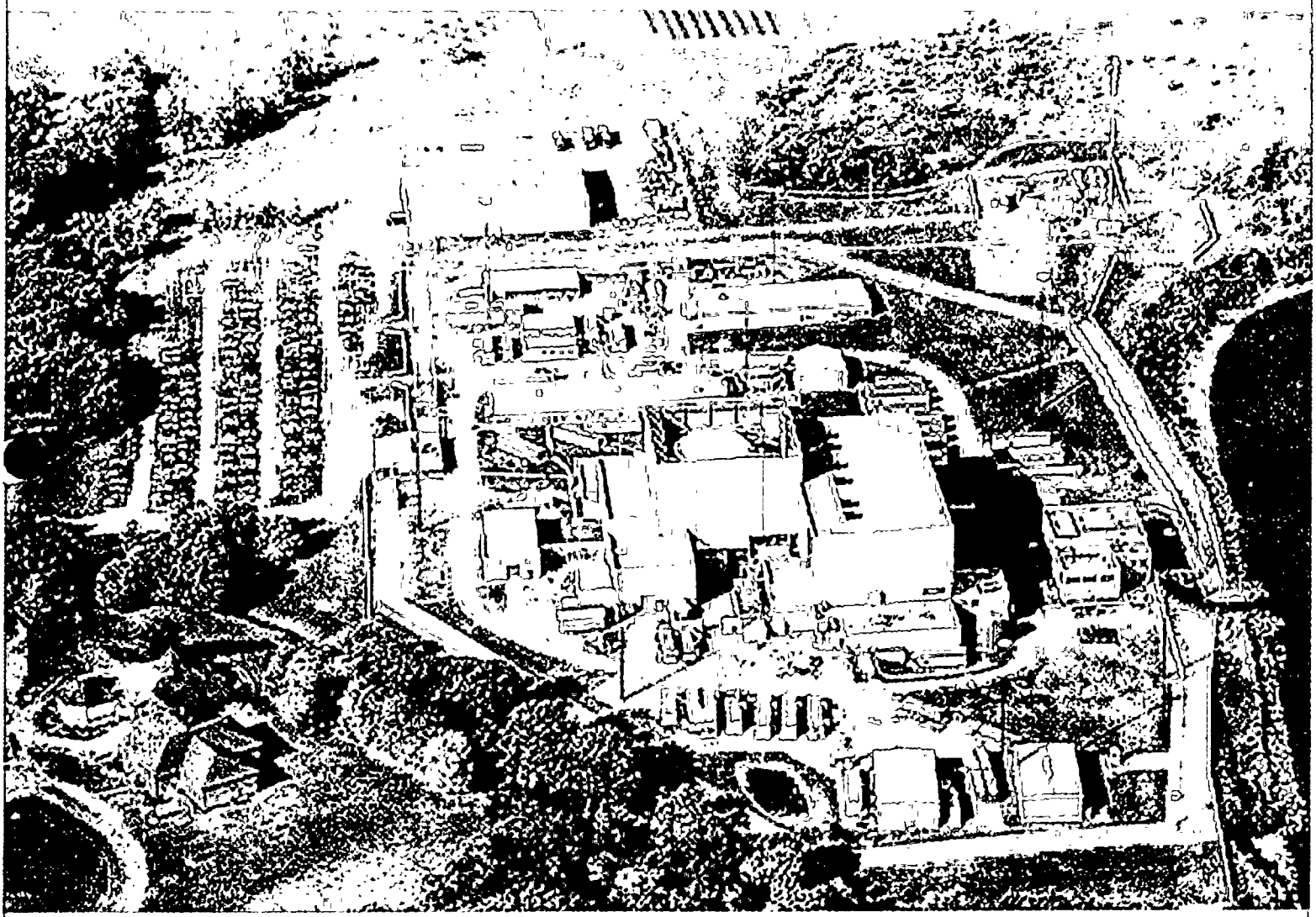
1998
Annual Radiological Environmental Operating Report



R.E. Ginna Nuclear Plant
Rochester Gas and Electric

Docket No. 50-244

1998

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

R.E. Ginna Nuclear Station

Rochester Gas & Electric Corporation

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RADIOLOGICAL ENVIRONMENTAL SURVEY
January 1 - December 31, 1998

1.0 SUMMARY

The Annual Radiological Environmental Operating Report is published in accordance with Section VI of the Offsite Dose Calculation Manual, (ODCM). This report describes the Radiological Environmental Monitoring Program, (REMP), and its implementation as required by the ODCM.

The REMP is implemented to measure radioactivity in the aquatic and terrestrial pathways. The aquatic pathways include Lake Ontario fish, Lake Ontario water, and Deer Creek water. Measurement results of the samples representing these pathways contained only natural background radionuclides or low concentrations of Cs-137 resulting from past atmospheric nuclear weapons testing. The 1998 results were consistent with data for the past five years and exhibited no adverse trends.

Terrestrial pathways were also monitored. These included airborne particulate and radioiodine, milk, food products, and direct radiation. Analysis of terrestrial pathways demonstrated no detectable increase in radiation levels as a result of plant operation. The 1998 results were consistent with data for the past five years and exhibited no adverse trends.

The analytical results from the 1998 Radiological Environmental Monitoring Program demonstrate that the operation of the Robert E. Ginna Nuclear Power Station had no measurable radiological impact on the environment. The results also demonstrate that operation of the plant did not result in a measurable dose to the general population above natural background levels.

During 1998, 1386 samples were collected for analysis by gross beta counting and/or gamma spectroscopy. These included 879 air samples, 260 water samples, 18 fish samples, 16 vegetation samples, 58 milk samples, and 155 thermoluminescent dosimeter measurements. During 1998 there was 1 deviation from the sampling schedule for TLD's, 7 for air samples, and 2 for water samples. The minimum number of samples required in ODCM Table V-1 were collected for all pathways.

Samples were collected by Ginna Station chemistry personnel and analyzed by the J. A. Fitzpatrick Nuclear Power Plant Environmental Laboratory.

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

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

PATHWAY SAMPLED UNIT OF MEASUREMENT	TYPE AND TOTAL NUMBER OF ANALYSES	LLD	INDICATOR LOCATIONS MEAN (1) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (1) RANGE
				NAME, DISTANCE AND DIRECTION	MEAN (1) RANGE	
AIR: Particulate(pCi/M^3)	Gross Beta 619	0.003	0.017 (467/467) 0.003-0.045	Offsite Location # 12 93 25100M	0.019 (48/48) 0.008 - 0.045	0.017 (152/152) 0.003 - 0.045
(pCi/M^3)	Gamma Scan 48	(2)	< LLD	N/A	N/A	< LLD
Iodine(pCi/M^3)	Gamma Scan 260	0.01- 0.05	< LLD	N/A	N/A	< LLD
DIRECT RADIATION: TLD (mrem/quarter)	Gamma 155	5.0	12.4 (119/119) 10.4 - 15.5	Onsite Location #13 292 230M	14.7 (4/4) 13.5 - 15.5	11.2 (36/36) 9.5 - 13.5
WATER: Drinking (pCi/Liter)	Gross Beta 12	1.2	2.94 (12/12) 1.26 - 5.43	OWD 70 1200M	2.94 1.26 - 5.43	N/A
	Gamma Scan 12	(2)	Ra-226 75 (11/12) 42 - 97	OWD 70 1200M	Ra-226 75 (11/12) 42 - 97	N/A
	Iodine 12	0.64*	< LLD	N/A	N/A	N/A
Surface (pCi/Liter)	Gross Beta 48	1.2	2.65 (12/12) 1.94 - 3.65	Deer Creek 105 260M	4.38 (12/12) 2.69 - 6.54	2.55 (12/12) 1.71 - 3.84
	Gamma Scan 48	(2)	Ra-226 68 (7/12) 51 - 82	Circ-out 15 130M	Ra-226 68 (7/12) 51 - 82	Ra-226 (9/12) 44 - 119
	Iodine 48	0.54	< LLD	N/A	N/A	< LLD
MILK: (pCi/Liter)	Iodine 58	0.46	< LLD	N/A	N/A	< LLD
	Gamma Scan 58	(2)	< LLD	N/A	N/A	< LLD
FISH: (pCi/Kg)	Gamma Scan 18	(2)	Ra-226 593 (5/8) 360 - 722	Control Fish 270 25600M	Ra-226 910 (7/10) 70 2200	Ra-226 910 (7/10) 422 - 3360
VEGETATION: (pCi/Kg)	Gamma Scan 8	(2)	Ra-226 237 (4/5) 153 - 454	Control Vegetation	Ra-226 245 (2/3) 143 - 346	Ra-226 245 (2/3) 143 - 346

(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) Single sample
* Average LLD

2.0 PROGRAM DESCRIPTION

2.1 Program Objectives

The objectives of the Radiological Environmental Monitoring Program are:

- Measure and evaluate the effects of plant operation on the environment.
- Monitor background radiation levels in the environs of the Ginna site.
- Demonstrate compliance with the environmental conditions and requirements of applicable state and federal regulatory agencies, including the ODCM and 40 CFR 190.
- Provide information by which the general public can evaluate environmental aspects of the operation of Ginna Nuclear Power Station.

2.2 Program Requirements

In order to achieve the objectives listed in section 2.1, a sampling and analysis program is implemented each year according to table V-1 of the ODCM. Following are the requirements from the ODCM:

Monitoring Program

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

If the radiological environmental monitoring program is not conducted as specified in Table V-1, prepare and submit to the Commission, in the Annual Radiological Environmental Operating Report, a description of the reasons for these deviations 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 Annual Radiological Environmental Operating 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 producing 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.

Specification

The radiological environmental monitoring samples shall be collected pursuant to Table V-1. Acceptable locations are shown in the ODCM. Samples shall be analyzed pursuant to the requirements of Tables V-1 and V-3.

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.

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.

During the last quarter of 1996, the analysis of environmental samples was transferred to the James A. FitzPatrick Environmental Laboratory. Although the Ginna Station environmental laboratory is not currently being used for routine sample analysis, the capability to analyze environmental samples in accordance with the requirements of the Ginna Station Nuclear Emergency Response Plan is maintained.

Table 2-1 Page 1 of 2

Offsite Dose Calculation Manual Table V-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. Radionuclide	5 indicator 1 control	Continuous operation of sampler with sample collection at least once per 10 days	Radionuclide canister. Analyze within 7 days of collection of I-131.
b. Particulate	9 indicator 3 control	Same as above	Particulate sampler. Analyze for gross beta radioactivity ≥ 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	30 indicator 9 control 11 placed greater than 5 miles from plant site.	TLDs at least quarterly	Gamma dose quarterly.
3. WATERBORNE			
a. Surface	1 control (Russell Station) 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.

Offsite Dose Calculation Manual Table V-1

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 3 indicator June thru October each of 3 farms	At least once per 15 days	Gamma isotopic and I-131 analysis of each sample.
	1 control 1 indicator November thru May one of the farms	At least once per 31 days	Gamma isotopic and I-131 analysis of each sample.
b. Fish	4 control 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 2 indicator (On site)	Annual at time of harvest. Sample from two of the following: 1. apples 2. cherries 3. grapes	Gamma isotopic analysis on edible portion of sample.
	1 control 1 indicator (On site garden or nearest offsite garden within 5 miles in the highest D/Q meterological sector)	At time of harvest. One sample of: 1. broad leaf vegetation 2. other vegetable	Gamma isotopic analysis on edible portion of sample.

Table 2-2 Page 1 of 2

The maximum LLD values as defined by ODCM Table V-3

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

The LLD is defined as an apriori (before the fact) limit representing the capability of a measurement system and not as an aposteriori (after the fact) limit for a particular measurement, the minimum detectable activity (MDA).

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

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

where:

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

4.66 establishes 95% confidence interval about LLD

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

λ is the decay constant for the particular radionuclide

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

Table 2-3
DIRECTION AND DISTANCE TO SAMPLE POINTS

All directions given in degrees and all distances given in meters

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

Water Sample Locations	Direction	Distance
Russell Station C	270	25600
Ontario Water District I	70	2200
Circ Water Intake S	0	420
Circ Water Discharge I	15	130
Deer Creek S	105	260

Milk Sample Locations	Direction	Distance
Farm A I	113	9500
Farm B I	242	5450
Farm C I	156	4950
Farm D C	132	21000

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

TLD Locations	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	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

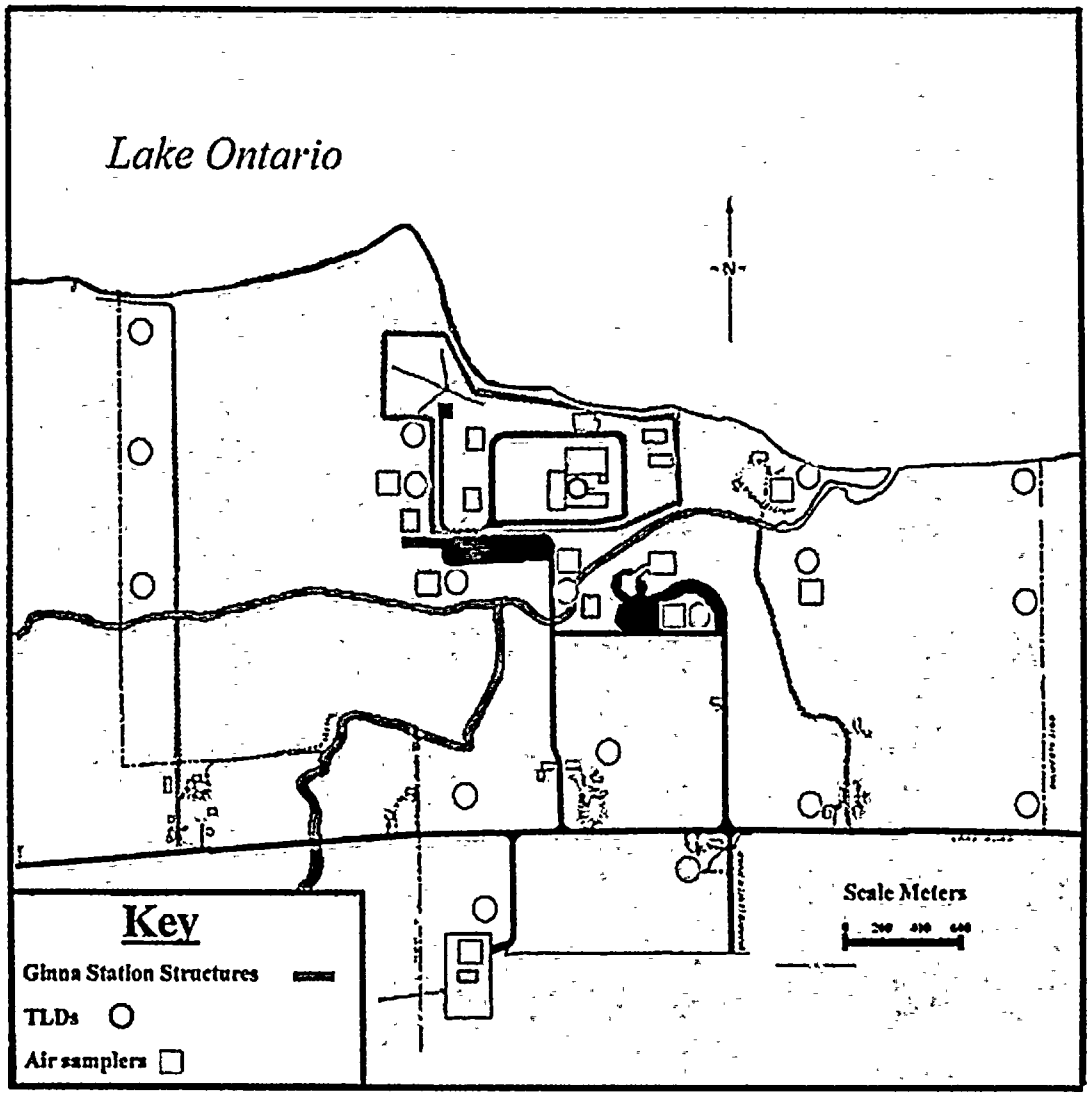
I = Indicator Samples

C = Control Samples

S = Supplemental Samples

Map 2-1

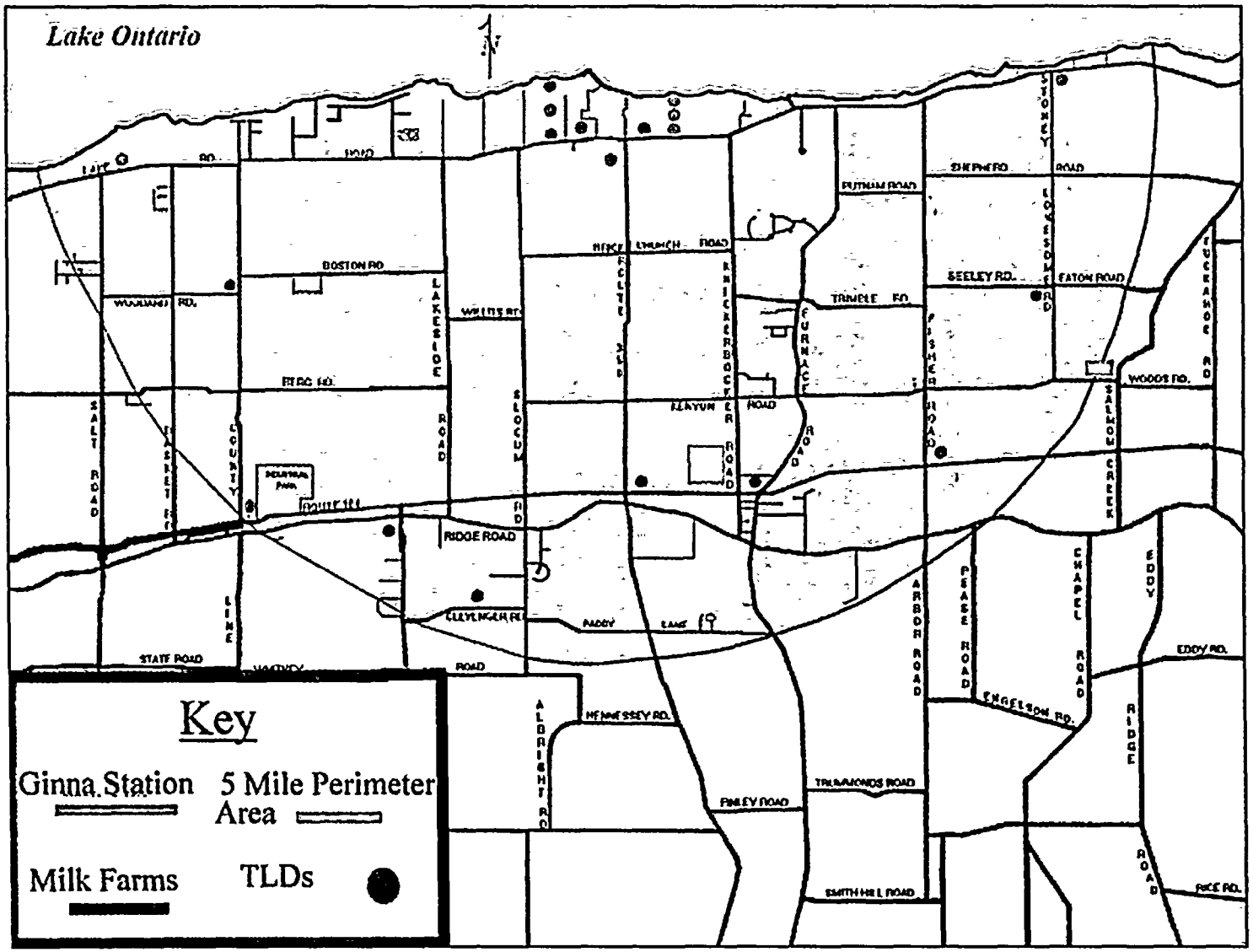
Onsite Sample Locations



Map 2-2

Offsite Sample Locations

Location of TLDs and milk farms within 5 mile radius of Ginna Station *.

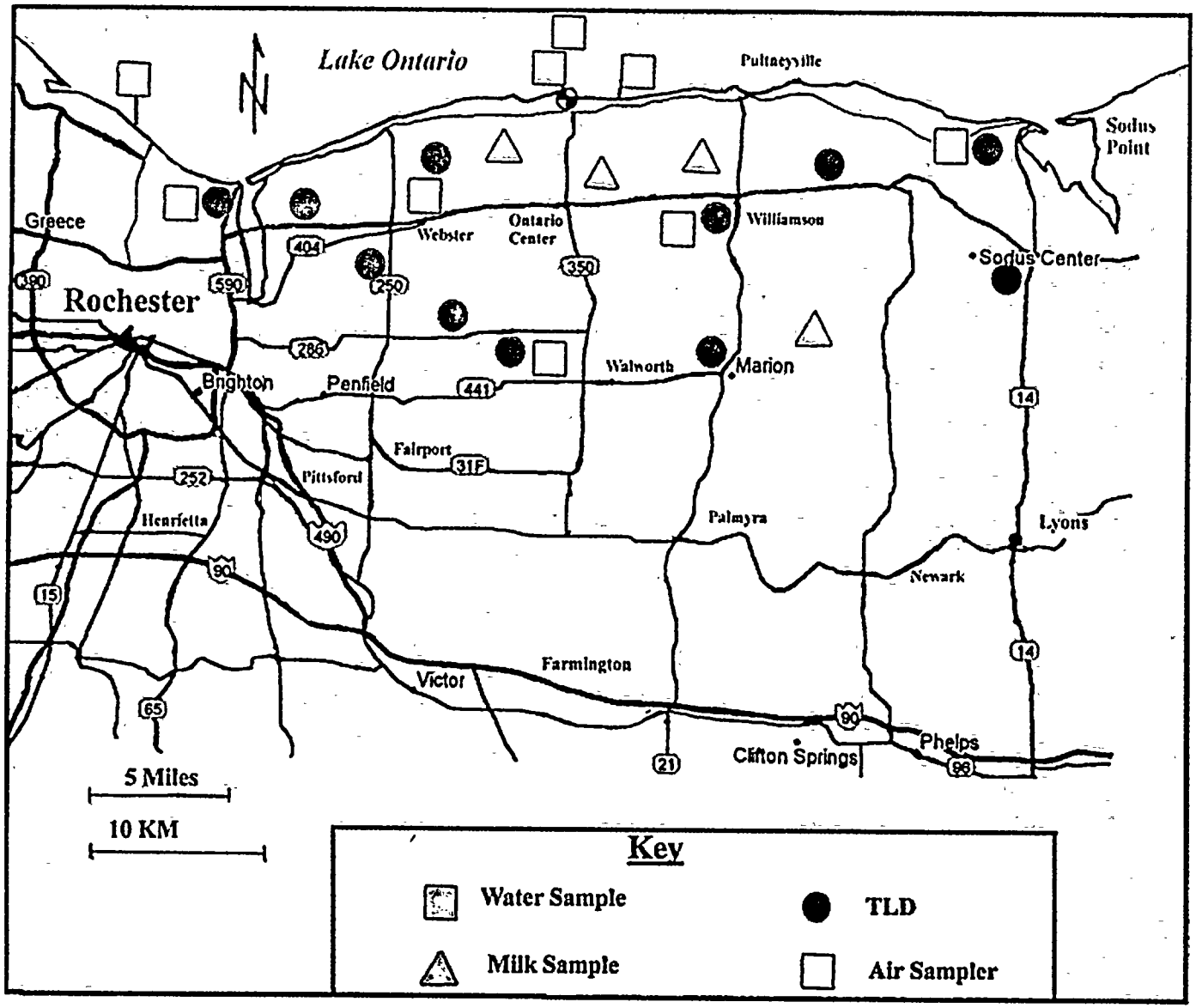


* Onsite samples detailed on map 2-1.

Map 2-3

Water Sample and Milk Farm Locations

Location of water samples, milk farms and TLDs *.



* Onsite samples and samples in close proximity to Ginna Station are detailed on maps 2-1 and 2-2.

3.0 DATA SUMMARY

3.1 Analytical Results

The values listed on the following tables include the uncertainties stated as +/- 1 standard deviation.

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
Kilogram (Kg):	Approximately 2.205 pounds

Lower Limit of Detection

The U.S. Nuclear Regulatory Commission has requested that reported values be compared to the Lower Limit of Detection (LLD) for each piece of equipment. The LLD for the equipment is established by the measurement of a blank sample. These values are before correction for decay. Decay correction is applied from the end of the sampling period to the counting time, not from the midpoint of the sampling period. An explanation of the calculation of the LLD is included with Table 2-2, (page 8).

3.2 Air Samples

Radioactive particles in air are collected by drawing approximately one scfm 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 progeny 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 and 1 additional at 690 meters. In addition, there are 3 sampling stations located approximately 7 to 17 miles from the site that serve as control stations.

Based on weekly comparisons, there was no statistical difference between the on-site and the off-site radioactive particulate concentrations. The average concentrations for each station were less than 0.019 pCi/m^3. The major airborne activities released from the plant are noble gases, tritium and radioiodines. Most of this activity is released in a gaseous form, however, some radioiodine is released as airborne particulate.

Tables 3-1A, 3-1B are a list of gross beta analysis values for the on-site samplers. Tables 3-2A, 3-2B are a list of gross beta analysis 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 performed for each sampling location and corrected for decay. The results of these analyses are listed in Tables 3-4 A to D.

Iodine cartridges are placed at six locations. These cartridges are changed and analyzed each week. No positive analysis was found on any sample. A list of values for these cartridges is given in Table 3-5.

A trend plot of the 1998 Onsite vs. Offsite air filter data is included, Table 3-3. Additionally, a trend plot of the annual averages measured since 1968, Table 3-6, 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.

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Table 3-1 A
On-Site Air Particulate Samplers
Gross Beta Results in pCi/m3

Collection Date	Sta. #2 (I)	Sta. #3 (I)	Sta. #4 (I)	Sta. #5 (I)	Sta. #6 (I)	Sta. #7 (I)	Sta #13A (I)	Average
5-Jan	0.015 ± 0.004	0.018 ± 0.003	0.016 ± 0.003	0.020 ± 0.003	0.017 ± 0.003	0.016 ± 0.003	0.019 ± 0.003	0.017
12-Jan	0.010 ± 0.003	0.013 ± 0.003	0.014 ± 0.003	0.016 ± 0.003	0.013 ± 0.002	0.013 ± 0.003	0.011 ± 0.003	0.013
19-Jan	0.015 ± 0.004	0.016 ± 0.003	0.015 ± 0.003	0.022 ± 0.003	0.017 ± 0.003	0.014 ± 0.003	0.019 ± 0.003	0.017
26-Jan	0.017 ± 0.004	0.017 ± 0.003	0.016 ± 0.003	0.021 ± 0.003	0.021 ± 0.003	0.014 ± 0.002	0.021 ± 0.003	0.018
2-Feb	0.016 ± 0.005	0.021 ± 0.004	0.020 ± 0.003	0.022 ± 0.004	0.022 ± 0.003	0.023 ± 0.004	0.021 ± 0.004	0.021
9-Feb	0.023 ± 0.004	0.020 ± 0.003	0.023 ± 0.003	0.022 ± 0.003	0.020 ± 0.003	0.017 ± 0.003	0.024 ± 0.004	0.021
16-Feb	0.019 ± 0.004	0.022 ± 0.003	0.021 ± 0.003	0.020 ± 0.003	0.018 ± 0.003	0.019 ± 0.003	0.020 ± 0.003	0.020
23-Feb	0.010 ± 0.003	0.010 ± 0.003	0.009 ± 0.002	0.013 ± 0.003	0.010 ± 0.002	0.008 ± 0.002	0.012 ± 0.003	0.010
2-Mar	0.011 ± 0.004	0.014 ± 0.003	0.015 ± 0.003	0.016 ± 0.003	0.014 ± 0.003	0.012 ± 0.002	0.011 ± 0.003	0.013
9-Mar	0.003 ± 0.003	0.004 ± 0.002	0.004 ± 0.002	0.007 ± 0.003	0.005 ± 0.002	0.005 ± 0.002	0.005 ± 0.003	0.005
16-Mar	0.018 ± 0.004	0.017 ± 0.003	0.015 ± 0.004	0.020 ± 0.003	0.018 ± 0.003	0.017 ± 0.003	0.024 ± 0.004	0.019
23-Mar	0.009 ± 0.003	0.011 ± 0.003	0.014 ± 0.003	0.015 ± 0.003	0.014 ± 0.002	0.012 ± 0.002	0.016 ± 0.003	0.013
30-Mar	0.023 ± 0.005	0.020 ± 0.003	0.019 ± 0.003	0.021 ± 0.004	0.020 ± 0.003	0.016 ± 0.003	0.022 ± 0.004	0.020
6-Apr	0.010 ± 0.004	0.008 ± 0.003	0.007 ± 0.002	0.010 ± 0.003	0.008 ± 0.002	0.007 ± 0.002	0.008 ± 0.003	0.008
13-Apr	0.020 ± 0.004	0.016 ± 0.003	0.019 ± 0.003	0.019 ± 0.003	0.019 ± 0.003	0.018 ± 0.003	0.024 ± 0.004	0.019
20-Apr	0.016 ± 0.004	0.016 ± 0.003	0.018 ± 0.003	0.016 ± 0.003	0.017 ± 0.003	0.014 ± 0.003	0.021 ± 0.004	0.017
27-Apr	0.013 ± 0.004	0.018 ± 0.003	0.018 ± 0.003	0.015 ± 0.003	0.016 ± 0.003	0.013 ± 0.003	0.021 ± 0.004	0.016
4-May	0.025 ± 0.004	0.013 ± 0.003	0.006 ± 0.002	0.015 ± 0.003	0.021 ± 0.004	0.011 ± 0.002	0.008 ± 0.003	0.014
11-May	0.011 ± 0.003	0.009 ± 0.002	0.009 ± 0.002	0.009 ± 0.002	0.007 ± 0.002	0.008 ± 0.002	0.017 ± 0.003	0.010
18-May	0.019 ± 0.004	0.019 ± 0.003	0.019 ± 0.003	0.021 ± 0.003	0.016 ± 0.003	0.017 ± 0.003	0.022 ± 0.004	0.019
25-May	0.019 ± 0.004	0.021 ± 0.004	0.019 ± 0.003	0.017 ± 0.003	0.018 ± 0.003	0.017 ± 0.003	0.021 ± 0.003	0.019
1-Jun	0.011 ± 0.004	0.018 ± 0.004	0.018 ± 0.003	0.019 ± 0.004	0.015 ± 0.003	0.017 ± 0.003	0.020 ± 0.004	0.017
8-Jun	0.008 ± 0.003	0.006 ± 0.002	0.008 ± 0.002	0.009 ± 0.005	0.006 ± 0.002	0.006 ± 0.002	0.008 ± 0.003	0.007
15-Jun	0.010 ± 0.003	0.009 ± 0.003	0.009 ± 0.002	0.009 ± 0.003	0.008 ± 0.002	0.007 ± 0.002	0.014 ± 0.003	0.009
22-Jun	0.014 ± 0.004	0.011 ± 0.003	0.013 ± 0.002	0.013 ± 0.003	0.011 ± 0.002	0.011 ± 0.002	0.010 ± 0.002	0.012
29-Jun	0.016 ± 0.004	0.016 ± 0.003	0.017 ± 0.003	0.019 ± 0.003	0.021 ± 0.006	0.013 ± 0.003	0.018 ± 0.003	0.017
Maximum	0.025 ± 0.004	0.022 ± 0.003	0.023 ± 0.003	0.022 ± 0.003	0.022 ± 0.003	0.023 ± 0.004	0.024 ± 0.004	
Average	0.015	0.015	0.015	0.016	0.015	0.013	0.017	
Minimum	0.003 ± 0.003	0.004 ± 0.002	0.004 ± 0.002	0.007 ± 0.003	0.005 ± 0.002	0.005 ± 0.002	0.005 ± 0.003	

I= Indicator
C= Control

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Table 3-1 B
On-Site Air Particulate Samplers
Gross Beta Results in pCi/m3

Collection Date	Sta. #2 (I)	Sta. #3 (I)	Sta. #4 (I)	Sta. #5 (I)	Sta. #6 (I)	Sta. #7 (I)	Sta. #13A (I)	Average
6-Jul	0.016 ± 0.004	0.012 ± 0.003	0.010 ± 0.002	0.018 ± 0.004	0.014 ± 0.003	0.015 ± 0.003	0.014 ± 0.003	0.014
13-Jul	0.014 ± 0.004	0.015 ± 0.003	0.025 ± 0.004	0.016 ± 0.003	0.015 ± 0.003	0.021 ± 0.003	0.014 ± 0.003	0.017
20-Jul	0.022 ± 0.004	0.024 ± 0.003	0.022 ± 0.003	0.024 ± 0.003	0.024 ± 0.003	0.025 ± 0.003	0.020 ± 0.003	0.023
27-Jul	0.014 ± 0.003	0.013 ± 0.003	0.010 ± 0.002	0.014 ± 0.003	0.013 ± 0.004	0.011 ± 0.003	0.015 ± 0.003	0.013
3-Aug	0.021 ± 0.003	0.023 ± 0.003	0.021 ± 0.003	0.020 ± 0.003	0.022 ± 0.003	0.021 ± 0.003	0.020 ± 0.003	0.021
10-Aug	0.023 ± 0.004	0.023 ± 0.004	0.021 ± 0.003	0.023 ± 0.004	0.021 ± 0.003	0.023 ± 0.004	0.022 ± 0.004	0.022
17-Aug	0.017 ± 0.003	0.017 ± 0.003	0.015 ± 0.003	0.018 ± 0.003	0.015 ± 0.003	0.018 ± 0.003	0.017 ± 0.003	0.017
24-Aug	0.019 ± 0.004	0.014 ± 0.003	0.017 ± 0.003	0.017 ± 0.003	0.019 ± 0.003	0.018 ± 0.003	0.018 ± 0.003	0.017
31-Aug	0.018 ± 0.004	0.017 ± 0.003	0.015 ± 0.003	0.024 ± 0.003	0.017 ± 0.003	0.018 ± 0.003	0.019 ± 0.003	0.018
7-Sep	0.011 ± 0.003	0.016 ± 0.002	0.015 ± 0.002	0.016 ± 0.003	0.019 ± 0.003	0.019 ± 0.003	0.016 ± 0.003	0.016
14-Sep	0.017 ± 0.004	0.012 ± 0.003	0.012 ± 0.003	0.012 ± 0.003	0.012 ± 0.003	a	0.012 ± 0.003	0.013
21-Sep	0.022 ± 0.003	0.022 ± 0.003	0.029 ± 0.004	0.025 ± 0.003	0.023 ± 0.003	0.021 ± 0.003	0.026 ± 0.003	0.024
28-Sep	0.021 ± 0.004	0.016 ± 0.003	0.022 ± 0.003	0.020 ± 0.003	0.021 ± 0.003	0.019 ± 0.003	0.021 ± 0.003	0.020
5-Oct	0.012 ± 0.003	0.012 ± 0.002	0.013 ± 0.003	0.012 ± 0.003	0.013 ± 0.003	0.012 ± 0.003	0.014 ± 0.003	0.012
12-Oct	0.014 ± 0.003	0.011 ± 0.002	0.013 ± 0.002	0.014 ± 0.003	0.011 ± 0.002	0.012 ± 0.003	0.014 ± 0.003	0.013
19-Oct	0.019 ± 0.004	0.015 ± 0.003	0.017 ± 0.003	0.020 ± 0.004	0.018 ± 0.003	0.015 ± 0.003	0.017 ± 0.003	0.017
26-Oct	0.015 ± 0.003	0.015 ± 0.002	0.015 ± 0.003	0.045 ± 0.008	0.016 ± 0.003	0.014 ± 0.003	0.015 ± 0.003	0.019
2-Nov	0.022 ± 0.004	0.017 ± 0.003	0.021 ± 0.003	0.020 ± 0.003	0.019 ± 0.003	0.021 ± 0.003	0.020 ± 0.003	0.020
9-Nov	0.005 ± 0.002	0.006 ± 0.002	0.006 ± 0.002	0.005 ± 0.002	0.005 ± 0.002	0.005 ± 0.002	0.005 ± 0.002	0.005
16-Nov	0.027 ± 0.004	0.022 ± 0.003	0.026 ± 0.004	0.021 ± 0.003	0.027 ± 0.003	0.026 ± 0.004	0.027 ± 0.004	0.025
23-Nov	0.019 ± 0.004	0.017 ± 0.003	0.015 ± 0.003	0.019 ± 0.003	0.018 ± 0.003	0.019 ± 0.003	0.014 ± 0.003	0.017
30-Nov	0.017 ± 0.004	0.022 ± 0.003	0.019 ± 0.003	0.021 ± 0.003	0.019 ± 0.003	0.021 ± 0.003	0.022 ± 0.003	0.020
7-Dec	0.026 ± 0.004	0.021 ± 0.003	0.022 ± 0.008	0.022 ± 0.003	0.024 ± 0.003	0.023 ± 0.003	0.023 ± 0.003	0.023
14-Dec	0.019 ± 0.004	0.016 ± 0.003	0.023 ± 0.005	0.017 ± 0.003	0.016 ± 0.003	0.020 ± 0.003	0.017 ± 0.003	0.018
21-Dec	0.025 ± 0.004	0.018 ± 0.003	0.021 ± 0.004	0.019 ± 0.003	0.019 ± 0.003	0.022 ± 0.003	0.021 ± 0.003	0.021
28-Dec	0.030 ± 0.004	0.025 ± 0.003	0.026 ± 0.004	0.029 ± 0.004	0.029 ± 0.003	0.025 ± 0.004	0.027 ± 0.004	0.027
Maximum	0.030 ± 0.004	0.025 ± 0.003	0.029 ± 0.004	0.045 ± 0.008	0.029 ± 0.003	0.026 ± 0.004	0.027 ± 0.004	
Average	0.019	0.017	0.018	0.020	0.018	0.019	0.018	
Minimum	0.005 ± 0.002	0.006 ± 0.002	0.006 ± 0.002	0.005 ± 0.002	0.005 ± 0.002	0.005 ± 0.002	0.005 ± 0.002	

(a) Station 7 air sampler tripped off line shortly after sample collection.

I= Indicator
C= Control

Rochester Gas and Electric

Table 3-2 A
Off-Site Air Particulate Samplers
Gross Beta Results in pCi/m3

Collection Date	Sta. #8 (C)	Sta.#9 (I)	Sta. #10 (C)	Sta. #11 (I)	Sta.#12 (C)	Average
5-Jan	0.016 ± 0.003	0.012 ± 0.002	0.016 ± 0.003	0.015 ± 0.003	0.016 ± 0.004	0.015
12-Jan	0.011 ± 0.003	0.010 ± 0.002	0.012 ± 0.003	0.012 ± 0.002	0.014 ± 0.004	0.012
19-Jan	0.016 ± 0.003	0.014 ± 0.003	0.016 ± 0.003	0.015 ± 0.003	0.020 ± 0.004	0.016
26-Jan	0.016 ± 0.003	0.015 ± 0.002	0.015 ± 0.003	0.017 ± 0.004	0.019 ± 0.004	0.016
2-Feb	0.019 ± 0.004	0.018 ± 0.003	0.020 ± 0.004	0.019 ± 0.006	0.021 ± 0.005	0.019
9-Feb	0.020 ± 0.003	0.019 ± 0.003	0.022 ± 0.003	0.017 ± 0.005	0.027 ± 0.004	0.021
16-Feb	0.020 ± 0.003	0.019 ± 0.003	0.022 ± 0.003	0.023 ± 0.005	0.024 ± 0.004	0.022
23-Feb	0.011 ± 0.003	0.008 ± 0.002	0.009 ± 0.003	0.008 ± 0.004	0.012 ± 0.004	0.009
2-Mar	0.014 ± 0.003	0.014 ± 0.003	0.013 ± 0.003	0.013 ± 0.004	0.013 ± 0.004	0.014
9-Mar	0.005 ± 0.002	0.006 ± 0.002	0.008 ± 0.003	0.006 ± 0.004	0.008 ± 0.003	0.007
16-Mar	0.016 ± 0.003	0.015 ± 0.003	0.020 ± 0.003	0.015 ± 0.005	0.023 ± 0.005	0.018
23-Mar	0.012 ± 0.003	0.011 ± 0.003	0.013 ± 0.003	0.013 ± 0.004	a	0.012
30-Mar	0.019 ± 0.003	0.020 ± 0.003	0.020 ± 0.003	0.021 ± 0.005	a	0.020
6-Apr	0.009 ± 0.003	0.007 ± 0.002	0.010 ± 0.003	0.011 ± 0.004	a	0.009
13-Apr	0.020 ± 0.003	0.021 ± 0.003	0.023 ± 0.003	0.021 ± 0.005	0.023 ± 0.004	0.022
20-Apr	0.015 ± 0.003	0.016 ± 0.003	0.019 ± 0.003	0.015 ± 0.005	0.025 ± 0.005	0.018
27-Apr	0.016 ± 0.003	0.020 ± 0.003	0.020 ± 0.003	0.017 ± 0.005	0.021 ± 0.007	0.019
4-May	0.017 ± 0.003	0.014 ± 0.003	0.018 ± 0.003	0.032 ± 0.006	0.025 ± 0.005	0.021
11-May	0.010 ± 0.003	0.012 ± 0.002	0.013 ± 0.003	0.009 ± 0.004	0.015 ± 0.004	0.012
18-May	0.017 ± 0.003	0.019 ± 0.003	0.017 ± 0.003	0.020 ± 0.005	0.017 ± 0.009	0.018
25-May	0.018 ± 0.003	0.018 ± 0.003	0.019 ± 0.003	0.019 ± 0.004	0.030 ± 0.005	0.021
1-Jun	0.022 ± 0.004	0.018 ± 0.003	0.018 ± 0.004	0.019 ± 0.006	0.021 ± 0.009	0.019
8-Jun	0.009 ± 0.003	0.006 ± 0.002	0.008 ± 0.003	0.004 ± 0.004	0.045 ± 0.136	0.014
15-Jun	0.011 ± 0.003	0.009 ± 0.002	0.010 ± 0.003	0.007 ± 0.004	a	0.009
22-Jun	0.013 ± 0.003	0.015 ± 0.003	0.011 ± 0.003	0.013 ± 0.004	0.011 ± 0.003	0.012
29-Jun	0.019 ± 0.003	0.016 ± 0.003	0.017 ± 0.003	0.017 ± 0.005	0.016 ± 0.003	0.017
Maximum	0.022 ± 0.004	0.021 ± 0.003	0.023 ± 0.003	0.032 ± 0.006	0.045 ± 0.136	
Average	0.015	0.014	0.016	0.015	0.020	
Minimum	0.005 ± 0.002	0.006 ± 0.002	0.008 ± 0.003	0.004 ± 0.004	0.008 ± 0.003	

(a) Unit out of service

I= Indicator
C= Control

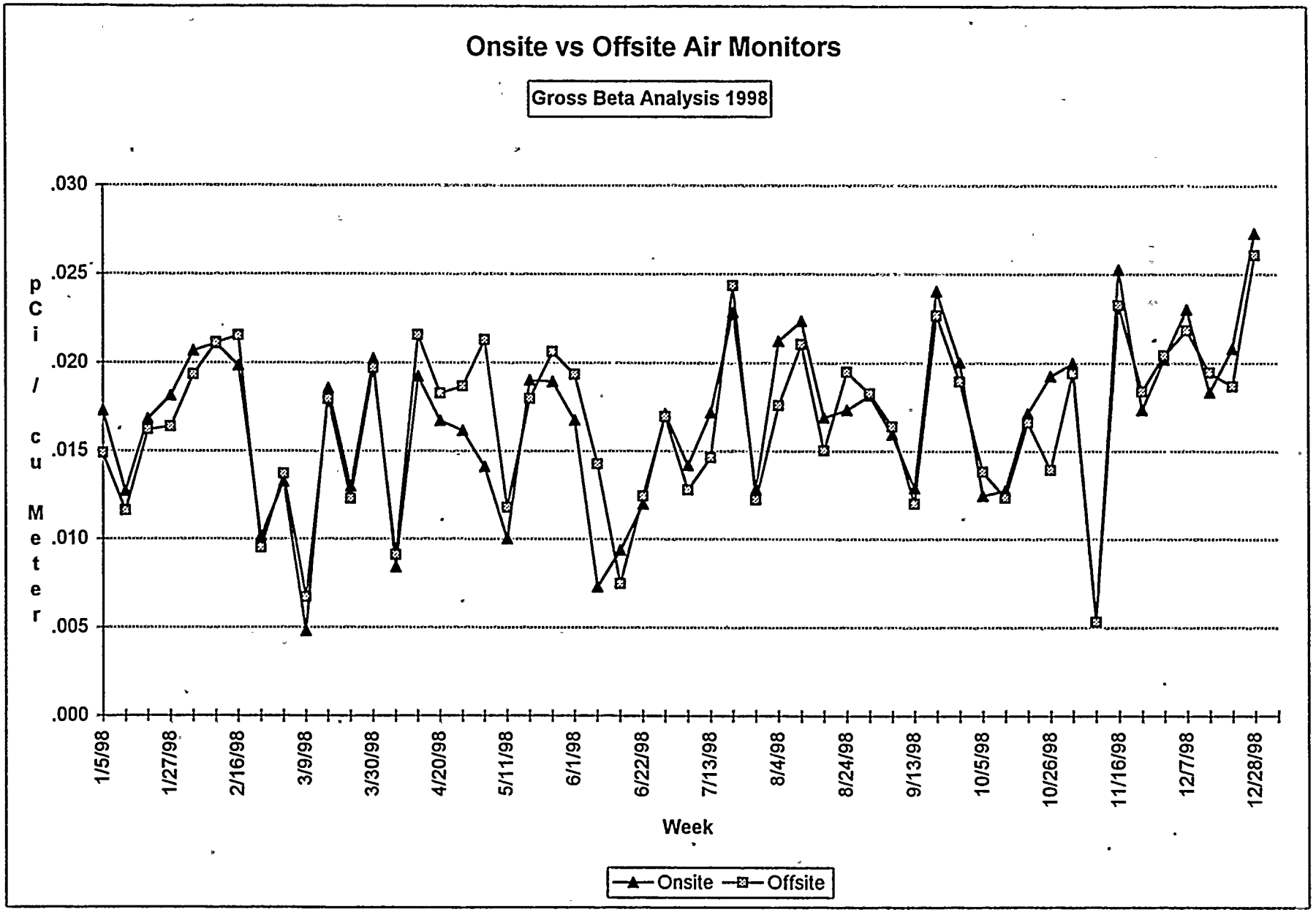
Rochester Gas and Electric

Table 3-2 B
Off-Site Air Particulate Samplers
Gross Beta Results in pCi/m3

Collection Date	Sta. #8 (C)	Sta. #9 (I)	Sta. #10 (C)	Sta. #11 (I)	Sta. #12 (C)	Average
6-Jul	0.013 ± 0.003	0.013 ± 0.003	0.014 ± 0.003	0.012 ± 0.004	0.012 ± 0.003	0.013
13-Jul	0.015 ± 0.003	0.014 ± 0.003	0.016 ± 0.003	0.014 ± 0.004	0.014 ± 0.003	0.015
20-Jul	0.027 ± 0.004	0.023 ± 0.003	0.028 ± 0.004	0.022 ± 0.005	0.021 ± 0.003	0.024
27-Jul	0.014 ± 0.003	0.012 ± 0.003	0.013 ± 0.003	0.010 ± 0.004	0.012 ± 0.003	0.012
3-Aug	0.017 ± 0.003	0.016 ± 0.003	0.020 ± 0.003	0.017 ± 0.004	0.018 ± 0.003	0.018
10-Aug	0.021 ± 0.004	0.022 ± 0.004	0.024 ± 0.004	0.016 ± 0.005	0.022 ± 0.003	0.021
17-Aug	0.017 ± 0.003	0.014 ± 0.003	0.017 ± 0.003	0.016 ± 0.004	0.012 ± 0.002	0.015
24-Aug	0.019 ± 0.004	0.019 ± 0.003	0.020 ± 0.003	0.014 ± 0.004	0.025 ± 0.004	0.019
31-Aug	0.016 ± 0.004	0.016 ± 0.003	0.020 ± 0.003	0.020 ± 0.005	0.020 ± 0.003	0.018
7-Sep	0.014 ± 0.003	0.017 ± 0.003	0.017 ± 0.003	0.016 ± 0.004	0.019 ± 0.003	0.016
14-Sep	0.011 ± 0.004	0.010 ± 0.003	0.012 ± 0.003	0.014 ± 0.005	0.013 ± 0.003	0.012
21-Sep	0.022 ± 0.004	0.021 ± 0.003	0.023 ± 0.003	0.023 ± 0.005	0.024 ± 0.003	0.023
28-Sep	0.019 ± 0.004	0.018 ± 0.003	0.019 ± 0.003	0.019 ± 0.005	0.021 ± 0.003	0.019
5-Oct	0.016 ± 0.004	0.013 ± 0.003	0.014 ± 0.003	0.014 ± 0.004	0.012 ± 0.002	0.014
12-Oct	0.011 ± 0.003	0.012 ± 0.003	0.012 ± 0.003	0.014 ± 0.004	0.013 ± 0.002	0.012
19-Oct	0.018 ± 0.004	0.016 ± 0.003	0.017 ± 0.003	0.014 ± 0.005	0.018 ± 0.003	0.017
26-Oct	0.015 ± 0.004	0.014 ± 0.003	0.014 ± 0.003	0.012 ± 0.004	0.016 ± 0.003	0.014
2-Nov	0.020 ± 0.004	0.017 ± 0.003	0.021 ± 0.003	0.018 ± 0.005	0.020 ± 0.003	0.019
9-Nov	0.006 ± 0.003	0.006 ± 0.002	0.003 ± 0.002	0.004 ± 0.003	0.008 ± 0.002	0.005
16-Nov	0.026 ± 0.005	0.022 ± 0.003	0.024 ± 0.004	0.021 ± 0.005	0.023 ± 0.003	0.023
23-Nov	0.018 ± 0.004	0.017 ± 0.003	0.020 ± 0.003	0.018 ± 0.005	0.019 ± 0.003	0.018
30-Nov	0.019 ± 0.004	0.024 ± 0.003	0.019 ± 0.003	0.018 ± 0.005	0.022 ± 0.003	0.020
7-Dec	0.021 ± 0.004	0.021 ± 0.003	0.024 ± 0.004	0.020 ± 0.005	0.023 ± 0.003	0.022
14-Dec	0.020 ± 0.004	0.021 ± 0.003	0.019 ± 0.003	0.017 ± 0.005	0.020 ± 0.003	0.019
21-Dec	0.019 ± 0.004	0.019 ± 0.003	0.019 ± 0.003	0.019 ± 0.005	0.017 ± 0.003	0.019
28-Dec	0.023 ± 0.004	0.025 ± 0.003	0.028 ± 0.004	0.025 ± 0.005	0.029 ± 0.004	0.026
Maximum	0.027 ± 0.004	0.025 ± 0.003	0.028 ± 0.004	0.025 ± 0.005	0.029 ± 0.004	
Average	0.018	0.017	0.018	0.016	0.018	
Minimum	0.006 ± 0.003	0.006 ± 0.002	0.003 ± 0.002	0.004 ± 0.003	0.008 ± 0.002	

I= Indicator
C= Control

Rochester Gas and Electric
Figure 3-3



Rochester Gas and Electric

Table 3-4A
13 Week Composite
Gamma Isotopic Analysis
Result in pCi/m3
First Qtr

Station	7Be	40K	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce
#2	.122±.014	.009±.007	<.002	<.010	<.003	<.003	<.003	<.004	<.004	<.002	<.016	<.002	<.002	<.010	<.002	<.004
#3	.077±.009	.008±.005	<.001	<.003	<.001	<.001	<.004	<.003	<.002	<.002	<.012	<.001	<.001	<.005	<.002	<.004
#4	.075±.008	.005±.004	<.001	<.006	<.002	<.002	<.002	<.002	<.002	<.001	<.010	<.001	<.001	<.006	<.002	<.003
#5	.113±.009	.048±.008	<.001	<.004	<.002	<.001	<.003	<.003	<.002	<.002	<.010	<.001	<.001	<.009	<.003	<.006
#6	.100±.010	.010±.004	<.001	<.005	<.002	<.001	<.002	<.002	<.002	<.002	<.014	<.001	<.001	<.011	<.002	<.004
#7	.089±.008	<.011	<.001	<.002	<.002	<.001	<.003	<.002	<.002	<.002	<.006	<.001	<.001	<.011	<.002	<.003
#8	.111±.011	<.017	<.001	<.008	<.002	<.001	<.002	<.004	<.003	<.002	<.009	<.001	<.001	<.012	<.003	<.003
#9	.087±.010	.014±.005	<.001	<.004	<.001	<.001	<.004	<.004	<.003	<.002	<.014	<.001	<.001	<.013	<.003	<.004
#10	.091±.008	.040±.006	<.001	<.004	<.002	<.001	<.003	<.003	<.002	<.002	<.011	<.001	<.001	<.012	<.003	<.004
#11	.096±.011	.016±.005	<.001	<.006	<.002	<.002	<.003	<.003	<.004	<.002	<.014	<.001	<.001	<.015	<.003	<.004
#12	.102±.013	<.017	<.002	<.008	<.002	<.001	<.004	<.004	<.004	<.003	<.016	<.001	<.001	<.015	<.003	<.006
#13	.120±.012	<.021	<.001	<.004	<.002	<.001	<.003	<.003	<.002	<.002	<.010	<.001	<.001	<.012	<.002	<.003

Table 3-4B
13 Week Composite
Gamma Isotopic Analysis
Result in pCi/m3
Second Qtr

Station	7Be	40K	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce
#2	.127±.014	<.024	<.001	<.005	<.003	<.002	<.005	<.004	<.003	<.003	<.015	<.001	<.001	<.017	<.003	<.004
#3	.113±.012	.021±.006	<.001	<.007	<.002	<.001	<.006	<.006	<.003	<.002	<.019	<.001	<.001	<.016	<.003	<.005
#4	.096±.009	<.008	<.001	<.005	<.001	<.001	<.003	<.003	<.002	<.002	<.010	<.001	<.001	<.008	<.002	<.004
#5	.138±.010	.044±.006	<.001	<.004	<.002	<.001	<.003	<.003	<.002	<.002	<.012	<.001	<.001	<.009	<.003	<.005
#6	.120±.011	.006±.004	<.001	<.006	<.002	<.001	<.003	<.002	<.002	<.002	<.010	<.001	<.001	<.009	<.002	<.003
#7	.099±.011	<.018	<.001	<.006	<.002	<.001	<.002	<.003	<.003	<.003	<.014	<.001	<.001	<.012	<.002	<.004
#8	.154±.011	.039±.007	<.001	<.006	<.002	<.001	<.003	<.003	<.003	<.002	<.011	<.001	<.001	<.013	<.003	<.005
#9	.117±.010	.012±.004	<.001	<.006	<.002	<.001	<.003	<.001	<.002	<.002	<.010	<.001	<.001	<.009	<.002	<.003
#10	.126±.011	<.009	<.001	<.005	<.002	<.001	<.001	<.002	<.001	<.002	<.010	<.001	<.001	<.009	<.002	<.004
#11	.116±.016	<.025	<.002	<.007	<.003	<.002	<.006	<.005	<.005	<.004	<.022	<.002	<.002	<.028	<.003	<.006
#12	.186±.026	<.037	<.003	<.013	<.003	<.003	<.007	<.009	<.007	<.005	<.031	<.003	<.003	<.041	<.006	<.011
#13	.134±.011	.046±.007	<.001	<.004	<.002	<.001	<.003	<.003	<.003	<.003	<.011	<.001	<.001	<.012	<.003	<.005

Rochester Gas and Electric

Table 3-4C
13 Week Composite
Gamma Isotopic Analysis
Result in pCi/m3
Third Qtr

Station	7Be	40K	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce
#2	.140±.017	<.030	<.001	<.010	<.004	<.003	<.004	<.006	<.007	<.004	<.022	<.002	<.001	<.031	<.005	<.005
#3	.104±.013	<.022	<.001	<.008	<.003	<.002	<.003	<.005	<.005	<.003	<.016	<.001	<.001	<.023	<.004	<.004
#4	.125±.013	<.019	<.001	<.005	<.002	<.002	<.004	<.003	<.005	<.004	<.015	<.002	<.001	<.022	<.004	<.004
#5	.154±.014	.013±.005	<.001	<.004	<.002	<.002	<.004	<.004	<.004	<.004	<.007	<.001	<.001	<.028	<.003	<.005
#6	.155±.015	.026±.007	<.001	<.008	<.002	<.002	<.003	<.004	<.005	<.003	<.012	<.001	<.001	<.022	<.004	<.004
#7	.134±.013	.021±.007	<.001	<.008	<.002	<.002	<.004	<.003	<.003	<.002	<.013	<.001	<.001	<.013	<.003	<.005
#8	.127±.017	<.029	<.002	<.012	<.003	<.003	<.007	<.008	<.005	<.004	<.013	<.002	<.002	<.031	<.005	<.005
#9	.128±.012	.016±.006	<.001	<.008	<.002	<.002	<.005	<.003	<.002	<.002	<.009	<.001	<.001	<.023	<.003	<.005
#10	.123±.015	<.016	<.002	<.005	<.002	<.002	<.003	<.005	<.004	<.003	<.014	<.002	<.001	<.050	<.005	<.006
#11	.147±.021	.057±.015	<.002	<.010	<.003	<.002	<.003	<.009	<.007	<.002	<.027	<.002	<.002	<.052	<.006	<.011
#12	.126±.011	.020±.005	<.001	<.005	<.001	<.001	<.003	<.003	<.002	<.002	<.008	<.001	<.001	<.014	<.003	<.004
#13	.138±.013	.028±.008	<.001	<.004	<.002	<.001	<.004	<.005	<.004	<.002	<.012	<.001	<.001	<.021	<.003	<.005

Table 3-4D
13 Week Composite
Gamma Isotopic Analysis
Result in pCi/m3
Fourth Qtr

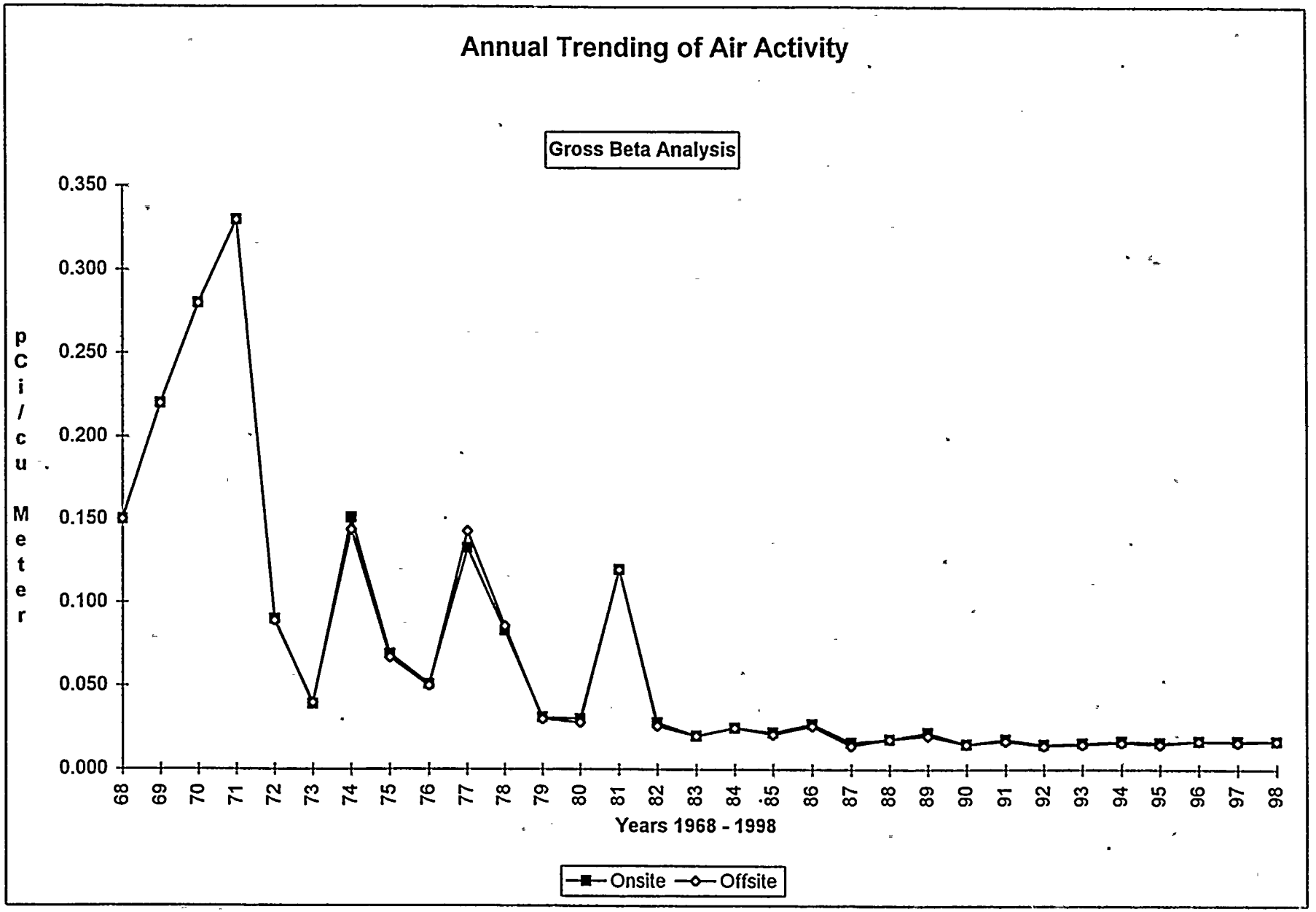
Station	7Be	40K	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce
#2	.095±.012	.013±.006	<.001	<.008	<.002	<.002	<.006	<.004	<.003	<.003	<.009	<.001	<.001	<.030	<.003	<.004
#3	.067±.010	<.014	<.001	<.004	<.002	<.001	<.003	<.003	<.004	<.003	<.010	<.002	<.001	<.019	<.003	<.005
#4	.070±.012	.013±.009	<.001	<.008	<.002	<.002	<.004	<.005	<.003	<.003	<.012	<.001	<.001	<.022	<.004	<.005
#5	.077±.009	.034±.006	<.001	<.004	<.002	<.001	<.002	<.004	<.003	<.003	<.011	<.001	<.001	<.010	<.004	<.005
#6	.077±.008	<.010	<.001	<.003	<.001	<.001	<.003	<.002	<.003	<.002	<.006	<.001	<.001	<.012	<.002	<.003
#7	.094±.011	<.014	<.001	<.006	<.002	<.001	<.003	<.003	<.003	<.002	<.011	<.001	<.001	<.026	<.004	<.005
#8	.097±.014	<.018	<.002	<.010	<.003	<.002	<.007	<.005	<.004	<.003	<.016	<.001	<.001	<.027	<.003	<.005
#9	.081±.012	<.018	<.002	<.009	<.003	<.002	<.005	<.003	<.005	<.004	<.015	<.001	<.002	<.024	<.004	<.005
#10	.070±.011	.022±.008	<.001	<.007	<.002	<.002	<.004	<.003	<.003	<.003	<.015	<.001	<.001	<.021	<.003	<.005
#11	.094±.014	.056±.012	<.002	<.009	<.002	<.002	<.005	<.007	<.006	<.006	<.022	<.002	<.002	<.026	<.006	<.009
#12	.085±.010	.016±.005	<.001	<.005	<.001	<.002	<.003	<.003	<.002	<.002	<.012	<.001	<.001	<.016	<.003	<.004
#13	.076±.010	.013±.005	<.001	<.004	<.001	<.001	<.003	<.003	<.002	<.001	<.010	<.001	<.001	<.017	<.002	<.004

Table 3-5
Charcoal Cartridges Gamma Analysis for Iodine
Results in pCi/m3

Collection Date	Sta. #2	Sta. #4	Sta. #7	Sta. #8	Sta. #9	Sta. #11
5-Jan	<.020	<.012	<.011	<.028	<.009	<.018
12-Jan	<.020	<.009	<.014	<.019	<.018	<.024
19-Jan	<.018	<.013	<.011	<.034	<.013	<.013
26-Jan	<.020	<.023	<.011	<.007	<.014	<.020
2-Feb	<.019	<.021	<.018	<.014	<.017	<.035
9-Feb	<.014	<.016	<.012	<.018	<.014	<.024
16-Feb	<.030	<.010	<.011	<.025	<.009	<.035
23-Feb	<.023	<.009	<.011	<.023	<.015	<.029
2-Mar	<.018	<.012	<.016	<.019	<.016	<.031
9-Mar	<.017	<.016	<.010	<.020	<.020	<.036
16-Mar	<.014	<.012	<.016	<.019	<.018	<.038
23-Mar	<.012	<.017	<.014	<.014	<.011	<.037
30-Mar	<.014	<.010	<.028	<.014	<.018	<.029
6-Apr	<.043	<.019	<.019	<.013	<.014	<.034
13-Apr	<.017	<.013	<.012	<.028	<.020	<.036
20-Apr	<.022	<.013	<.008	<.031	<.017	<.034
27-Apr	<.012	<.013	<.017	<.017	<.017	<.024
4-May	<.019	<.013	<.013	<.027	<.020	<.040
11-May	<.022	<.017	<.011	<.019	<.009	<.036
18-May	<.020	<.016	<.012	<.018	<.012	<.042
25-May	<.021	<.012	<.012	<.025	<.016	<.029
1-Jun	<.033	<.020	<.022	<.021	<.020	<.049
8-Jun	<.010	<.016	<.010	<.020	<.015	<.027
15-Jun	<.020	<.015	<.016	<.016	<.021	<.023
22-Jun	<.017	<.011	<.014	<.027	<.016	<.035
29-Jun	<.022	<.011	<.014	<.020	<.015	<.022
6-Jul	<.025	<.011	<.014	<.021	<.017	<.034
13-Jul	<.020	<.025	<.019	<.019	<.021	<.022
20-Jul	<.020	<.011	<.012	<.016	<.025	<.027
27-Jul	<.020	<.015	<.013	<.025	<.018	<.038
3-Aug	<.017	<.013	<.014	<.013	<.013	<.024
10-Aug	<.026	<.011	<.016	<.013	<.017	<.027
17-Aug	<.020	<.016	<.018	<.021	<.015	<.034
24-Aug	<.019	<.014	<.013	<.024	<.014	<.031
31-Aug	<.011	<.018	<.012	<.027	<.013	<.027
7-Sep	<.018	<.018	<.017	<.032	<.021	<.029
14-Sep	<.023	<.017	(a)	<.027	<.026	<.040
21-Sep	<.020	<.018	<.015	<.029	<.016	<.030
28-Sep	<.014	<.017	<.025	<.031	<.012	<.022
5-Oct	<.014	<.012	<.013	<.011	<.016	<.022
12-Oct	<.014	<.013	<.014	<.021	<.012	<.036
19-Oct	<.019	<.018	<.017	<.026	<.017	<.035
26-Oct	<.019	<.014	<.024	<.026	<.017	<.033
2-Nov	<.017	<.012	<.013	<.021	<.014	<.027
9-Nov	<.027	<.023	<.013	<.017	<.014	<.036
16-Nov	<.015	<.016	<.015	<.030	<.009	<.025
23-Nov	<.013	<.015	<.018	<.026	<.014	<.017
30-Nov	<.018	<.017	<.014	<.027	<.013	<.032
7-Dec	<.017	<.063	<.016	<.020	<.018	<.032
14-Dec	<.016	<.025	<.024	<.028	<.017	<.024
21-Dec	<.019	<.017	<.013	<.025	<.015	<.033
28-Dec	<.015	<.016	<.016	<.035	<.014	<.039

(a) Station 7 air sampler tripped off line shortly after sample collection.

Rochester Gas and Electric
Figure 3-6



Peaks are indicative of atmospheric nuclear weapon detonations

3.3 Water Samples

Water samples are collected on a schedule from locations surrounding the plant to assess if there is any measurable influence upon 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), composited monthly, and analyzed for gross beta activity. There was no significant difference between the upstream and downstream sample concentrations. The 1998 averages were 2.55 and 2.94 pCi/liter for the upstream and downstream samples respectively.

A graphical comparison of upstream vs downstream gross beta analysis results is given in Table 3-7A. Peaks up to 5 pCi/liter occur when the lake is stirred up by wind and the sample includes large quantities of suspended silt. A trend plot, Table 3-7 B, showing the annual average activity measured during the years since 1968 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.

Weekly samples are taken from the plant circulating water intake (Circ In) and discharge canal (Circ Out), and composited monthly. The yearly averages were 2.52 and 2.65 pCi/liter for the intake and discharge canal respectively. These are essentially the same as the upstream and downstream values as they fall within the $\pm$ 2 sigma error band and range of the measurement.

For all batch releases, the average concentration in the discharge canal from the identified activity during 1998 was 6.4×10^{-6} pCi/liter. The normal ± 1 sigma variation for the gross beta activity calculation of composite samples is 5.0×10^{-1} pCi/liter or 10^{5} times the average concentration added by releases from the plant.

Samples of the creek which crosses the site are collected and analyzed monthly. The results show no indication of plant influence. The higher average gross beta values for Deer Creek are attributed to higher levels of Radon progeny in the soils from which the creek recharges and over which the creek flows. Results for all water beta analyses are listed in Tables 3-8 .

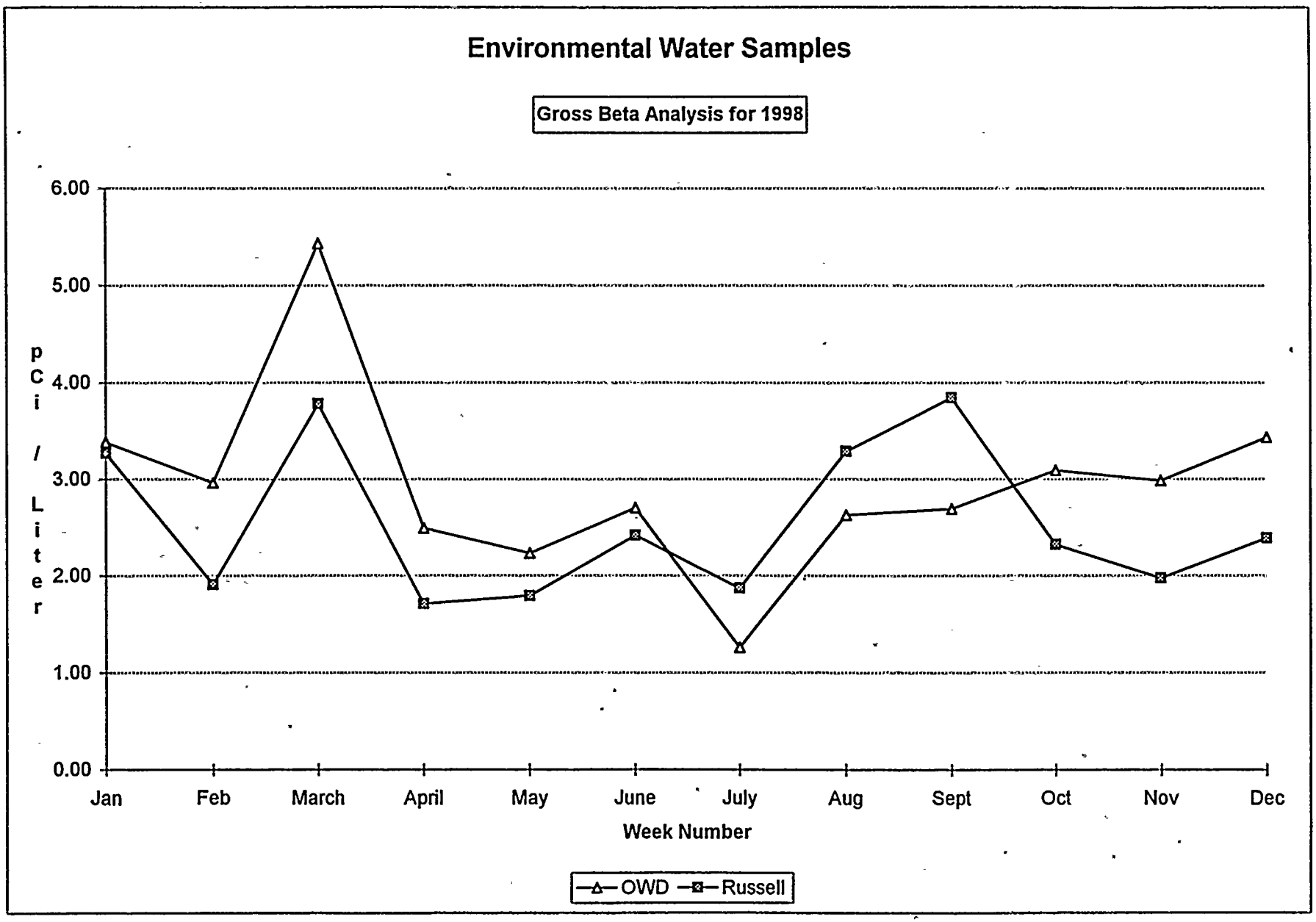
Gamma isotopic analysis is performed on each monthly sample and on each monthly composite of weekly samples. These are listed in Tables 3-9 to 3-14 and are separated by source of sample.

Tritium Analysis

Tritium analysis was performed on all water samples on a monthly basis. Composites are made from the weekly composites and a portion distilled for analysis to remove interferences. Tritium data is given in Table 3-15.

Iodine Analysis

All monthly composite water samples are analyzed for Iodine-131. The analysis allows the determination of Iodine-131 activity of < 1 pCi/liter. Iodine data is given in Table 3-16. Any positive counts and the 1 sigma error are reported. During 1998, no sample results indicated I-131 activity that exceeded the LLD for the analysis. There were no positive Iodine-131 results.


Environmental Water Samples
Gross Beta Analysis for 1998
6.00
5.00
4.00
3.00
2.00
1.00
0.00
pCi/Liter
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Week Number
OWD
Russell

Rochester Gas and Electric
Figure 3-7B

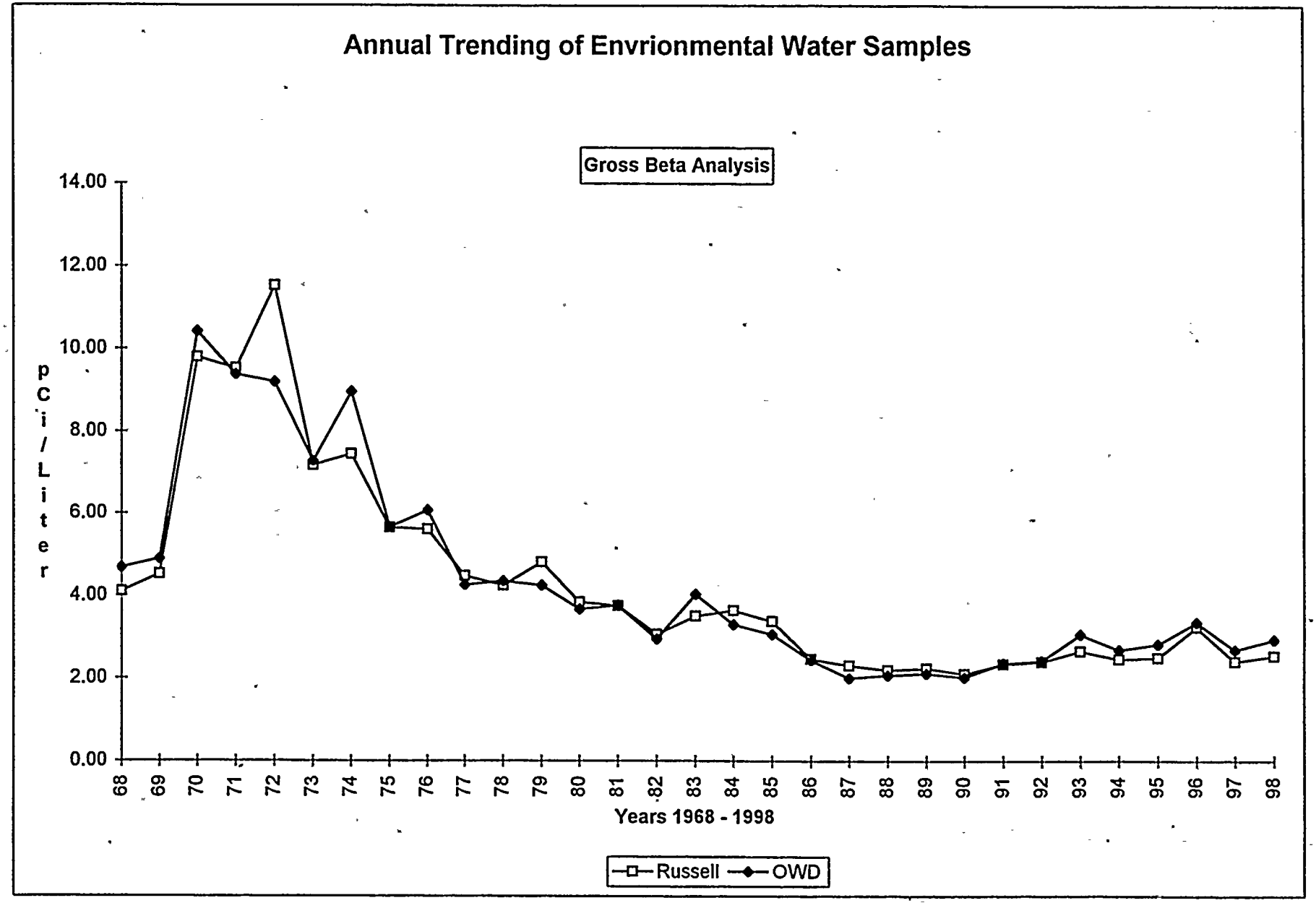


Table 3-8
Environmental Water Samples Gross Beta Analysis
Results in pCi / l

Month	Russell	O.W.D.	Circ In	Circ Out	Deer Creek
January	3.27 ± 0.48	3.38 ± 0.48	2.89 ± 0.47	2.61 ± 0.46	4.82 ± 0.58
February	1.91 ± 0.47	2.96 ± 0.50	3.43 ± 0.51	2.64 ± 0.49	4.38 ± 0.59
March	3.78 ± 0.50	5.43 ± 0.55	2.66 ± 0.46	2.91 ± 0.47	2.69 ± 0.49
April	1.71 ± 0.45	2.49 ± 0.48	2.09 ± 0.47	2.59 ± 0.49	3.08 ± 0.54
May	1.79 ± 0.44	2.23 ± 0.46	1.46 ± 0.43	2.29 ± 0.44	3.65 ± 0.59
June	2.42 ± 0.44	2.70 ± 0.45	1.92 ± 0.41	2.28 ± 0.44	3.02 ± 0.51
July	1.87 ± 0.48	1.26 ± 0.46	1.90 ± 0.48	2.50 ± 0.50	5.49 ± 0.64
August	3.29 ± 0.51	2.63 ± 0.50	3.08 ± 0.50	2.86 ± 0.50	3.40 ± 0.52
September	3.84 ± 0.52	2.69 ± 0.48	2.88 ± 0.48	2.60 ± 0.46	4.34 ± 0.56
October	2.32 ± 0.48	3.09 ± 0.50	3.13 ± 0.50	1.94 ± 0.47	6.54 ± 0.63
November	1.97 ± 0.46	2.98 ± 0.50	2.57 ± 0.48	3.65 ± 0.53	5.64 ± 0.69
December	2.39 ± 0.47	3.43 ± 0.50	2.27 ± 0.47	2.89 ± 0.49	5.46 ± 0.62
Maximum	3.84 ± 0.52	5.43 ± 0.55	3.43 ± 0.51	3.65 ± 0.53	6.54 ± 0.63
Average	2.55	2.94	2.52	2.65	4.38
Minimum	1.71 ± 0.45	1.26 ± 0.46	1.46 ± 0.43	1.94 ± 0.47	2.69 ± 0.49

Table 3-9
Russell Station Water Gamma Isotopic Analyses
Results in pCi/Liter

Month	7Be	51Cr	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce	226Ra
January	<28	<32	<3	<8	<3	<3	<7	<6	<4	<4	<30	<3	<3	<7	<6	<19	53±21
February	<30	<31	<3	<8	<3	<3	<7	<6	<4	<4	<29	<3	<3	<10	<6	<16	71±21
March	<24	<28	<3	<7	<3	<3	<6	<5	<3	<4	<25	<3	<2	<9	<5	<17	120±24
April	<44	<58	<5	<12	<5	<5	<12	<11	<7	<6	<50	<5	<5	<10	<10	<28	<94
May	<24	<32	<2	<6	<3	<2	<4	<5	<3	<3	<25	<2	<2	<7	<5	<18	91±20
June	<30	<40	<3	<7	<3	<3	<7	<6	<5	<5	<31	<2	<2	<12	<7	<19	<67
July	<32	<34	<3	<8	<4	<3	<7	<6	<4	<4	<29	<2	<3	<11	<6	<19	86±24
August	<26	<30	<3	<7	<3	<3	<6	<5	<4	<4	<31	<2	<3	<12	<5	<16	85±20
September	<41	<42	<4	<11	<4	<4	<8	<9	<6	<6	<43	<4	<4	<14	<8	<25	<70
October	<17	<20	<2	<6	<2	<2	<5	<4	<2	<3	<21	<2	<2	<7	<5	<16	54±16
November	<17	<22	<2	<6	<2	<3	<5	<4	<3	<2	<19	<2	<2	<9	<5	<16	37±18
December	<30	<30	<3	<7	<3	<3	<7	<6	<4	<4	<29	<3	<3	<14	<6	<16	<51

Table 3-10
Ontario Water District Water Gamma Isotopic Analyses
Results in pCi/Liter

Month	7Be	51Cr	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce	226Ra
January	<26	<28	<3	<7	<3	<3	<6	<5	<4	<3	<28	<2	<3	<7	<6	<17	66±22
February	<25	<29	<3	<8	<3	<3	<7	<6	<3	<4	<30	<2	<3	<11	<5	<17	42±21
March	<35	<45	<3	<10	<4	<4	<9	<8	<5	<6	<38	<3	<4	<11	<8	<26	97±39
April	<24	<27	<3	<6	<3	<3	<6	<5	<3	<4	<23	<2	<2	<8	<5	<16	76±20
May	<25	<28	<3	<9	<3	<3	<6	<5	<4	<4	<29	<3	<3	<12	<6	<17	51±21
June	<37	<51	<4	<9	<5	<4	<9	<8	<6	<6	<37	<4	<3	<13	<9	<26	87±37
July	<38	<52	<4	<10	<5	<4	<8	<8	<5	<6	<38	<4	<4	<12	<9	<26	84±35
August	<25	<30	<3	<8	<3	<3	<8	<6	<4	<4	<26	<2	<3	<10	<5	<16	93±26
September	<25	<26	<2	<7	<3	<3	<6	<5	<3	<3	<23	<2	<3	<9	<5	<14	68±19
October	<26	<31	<3	<7	<3	<3	<6	<5	<3	<4	<31	<3	<3	<7	<6	<22	<65.2
November	<25	<33	<3	<6	<3	<3	<6	<4	<3	<4	<29	<3	<3	<7	<6	<21	72±22
December	<41	<47	<4	<12	<6	<6	<11	<8	<7	<7	<45	<4	<5	<14	<9	<28	85±36

Table 3-11
Circ-In Water Gamma Isotopic Analyses
Results in pCi/Liter

Month	7Be	51Cr	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce	226Ra
January	<27	<30	<3	<7	<3	<3	<6	<6	<4	<4	<33	<3	<3	<8	<6	<19	<70
February	<28	<30	<3	<7	<3	<3	<6	<5	<4	<4	<29	<3	<3	<9	<6	<18	89±23
March	<26	<29	<3	<8	<3	<3	<8	<5	<3	<4	<26	<3	<3	<8	<5	<16	43±20
April	<25	<27	<3	<8	<3	<3	<7	<5	<3	<4	<28	<3	<3	<9	<5	<16	42±21
May	<28	<30	<3	<7	<3	<3	<7	<6	<4	<4	<24	<2	<3	<10	<6	<17	60±22
June	<29	<28	<3	<8	<4	<3	<7	<5	<4	<5	<27	<3	<3	<10	<6	<18	83±24
July	<29	<29	<3	<8	<3	<3	<6	<6	<4	<4	<25	<2	<3	<9	<6	<16	92±21
August	<27	<32	<3	<6	<3	<3	<6	<5	<4	<4	<33	<3	<3	<9	<6	<22	59±23
September	<24	<24	<2	<7	<3	<2	<6	<4	<3	<4	<27	<3	<2	<8	<6	<19	<58
October	<24	<26	<3	<7	<3	<4	<7	<6	<4	<4	<27	<3	<3	<7	<7	<17	71±21
November	<23	<25	<3	<7	<3	<3	<7	<5	<3	<3	<26	<3	<3	<8	<5	<17	63±21
December	<27	<31	<3	<6	<3	<2	<5	<5	<4	<4	<25	<2	<2	<7	<6	<21	91±22

Table 3-12
Circ. Outlet Water Gamma Isotopic Analyses
Results in pCi/Liter

Month	7Be	51Cr	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce	226Ra
January	<26	<27	<3	<8	<3	<3	<6	<6	<4	<3	<28	<2	<3	<9	<5	<16	75±19
February	<29	<35	<2	<5	<3	<2	<4	<5	<3	<4	<24	<2	<2	<7	<6	<20	58±22
March	<45	<51	<5	<14	<5	<6	<10	<9	<7	<6	<51	<5	<5	<13	<9	<27	82±36
April	<30	<33	<3	<7	<3	<3	<6	<6	<3	<4	<27	<3	<3	<8	<6	<19	<65
May	<29	<37	<3	<7	<3	<3	<6	<6	<4	<5	<27	<2	<3	<11	<7	<22	<64
June	<28	<31	<3	<8	<3	<3	<8	<5	<4	<4	<26	<3	<3	<10	<5	<16	51±24
July	<27	<38	<3	<8	<3	<3	<7	<5	<4	<5	<26	<3	<2	<10	<7	<22	<67
August	<34	<39	<4	<9	<4	<5	<9	<7	<5	<5	<37	<3	<4	<10	<7	<25	<72
September	<36	<44	<4	<10	<5	<5	<10	<8	<6	<5	<42	<4	<4	<14	<8	<23	80±31
October	<27	<32	<3	<6	<3	<3	<6	<5	<3	<4	<28	<3	<3	<7	<6	<22	69±24
November	<40	<42	<5	<12	<5	<3	<9	<8	<6	<6	<47	<5	<5	<12	<9	<28	<99
December	<20	<26	<3	<7	<3	<3	<6	<5	<3	<3	<24	<3	<2	<9	<6	<19	61±20

Table 3-13
Deer Creek Water Gamma Isotopic Analyses
Results in pCi/Liter

Month	7Be	51Cr	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb	103Ru	106Ru	134Cs	137Cs	140Ba	141Ce	144Ce	226Ra
January	<33	<36	<5	<10	<5	<6	<10	<8	<5	<6	<52	<5	<5	<7	<8	<31	<116
February	<33	<34	<4	<7	<4	<4	<9	<6	<4	<5	<40	<4	<4	<5	<7	<32	64±34
March	<38	<33	<5	<11	<5	<8	<16	<9	<5	<5	<46	<6	<5	<5	<7	<28	<102
April	<35	<31	<5	<8	<4	<5	<9	<6	<4	<4	<41	<5	<4	<6	<7	<32	<88
May	<38	<28	<5	<9	<5	<6	<12	<8	<5	<5	<46	<4	<5	<6	<6	<28	<94
June	<28	<31	<4	<7	<3	<4	<6	<7	<4	<3	<40	<3	<4	<5	<6	<28	<102
July	<39	<44	<5	<12	<5	<5	<13	<11	<6	<7	<48	<5	<5	<9	<10	<36	<118
August	<32	<31	<4	<11	<4	<6	<10	<9	<5	<5	<48	<4	<4	<6	<6	<24	<86.8
September	<33	<38	<5	<11	<5	<6	<13	<8	<4	<5	<46	<5	<5	<10	<6	<24	93±36
October	<38	<30	<4	<11	<5	<6	<13	<8	<6	<5	<45	<4	<6	<8	<6	<27	121±39
November	<47	<46	<7	<12	<5	<9	<16	<13	<7	<6	<54	<7	<7	<8	<9	<42	158±65
December	<32	<28	<4	<8	<3	<3	<6	<6	<3	<4	<32	<3	<3	<3	<6	<29	103±29

Table 3-14
Environmental Water Samples Tritium Analysis
Results in pCi/L

Month of	Russell	O.W.D.	Circ In	Circ Out	Deer Creek
January	<496	<487	<485	<481	<487
February	<484	<476	<482	<478	<479
March	<499	<500	<500	<498	<494
April	<473	<465	<462	<465	<543
May	<465	<467	<468	<469	<466
June	<478	<473	<485	<482	<485
July	<538	<542	<541	<545	<538
August	<442	<463	<441	<450	<448
September	<467	<467	<468	<470	<461
October	<478	<480	<477	<480	<480
November	<480	<478	<479	<480	<473
December	<464	<454	<458	<467	<453

Rochester Gas and Electric

Table 3-15
Iodine in Water
Results in pCi/L

Month of	Russell	O.W.D.	Circ. In	Circ. Out	Deer Creek
January	<.49	<.37	<.40	<.48	<.36
February	<.68	<.57	<.53	<.45	<.32
March	<.82	<.46	<.56	<.42	<.36
April	<.67	<.61	<.71	<.82	<.37
May	<.57	<.77	<.63	<.53	<.51
June	<.62	<.43	<.67	<.39	<.45
July	<.86	<.53	<.68	<.77	<.73
August	<.56	<.51	<.50	<.55	<.34
September	<.52	<.47	<.40	<.66	<.46
October	<.52	<.44	<.46	<.65	<.36
November	<.74	<.67	<.37	<.43	<.43
December	<.65	<.48	<.52	<.46	<.39

3.4 Milk Samples

There are three indicator 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 analyzed by gamma spectroscopy for major fission products.

All positive counts and the ±1 sigma error are reported. During 1998, no samples indicated I-131 activity that exceeded the LLD for the analysis. Table 3-17 is a listing of all samples collected during 1998.

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 ODCM. The calculation was done for releases during the growing season when cows may be grazing. For Ginna Station, this includes only releases during the months of May through October. The maximum resultant annual thyroid dose for 1998 would be 1.6×10^{-2} mrem using the cow-milk-infant pathway for a hypothetical farm at the site boundary. Using the farm with the highest D/Q, which is 5 miles from the plant, the maximum calculated dose to the infant would be 8.4×10^{-4} mrem from plant releases during the growing season.

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Table 3-16

Milk

Results in pCi/Liter

Farm	Date	I-131	Cs-134	Cs-137	Ba-140	K-40
FARM B	1/13/98	<.51	<5	<6	<9	1510±75
FARM D	1/13/98	<.42	<6	<5	<9	1730±89
FARM C	2/10/98	<.68	<8	<9	<12	1610±99
FARM D	2/10/98	<.44	<5	<5	<6	1370±62
FARM A	3/10/98	<.37	<4	<4	<8	1380±62
FARM D	3/10/98	<.35	<7	<7	<9	1770±89
FARM B	4/14/98	<.36	<5	<4	<6	1540±66
FARM D	4/14/98	<.49	<5	<6	<9	1380±71
FARM C	5/12/98	<.59	<5	<4	<5	1570±66
FARM D	5/12/98	<.49	<8	<9	<11	1580±99
FARM A	6/9/98	<.37	<5	<5	<7	1490±64
FARM B	6/9/98	<.40	<7	<6	<7	1620±85
FARM C	6/9/98	<.34	<6	<5	<6	1490±64
FARM D	6/9/98	<.62	<9	<8	<10	1660±99
FARM A	6/23/98	<.38	<5	<4	<7	1630±66
FARM B	6/23/98	<.42	<5	<6	<6	1470±75
FARM C	6/23/98	<.33	<9	<9	<13	1610±99
FARM D	6/23/98	<.43	<6	<7	<7	1670±89
FARM A	7/7/98	<.44	<5	<5	<6	1550±66
FARM B	7/7/98	<.50	<5	<5	<7	1420±62
FARM C	7/7/98	<.54	<8	<8	<13	1670±91
FARM D	7/7/98	<.68	<5	<6	<8	1460±75
FARM A	7/21/98	<.38	<3	<5	<5	1390±62
FARM B	7/21/98	<.41	<4	<6	<7	1540±75
FARM C	7/21/98	<.34	<5	<5	<6	1670±69
FARM D	7/21/98	<.57	<5	<6	<6	1500±75
FARM A	8/5/98	<.37	<6	<5	<5	1650±69
FARM B	8/5/98	<.34	<4	<6	<8	1590±85
FARM C	8/5/98	<.44	<3	<4	<5	1720±51
FARM D	8/5/98	<.51	<5	<5	<6	1570±66
FARM A	8/18/98	<.44	<5	<5	<6	1500±75
FARM B	8/18/98	<.49	<5	<6	<8	1410±71
FARM C	8/18/98	<.35	<3	<4	<4	1790±52
FARM D	8/18/98	<.49	<7	<5	<9	1540±81
FARM A	9/1/98	<.70	<10	<9	<11	1430±92
FARM B	9/1/98	<.73	<7	<8	<9	1780±92
FARM C	9/1/98	<.43	<5	<7	<8	1590±66
FARM D	9/1/98	<.47	<5	<6	<6	1360±71
FARM A	9/15/98	<.40	<5	<5	<7	1560±66
FARM B	9/14/98	<.37	<5	<5	<6	1540±66
FARM C	9/14/98	<.62	<7	<8	<8	1530±87
FARM D	9/14/98	<.43	<5	<5	<8	1340±71
FARM A	9/29/98	<.40	<5	<5	<7	1590±66
FARM B	9/29/98	<.36	<5	<6	<8	1460±75
FARM C	9/29/98	<.63	<9	<9	<12	1700±103
FARM D	9/29/98	<.44	<6	<8	<11	1700±92
FARM A	10/14/98	<.40	<6	<4	<8	1610±66
FARM B	10/14/98	<.35	<5	<5	<8	1420±71
FARM C	10/14/98	<.59	<9	<9	<9	1730±103
FARM D	10/14/98	<.44	<6	<8	<6	1540±83
FARM A	10/27/98	<.36	<8	<8	<8	1600±91
FARM B	10/27/98	<.41	<6	<9	<8	1630±87
FARM C	10/27/98	<.34	<8	<9	<12	1670±91
FARM D	10/27/98	<.60	<6	<7	<8	1560±87
FARM A	11/10/98	<.38	<4	<4	<7	1570±61
FARM D	11/10/98	<.41	<5	<5	<6	1490±66
FARM C	12/15/98	<.58	<4	<4	<6	1560±61
FARM D	12/15/98	<.40	<4	<5	<5	1570±66

3.5 Fish Samples

Indicator fish are caught in the vicinity of the Discharge Canal and analyzed for radioactivity from liquid effluent releases from the plant. The fish are filleted to represent that portion which would normally be eaten. Additional fish are caught more than 15 miles away to be used as control samples 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. There was no statistically significant difference in the activity of the fish caught between the indicator and control locations.

Fish are caught by R. G. & E. biologists and analyzed by gamma spectroscopy after being held for periods of less than one week. The LLD value for the shorter half life isotopes became greater. The data could also be affected by small mass samples, (< 2000 grams), in some species.
Isotopic gamma concentrations (pCi/kilogram wet) are listed in Tables 3-18A, 3-18B.

Samples of algae (cladophora) and sand, (benthic sediment), were obtained from the lake bottom in the discharge plume area. Lake bottom samples continue to show small amounts of Cs-137 activity. Results of the gamma isotopic analysis are included in Table 3-19.

Table 3-17A
Fish Samples Gamma Isotopic Analysis
Results in pCi/kgm Wet

Description	40K	51Cr	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb
Indicator Fish									
First Half 1998									
Smallmouth Bass	4070±291	<289	<38	<88	<40	<35	<88	<60	<37
Brown Trout	3870±189	<333	<24	<88	<30	<27	<53	<54	<48
Lake Trout	4140±205	<440	<22	<84	<29	<26	<56	<51	<46
Chinook Salmon	3570±208	<360	<23	<103	<28	<23	<72	<56	<43
Second Half 1998									
Brown Trout	4370±224	<217	<27	<68	<26	<28	<53	<45	<29
White Sucker	5410±242	<217	<22	<62	<24	<24	<58	<43	<25
Lake Trout	3940±237	<218	<21	<62	<26	<26	<69	<44	<28
Small Mouth Bass	5460±350	<360	<38	<102	<47	<42	<99	<77	<61
Background Fish									
First Half 1998									
Yellow Perch	5010±289	<1010	<28	<128	<55	<23	<67	<96	<94
Freshwater Drum	5770±214	<578	<24	<92	<34	<26	<41	<68	<58
Smallmouth Bass	3280±209	<869	<25	<145	<47	<30	<88	<82	<82
Lake Trout	4450±243	<488	<26	<89	<37	<26	<63	<76	<56
Brown Trout	6340±205	<457	<25	<71	<30	<22	<52	<55	<47
Second Half 1998									
Smallmouth Bass	3980±248	<211	<26	<65	<27	<32	<68	<40	<27
Lake Trout	4770±274	<274	<28	<77	<29	<36	<71	<52	<36
Yellow Perch	4620±221	<205	<23	<59	<25	<26	<53	<43	<30
White Sucker	6280±343	<255	<31	<69	<35	<39	<86	<69	<43
Brown Trout	5670±305	<240	<27	<80	<32	<42	<70	<63	<32

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3-17B
Fish Samples Gamma Isotopic Analysis
Results in pCi/kgm Wet

Description	103 Ru	Ru 106	131I	134Cs	137Cs	140Ba	141Ce	144Ce	226Ra
Indicator Fish									
First Half 1998									
Smallmouth Bass	<41	<356	<58	<36	<34	<57	<42	<162	<520
Brown Trout	<41	<198	<723	<19	<19	<226	<53	<96	360±151
Lake Trout	<41	<217	<732	<23	<17	<245	<65	<131	<375
Chinook Salmon	<34	<212	<625	<21	<22	<272	<51	<92	487±133
Second Half 1998									
Brown Trout	<25	<243	<79	<26	<24	<54	<34	<110	404±160
White Sucker	<27	<246	<65	<22	<23	<49	<39	<139	400±155
Lake Trout	<28	<262	<76	<23	<25	<73	<32	<102	722±152
Small Mouth Bass	<43	<431	<124	<44	<40	<119	<64	<195	<726
Background Fish									
First Half 1998									
Yellow Perch	<71	<292	<6630	<24	28±9	<865	<122	<151	<382
Freshwater Drum	<50	<300	<1190	<27	42±9	<239	<80	<143	644±186
Smallmouth Bass	<75	<273	<9160	<25	<26	<1530	<105	<121	3360±142
Lake Trout	<45	<233	<693	<22	<24	<210	<69	<123	<409
Brown Trout	<38	<250	<900	<18	<22	<202	<62	<121	501±148
Second Half 1998									
Smallmouth Bass	<26	<274	<63	<25	16±8	<62	<33	<110	422±175
Lake Trout	<31	<302	<64	<28	<29	<73	<43	<143	451±156
Yellow Perch	<25	<250	<72	<24	<23	<63	<35	<111	468±165
White Sucker	<35	<329	<90	<27	<31	<76	<45	<152	<540
Brown Trout	<30	<28	<47	<30	<29	<45	<39	<144	526±222

Table 3-18
Lake Samples Gamma Isotopic Analysis
Results in pCi/kgm Wet

Description	40K	Cr 51	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb
Benthic Sediment	6910±435	<259	<34	<91	<37	<59	<95	<72	<55
Cladaphora	3010±89	<69	<8	<21	<9	<10	<15	<16	<10

Description	103Ru	106Ru	131I	134Cs	137Cs	140Ba	141Ce	144Ce	226Ra
Benthic Sediment	<40	<359	<63	<36	<37	<85	<52	<206	774±253
Cladaphora	<8	<82	<15	<7	5±2	<15	<13	<39	303±60

3.6 Vegetation Samples

Crops are grown on the plant property and samples of the fruits and grains are collected at harvest time for analysis. Control samples are purchased from farms greater than 10 miles from the plant. There was no indication in the samples of any measurable activity other than naturally occuring K-40 and Ra-226. Gamma isotopic data is given in Table 3-20.

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Table 3-19

Vegetation Samples Gamma Isotopic Analysis

Results in pCi/kgm Wet

Description	40K	Cr 51	54Mn	59Fe	58Co	60Co	65Zn	95Zr	95Nb
Indicator Vegitation									
Cherries	2430±96	<73	<8	<19	<9	<10	<22	<15	<10
Lettuce	5140±203	<148	<18	<41	<19	<19	<41	<35	<19
Squash	3720±103	<51	<7	<21	<7	<9	<21	<13	<8
Squash	1410±71	<54	<7	<16	<8	<9	<20	<16	<8
Apples	1130±73	<69	<9	<18	<10	<10	<24	<17	<10
Background Vegitation									
Apples	1440±92	<79	<12	<28	<14	<15	<31	<23	<14
Lettuce	2840±136	<85	<14	<33	<14	<15	<37	<22	<14
Squash	2090±89	<51	<8	<19	<8	<11	<20	<15	<8

	103 Ru	Ru 106	131I	134Cs	137Cs	140Ba	141Ce	144Ce	226Ra
Indicator Vegitation									
Cherries	<10	<80	<14	<8	<8	<16	<11	<41	169±55
Lettuce	<17	<167	<30	<16	<15	<36	<23	<79	454±97
Squash	<7	<68	<11	<7	<8	<14	<8	<28	173±42
Squash	<8	<76	<7	<7	<7	<8	<9	<39	153±52
Apples	<8	<96	<10	<9	<10	<14	<11	<43	<167
Background Vegitation									
Apples	<11	<121	<13	<13	<12	<18	<13	<50	<202
Lettuce	<12	<122	<13	<13	<14	<20	<13	<52	346±91
Squash	<8	<82	<8	<7	<9	<12	<9	<39	143±51

3.7 External Penetrating Radiation

Thermoluminescent dosimeters, (TLD's), with a sensitivity of 5 millirem/quarter are placed 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 locations #7 and #13 are influenced by close proximity to the Contaminated Equipment Storage Areas and will normally read slightly higher than other locations. For the year of 1998, on-site exposure ranged between 12.3-13.1 mrem/quarter, with an average exposure of 12.7 mrem/quarter and off-site 11.1-12.3 mrem/quarter with an average exposure of 11.6 mrem/quarter.

40 CFR 190 requires that the annual dose equivalent not exceed 25 millirems to the whole body of any member of the public. Using 54 millirems average ambient radiation,(*Environmental Radioactivity,* Eisenbud, 1987), and the highest annual total TLD value, (Station 13), of 58.6 millirems yields an annual maximum dose of 4.6 millirems, on-site. The highest annual total TLD value off-site, (Station 18), of 54.6 millirem yields an annual maximum dose of <1 millirem. Table 3-21 gives TLD readings for each quarter. 1 TLD was missing at the time of collection.

A trend chart with a comparison of data for each location for the years of 1997 and 1998 is included, Table 3-22. The data plotted is the average quarterly dose measured. TLD locations #7 and #13 were influenced by their proximity to the Contaminated Equipment Storage Area.

Table 3-20
External Penetrating Radiation
Thermoluminescent Dosimetry 1998
Units mrem/91 Day Quarter

	Location	Type	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
#2 - #7 plus #13 are	2	I	11.5 ± 2.9	11.9 ± 3.0	11.6 ± 2.9	12.2 ± 3.1
on-site near the line	3	I	12.2 ± 3.1	12.5 ± 3.2	12.6 ± 3.2	12.9 ± 3.3
of the highest annual	4	I	12.3 ± 3.1	13.0 ± 3.3	12.7 ± 3.2	12.6 ± 3.2
average ground level	5	I	13.5 ± 3.4	13.6 ± 3.4	13.1 ± 3.3	13.5 ± 3.4
concentration.	6	I	11.1 ± 2.8	10.7 ± 2.7	10.9 ± 2.8	10.8 ± 2.7
	7	I	15.1 ± 3.8	14.4 ± 3.6	13.6 ± 3.4	13.8 ± 3.5
#8 - #12 are offsite at	8	C	11.7 ± 2.9	11.9 ± 3.0	11.5 ± 2.9	12.6 ± 3.2
a distance of 8 to 15 miles.	9	I	11.0 ± 2.8	11.3 ± 2.8	11.4 ± 2.9	11.4 ± 2.9
	10	C	10.6 ± 2.7	10.8 ± 2.7	10.6 ± 2.7	11.3 ± 2.8
	11	I	11.2 ± 2.8	11.3 ± 2.9	11.3 ± 2.9	11.4 ± 2.9
	12	C	10.6 ± 2.7	10.6 ± 2.7	10.7 ± 2.7	10.8 ± 2.7
	13	I	13.5 ± 3.4	15.0 ± 3.8	14.6 ± 3.7	15.5 ± 3.9
#14 - #16 are located	14	I	11.5 ± 2.9	12.2 ± 3.1	12.5 ± 3.1	13.2 ± 3.3
along a line 3000 ft. west	15	I	13.0 ± 3.3		13.3 ± 3.4	14.0 ± 3.5
of the plant.	16	I	12.3 ± 3.1	13.0 ± 3.3	12.9 ± 3.3	13.5 ± 3.4
#17 - #21 are located	17	I	11.3 ± 2.8	12.0 ± 3.0	11.9 ± 3.0	12.1 ± 3.0
along Lake Road.	18	I	13.2 ± 3.3	13.7 ± 3.5	14.0 ± 3.5	13.7 ± 3.4
	19	I	11.7 ± 2.9	12.6 ± 3.2	12.5 ± 3.1	13.1 ± 3.3
	20	I	10.9 ± 2.8	11.8 ± 3.0	11.9 ± 3.0	12.0 ± 3.0
	21	I	12.6 ± 3.2	13.3 ± 3.4	13.5 ± 3.4	13.8 ± 3.5
#22 - #24 are located	22	I	11.4 ± 2.9	11.8 ± 3.0	11.9 ± 3.0	12.2 ± 3.1
along the east site	23	I	11.8 ± 3.0	12.6 ± 3.2	13.6 ± 3.4	13.4 ± 3.4
boundary line.	24	I	12.8 ± 3.2	13.1 ± 3.3	13.2 ± 3.3	13.5 ± 3.4
#25 - #30 are offsite	25	C	10.7 ± 2.7	10.9 ± 2.7	10.8 ± 2.7	11.4 ± 2.9
at a distance of 8	26	C	10.1 ± 2.6	10.6 ± 2.7	10.4 ± 2.6	10.8 ± 2.7
to 15 miles.	27	C	11.4 ± 2.9	12.0 ± 3.0	11.8 ± 3.0	12.6 ± 3.2
	28	C	11.8 ± 3.0	13.3 ± 3.3	12.9 ± 3.3	13.5 ± 3.4
	29	C	10.6 ± 2.7	11.4 ± 2.9	11.1 ± 2.8	11.4 ± 2.9
	30	C	12.0 ± 3.0	10.0 ± 2.5	9.5 ± 2.4	10.0 ± 2.5
#31 - #40 are located	31	I	12.7 ± 3.2	13.3 ± 3.3	13.3 ± 3.4	13.4 ± 3.4
in an arc at a distance	32	I	10.4 ± 2.6	11.2 ± 2.8	11.0 ± 2.8	11.1 ± 2.8
of 4 - 5 miles.	33	I	10.5 ± 2.7	11.7 ± 2.9	11.1 ± 2.8	11.2 ± 2.8
	34	I	11.9 ± 3.0	13.2 ± 3.3	12.6 ± 3.2	13.1 ± 3.3
	35	I	11.9 ± 3.0	13.3 ± 3.3	13.1 ± 3.3	13.3 ± 3.3
	36	I	10.6 ± 2.7	11.6 ± 2.9	11.2 ± 2.8	11.5 ± 2.9
	37	I	10.5 ± 2.7	11.0 ± 2.8	10.6 ± 2.7	11.2 ± 2.8
	38	I	12.6 ± 3.2	13.4 ± 3.4	12.7 ± 3.2	12.9 ± 3.3
	39	I	11.6 ± 2.9	12.6 ± 3.2	12.4 ± 3.1	12.5 ± 3.1
	40	I	10.5 ± 2.7	11.3 ± 2.9	10.9 ± 2.8	11.0 ± 2.8

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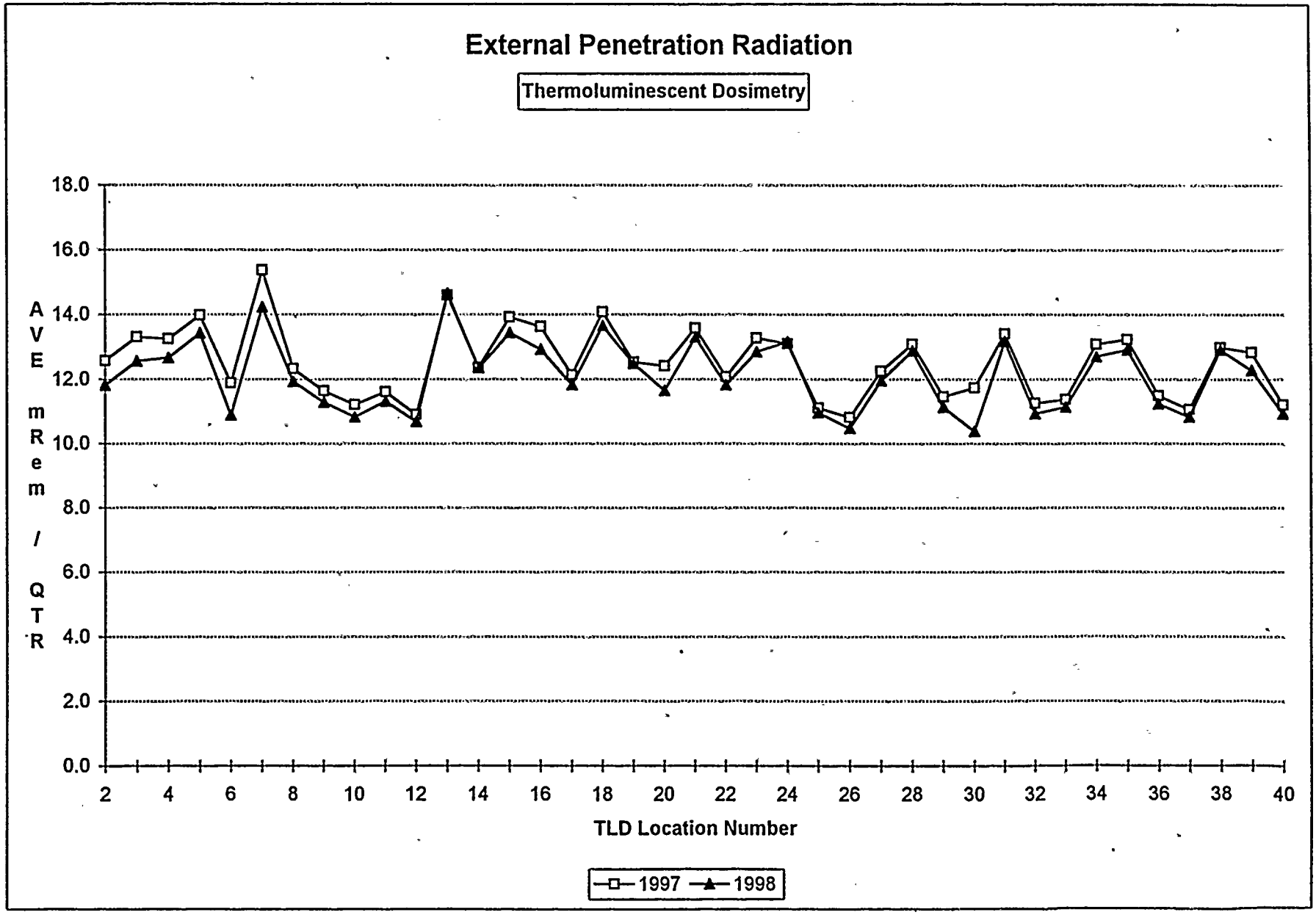
Figure 3-21



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 in 1998. The land use remains mainly agricultural in nature. There were several private homes constructed and a new housing development on Stonebrook Road off Ridge Road 2 miles west of the town of Ontario. 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.

An onsite garden is used for the broad leaf vegetation and onsite crops are collected for indicator samples when available.

A copy of the Land Use Census that was completed during September, 1998 is attached.

5.0 EXTERNAL INFLUENCES

During 1998, 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.

Figure 4-1

1998 Land Use Census

Sector	Distance to Nearest Residence	Distance to Nearest Garden	Distance to Milk Producing Animals
E	783m	2175m	
ESE	950m	1740m	
SE	650m	2580m	8200m
SSE	735m	2380m	5450m
S	1130m	1871m	
SSW	600m	2260m	
SW	750m	2175m	
WSW	1436m	2958m	
W	1500m	4300m	

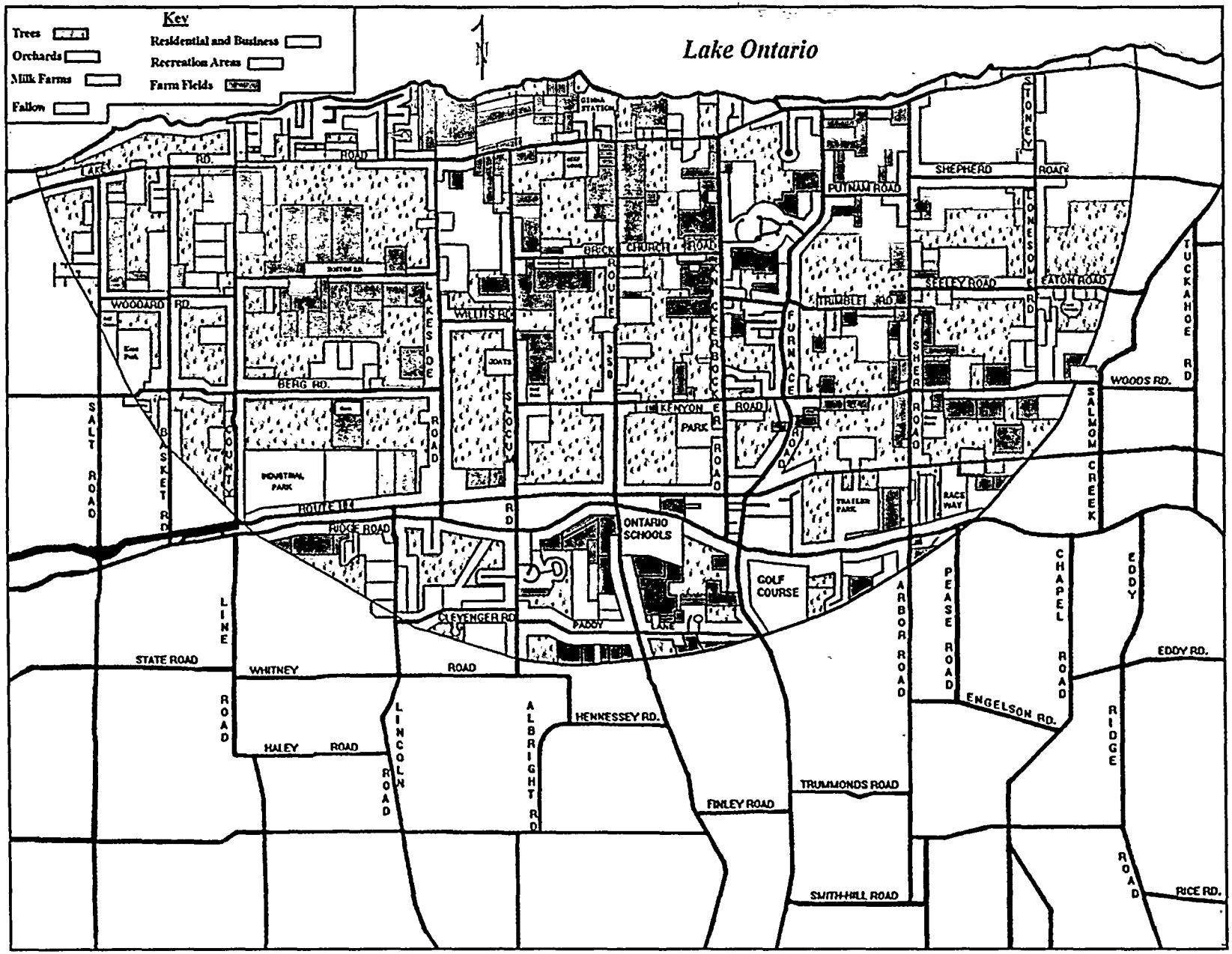
Changes from previous year: No major changes. Construction of new homes continues at the same rate as previous years. New housing development located at Ridge Road and Stonebrook Road in Ontario.

Milk animal locations: Goats (non-milking) located at Brick Church Road. Goats (non-milking) occasionally located at Slocum Road Meat Market.

Land Use Census Completed by: _____ Date: 10/1/98

Reviewed by: _____ Date: 4/9/99

MAP 2-4


Key
Trees
Orchards
Milk Farms
Fallow
Residential and Business
Recreation Areas
Farm Fields
N
Lake Ontario
LAKE RD.
WOODARD RD.
BERG RD.
LAKESHORE ROAD
WILLIS RD.
BRICK CHURCH ROAD
ROUTE 104
KENYON PARK ROAD
PUTNAM ROAD
SHEPHERD ROAD
STONEY
SEELEY ROAD
EATON ROAD
TRUMBELL RD.
FURNACE
FISHER ROAD
TUCKAHOE RD.
WOODS RD.
SALEM CREEK
SALT ROAD
BASKET RD.
COUNTY
INDUSTRIAL PARK
RIDGE ROAD
ONTARIO SCHOOLS
GOLF COURSE
TRAILER PARK
RACE WAY
CLEYENGER RD.
PADDY LANE
LINE ROAD
STATE ROAD
WHITNEY ROAD
HALEY ROAD
LINCOLN ROAD
ALBRIGHT RD.
HENNESSEY RD.
FINLEY ROAD
TRUMMONDS ROAD
SMITH HILL ROAD
ARBOR ROAD
PEASE ROAD
CHAPEL ROAD
ENGELSON RD.
EDDY
EDDY RD.
RIDGE ROAD
RICE RD.

6.0 INTERLABORATORY COMPARISON STUDY

Participation in an interlaboratory comparison program ensures that independent checks for bias and accuracy of the measurement of radioactive material in environmental samples are performed as part of a quality assurance program for environmental monitoring. The ODCM requires participation in an interlaboratory comparison program that is approved by the NRC, if such a program exists. Until 1996 the United States Environmental Protection Agency (EPA), Office of Research and Development, National Exposure Research Laboratory, Las Vegas, Nevada, was the NRC approved program. Since the NRC has not approved a replacement for the EPA's program, Ginna Station has engaged the services of an independent laboratory, Analytics, Inc., Atlanta, Georgia.

Ginna Station purchases blind spiked samples that are similar to routinely collected environmental water, milk, and air samples. Ginna Station analyzes tritium blind spikes and all other blind spikes are analyzed by JAF Environmental Laboratory (JAFEL). Ginna Station assesses the blind spike analysis by comparing Laboratory result to the vendor's results for agreement accuracy and bias trending.

An assessment of JAFEL for analysis accuracy of the Analytics blind spikes was preformed, using the acceptance test generally referred to as the "NRC" method. This method is contained in NRC Procedure DVP-04.01 and was taken from the Criteria of Comparing Analytical Results (USNRC) and Bevington, P.R., Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill, New York, (1969). The accuracy evaluation is as follows:

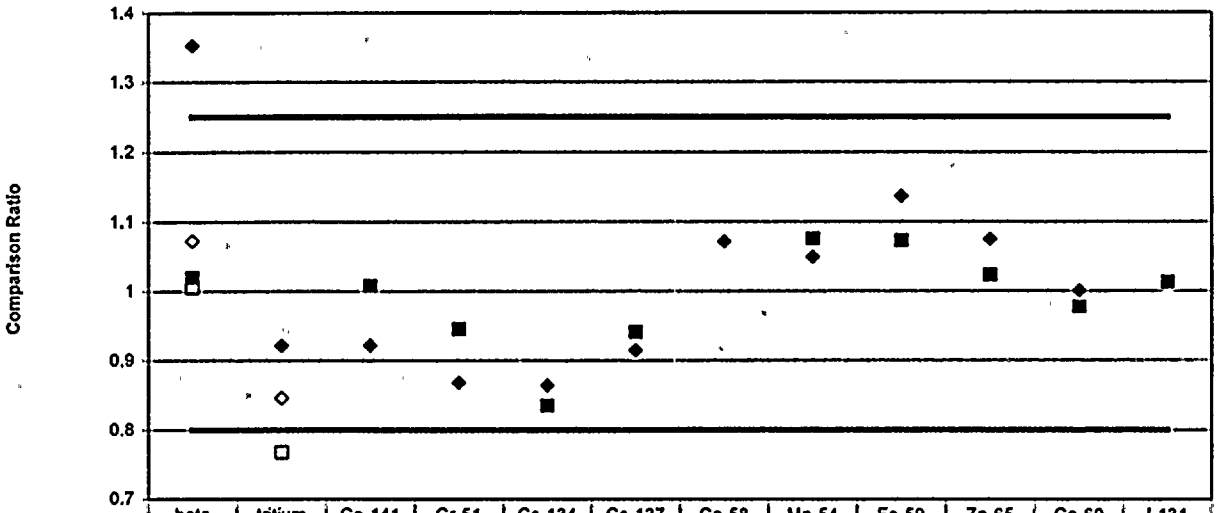
$$\text{Error Resolution} = \frac{\text{Spike Value}}{\text{Spike Uncertainty}} \qquad \text{Comparison Ratio} = \frac{\text{Lab Analysis}}{\text{Spike Value}}$$

Using the appropriate row under the ERROR RESOLUTION column in Table 6.1A, determines the interval for RATIO OF AGREEMENT as the acceptance criteria for the comparison ratio.

ERROR RESOLUTION	RATIO OF AGREEMENT
<3	0.4-2.5
3.1 to 7.5	0.5-2.0
7.6 to 15.5	0.6-1.66
15.6 to 50.5	0.75-1.33
50.6 to 200	0.8-1.25
>200	0.85-1.18

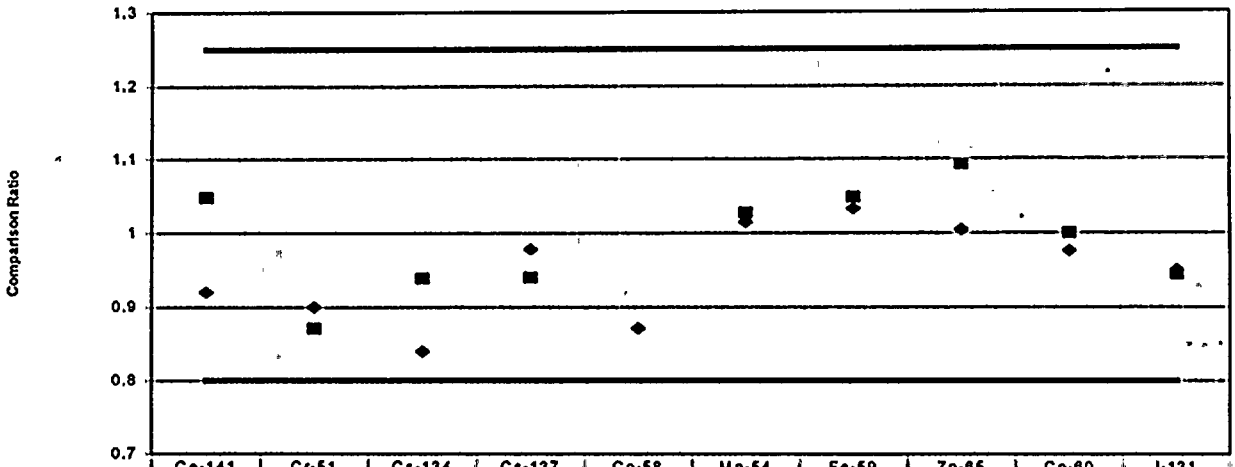
The ERROR RESOLUTION for all blind spiked samples was 50.6 to 200 which correlates to an upper control limit (UCL) was 1.25 and a lower control limit (LCL) was 0.8. If the comparison ratio falls within the UCL and LCL, the analysis is assessed as agree, and if not the assessment is disagree. Comparison trends are assessed for trending within or outside of the UCL of LCL. (See Figures 6.1A, 6.1B, and 6.1C) For 1998, only the tritium comparison ratio fell outside of the LCL, resulting in the tritium trending outside the lower (see Figure 6.1A). 1997 comparison ratios that were outside of the UCL or LCL trended within the limits for 1998.

6.1A Trend of Blind Spiked Water Samples



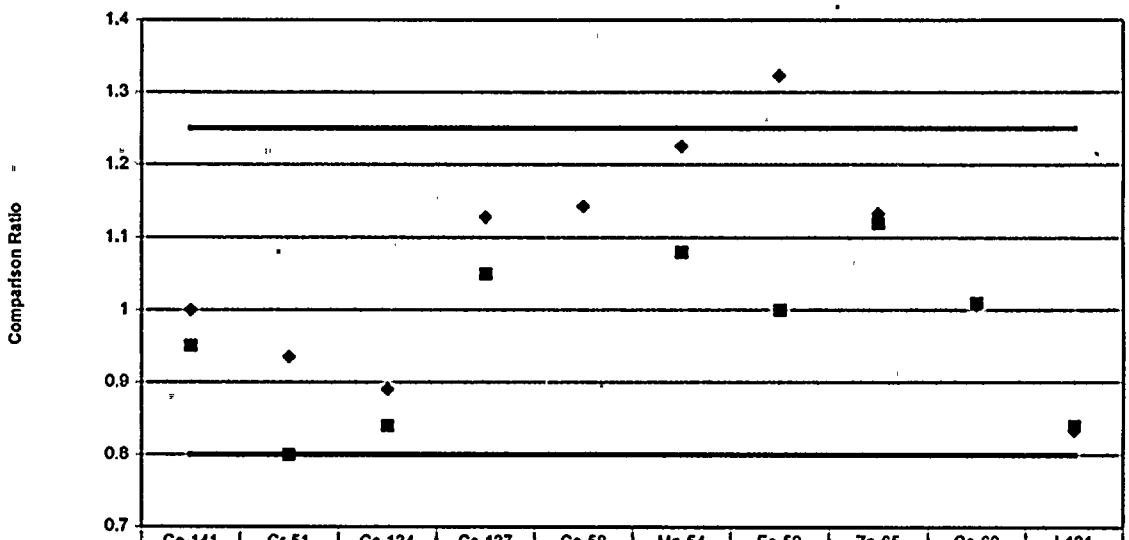
	beta	tritium	Ce-141	Cr-51	Cs-134	Cs-137	Co-58	Mn-54	Fe-59	Zn-65	Co-60	I-131
UCL	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
◆ 1997-1	1.35	0.92	0.92	0.87	0.86	0.91	1.07	1.05	1.14	1.07	1.00	
◇ 1997-2	1.07	0.85										
■ 1998-1	1.02		1.01	0.95	0.84	0.94		1.08	1.07	1.02	0.98	1.01
□ 1998-2	1.01	0.77										
LCL	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

6.1B Trend of Blind Spiked Milk Samples



	Ce-141	Cr-51	Cs-134	Cs-137	Co-58	Mn-54	Fe-59	Zn-65	Co-60	I-131
UCL	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
◆ 1997-1	0.92	0.90	0.84	0.98	0.87	1.01	1.03	1.00	0.98	0.95
■ 1998-1	1.05	0.87	0.94	0.94		1.03	1.05	1.09	1.00	0.94
LCL	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

6.1C Trend of Blind Spiked Filter Samples



	Ce-141	Cr-51	Cs-134	Cs-137	Co-58	Mn-54	Fe-59	Zn-65	Co-60	I-131
UCL	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
◆ 1997-1	1.00	0.93	0.89	1.13	1.14	1.23	1.32	1.13	1.01	0.83
■ 1998-1	0.95	0.80	0.84	1.05		1.08	1.00	1.12	1.01	0.84
LCL	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

7.0 DEVIATIONS FROM SCHEDULE

Ten items reportable in the Annual Environmental Radiological Operating Report under CHA-RETS-VARIATION were reported as follows:

1. Air sample station #12 pump failed 3/17/98 and would not restart. Sampler returned to service 4/6/98.
2. Air sample station #5 tripped offline 6/9/98. Sampler returned to service 6/9/98.
3. Air sample station found tripped offline 6/9/98. 4.2 hour sample time for the caused no results for the week of 6/8/98.
4. Air sample station #5 ground fault interrupt tripped on 6/29/98 after thunderstorm. Reset on 6/30/98.
5. Station #15 TLD left in field 14 days past collection date of 7/2/98. Replaced 7/16/98.
6. Air sample station #6 found tripped during weekly sample change 7/27/98. Actual run time was 75.9 hours.
7. Air sample station #7 tripped shortly after sample changeout 9/7/98, returned to service 9/14/98. No data reported.
8. Circ-out water sample compositor was removed from service for repair 0546 -1405 on 11/1/98.
9. Air sample station #4 was removed from service for repair 1530 12/3/98, Restored to service 12/5/98.
10. Circ-out water sample pump removed from service 1251,12/31/98 for leak repair. Repair was completed in 1999.