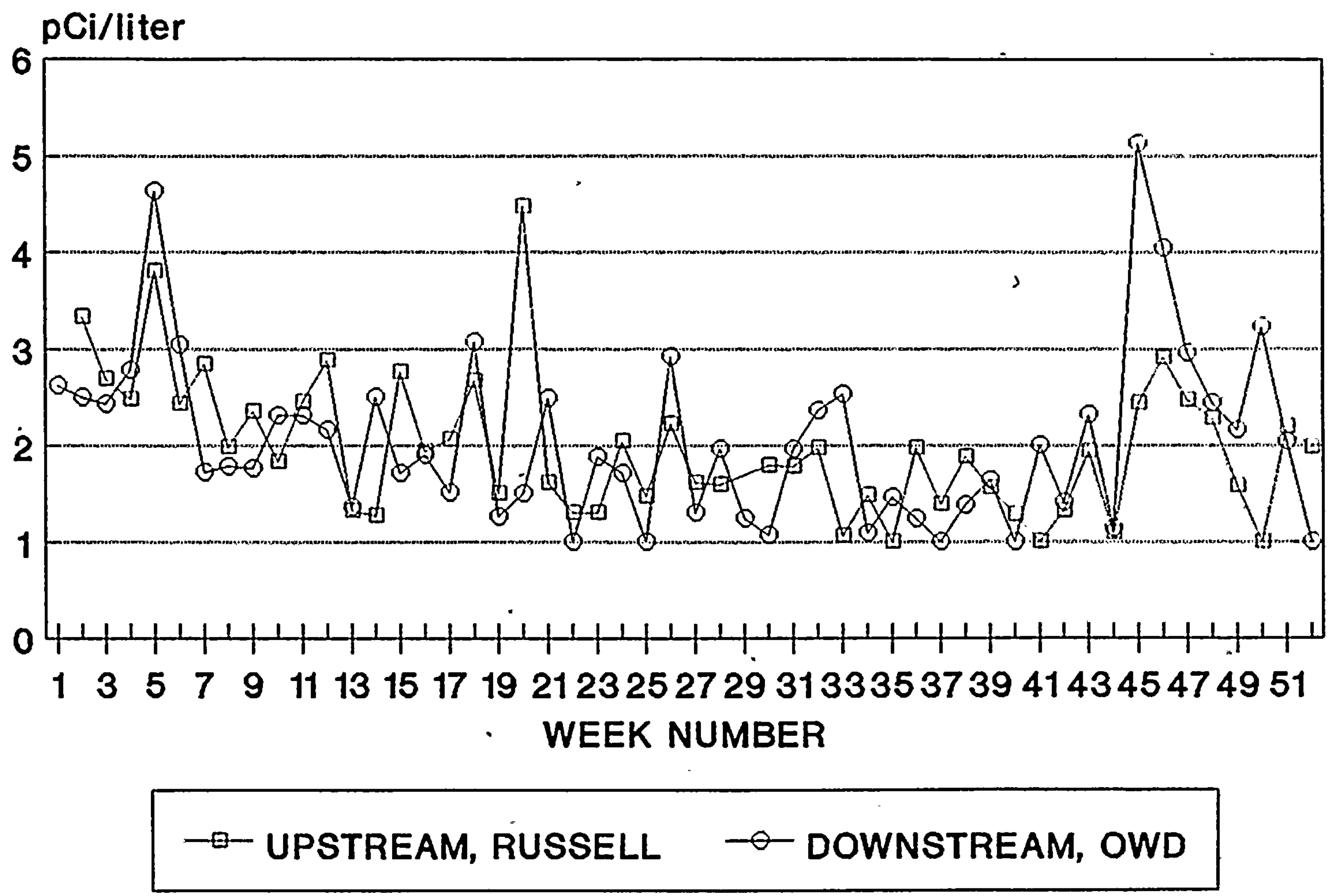
Fallout
Results in pCi/m²/Day

| | Sta. #3 | Sta. #5 | Sta. #8 | Sta. #10 | Sta. #12 |
|---|---|---|---|---|---|
| January | 1.44±0.33 | 1.76±0.31 | 1.76±0.38 | 1.25±0.33 | 1.74±0.38 |
| February | 5.33±0.57 | 2.46±0.49 | 6.60±0.69 | 6.37±0.64 | 3.71±0.66 |
| March | 6.70±1.76 | 4.81±1.43 | 20.3±2.28 | 3.64±1.46 | 2.52±1.29 |
| April | 3.72±0.81 | 3.07±0.96 | 6.84±1.28 | 5.42±1.28 | 4.70±1.03 |
| May | 13.3±3.02 | 14.5±3.05 | 7.42±2.54 | 3.63±2.68 | 15.7±2.52 |
| June | 5.27±2.00 | 4.20±2.04 | 3.82±1.92 | 3.24±1.31 | 7.31±2.56 |
| July | 1.80±0.38 | 2.34±0.26 | 1.47±0.26 | 1.78±0.53 | <1.10 |
| August | 11.9±1.26 | 8.49±1.13 | 1.22±0.94 | 2.66±1.27 | 3.09±1.01 |
| September | 4.55±1.65 | 3.58±1.57 | 3.63±1.67 | 3.06±1.66 | 6.04±1.86 |
| October | 10.4±2.67 | 1.40±2.54 | 1.40±2.53 | 14.6±2.76 | <1.10 |
| November | 5.06±3.48 | 3.82±2.31 | 15.3±2.54 | 6.12±2.02 | 7.15±2.34 |
| December | 3.80±0.43 | 5.43±0.42 | 8.60±0.55 | 7.50±0.62 | 5.50±0.58 |
| | | | | | |
| Maximum | 13.3 | 14.5 | 20.3 | 14.6 | 15.7 |
| Average | 6.11 | 4.66 | 6.53 | 4.94 | 5.74 |
| Minimum | 1.44 | 1.40 | 1.40 | 1.25 | 1.74 |

All values given as < are less than LLD corrected for decay

# ENVIRONMENTAL WATER SAMPLES

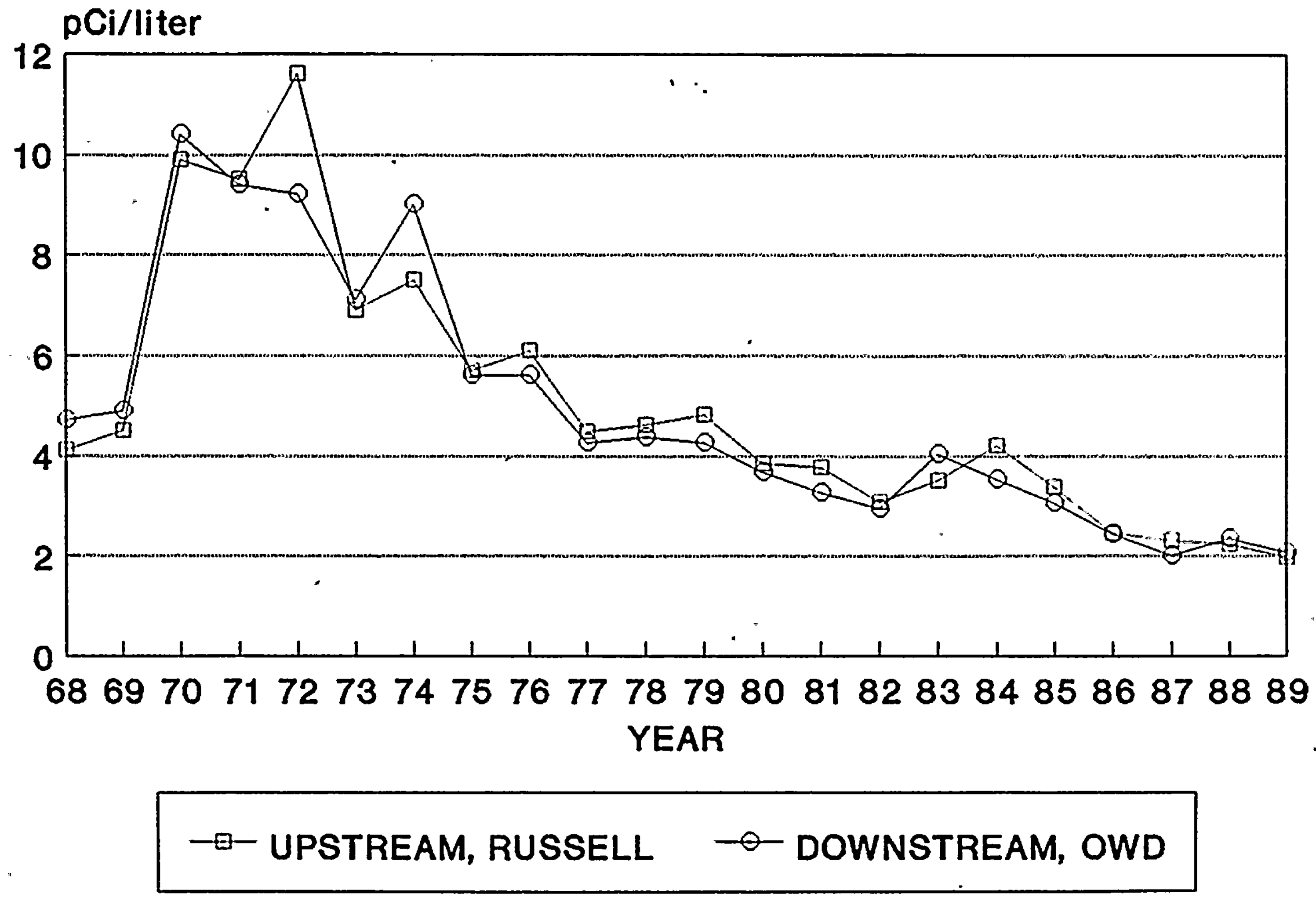
GROSS BETA ANALYSIS FOR 1989
R. E. GINNA POWER STATION




ALL VALUES PLOTTED AT 1.00 pCi/L
ARE LLD VALUES.

# ANNUAL TRENDING OF ENVIRONMENTAL WATERS

GROSS BETA ANALYSIS
R. E. GINNA POWER STATION




YEARS 1968 - 1989

Table 3-6

Ontario Water District Water Gamma Isotopic Analyses
Results in pCi/Liter

| Between Dates Of | $^{7}$Be | $^{51}$Cr | $^{54}$Mn | $^{59}$Fe | $^{58}$Co | $^{60}$Co | $^{65}$Zn | $^{95}$Zr | $^{103}$Ru | $^{106}$Ru | $^{134}$Cs | $^{137}$Cs | $^{140}$Ba | $^{141}$Ce | $^{144}$Ce | $^{226}$Ra |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/30 - 1/13 | <53 | <60 | <4 | <10 | <6 | <6 | <11 | <10 | <7 | <51 | <5 | <6 | <28 | <15 | <61 | <11 |
| 1/13 - 1/30 | <49 | <55 | <5 | <9 | <5 | <6 | <10 | <9 | <6 | <49 | <4 | <6 | <25 | <14 | <61 | <11 |
| 1/30 - 2/17 | <48 | <60 | <5 | <10 | <5 | <5 | <10 | <9 | <6 | <48 | <5 | <6 | <29 | <14 | <61 | <10 |
| 2/17 - 3/3 | | | | (a) | | | | | <6 | <48 | <5 | <5 | <28 | <14 | <58 | <10 |
| 3/3 - 3/17 | <50 | <58 | <5 | <9 | <4 | <5 | <10 | <9 | | | | (a) | | | | |
| 3/17 - 3/31 | <48 | <56 | <4 | <9 | <5 | <6 | <9 | <8 | <6 | <46 | <5 | <5 | <26 | <14 | <56 | <10 |
| 3/31 - 4/14 | <45 | <51 | <5 | <9 | <5 | <6 | <9 | <9 | <5 | <46 | <5 | <6 | <21 | <13 | <56 | <10 |
| 4/14 - 4/28 | <49 | <55 | <5 | <9 | <5 | <5 | <9 | <9 | <6 | <48 | <5 | <6 | <27 | <14 | <56 | <10 |
| 4/28 - 5/12 | <48 | <55 | <5 | <9 | <5 | <5 | <9 | <8 | <6 | <47 | <5 | <6 | <27 | <14 | <57 | <10 |
| 5/12 - 5/26 | | | | (b) | | | | | | | | (b) | | | | |
| 5/26 - 6/9 | | | | (b) | | | | | | | | (b) | | | | |
| 6/9 - 6/23 | | | | (b) | | | | | | | | (b) | | | | |
| 6/23 - 7/1 | | | | (b) | | | | | | | | (b) | | | | |
| 7/1 - 7/31 | <35 | <49 | <3 | <8 | <4 | $5\pm3$ | <7 | <7 | <5 | <34 | <3 | <4 | <29 | <11 | <38 | <7 |
| 8/1 - 9/1 | <25 | <32 | <3 | <6 | <3 | <4 | <7 | <5 | <4 | <30 | <3 | <4 | <13 | <7 | <31 | <7 |
| 9/1 - 9/14 | <31 | <36 | <3 | <6 | <3 | <4 | <6 | <6 | <4 | <28 | <3 | <4 | <19 | <8 | <32 | <7 |
| 9/14 - 9/28 | <31 | <34 | <3 | <6 | <3 | <4 | <7 | <6 | <4 | <29 | <3 | <4 | <17 | <8 | <32 | <6 |
| 9/28 -10/13 | <30 | <36 | <3 | <6 | <3 | <4 | <5 | <6 | <4 | <28 | <3 | <4 | <16 | <8 | <33 | <7 |
| 10/13 -10/27 | <28 | <35 | <3 | <6 | <3 | <4 | <6 | <6 | <4 | <29 | <3 | <4 | <16 | <8 | <33 | <6 |
| 10/27 -11/28 | <31 | <40 | <3 | <6 | <4 | <4 | <6 | <6 | <4 | <29 | <3 | <4 | <22 | <9 | <32 | <7 |
| 11/28 -12/9 | <32 | <36 | <3 | <6 | <3 | <5 | <6 | <5 | <4 | <30 | <3 | <3 | <18 | <8 | <32 | <6 |
| 12/9 -12/22 | <27 | <33 | <3 | <5 | <3 | <4 | <5 | <5 | <3 | <27 | <3 | <4 | <16 | <7 | <30 | <7 |
| 12/22 -12/31 | <27 | <33 | <3 | <6 | <3 | $6\pm3$ | <6 | <6 | <4 | <25 | <3 | <3 | <16 | <7 | <31 | <7 |

(a) Sample lost in sampling or processing.

(b) Environmental Ge(Li) Counter sent out for repair.
Tech. Spec. requirement is one (1) sample per quarter.

All values given as < are less than LLD corrected for decay

Table 3-7

Circ. Outlet Water Gamma Isotopic Analyses
Results in pCi/Liter

| Between Dates Of | $^{7}Be$ | $^{51}Cr$ | $^{54}Mn$ | $^{59}Fe$ | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{226}Ra$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/5 - 1/19 | <53 | <60 | <5 | <10 | <6 | <6 | <11 | <10 | <6 | <7 | <50 | <5 | <6 | <29 | <15 | <62 | <11 |
| 1/19 - 2/2 | <51 | <56 | <5 | <9 | <5 | <6 | <12 | <9 | <6 | <6 | <52 | <5 | <6 | <24 | <14 | <60 | <11 |
| 2/2 - 2/16 | <49 | <59 | <5 | <8 | <5 | <6 | <10 | <9 | <6 | <6 | <48 | <5 | <6 | <27 | <14 | <60 | <11 |
| 2/16 - 3/2 | <48 | <55 | <5 | <9 | <5 | <5 | <10 | <9 | <5 | <6 | <45 | <5 | <6 | <27 | <14 | <58 | <10 |
| 3/2 - 3/16 | <47 | <56 | <5 | <9 | <5 | <6 | <10 | <9 | <5 | <6 | <45 | <5 | <6 | <26 | <14 | <59 | <10 |
| 3/16 - 3/30 | <47 | <56 | <5 | <9 | <5 | <6 | <10 | <9 | <5 | <6 | <49 | <5 | <6 | <26 | <14 | <59 | <10 |
| 3/30 - 4/13 | <48 | <56 | <5 | <9 | <5 | <5 | <10 | <9 | <5 | <6 | <44 | <5 | <6 | <29 | <14 | <56 | <10 |
| 4/13 - 4/27 | <48 | <53 | <5 | <9 | <5 | <6 | <10 | <9 | <5 | <6 | <47 | <5 | <6 | <25 | <13 | <56 | <10 |
| 4/27 - 5/11 | <51 | <64 | <5 | <10 | <6 | 18±3 | <10 | <10 | <6 | <7 | <50 | <5 | <6 | <31 | <15 | <61 | <11 |
| 5/11 - 5/25 | | | | | (a) | | | | | | | | (a) | | | | |
| 5/25 - 6/8 | | | | | (a) | | | | | | | | (a) | | | | |
| 6/8 - 6/22 | | | | | (a) | | | | | | | | (a) | | | | |
| 6/22 - 7/1 | | | | | (a) | | | | | | | | (a) | | | | |
| 7/1 - 7/31 | <37 | <50 | <3 | <8 | <4 | <5 | <7 | <7 | <4 | <5 | <33 | <3 | <4 | <28 | <11 | <36 | <7 |
| 8/1 - 8/31 | <28 | <34 | <3 | <6 | <3 | <4 | <7 | <6 | <3 | <3 | <30 | <3 | <4 | <15 | <8 | <32 | <6 |
| 9/1 - 9/14 | <30 | <36 | <3 | <6 | <3 | <4 | <6 | <6 | <3 | <4 | <29 | <3 | <3 | <17 | <8 | <32 | <6 |
| 9/14 - 9/28 | <30 | <36 | <3 | <7 | <3 | <4 | <6 | <6 | <4 | <4 | <29 | <3 | <4 | <16 | <8 | <33 | <7 |
| 9/28 -10/12 | <22 | <55 | <2 | <4 | <2 | <3 | <4 | <4 | <2 | <2 | <20 | <2 | <3 | <8 | <6 | <27 | <5 |
| 10/12 -10/26 | <32 | <38 | <3 | <6 | <3 | <4 | <6 | <6 | <3 | <4 | <29 | <3 | <4 | <19 | <8 | <33 | <7 |
| 10/26 -11/9 | <31 | <35 | <3 | <5 | <3 | <4 | <7 | <6 | <4 | <4 | <28 | <3 | <3 | <18 | <8 | <33 | <7 |
| 11/9 -11/22 | <29 | <34 | <3 | <6 | <3 | <5 | <6 | <6 | <3 | <3 | <29 | <3 | <4 | <15 | <7 | <32 | <7 |
| 11/22 -12/7 | <29 | <35 | <3 | <6 | <3 | <4 | <5 | <6 | <3 | <3 | <28 | <3 | <4 | <16 | <8 | <31 | <7 |
| 12/7 -12/21 | <30 | <36 | <3 | <7 | <3 | <4 | <6 | <6 | <3 | <4 | <30 | <3 | <3 | <17 | <8 | <31 | <6 |
| 12/21 - 1/4 | <31 | <35 | <3 | <6 | <3 | <4 | <6 | <6 | <3 | <4 | <30 | <3 | <3 | <16 | <8 | <31 | <7 |

All values given as < are less than the LLD corrected for decay

(a) Environmental Ge(Li) Counter sent out for repair.
Tech. Spec. requirement is one (1) sample per quarter.

Table 3-8

## Russell Station Water Gamma Isotopic Analyses
Results in pCi/Liter

| Between Dates Of | $^{7}Be$ | $^{51}Cr$ | $^{54}Mn$ | $^{59}Fe$ | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{95}Zr$ | $^{95}Nb$ |
|---|---|---|---|---|---|---|---|---|---|
| 1/1 - 1/31 | <49 | <55 | <5 | <9 | <5 | <6 | <10 | <9 | <5 |
| 2/1 - 2/28 | <47 | <51 | <5 | <9 | <5 | <6 | <10 | <8 | <5 |
| 3/1 - 3/31 | <47 | <50 | <5 | <9 | <5 | <6 | <9 | <9 | <5 |
| 4/1 - 4/30 | <45 | <49 | <5 | <8 | <5 | <6 | <10 | <8 | <5 |
| 5/1 - 5/31 | <55 | <89 | <4 | <12 | <6 | <5 | <8 | <10 | <8 |
| 6/1 - 6/30 | <45 | <67 | <4 | <10 | <5 | <5 | <7 | <7 | <6 |
| 7/1 - 7/31 | <40 | <54 | <3 | <8 | <4 | <5 | <7 | <7 | <5 |
| 8/1 - 8/31 | <29 | <31 | <3 | <5 | <3 | <5 | <6 | <5 | <3 |
| 9/1 - 9/30 | <28 | <31 | <3 | <6 | <3 | <5 | <6 | <6 | <3 |
| 10/1 -10/31 | <29 | <32 | <3 | <6 | <3 | <5 | <7 | <5 | <3 |
| 11/1 -11/30 | <28 | <29 | <3 | <6 | <3 | <4 | <7 | <6 | <3 |
| 12/1 -12/31 | <28 | <29 | <3 | <5 | <3 | <4 | <6 | <5 | <3 |

| Between Dates Of | $^{103}Ru$ | $^{106}Ru$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{226}Ra$ |
|---|---|---|---|---|---|---|---|---|
| 1/1 - 1/31 | <6 | <50 | <5 | <6 | <23 | <14 | <61 | <11 |
| 2/1 - 2/28 | <6 | <49 | <5 | <6 | <20 | <13 | <60 | <11 |
| 3/1 - 3/31 | <5 | <44 | <5 | <6 | <20 | <12 | <55 | <10 |
| 4/1 - 4/30 | <5 | <45 | <5 | <6 | <21 | <12 | <56 | <10 |
| 5/1 - 5/31 | <8 | <39 | <4 | <5 | <116 | <19 | <44 | <9 |
| 6/1 - 6/30 | <6 | <35 | <3 | <4 | <64 | <15 | <40 | <8 |
| 7/1 - 7/31 | <5 | <30 | <3 | <4 | <34 | <11 | <37 | <7 |
| 8/1 - 8/31 | <3 | <27 | <3 | <4 | <13 | <7 | <31 | <7 |
| 9/1 - 9/30 | <3 | <29 | <3 | <3 | <11 | <7 | <34 | <7 |
| 10/1 -10/31 | <3 | <30 | <3 | <4 | <12 | <7 | <31 | <7 |
| 11/1 -11/30 | <3 | <29 | <3 | <4 | <11 | <7 | <32 | <7 |
| 12/1 -12/31 | <3 | <28 | <3 | <4 | <12 | <7 | <30 | <7 |

All values given as < are less than the LLD corrected for decay

Table 3-9

Tap Water Gamma Isotopic Analyses
Results in pCi/Liter

| Between Dates Of | $^{7}$Be | $^{51}$Cr | $^{54}$Mn | $^{59}$Fe | $^{58}$Co | $^{60}$Co | $^{65}$Zn | $^{95}$Zr | $^{95}$Nb |
|---|---|---|---|---|---|---|---|---|---|
| 1/1 - 1/31 | <49 | <52 | <5 | <9 | <5 | <6 | <11 | <9 | <5 |
| 2/1 - 2/28 | <46 | <50 | <5 | <9 | <5 | <6 | <10 | <9 | <5 |
| 3/1 - 3/31 | <46 | <46 | <5 | <8 | <4 | <5 | <10 | <8 | <4 |
| 4/1 - 4/30 | <44 | <46 | <4 | <8 | <5 | <5 | <9 | <8 | <5 |
| 5/1 - 5/31 | | | | | (a) | | | | |
| 6/1 - 6/30 | | | | | (a) | | | | |
| 7/1 - 7/31 | <30 | <33 | <3 | <6 | <3 | 7±5 | <7 | <6 | <3 |
| 8/1 - 8/31 | <30 | <30 | <3 | <5 | <3 | 5±4 | <6 | <5 | <3 |
| 9/1 - 9/30 | <29 | <30 | <3 | <6 | <3 | <5 | <6 | <6 | <3 |
| 10/1 -10/31 | <27 | <30 | <3 | <5 | <3 | <5 | <6 | <6 | <3 |
| 11/1 -11/30 | <27 | <30 | <3 | <5 | <3 | <5 | <6 | <5 | <3 |
| 12/1 -12/31 | <29 | <30 | <3 | <6 | <3 | <5 | <6 | <5 | <3 |

| Between Dates Of | $^{103}$Ru | $^{106}$Ru | $^{134}$Cs | $^{137}$Cs | $^{140}$Ba | $^{141}$Ce | $^{144}$Ce | $^{226}$Ra |
|---|---|---|---|---|---|---|---|---|
| 1/1 - 1/31 | <6 | <48 | <5 | <6 | <20 | <13 | <61 | <12 |
| 2/1 - 2/28 | <5 | <49 | <5 | <6 | <20 | <13 | <60 | <11 |
| 3/1 - 3/31 | <5 | <46 | <5 | <6 | <18 | <12 | <55 | <10 |
| 4/1 - 4/30 | <5 | <43 | <5 | <6 | <17 | <12 | <55 | <10 |
| 5/1 - 5/31 | | | | (a) | | | | |
| 6/1 - 6/30 | | | | (a) | | | | |
| 7/1 - 7/31 | <4 | <35 | <3 | 9±5 | <13 | <8 | <36 | <8 |
| 8/1 - 8/31 | <3 | <31 | <3 | <4 | <12 | <10 | <33 | <7 |
| 9/1 - 9/30 | <3 | <28 | <3 | <4 | <11 | <7 | <32 | <7 |
| 10/1 -10/31 | <3 | <28 | <3 | <4 | <11 | <7 | <33 | <7 |
| 11/1 -11/30 | <3 | <29 | <3 | <4 | <11 | <7 | <31 | <7 |
| 12/1 -12/31 | <3 | <28 | <3 | <4 | <11 | <7 | <31 | <6 |

All values given as < are less than the LLD corrected for decay

(a) Environmental Ge(Li) counter sent out for repair.
Tech. Spec. requirement is one (1) sample per quarter.

## Table 3-10

### Well "B" Water Gamma Isotopic Analyses
Results in pCi/Liter

| Between Dates Of | $^{7}Be$ | $^{51}Cr$ | $^{54}Mn$ | $^{59}Fe$ | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{95}Zr$ | $^{95}Nb$ |
|---|---|---|---|---|---|---|---|---|---|
| 1/1 - 1/31 | <51 | <55 | <5 | <10 | <6 | <6 | <12 | <9 | <6 |
| 2/1 - 2/28 | <50 | <53 | <5 | <10 | <6 | <6 | <12 | <9 | <5 |
| 3/1 - 3/31 | <49 | <52 | <5 | <9 | <5 | <6 | <12 | <9 | <5 |
| 4/1 - 4/30 | <45 | <48 | <5 | <9 | <5 | <6 | <10 | <8 | <5 |
| 5/1 - 5/31 | <50 | <53 | <5 | <9 | <5 | <7 | <11 | <10 | <6 |
| 6/1 - 6/30 | <48 | <69 | <4 | <10 | <5 | <6 | <7 | <9 | <6 |
| 7/1 - 7/31 | <33 | <86 | <4 | <6 | <3 | <5 | <7 | <6 | <3 |
| 8/1 - 8/31 | <29 | <31 | <3 | <5 | <3 | 9±4 | <6 | <6 | <3 |
| 9/1 - 9/30 | <28 | <29 | <3 | <5 | <3 | <4 | <6 | <5 | <3 |
| 10/1 -10/31 | <30 | <29 | <3 | <5 | <3 | <4 | <6 | <5 | <3 |
| 11/1 -11/30 | <27 | <29 | <3 | <6 | <3 | <5 | <6 | <5 | <3 |
| 12/1 -12/31 | No sample due to weather conditions | | | | | | | | |

| Between Dates Of | $^{103}Ru$ | $^{106}Ru$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{226}Ra$ |
|---|---|---|---|---|---|---|---|---|
| 1/1 - 1/31 | <6 | <52 | <7 | <7 | <22 | <14 | <66 | 39±7 |
| 2/1 - 2/28 | <6 | <51 | <7 | <6 | <20 | <14 | <64 | <15 |
| 3/1 - 3/31 | <6 | <52 | <6 | <6 | <20 | <13 | <64 | <14 |
| 4/1 - 4/30 | <6 | <48 | <6 | <6 | <20 | <12 | <57 | <14 |
| 5/1 - 5/31 | <6 | <53 | <6 | <6 | <21 | <14 | <63 | <14 |
| 6/1 - 6/30 | <6 | <34 | <4 | <5 | <68 | <15 | <40 | <8 |
| 7/1 - 7/31 | <4 | <35 | <4 | <5 | <14 | <9 | <38 | <12 |
| 8/1 - 8/31 | <3 | <30 | <3 | <4 | <12 | <7 | <33 | 25±9 |
| 9/1 - 9/30 | <3 | <29 | <3 | <4 | <11 | <7 | <33 | 15±9 |
| 10/1 -10/31 | <3 | <27 | <3 | <4 | <11 | <7 | <32 | 16±7 |
| 11/1 -11/30 | <3 | <29 | <3 | <4 | <12 | <7 | <32 | 22±7 |
| 12/1 -12/31 | No sample due to weather conditions | | | | | | | |

All values given as < are less than the LLD corrected for decay

## Table 3-11

### Deer Creek Water Gamma Isotopic Analyses
### Results in pCi/Liter

| Between Dates Of | $^{7}Be$ | $^{51}Cr$ | $^{54}Mn$ | $^{59}Fe$ | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{95}Zr$ | $^{95}Nb$ |
|---|---|---|---|---|---|---|---|---|---|
| 1/1 - 1/31 | <49 | <51 | <5 | <9 | <5 | <6 | <11 | <9 | <5 |
| 2/1 - 2/28 | <48 | <50 | <5 | <10 | <5 | <6 | <11 | <9 | <5 |
| 3/1 - 3/31 | <46 | <48 | <5 | <8 | <5 | <5 | <11 | <8 | <5 |
| 4/1 - 4/30 | <43 | <46 | <5 | <9 | <5 | <6 | <9 | <8 | <4 |
| 5/1 - 5/31 | <50 | <52 | <5 | <9 | <5 | 9±3 | <9 | <9 | <5 |
| 6/1 - 6/30 | <45 | <67 | <4 | <10 | <5 | <4 | <8 | <8 | <6 |
| 7/1 - 7/31 | <32 | <34 | <4 | <6 | <3 | <5 | <8 | <6 | <4 |
| 8/1 - 8/31 | <29 | <33 | <3 | <6 | <3 | 10±3 | <6 | <6 | <3 |
| 9/1 - 9/30 | <27 | <30 | <3 | <5 | <3 | <4 | <6 | <5 | <3 |
| 10/1 -10/31 | <29 | <31 | <3 | <6 | <3 | <4 | <7 | <5 | <5 |
| 11/1 -11/30 | <28 | <31 | <3 | <6 | <3 | <4 | <6 | <6 | <3 |
| 12/1 -12/31 | <28 | <30 | <3 | <6 | <3 | <5 | <6 | <5 | <3 |

| Between Dates Of | $^{103}Ru$ | $^{106}Ru$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{226}Ra$ |
|---|---|---|---|---|---|---|---|---|
| 1/1 - 1/31 | <6 | <51 | <5 | <6 | <21 | <13 | <61 | <12 |
| 2/1 - 2/28 | <6 | <51 | <6 | <6 | <20 | <13 | <62 | <12 |
| 3/1 - 3/31 | <5 | <47 | <5 | <6 | <19 | <12 | <59 | <11 |
| 4/1 - 4/30 | <5 | <45 | <5 | <6 | <18 | <12 | <56 | <11 |
| 5/1 - 5/31 | <5 | <50 | <5 | <6 | <20 | <13 | <59 | <12 |
| 6/1 - 6/30 | <7 | <37 | <3 | <4 | <65 | <15 | <41 | <7 |
| 7/1 - 7/31 | <3 | <32 | <3 | <4 | <13 | <8 | <37 | <9 |
| 8/1 - 8/31 | <4 | <29 | <3 | 4±3 | <13 | <7 | <32 | <7 |
| 9/1 - 9/30 | <3 | <29 | <3 | <4 | <12 | <7 | <33 | <8 |
| 10/1 -10/31 | <3 | <28 | <3 | <4 | <12 | <7 | <32 | <8 |
| 11/1 -11/30 | <3 | <29 | <3 | <4 | <12 | <7 | <31 | <8 |
| 12/1 -12/31 | <3 | <29 | <3 | <3 | <11 | <7 | <31 | 18±8 |

All values given as < are less than the LLD corrected for decay

Tab[illegible]-12 A

Environmental Water Samples Tritium Analysis
Results in pCi/L

| Month of | Russell | O.W.D. | Circ In | Circ Out | Deer Creek | Tap | Well 'B' |
|---|---|---|---|---|---|---|---|
| January | <634 | <634 | 683±344 | <634 | 701±440 | 748±423 | <634 |
| February | <634 | 811±335 | <634 | 635±327 | <634 | <634 | <634 |
| March | <634 | 644±404 | <634 | 1081±501 | <634 | <634 | <634 |
| April | <634 | <634 | <634 | <634 | <634 | 1278±373 | <634 |
| May | <663 | <663 | <663 | <663 | <663 | 993±434 | <634 |
| June | <634 | <634 | <634 | <634 | <634 | <634 | <634 |
| July | <655 | <655 | <655 | <655 | <655 | <655 | <655 |
| August | 894±379 | <562 | <562 | <562 | <562 | <562 | <562 |
| September | <970 | <970 | <970 | <970 | <970 | <970 | <970 |
| October | <680 | <680 | <680 | <680 | <680 | <680 | <680 |
| November | <574 | 872±328 | <574 | <574 | <574 | <574 | 756±361 |
| December | <567 | <567 | 590±355 | <567 | <567 | 741±403 | (a) |

(a) No sample due to weather conditions.

All values given as < are less than the LLD corrected for decay.

Table 3-12 B

Fallout Tritium Analysis
Results in pCi/L

| Month of | Station 3 | Station 5 | Station 8 | Station 10 | Station 12 |
|---|---|---|---|---|---|
| January | <634 | <634 | <634 | <634 | <634 |
| February | 772±472 | <634 | <634 | 1261±373 | <634 |
| March | 901±386 | 784±371 | 762±384 | <634 | <634 |
| April | <634 | 701±387 | 649±386 | 685±397 | 775±399 |
| May | <663 | <663 | <663 | <663 | <663 |
| June | <634 | <634 | <634 | <634 | <634 |
| July | <655 | <655 | <655 | <655 | <655 |
| August | <562 | <562 | <562 | <562 | <562 |
| September | <970 | <970 | <970 | <970 | <970 |
| October | <680 | <680 | <680 | <680 | <680 |
| November | 722±360 | <574 | <574 | <574 | <574 |
| December | <567 | <567 | <567 | <567 | <567 |

(a) No sample due to weather conditions.

All values given as < are less than the LLD corrected for decay.

Table 3-13

Iodine in Water
Results in pCi/L

| Month of | Russell | O.W.D. | Circ. In | Circ. Out | DeerCreek | Tap | Well"B" |
|---|---|---|---|---|---|---|---|
| January | <0.34 | <0.32 | <0.37 | <0.33 | <0.26 | <0.31 | <0.25 |
| February | <0.36 | <0.25 | <0.47 | <0.24 | <0.27 | <0.32 | <0.30 |
| March | <0.36 | <0.26 | <0.32 | <0.35 | <0.26 | <0.28 | <0.31 |
| April | <0.46 | <0.34 | <0.43 | <0.39 | <0.31 | <0.36 | <0.32 |
| May | <0.39 | <0.34 | <0.45 | <0.30 | <0.30 | <0.35 | <0.33 |
| June | <0.49 | <0.32 | <0.53 | <0.37 | <0.29 | <0.44 | <0.33 |
| July | <0.38 | <0.30 | <0.27 | <0.34 | <0.33 | <0.37 | <0.28 |
| August | <0.41 | <0.27 | (b) | <0.35 | <0.33 | <0.36 | <0.34 |
| September | <0.42 | <0.41 | <0.48 | <0.31 | <0.37 | <0.31 | <0.36 |
| October | <0.38 | <0.36 | <0.38 | <0.40 | <0.29 | <0.40 | <0.38 |
| November | <0.69 | <0.83 | <0.79 | <0.70 | <1.00 | (b) | <0.87 |
| December | (a) | (a) | (a) | (a) | <0.67 | <0.76 | (a) |

(a) Counting equipment out of service

(b) Sample lost in processing.

All values given as < are less than the LLD corrected for decay

[illegible]

[illegible]

3.4 Milk Samples

There are three dairy herds located three to five miles from the plant. Milk samples are collected monthly during November through May from one of the three and biweekly during June through October from each. A control farm sample is taken for each monthly sample and once during each biweekly period. The milk is analyzed for Iodine-131 and also gamma scanned for major fission products. The method involves chemical separation of iodine and gross beta counting. The counting procedure is not specific for Iodine-131 and other isotopes may add to the count rate. Attempts to determine the half-life of the activity in the sample is difficult because of the low counting rates involved.

During 1989, no samples indicated positive I-131 activity that exceeded the LLD for the analysis.

The annual dose to the thyroid of an infant which could result from the measured plant release rate, was calculated by the method described in the Offsite Dose Calculation Manual using equation 13. The maximum resultant annual thyroid dose for 1989 would be 0.13 mrem using the cow-milk-infant pathway for a hypothetical farm at the site boundary. Using the maximum for the real farm with the highest D/Q which is 5 miles from the plant, the calculated dose to the infant is 0.0012 mrem from plant releases during the growing season. The annual average plant release rate during the grazing season would give a concentration of < 0.038 pCi/liter of Iodine-131 in milk at the real farm. This concentration is equal to 1/10 of the LLD for this analysis.

The higher LLDs for Ba-140 for samples between 5/18 and 7/11 was caused by holding the samples for counting while the environmental Ge(Li) detector was return to the manufacturer for repair.

Table 3-14

Milk
Results in pCi/Liter

| Farm | Date | I-131 | Cs-137 | Ba-140 | K-40 |
|---|---|---|---|---|---|
| B | 1/17 | <0.30 | <5 | <53 | 1570±56 |
| D | 1/19 | <0.33 | <7 | <21 | 1690±56 |
| A | 2/14 | <0.28 | <7 | <21 | 1550±54 |
| D | 2/16 | <0.33 | <7 | <20 | 1580±56 |
| C | 3/14 | <0.29 | <7 | <21 | 1540±54 |
| D | 3/18 | <0.28 | <6 | <21 | 1560±54 |
| B | 4/18 | <0.31 | <6 | <19 | 1300±73 |
| D | 4/20 | <0.35 | <6 | <20 | 1150±150 |
| A | 5/16 | <0.32 | <7 | <20 | 1540±60 |
| D | 5/18 | <0.31 | <5 | <410 | 1370±146 |
| C | 6/6 | <0.43 | <9 | <35 | 1570±86 |
| D | 6/8 | <0.30 | <5 | <14 | 1500±150 |
| B | 6/13 | <0.43 | <5 | <29 | 1370±75 |
| A | 6/15 | <0.32 | <5 | <100 | 1310±141 |
| C | 6/20 | <0.34 | <5 | <76 | 1410±143 |
| D | 6/22 | <0.35 | <5 | <72 | 1410±143 |
| B | 6/27 | <0.37 | <4 | <53 | 1530±147 |
| A | 6/29 | <0.38 | <4 | <55 | 1400±144 |
| C | 7/5 | <0.32 | 6±3 | <22 | 1490±76 |
| D | 7/6 | <0.36 | <4 | <21 | 1230±66 |
| B | 7/11 | <0.35 | <5 | <29 | 1640±54 |
| A | 7/13 | <0.34 | <5 | <14 | 1800±54 |
| C | 7/18 | <0.39 | <5 | <15 | 1440±149 |
| D | 7/20 | <0.30 | <5 | <14 | 1410±147 |
| B | 7/25 | <0.40 | <5 | <13 | 1370±143 |
| A | 7/27 | <0.43 | <5 | <15 | 1290±143 |
| C | 8/1 | <0.33 | <4 | <14 | 1340±117 |
| D | 8/3 | <0.38 | <4 | <14 | 1250±118 |
| B | 8/8 | <0.31 | <4 | <14 | 1300±117 |
| A | 8/10 | <0.30 | <5 | <14 | 1290±108 |
| C | 8/15 | <0.34 | <4 | <13 | 1430±108 |
| D | 8/17 | <0.37 | <4 | <12 | 1340±104 |
| B | 8/22 | <0.41 | <4 | <12 | 1270±104 |
| A | 8/24 | <0.39 | <4 | <12 | 1380±106 |
| C | 8/29 | <0.42 | <4 | <12 | 1320±102 |
| D | 8/31 | <0.30 | <4 | <12 | 1290±103 |
| B | 9/5 | <0.38 | <6 | <12 | 1270±103 |
| A | 9/7 | <0.36 | <5 | <12 | 1320±103 |
| C | 9/12 | <0.34 | <4 | <13 | 1310±103 |
| D | 9/14 | <0.33 | <4 | <13 | 1310±101 |
| B | 9/18 | <0.32 | <4 | <12 | 1400±104 |
| A | 9/21 | <0.39 | <4 | <13 | 1170±100 |
| C | 9/26 | <0.40 | <4 | <12 | 1260±99 |
| D | 9/28 | <0.30 | <4 | <12 | 1200±99 |
| B | 10/3 | <0.40 | <4 | <13 | 1290±100 |
| A | 10/5 | <0.43 | <4 | <11 | 1240±97 |
| C | 10/10 | <0.46 | <4 | <13 | 1330±99 |
| D | 10/12 | <0.41 | <4 | <12 | 1290±95 |
| B | 10/17 | <0.52 | <4 | <13 | 1170±98 |
| A | 10/19 | <0.41 | <4 | <13 | 1240±93 |
| C | 10/24 | <0.35 | <4 | <12 | 1270±101 |
| D | 10/26 | <0.40 | <4 | <12 | 1290±103 |
| B | 11/14 | <1.27 | <4 | <12 | 1280±98 |
| D | 11/17 | <1.02 | <4 | <12 | 1380±101 |
| A | 12/11 | <0.98 | <4 | <13 | 1220±99 |
| D | 12/13 | <0.60 | <4 | <12 | 1250±97 |

All values given as < are less than the LLD corrected for decay

[illegible] [illegible] [illegible]

## 3.5 Fish Samples

Indicator fish are caught in the plume from the Discharge Canal to be tested for radioactivity ingested from liquid effluent releases from the plant. The fish are filleted so they represent that portion which would normally be eaten. Additional fish are caught more than 15 miles away to be used as background indicators and are prepared in the same manner.

Four different species of fish are analyzed during each half year from the indicator and background locations if they are available. During the second half of 1989, a fourth species of fish was not caught from the indicator location.

There was no real difference in the activity of the fish caught between the indicator and background locations.

Isotopic gamma concentrations (pCi/wet kilogram) are listed in Table 3-15.

A sample of algae (cladophora) and of the sand was obtained from the lake bottom in the discharge plume area. Results of the gamma scan are included in Table 3-16.

Table 3-15

Fish Samples
Results in pCi/kgm Wet

| Description | $^{40}K$ | $^{51}Cr$ | $^{54}Mn$ | $^{59}Fe$ | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{131}I$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{226}Ra$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator Fish** | | | | | | | | | | | | | | | | | | |
| **First Half 1989** | | | | | | | | | | | | | | | | | | |
| Lake Trout | 2160±60 | < 57 | <6 | <13 | < 6 | <7 | <12 | <10 | <6 | <7 | <53 | <9 | <5 | 15±5 | <25 | <14 | <60 | <12 |
| Rainbow Trout | 2860±130 | <173 | <5 | <26 | < 7 | <5 | <11 | <13 | <13 | <11 | <36 | (a) | <4 | 18±5 | <446 | <31 | <41 | <8 |
| Brown Trout | 2650±140 | <200 | <5 | <27 | < 8 | <6 | <13 | <16 | <16 | <13 | <45 | (a) | <5 | 20±6 | <554 | <36 | <48 | <9 |
| White Perch | 2470±190 | <399 | <7 | <41 | <12 | <9 | <17 | <24 | <25 | <24 | <66 | (a) | <6 | 24±7 | <154 | <67 | <70 | <13 |
| **Second Half 1989** | | | | | | | | | | | | | | | | | | |
| Lake Trout | 2870±150 | <124 | <5 | <18 | <7 | <6 | <13 | <13 | <10 | <10 | <46 | <176 | <5 | 29±6 | <155 | <24 | <50 | <10 |
| Brown Trout | 2810±140 | <10 | <4 | <16 | <6 | <6 | <11 | <11 | <9 | <8 | <41 | <133 | <4 | 24±6 | <123 | <19 | <43 | <9 |
| White Perch | 1960±130 | <114 | <5 | <17 | <7 | <7 | <11 | <12 | <10 | <9 | <46 | <150 | <5 | 25±7 | <127 | <21 | <49 | <9 |
| **Background Fish** | | | | | | | | | | | | | | | | | | |
| **First Half 1989** | | | | | | | | | | | | | | | | | | |
| Lake Trout | 3930±130 | <163 | <14 | <30 | <15 | <16 | <34 | <28 | <16 | <18 | <138 | <34 | <15 | 61±11 | <85 | <39 | <155 | <31 |
| Lake Trout | 1520±80 | <68 | <6 | <14 | <6 | <7 | <13 | <11 | <7 | <7 | <57 | <16 | <6 | 22±4 | <39 | <16 | <63 | <12 |
| Rainbow Trout | 2310±240 | <223 | <10 | <30 | <13 | <13 | <22 | <24 | <20 | <18 | <96 | <256 | <9 | 31±13 | <255 | <41 | <98 | <22 |
| Rock Bass | 4220±380 | <355 | <14 | <50 | <18 | 22±18 | <35 | <36 | <28 | <25 | <133 | <509 | <12 | 53±20 | <411 | <62 | <138 | <29 |
| Bullhead | 1580±110 | <95 | <4 | <14 | <5 | 7±5 | <10 | <10 | <9 | <8 | <36 | <158 | <3 | 12±5 | <131 | <18 | <36 | <8 |
| **Second Half 1989** | | | | | | | | | | | | | | | | | | |
| Coho Salmon | 3810±220 | <93 | <8 | <18 | <8 | <11 | <17 | <15 | <10 | <9 | <67 | <30 | <7 | 36±7 | <56 | 31±22 | <68 | <15 |
| Rainbow Trout | 4690±300 | <136 | <11 | <28 | <12 | <13 | <25 | <20 | <14 | <13 | <9 | <50 | <9 | 42±13 | <93 | <29 | <93 | <20 |
| Chinook Salmon | 3280±150 | <121 | <5 | <20 | <7 | <6 | <12 | <12 | <11 | <9 | <44 | <252 | <4 | 30±6 | <187 | <23 | <45 | <9 |
| Lake Trout | 2900±300 | <94 | <9 | <20 | <9 | <13 | <22 | <15 | <10 | <10 | <8 | <18 | <8 | 41±14 | <48 | <20 | <85 | <18 |

(a) Sample held for counting greater than 8 half lives.

All values given as < are less than the LLD corrected for decay

Table 3-16

Lake Samples
Results in pCi/kgm

| Description | $^{40}K$ | $^{51}Cr$ | $^{54}Mn$ | $^{59}Fe$ | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{95}Zr$ | $^{95}Nb$ |
|---|---|---|---|---|---|---|---|---|---|
| Cladophora | 1590±160 | <68 | <6 | <14 | <7 | <8 | <13 | <12 | <7 |
| Lake Bottom | 10130±270 | <80 | <9 | <18 | <8 | <10 | <20 | <16 | <9 |

| Description | $^{103}Ru$ | $^{106}Ru$ | $^{131}I$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{226}Ra$ |
|---|---|---|---|---|---|---|---|---|---|
| Cladophora | <7 | <55 | <16 | <6 | 22±10 | <34 | <16 | <58 | 24±13 |
| Lake Bottom | <9 | <71 | <14 | <8 | 74±12 | <40 | <19 | <79 | 201±20 |

All values given as < are less than LLD corrected for decay

[illegible]

## 3.6 Vegetation Samples

Crops are grown on the plant property and samples of the fruits and grains are collected at harvest time for testing. Background samples are purchased from farms greater than 10 miles from the plant. There was no indication in the samples of any activity measured. Gamma isotopic data is given in Table 3-17. The large LLDs for lettuce is caused by the small sample weight.

Table 3-17

Vegetation Samples
Results in pCi/kgm Wet

| Description | $^{40}K$ | $^{51}Cr$ | $^{54}Mn$ | $^{59}Fe$ | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{95}Zr$ | $^{95}Nb$ |
|---|---|---|---|---|---|---|---|---|---|
| Cherries | 1580±60 | <33 | <4 | <8 | <4 | <5 | <9 | <7 | <4 |
| Apples | 630±100 | <37 | <4 | <7 | <4 | <5 | <8 | <7 | <3 |
| Corn | 2530±150 | <44 | <5 | <11 | <48 | <7 | <12 | <8 | <5 |
| Lettuce | 7580±490 | <138 | <15 | <29 | <16 | <22 | <36 | <24 | <16 |
| Grapes | 2590±160 | <46 | <5 | <11 | <5 | <7 | <12 | <9 | <5 |
| Squash | 2110±180 | <62 | <6 | <11 | <6 | <8 | <15 | <10 | <7 |
| **Control Vegetation Samples** | | | | | | | | | |
| Apples | 740±90 | <34 | <3 | <7 | <3 | <5 | <7 | <6 | <4 |
| Cherries | 2000±140 | <44 | <5 | <10 | <5 | <6 | <11 | <8 | <5 |
| Lettuce | 1490±180 | <69 | <7 | <15 | <6 | <10 | <16 | <12 | <7 |

| Description | $^{103}Ru$ | $^{106}Ru$ | $^{131}I$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{226}Ra$ |
|---|---|---|---|---|---|---|---|---|---|
| Cherries | <4 | <34 | <4 | <3 | <5 | <14 | <9 | <40 | <9 |
| Apples | <4 | <36 | <5 | <3 | <5 | <14 | <8 | <40 | <8 |
| Corn | <5 | <43 | <5 | <4 | <5 | <17 | <10 | <46 | <10 |
| Lettuce | <16 | <146 | <17 | <14 | <19 | <54 | <31 | <148 | <35 |
| Grapes | <5 | <49 | <6 | <5 | <6 | <19 | <10 | <50 | <10 |
| Squash | <6 | <61 | <7 | <6 | <8 | <22 | <13 | <61 | <14 |
| **Control Vegetation Samples** | | | | | | | | | |
| Apples | <4 | <31 | <4 | <3 | <4 | <13 | <8 | <36 | <8 |
| Cherries | <5 | <42 | <6 | <4 | <5 | <17 | <10 | <44 | <10 |
| Lettuce | <7 | <68 | <8 | <7 | <9 | <25 | <15 | <69 | <15 |

All values given as < are less than LLD corrected for decay

[illegible]

## 3.7 External Penetrating Radiation

A thermoluminescent dosimeter (TLD) with a sensitivity of 5 millirem/quarter is issued as part of the environmental monitoring program. Thirty-nine TLD badges are currently placed in four rings around the plant. These rings range from less than 1000 feet to 15 miles and have been dispersed to give indications in each of the nine land based sectors around the plant should an excessive release occur from the plant. Badges are changed and read after approximately 3 months exposure.

TLD location #7 is influenced by its close proximity to the Contaminated Equipment Storage Area established in 1983 and will normally read 40-60 mRem/quarter. For the year of 1989, omitting location 7, on-site exposure ranged between 16 and 23 mrem/quarter, with an average exposure of 19.2 rem/quarter and off-site 14 to 21 mrem/quarter with an average exposure of 16.6 mrem/quarter. Table 3-18 gives TLD readings for each quarter. Two TLDs were wet at the time of being read and their values are zero.

During 1989, the TLD used for environmental measurements was changed from a Panasonic model UD-802 to a Panasonic model UD-814. The model UD-814 has three calcium sulfate phosphors under 1000 $mg/cm^2$ of shielding compared to one for the model UD-802. This will give improved precision for determining the low doses encountered in the environment.

Table 3-18
External Penetrating Radiation
Thermoluminescent Dosimetry 1989

#2 - #7 plus #13 are on-site near the line of the highest annual average ground level concentration.

#8 - #12 are offsite at a distance of 8 to 15 miles.

#14 - #16 are located along a line 3000 ft. west of the plant.
#17 - #21 are located along Lake Road.

#22 - #24 are located along the east site boundry line.
#25 - #30 are offsite at a distance of 8 to 15 miles.

#31 - #40 are located in an arc at a distance of 4 - 5 miles.

Units = Mr/91 Day Quarter

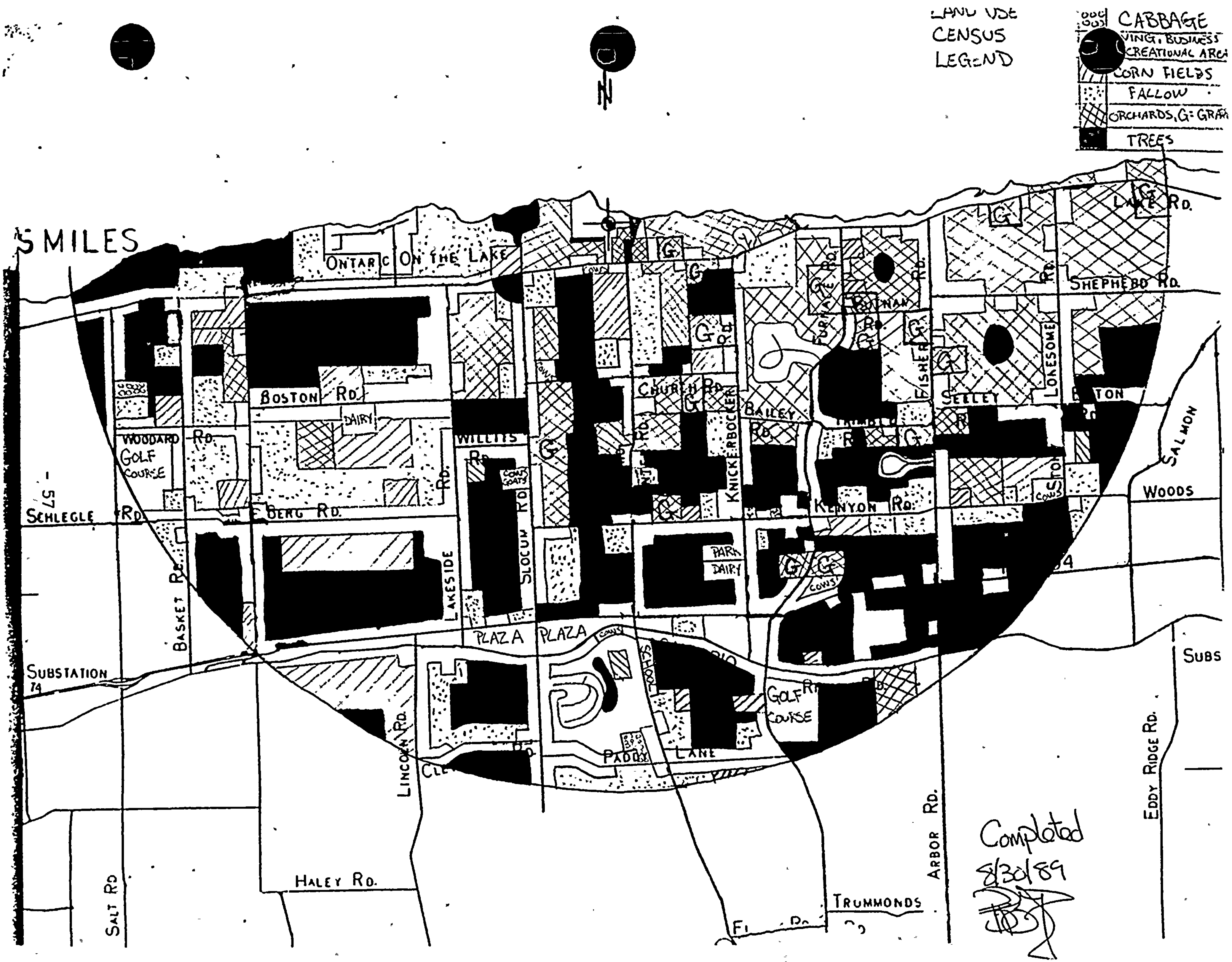
| Location | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|---|---|---|---|---|
| 2 | 18.4±4.6 | 20.7±5.2 | 21.3±5.4 | 22.7±5.7 |
| 3 | 19.4±4.9 | 18.0±4.5 | 20.3±5.1 | 20.4±5.2 |
| 4 | 19.1±4.8 | 20.9±5.3 | 21.5±5.4 | 22.5±5.7 |
| 5 | 21.0±5.3 | 21.7±5.5 | 20.9±5.3 | 20.2±5.1 |
| 6 | 17.7±4.5 | 16.5±4.2 | 16.9±4.3 | 16.5±4.2 |
| 7 | 44.4±7.1 | 43.0±6.9 | 45.3±7.3 | 43.5±7.0 |
| 8 | 17.1±4.3 | 17.7±4.5 | 16.1±4.1 | 17.2±4.3 |
| 9 | 15.1±3.8 | 14.3±3.6 | 14.4±3.6 | 14.9±3.7 |
| 10 | 16.1±4.1 | 14.9±3.8 | 14.9±3.7 | 15.2±3.8 |
| 11 | 18.2±4.6 | 15.2±3.8 | 16.9±4.3 | 15.5±3.9 |
| 12 | 15.9±4.0 | 15.6±3.9 | 14.6±3.7 | 15.3±3.9 |
| 13 | 20.8±5.2 | 20.1±5.1 | 21.2±5.3 | 20.7±5.2 |
| 14 | 15.6±3.9 | 17.4±4.4 | 18.4±4.6 | 17.5±4.4 |
| 15 | 19.5±4.9 | 18.2±4.6 | 19.5±4.9 | 19.0±4.8 |
| 16 | 18.4±4.6 | 19.4±4.9 | 18.7±4.7 | 20.1±5.1 |
| 17 | 16.9±4.3 | 18.6±4.7 | 17.4±4.4 | 19.2±4.8 |
| 18 | 18.5±4.7 | 20.0±5.0 | 20.2±5.1 | 19.8±5.0 |
| 19 | 18.7±4.7 | 18.4±4.6 | 19.5±4.9 | 17.8±4.5 |
| 20 | 19.4±4.9 | 20.5±5.2 | 23.2±5.8 | 21.6±5.4 |
| 21 | 18.5±4.7 | 18.2±4.6 | 19.6±4.9 | 19.1±4.8 |
| 22 | 17.7±4.5 | 0.0±0.0 | 17.1±4.3 | 16.4±4.1 |
| 23 | 18.8±4.7 | 17.0±4.3 | 21.4±5.4 | 19.0±4.8 |
| 24 | 17.9±4.5 | 18.1±4.6 | 20.0±5.0 | 18.9±4.8 |
| 25 | 15.8±4.0 | 13.4±3.4 | 15.9±4.0 | 15.5±3.9 |
| 26 | 14.6±3.7 | 13.6±3.4 | 13.6±3.4 | 14.4±3.6 |
| 27 | 17.9±4.5 | 15.6±3.9 | 17.5±4.4 | 16.3±4.1 |
| 28 | 18.8±4.7 | 17.6±4.4 | 18.0±4.5 | 17.2±4.3 |
| 29 | 17.2±4.3 | 16.0±4.0 | 16.8±4.2 | 16.5±4.2 |
| 30 | 15.5±3.9 | 12.7±3.2 | 13.8±3.5 | 13.4±3.4 |
| 31 | 18.9±4.8 | 17.3±4.4 | 18.7±4.7 | 18.2±4.6 |
| 32 | 17.7±4.5 | 15.9±4.0 | 15.3±3.9 | 15.4±3.9 |
| 33 | 19.4±4.9 | 17.8±4.5 | 19.9±5.0 | 18.1±4.6 |
| 34 | 18.2±4.6 | 17.1±4.3 | 18.7±4.7 | 18.3±4.6 |
| 35 | 19.2±4.8 | 20.9±5.3 | 20.0±5.0 | 18.7±4.7 |
| 36 | 17.1±4.3 | 14.3±3.6 | 14.6±3.7 | 15.2±3.8 |
| 37 | 17.7±4.5 | 15.7±4.0 | 15.0±3.8 | 0.0±0.0 |
| 38 | 19.3±4.9 | 16.6±4.2 | 17.4±4.4 | 17.1±4.3 |
| 39 | 18.7±4.7 | 17.7±4.5 | 18.8±4.7 | 17.9±4.5 |
| 40 | 18.1±4.6 | 15.0±3.8 | 15.5±3.9 | 16.0±4.0 |

[illegible]

## 4.0 LAND USE CENSUS

A land use census is done each year to determine any major changes in the use of the land within 5 miles of the plant. There were no major changes. The land use remains mainly agricultural in nature. There were several private homes constructed, but no new housing developments or large business construction projects. The three dairy operations nearest the plant continued in operation with an average of 40 to 70 milking cows. There are no goats used for milk on a regular basis within the 5 mile radius. Beef cattle are still raised on 3 farms within 2 miles of the plant as in the past.

A copy of the Land Use Census is attached.



LAND USE
CENSUS
LEGEND
CABBAGE
CORN FIELDS
FALLOW
ORCHARDS, G: GRA
TREES
5 MILES
ONTARIO ON THE LAKE
LAKE RD.
SHEPHERD RD.
BOSTON RD.
DAIRY
WOODARD RD.
GOLF COURSE
WILLITS RD.
CHURCH RD.
KNICKERBOCKER
BAILEY RD.
FURNACE RD.
PUTNAM RD.
FISHER RD.
SEELEY
LONESOME
TRIMBLE
KENYON RD.
SALMON
WOODS
57
SCHLEGLE RD.
BERG RD.
LAKESIDE RD.
SLOCUM RD.
COWS GOATS
PARK DAIRY
COWS
BASKET RD.
PLAZA PLAZA
SCHOOL
GOLF COURSE
SUBSTATION
74
SUBS
LINCOLN RD.
LANE
ARBOR RD.
EDDY RIDGE RD.
HALEY RD.
SALT RD
TRUMMONDS
Completed
8/30/89

TABLE I

| Sector | Distance to Nearest Residence | Distance to Nearest Garden >500 ft² | Distance to Milk Producing Animals |
|---|---|---|---|
| E | 1190 meters | 1200 meters | |
| ESE | 930 meters | 900 meters | |
| SE | 570 meters | 570 meters | 8200 meters |
| SSE | 600 meters | 600 meters | 5450 meters |
| S | 450 meters | 450 meters | |
| SSW | 600 meters | 600 meters | |
| SW | 750 meters | 750 meters | 4950 meters |
| WSW | 1000 meters | 1000 meters | |
| W | 1500 meters | 1500 meters | |

**Changes from previous year:**

Additional homes built along roadways in area.

**Milk animal locations:**

No new milk locations.
Local meat market raising goats but for non-milk producing uses.

**Land Use Census Completed By:** [signature] **Date:** 8/30/89

[illegible]

## 5.0 EXTERNAL INFLUENCES

During 1989, there were no external influences such as atmospheric weapons testing or accidents at other nuclear facilities which caused an influence on the data reported. The annual trending graphs for air and water indicate a level effect in the measured activity.

## 6.0 EPA INTERLABORATORY COMPARISON STUDY

An indication of the laboratory's ability to analyze samples and achieve results consistent with other laboratories is the aim of the EPA Interlaboratory Comparison. Selected unknowns are received and analyzed by our procedures and the results are sent to the EPA Environmental Monitoring Systems Laboratory. A report is returned from them indicating the concentrations with which the samples were spiked and how we compared to other laboratories analyzing the same samples. Table 6-1 is a tabulation of the samples analyzed during 1989.

TABLE 6-1

EPA INTERLABORATORY COMPARISON PROGRAM - 1989

| Description | Date | Sample Analysis | Experimental Data | | | EPA Value ±1σ |
|---|---|---|---|---|---|---|
| Alpha/Beta in Water (Results in pCi/l) | 5/12/89 | Alpha | 27 | 28 | 20 | 30±8 |
| | | Beta | 56 | 63 | 62 | 50±5 |
| | 9/22/89 | Alpha | 1 | 1 | 1 | 4±5 |
| | | Beta | 5 | 5 | 6 | 6±5 |
| Gamma in Water (Results in pCi/l) | 2/10/89 | Cr-51 | 255 | 219 | 243 | 235±24 |
| | | Co-60 | 16 | 18 | 20 | 10±5 |
| | | Zn-65 | 177 | 180 | 185 | 159±16 |
| | | Ru-106 | 162 | 180 | 177 | 178±18 |
| | | Cs-134 | 9 | 11 | 11 | 10±5 |
| | | Cs-137 | 10 | 15 | 11 | 10±5 |
| | 6/9/89 | Co-60 * | 11 | 15 | 10 | 31±5 |
| | | Zn-65 | 178 | 164 | 176 | 165±17 |
| | | Ru-106 | 120 | 125 | 118 | 128±13 |
| | | Ba-133 | 57 | 51 | 62 | 49±5 |
| | | Cs-134 | 37 | 37 | 40 | 39±5 |
| | | Cs-137 | 25 | 28 | 27 | 20±5 |
| | 10/6/89 | Co-60 | 26 | 28 | 29 | 30±5 |
| | | Zn-65 | 148 | 145 | 146 | 129±13 |
| | | Ru-106 | 164 | 154 | 153 | 161±16 |
| | | Ba-133 | 67 | 69 | 67 | 59±6 |
| | | Cs-134 | 26 | 26 | 27 | 29±5 |
| | | Cs-137 | 68 | 67 | 69 | 59±5 |
| Iodine-131 in Water (Results in pCi/l) | 2/17/89 | I-131 | 105 | 109 | 100 | 106±11 |
| | 8/4/89 | I-131 | 91 | 89 | 90 | 83±8 |

* Average of results reported exceeding ± 2 sigma, see attached notes.

TABLE 6-1 (Cont'd)

EPA INTERLABORATORY COMPARISON PROGRAM - 1989

| Description | Date | Sample Analysis | Experimental Data | | | EPA Value ±1σ |
|---|---|---|---|---|---|---|
| Air Filters (Results in pCi/filter) | 3/31/89 | Alpha | 22 | 21 | 24 | 21±5 |
| | | Beta | 57 | 57 | 56 | 62±5 |
| | | Cs-137 | 26 | 26 | 28 | 20±5 |
| | 8/25/89 | Alpha | 7 | 7 | 8 | 6±5 |
| | | Beta | 11 | 11 | 10 | Invalid Results |
| | | Cs-137 | 15 | 9 | 11 | 10±5 |
| Milk (Results in pCi/l) | 4/28/89 | Cs-137 | 55 | 53 | 46 | 50±5 |
| | | K-40 * | 1900 | 1950 | 1900 | 1600±80 |
| Tritium in Water (Results in pCi/l) | 2/24/89 | H-3 | Sample lost in transit | | | |
| | 6/23/89 | H-3 | 4400 | 4680 | 4330 | 4500±450 |
| | 10/20/89 | H-3 | 3580 | 3370 | 3920 | 3496±364 |

* Average of results reported exceeding ± 2 sigma, see attached notes.

Notes to Table 6-1

Reported value averages exceeding ± 2 sigma.

Gamma in Water

| | | |
|---|---|---|
| 6/9/89 | Co-60 | The values reported were not the determination for Co-60. The values from the gamma scan measurement that should have been reported are 29, 30 and 26 pCi/liter which are within 1 sigma of the known value of 31 pCi/liter. |

Milk

| | | |
|---|---|---|
| 4/28/89 | K-40 | A review of the data sheets showed that no background subtraction was done before analysis. With a normal background subtraction, the values are 1700, 1740 and 1690 mg/liter which are within 2 sigma of the known value of 1600 mg/liter. |