2004

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

R.E. Ginna Nuclear Power Plant

Docket No. 50-244

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January 1, 2004 - December 31, 2004

1.0 SUMMARY

The Annual Radiological Environmental Operating Report is published in accordance with Section 5.0 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 radiation or low concentrations of Cs-137 resulting from past atmospheric nuclear weapons testing. Terrestrial pathways monitored 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 2004 results were consistent with data for the past five years and exhibited no adverse trends.

The analytical results from the 2004 Radiological Environmental Monitoring program demonstrate that the operation of the R.E. Ginna Nuclear Power Plant had no measurable radiological impact on the environment. The results also demonstrate that operation of the plant did not result in a measurable radiation dose to the general population above natural background levels.

During 2004, 1236 samples were collected for analysis by gross beta counting and/or gamma spectroscopy. These included 936 air samples, 60 water samples, 17 fish samples, 6 sediment samples, 14 vegetation samples, 47 milk samples, and 156 thermoluminescent dosimeter measurements. During 2004 there were three deviations from the sampling schedule for air samples. The minimum number of samples required in ODCM Table 5-1 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 LOCATION MEAN (1) RANGE
				NAME, DISTANCE AND DIRECTION	MEAN (1) RANGE	
AIR: Particulate (pCi/M^3)	Gross Beta 628	0.003	0.016 (465/468) 0.006-0.031	Onsite Location #13 292 230M	0.017 (52/52) 0.11 - 0.028	0.016 (155/156) 0.006 - 0.028902
(pCi/M^3)	Gamma Scan 48	(2)	< LLD	N/A	N/A	< LLD
Iodine (pCi/M^3)	Gamma Scan 258	0.006 - 0.057	< LLD	N/A	N/A	< LLD
DIRECT RADIATION: TLD (mrem/quarter)	Gamma 156	5.0	11.5 (120/120) 8.8 – 17.0	Onsite Location #7 257 220M	15.9 (4/4) 14.5 – 17.0	10.6 (36/36) 8.9 – 11.7
WATER: Drinking (pCi/Liter)	Gross Beta 12	0.2	2.62 (12/12) 1.29 – 3.84	OWD 70 1200M	2.62 1.29 – 3.84	N/A
	Gamma Scan 12	(2)	Ra-226 83 (10/12) 44 – 135	OWD 70 1200M	Ra-226 83 (10/12) 44 – 135	N/A
	Tritium 12	(2)	<LLD	N/A	N/A	N/A
	Iodine 12	0.47*	< LLD	N/A	N/A	N/A
WATER: Surface (pCi/Liter)	Gross Beta 48	0.2	2.16 (12/12) 1.18 – 3.74	Deer Creek 105 260M	3.97 (12/12) 2.27 – 6.53	2.23 (12/12) 0.79 – 2.92
	Gamma Scan 48	(2)	Ra-226 101 (9/12) 58 – 153	Circ-out 15 130M	Ra-226 101 (9/12) 58 - 153	Ra-226 95 (12/12) 41 – 165
	Tritium 48	(2)	<LLD	N/A	N/A	N/A
	Iodine 48	0.46*	< LLD	N/A	N/A	< LLD
MILK: (pCi/Liter)	Iodine 47	0.44*	< LLD	N/A	N/A	< LLD
	Gamma Scan 47	(2)	< LLD	N/A	N/A	< LLD
FISH: (pCi/Kg)	Gamma Scan 17	(2)	Ra-226 541 (9/10) 252 - 726	Indicator Fish 015 130M	Ra-226 541 (9/10) 252 - 726	Ra-226 540 (6/8) 122 – 391
VEGETATION: (pCi/Kg)	Gamma Scan 14	(2)	Ra-226 251 (6/8) 155 - 358	Indicator Vegetation .	Ra-226 251 (6/8) 155 - 358	Ra-226 242 (4/6) 128 - 495
SEDIMENT: (pCi/Kg)	Gamma Scan 6	(2)	Ra-226 1028 (4/4) 504 - 2410	Indicator Sediment	Ra-226 1028 (4/4) 504 - 2410	Ra-226 804 (2/2) 418 - 1190

(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 and tritium measurements.

* 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 regulations, 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 5-1 of the ODCM. Following are the requirements from the ODCM:

Monitoring Program

The radiological environmental monitoring program shall be conducted as specified in Table 5-1 at the locations given in the ODCM.

If the radiological environmental monitoring program is not conducted as specified in Table 5-1, 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 (if available) 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 either the meteorological sector having the highest historical D/Q, or in a location with a higher D/Q than the location of the maximally exposed individual, 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 5-1. Acceptable locations are shown in the ODCM. Samples shall be analyzed pursuant to the requirements of Tables 5-1 and 5-3.

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.

Table 2-1 Page 1 of 2
Offsite Dose Calculation Manual Table 5-1

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	5 indicator 1 control	Continuous operation of sampler with sample collection at least once per 10 days	Radioiodine canister. Analyze within 7 days of collection for Iodine-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.
c. Shoreline Sediment	1 Control (Russell Station) 1 Indicator (Ontario Water District)	Semi-annnually	Gamma isotopic analysis of each sample

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

Offsite Dose Calculation Manual Table 5-1
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)	At least once per 15 days	Gamma isotopic and I-131 analysis of each sample.
	1 control 1 indicator (November thru May)	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. Other crops grown on site by contract farmer	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 *leaves from 3 different plant species composited	Gamma isotopic analysis on edible portion of sample.

* See Land Use Census, page 50

Table 2-2 Page 1 of 2

The maximum LLD values as defined by ODCM Table 5-3

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

Sediment Samples	Direction	Distance
OWD Shoreline I	70	2200
Russell Shoreline C	270	25600
Lake Ontario Benthic S	70	2200

Milk Sample Locations	Direction	Distance
Farm A I	113	8270
Farm B I	242	4680
Farm C I	156	5230
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

I = Indicator Samples

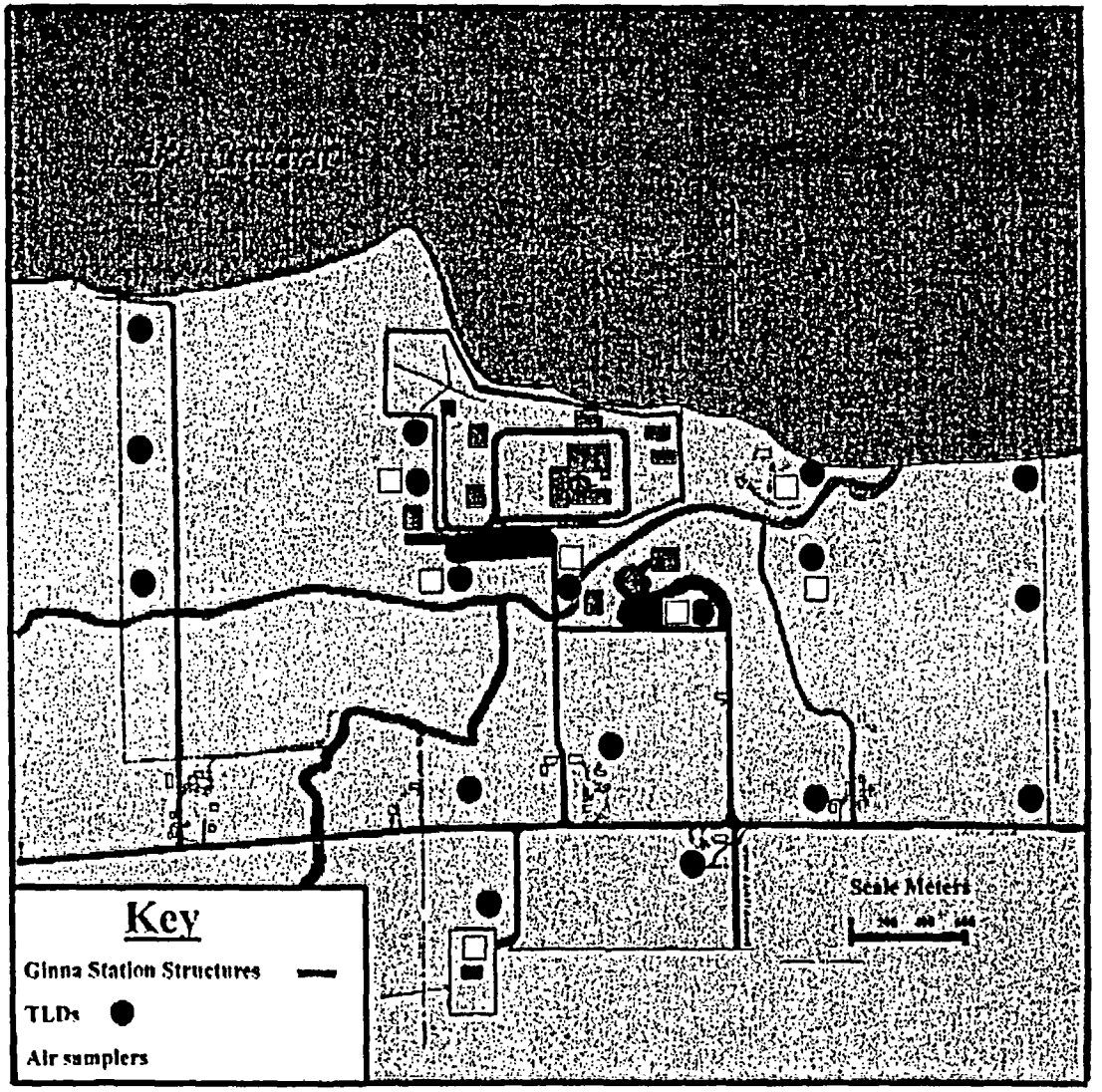
C = Control Samples

S = Supplemental Samples

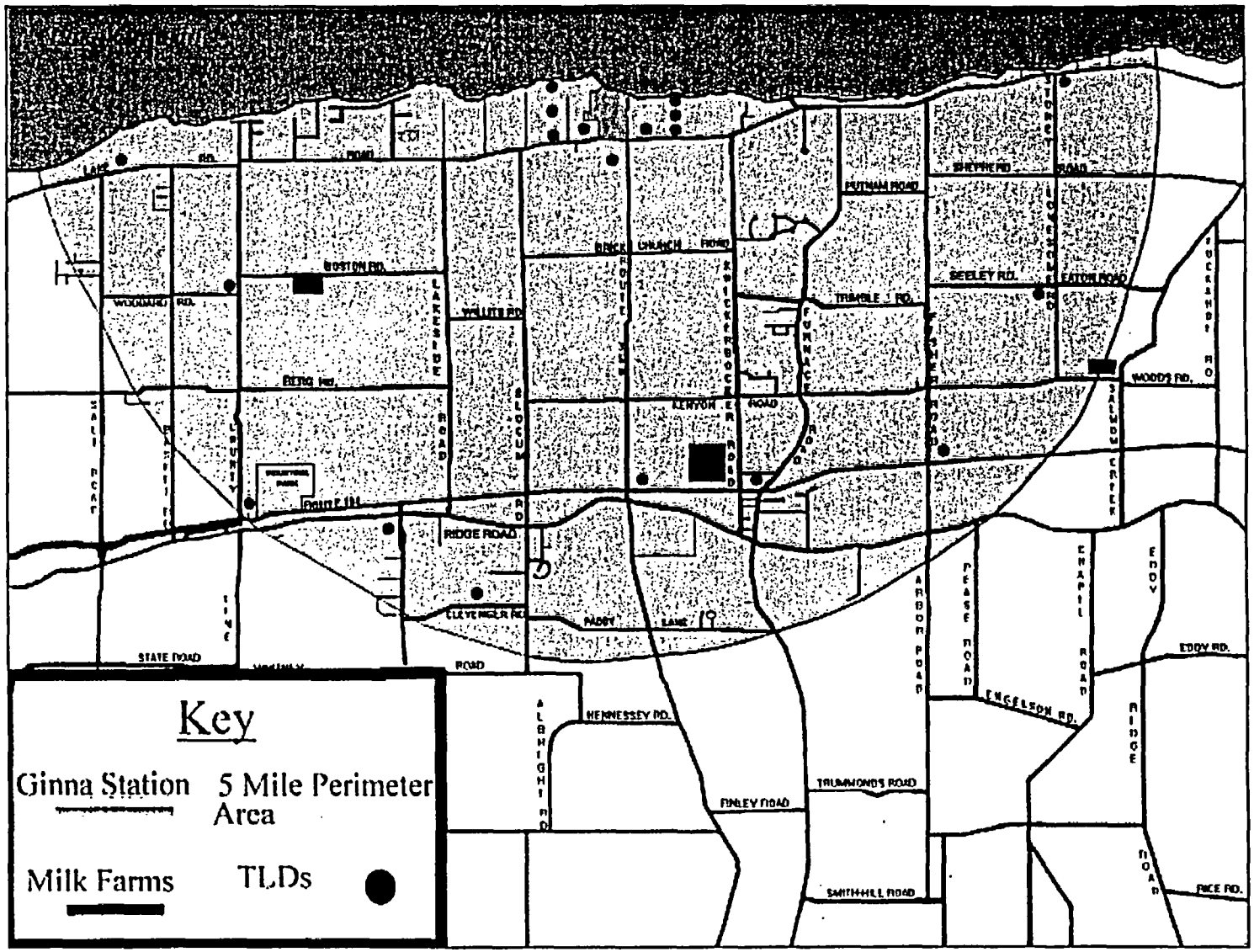
TLD Locations	Direction	Distance
# 2	87	320
# 3	110	420
# 4	140	250
# 5	185	160
# 6	232	225
# 7	257	220
# 8	258	19200
# 9	235	11400
# 10	185	13100
# 11	123	11500
# 12	93	25100
# 13	292	230
# 14	292	770
# 15	272	850
# 16	242	900
# 17	208	500
# 18	193	650
# 19	177	400
# 20	165	680
# 21	145	600
# 22	128	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

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 *.

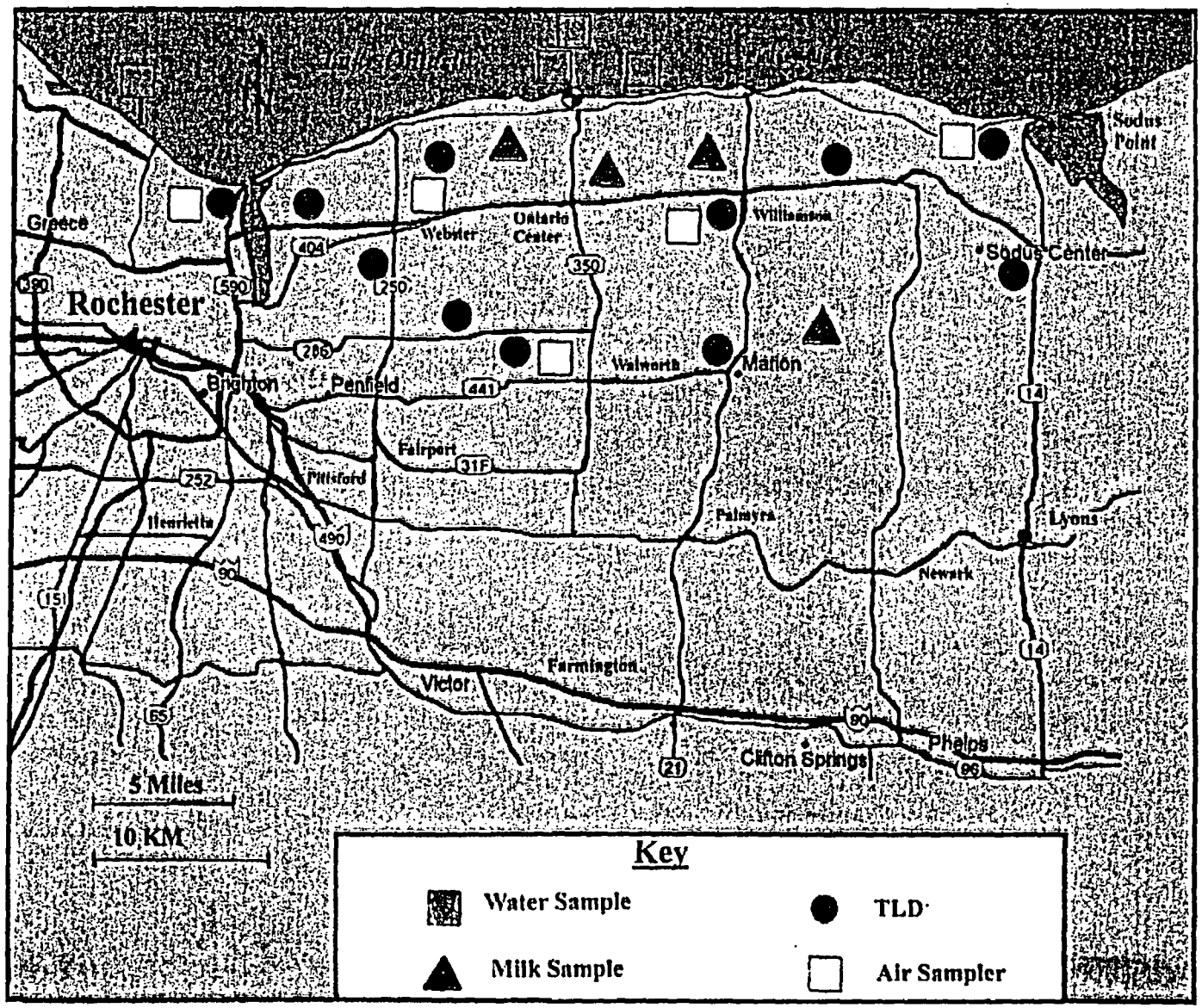


* Onsite samples detailed on map 2-1.

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 decay products of radon. 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 420 meters from the reactor centerline near the point of the maximum annual average ground level concentration, 1 more is located on-site at 690 meters, and 2 others offsite at approximately 7 miles. In addition, there are 3 sampling stations located approximately 7 to 16 miles from the site that serve as control stations.

Based on weekly comparisons, there was no statistical difference between the Control and Indicator radioactive particulate concentrations. The averages for the control samples were 0.016 pCi/m^3, and the averages for the indicators were 0.016 pCi/m^3 for the period of January to December, 2004. Maximum weekly concentrations for each station were less than 0.033 pCi/m^3.

The major airborne species 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 and some of the particulate activity is due to short lived noble gas decay products.

Tables 3-1A, 3-1B are a list of gross beta analysis values for the on-site sample stations. Tables 3-2A, 3-2B are a list of gross beta analysis values for the off-site sampler stations.

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, and indicate only the naturally occurring radioisotopes, Be-7 and K-40.

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

R. E. Ginna Nuclear Power Plant
Table 3-1A
On-Site Air Particulate Samplers
Gross Beta Results in pCi/m3

Collection Date	Station #2 (I)	Station #3 (I)	Station #4 (I)	Station #5 (I)	Station #6 (I)	Station #7 (I)	Station #13 (I)	Average
5-Jan	0.022 ± 0.004	0.020 ± 0.003	0.018 ± 0.003	0.019 ± 0.003	0.021 ± 0.003	0.020 ± 0.004	0.021 ± 0.004	0.020
12-Jan	0.016 ± 0.003	0.019 ± 0.003	0.018 ± 0.000	0.018 ± 0.003	0.018 ± 0.003	0.015 ± 0.003	0.022 ± 0.005	0.018
20-Jan	0.015 ± 0.003	0.012 ± 0.002	0.010 ± 0.002	0.010 ± 0.002	0.012 ± 0.002	0.012 ± 0.003	0.012 ± 0.003	0.012
26-Jan	0.017 ± 0.004	0.015 ± 0.003	0.013 ± 0.003	0.015 ± 0.003	0.014 ± 0.003	0.018 ± 0.004	0.016 ± 0.004	0.015
2-Feb	0.021 ± 0.004	0.017 ± 0.003	0.017 ± 0.003	0.017 ± 0.003	0.016 ± 0.003	0.017 ± 0.003	0.017 ± 0.004	0.017
9-Feb	0.019 ± 0.004	0.015 ± 0.003	0.019 ± 0.003	0.020 ± 0.003	0.017 ± 0.003	0.015 ± 0.003	0.020 ± 0.004	0.018
16-Feb	0.028 ± 0.004	0.024 ± 0.003	0.020 ± 0.003	0.019 ± 0.003	0.025 ± 0.003	0.022 ± 0.004	0.027 ± 0.005	0.024
23-Feb	0.024 ± 0.004	0.020 ± 0.003	0.020 ± 0.003	0.017 ± 0.003	0.022 ± 0.003	0.019 ± 0.004	0.021 ± 0.004	0.020
1-Mar	0.028 ± 0.004	0.024 ± 0.003	0.026 ± 0.003	0.024 ± 0.003	0.026 ± 0.003	0.027 ± 0.003	0.028 ± 0.005	0.026
8-Mar	0.017 ± 0.003	0.016 ± 0.003	0.014 ± 0.003	0.018 ± 0.003	0.016 ± 0.003	0.020 ± 0.004	0.017 ± 0.004	0.017
15-Mar	0.014 ± 0.003	0.013 ± 0.003	0.017 ± 0.003	0.013 ± 0.003	0.015 ± 0.003	0.014 ± 0.004	0.014 ± 0.003	0.014
22-Mar	0.019 ± .011(a)	0.015 ± 0.003	0.018 ± 0.003	0.017 ± 0.003	0.018 ± 0.003	0.016 ± 0.003	0.019 ± 0.003	0.017
29-Mar	0.023 ± 0.004	0.017 ± 0.003	0.018 ± 0.003	0.020 ± 0.003	0.019 ± 0.003	0.018 ± 0.004	0.019 ± 0.003	0.019
6-Apr	0.012 ± 0.003	0.010 ± 0.002	0.009 ± 0.002	0.010 ± 0.002	0.011 ± 0.002	0.009 ± 0.003	0.008 ± 0.002	0.010
12-Apr	0.013 ± 0.003	0.011 ± 0.003	0.011 ± 0.003	0.010 ± 0.003	0.012 ± 0.003	0.009 ± 0.003	0.013 ± 0.003	0.011
20-Apr	0.019 ± 0.003	0.014 ± 0.003	0.012 ± 0.002	0.014 ± 0.003	0.014 ± 0.003	0.018 ± 0.004	0.012 ± 0.003	0.015
26-Apr	0.009 ± 0.003	0.008 ± 0.003	0.012 ± 0.003	0.007 ± 0.002	0.009 ± 0.003	0.010 ± 0.003	0.011 ± 0.002	0.009
4-May	0.013 ± 0.003	0.010 ± 0.002	0.012 ± 0.002	0.013 ± 0.003	0.011 ± 0.002	0.011 ± 0.003	0.012 ± 0.003	0.012
11-May	0.019 ± 0.003	0.017 ± 0.003	0.018 ± 0.003	0.015 ± 0.004	0.019 ± 0.003	0.017 ± 0.003	0.018 ± 0.003	0.018
18-May	0.019 ± 0.003	0.014 ± 0.003	0.014 ± 0.003	0.015 ± 0.003	0.015 ± 0.003	0.017 ± 0.003	0.014 ± 0.003	0.015
24-May	0.012 ± 0.003	0.010 ± 0.003	0.011 ± 0.003	0.010 ± 0.003	0.011 ± 0.003	0.012 ± 0.003	0.012 ± 0.003	0.011
2-Jun	0.015 ± 0.003	0.012 ± 0.002	0.012 ± 0.002	0.012 ± 0.002	0.014 ± 0.002	0.013 ± 0.003	0.014 ± 0.003	0.013
8-Jun	0.014 ± 0.003	0.011 ± 0.003	0.012 ± 0.003	0.015 ± 0.003	0.014 ± 0.003	0.012 ± 0.003	0.018 ± 0.004	0.014
15-Jun	0.017 ± 0.003	0.014 ± 0.003	0.016 ± 0.004	0.016 ± 0.003	0.016 ± 0.003	0.015 ± 0.003	0.018 ± 0.004	0.016
22-Jun	0.015 ± 0.003	0.010 ± 0.002	0.012 ± 0.004	0.012 ± 0.002	0.014 ± 0.003	0.013 ± 0.003	0.014 ± 0.003	0.013
29-Jun	0.027 ± 0.004	0.022 ± 0.003	0.027 ± 0.005	0.013 ± 0.003	0.014 ± 0.003	0.016 ± 0.004	0.012 ± 0.003	0.019
Maximum	0.028 ± 0.004	0.024 ± 0.003	0.027 ± 0.005	0.024 ± 0.004	0.026 ± 0.003	0.027 ± 0.004	0.028 ± 0.005	
Average	0.018	0.015	0.016	0.015	0.016	0.016	0.017	
Minimum	0.009 ± 0.003	0.008 ± 0.002	0.009 ± 0.000	0.007 ± 0.002	0.009 ± 0.002	0.009 ± 0.003	0.008 ± 0.002	

(a) Sample collected for <84 hours in sample period

I = Indicator
C = Control

R. E. Ginna Nuclear Power Plant
Table 3-1B
On-Site Air Particulate Samplers
Gross Beta Results in pCi/m3

Collection Date	Station #2 (I)	Station #3 (I)	Station #4 (I)	Station #5 (I)	Station #6 (I)	Station #7 (I)	Station #13 (I)	Average
6-Jul	0.016 ± 0.003	0.013 ± 0.003	0.014 ± 0.004	0.013 ± 0.002	0.011 ± 0.002	0.013 ± 0.003	0.014 ± 0.003	0.013
12-Jul	0.013 ± 0.003	0.010 ± 0.003	0.007 ± 0.004	0.009 ± 0.003	0.011 ± 0.003	0.010 ± 0.003	0.011 ± 0.003	0.010
19-Jul	0.008 ± 0.003	0.010 ± 0.003	0.011 ± 0.004	0.009 ± 0.003	0.010 ± 0.002	0.010 ± 0.003	0.010 ± 0.003	0.010
27-Jul	0.021 ± 0.003	0.019 ± 0.003	0.021 ± 0.004	0.019 ± 0.003	0.018 ± 0.003	0.019 ± 0.003	0.020 ± 0.003	0.020
3-Aug	0.011 ± 0.003	0.010 ± 0.003	0.010 ± 0.004	0.012 ± 0.003	0.010 ± 0.003	0.011 ± 0.003	0.011 ± 0.003	0.011
9-Aug	0.011 ± 0.003	0.013 ± 0.003	0.015 ± 0.004	0.014 ± 0.003	0.015 ± 0.003	0.017 ± 0.003	0.017 ± 0.003	0.015
16-Aug	0.016 ± 0.003	0.021 ± 0.003	0.019 ± 0.004	0.020 ± 0.003	0.019 ± 0.003	0.020 ± 0.003	0.019 ± 0.003	0.019
23-Aug	0.026 ± 0.004	0.031 ± 0.004	0.023 ± 0.004	0.023 ± 0.003	0.025 ± 0.003	0.024 ± 0.003	0.024 ± 0.003	0.025
30-Aug	0.018 ± 0.003	0.017 ± 0.003	0.017 ± 0.004	0.016 ± 0.003	0.019 ± 0.003	0.020 ± 0.003	0.018 ± 0.003	0.018
7-Sep	0.018 ± 0.003	0.018 ± 0.003	0.014 ± 0.004	0.017 ± 0.003	0.017 ± 0.002	0.014 ± 0.003	0.018 ± 0.003	0.017
14-Sep	0.010 ± 0.003	0.010 ± 0.003	0.009 ± 0.004	0.009 ± 0.003	0.010 ± 0.003	0.011 ± 0.003	0.012 ± 0.003	0.010
21-Sep	0.017 ± 0.003	0.024 ± 0.151(a)	0.012 ± 0.004.	0.014 ± 0.003	0.014 ± 0.003	0.012 ± 0.003	0.018 ± 0.003	0.016
28-Sep	0.030 ± 0.004	0.031 ± 0.004	0.027 ± 0.005	0.025 ± 0.004	0.028 ± 0.003	0.025 ± 0.003	0.025 ± 0.003	0.019
4-Oct	0.013 ± 0.003	0.012 ± 0.003	0.015 ± 0.004	0.020 ± 0.003	0.016 ± 0.003	0.014 ± 0.003	0.015 ± 0.003	0.015
11-Oct	0.020 ± 0.003	0.021 ± 0.003	0.020 ± 0.004	0.023 ± 0.004	0.020 ± 0.003	0.021 ± 0.003	0.023 ± 0.003	0.021
18-Oct	0.009 ± 0.003	0.012 ± 0.003	0.011 ± 0.004	0.013 ± 0.003	0.011 ± 0.002	0.013 ± 0.003	0.014 ± 0.003	0.012
25-Oct	0.008 ± 0.003	0.007 ± 0.002	0.008 ± 0.003	0.009 ± 0.003	0.005 ± 0.002	0.008 ± 0.002	0.007 ± 0.002	0.007
2-Nov	0.013 ± 0.003	0.017 ± 0.004	0.014 ± 0.004	0.017 ± 0.003	0.013 ± 0.002	0.016 ± 0.003	0.014 ± 0.003	0.015
8-Nov	0.013 ± 0.003	0.014 ± 0.003	0.013 ± 0.004	0.018 ± 0.004	0.014 ± 0.003	0.017 ± 0.003	0.014 ± 0.003	0.015
16-Nov	0.013 ± 0.003	0.016 ± 0.003	0.017 ± 0.004	0.017 ± 0.003	0.016 ± 0.003	0.018 ± 0.003	0.016 ± 0.003	0.016
22-Nov	0.023 ± 0.004	0.025 ± 0.004	0.027 ± 0.005	0.024 ± 0.004	0.025 ± 0.004	0.024 ± 0.004	0.026 ± 0.004	0.025
29-Nov	0.014 ± 0.003	0.013 ± 0.003	0.017 ± 0.004	0.010 ± 0.003	0.005 ± 0.002	0.011 ± 0.002	0.012 ± 0.003	0.012
6-Dec	0.018 ± 0.003	0.022 ± 0.003	0.022 ± 0.005	0.020 ± 0.003	0.018 ± 0.003	0.021 ± 0.003	0.018 ± 0.003	0.020
13-Dec	0.006 ± 0.002	0.008 ± 0.020	0.010 ± 0.003	0.008 ± 0.002	0.009 ± 0.002	0.008 ± 0.002	0.008 ± 0.002	0.008
20-Dec	0.017 ± 0.004	0.015 ± 0.003	0.017 ± 0.005	0.015 ± 0.004	0.014 ± 0.003	0.013 ± 0.003	0.017 ± 0.003	0.015
27-Dec	0.020 ± 0.003	0.014 ± 0.003	0.020 ± 0.005	0.015 ± 0.003	0.007 ± 0.002	0.013 ± 0.003	0.013 ± 0.003	0.015
Maximum	0.030 ± 0.004	0.031 ± 0.020	0.027 ± 0.005	0.025 ± 0.004	0.028 ± 0.004	0.025 ± 0.004	0.026 ± 0.004	
Average	0.015	0.016	0.016	0.016	0.015	0.016	0.016	
Minimum	0.006 ± 0.002	0.007 ± 0.002	0.007 ± 0.003	0.008 ± 0.002	0.005 ± 0.002	0.008 ± 0.002	0.007 ± 0.002	

(a) Sample collected for <84 hours in sample period

I = Indicator
C = Control

R. E. Ginna Nuclear Power Plant
Table 3-2A
Off-Site Air Particulate Samplers
Gross Beta Results in pCi/m3

Collection Date	Station #8 (C)	Station #9 (I)	Station #10 (C)	Station #11 (I)	Station #12 (C)	Average
5-Jan	0.021 ± 0.003	0.019 ± 0.005	0.023 ± 0.004	0.023 ± 0.003	0.020 ± 0.003	0.021
12-Jan	0.017 ± 0.003	0.016 ± 0.005	0.022 ± 0.003	0.019 ± 0.003	0.017 ± 0.003	0.018
20-Jan	0.009 ± 0.002	0.013 ± 0.004	0.014 ± 0.003	0.014 ± 0.003	0.014 ± 0.003	0.013
26-Jan	0.014 ± 0.003	0.012 ± 0.005	0.020 ± 0.004	0.019 ± 0.003	0.016 ± 0.003	0.016
2-Feb	0.017 ± 0.003	0.020 ± 0.005	0.017 ± 0.003	0.020 ± 0.003	0.017 ± 0.003	0.018
9-Feb	0.015 ± 0.003	0.017 ± 0.005	0.019 ± 0.003	0.014 ± 0.003	0.015 ± 0.003	0.016
16-Feb	0.021 ± 0.003	0.025 ± 0.005	0.026 ± 0.004	0.024 ± 0.003	0.021 ± 0.003	0.023
23-Feb	0.024 ± 0.003	0.020 ± 0.005	0.023 ± 0.004	0.020 ± 0.003	0.018 ± 0.003	0.021
1-Mar	0.025 ± 0.003	0.026 ± 0.004	0.024 ± 0.004	0.025 ± 0.003	0.029 ± 0.004	0.026
8-Mar	0.019 ± 0.003	0.013 ± 0.005	0.019 ± 0.003	0.016 ± 0.003	0.016 ± 0.003	0.017
15-Mar	0.014 ± 0.003	0.006 ± 0.004	0.013 ± 0.003	0.016 ± 0.003	0.015 ± 0.003	0.013
22-Mar	0.016 ± 0.003	0.013 ± 0.005	0.016 ± 0.003	0.015 ± 0.003	0.016 ± 0.003	0.015
29-Mar	0.018 ± 0.003	0.015 ± 0.005	0.016 ± 0.003	0.022 ± 0.003	0.016 ± 0.003	0.017
6-Apr	0.010 ± 0.002	0.011 ± 0.004	0.009 ± 0.003	0.009 ± 0.002	0.008 ± 0.002	0.009
12-Apr	0.012 ± 0.003	0.011 ± 0.005	0.015 ± 0.003	0.013 ± 0.003	0.014 ± 0.003	0.013
20-Apr	0.016 ± 0.003	0.013 ± 0.005	0.016 ± 0.005	0.016 ± 0.003	0.017 ± 0.003	0.016
26-Apr	0.011 ± 0.002	0.010 ± 0.002	0.008 ± 0.002	0.010 ± 0.002	0.010 ± 0.002	0.010
4-May	0.013 ± 0.003	0.010 ± 0.005	0.014 ± 0.003	0.011 ± 0.003	0.010 ± 0.003	0.012
11-May	0.018 ± 0.003	0.015 ± 0.004	0.017 ± 0.003	0.018 ± 0.003	0.016 ± 0.003	0.017
18-May	0.018 ± 0.003	0.033 ± 0.008	0.017 ± 0.003	0.016 ± 0.003	0.016 ± 0.003	0.020
24-May	0.015 ± 0.003	0.029 ± 0.009	0.011 ± 0.003	0.012 ± 0.003	0.011 ± 0.030	0.016
2-Jun	0.012 ± 0.002	0.010 ± 0.003	0.011 ± 0.003	0.012 ± 0.003	0.012 ± 0.002	0.011
8-Jun	0.013 ± 0.003	0.011 ± 0.005	0.014 ± 0.003	0.011 ± 0.013(a)	0.011 ± 0.003	0.012
15-Jun	0.020 ± 0.003	0.017 ± 0.005	0.019 ± 0.003	0.017 ± 0.003	0.016 ± 0.003	0.018
22-Jun	0.013 ± 0.003	0.009 ± 0.004	0.015 ± 0.003	0.014 ± 0.004	0.012 ± 0.003	0.013
29-Jun	0.016 ± 0.003	0.014 ± 0.004	0.016 ± 0.003	0.011 ± 0.003	0.015 ± 0.003	0.014
Maximum	0.025 ± 0.003	0.033 ± 0.009	0.026 ± 0.005	0.025 ± 0.004	0.029 ± 0.030	
Average	0.016	0.016	0.016	0.016	0.015	
Minimum	0.009 ± 0.002	0.006 ± 0.002	0.008 ± 0.002	0.009 ± 0.002	0.008 ± 0.002	

(a) Sample collected for <84 hours in sample period

I = Indicator
C = Control

R. E. Ginna Nuclear Power Plant
Table 3-2B
Off-Site Air Particulate Samplers
Gross Beta Results in pCi/m3

Collection Date	Station #8 (C)	Station #9 (I)	Station #10 (C)	Station #11 (I)	Station #12 (C)	Average
6-Jul	0.015 ± 0.003	0.011 ± 0.004	0.012 ± 0.003	0.012 ± 0.003	0.012 ± 0.003	0.012
12-Jul	0.009 ± 0.003	0.012 ± 0.005	0.009 ± 0.003	0.010 ± 0.003	0.010 ± 0.003	0.010
19-Jul	0.015 ± 0.003	0.007 ± 0.004	0.010 ± 0.003	0.010 ± 0.003	0.011 ± 0.003	0.011
27-Jul	0.016 ± 0.003	0.020 ± 0.004	0.018 ± 0.003	0.018 ± 0.003	0.020 ± 0.003	0.018
3-Aug	0.016 ± 0.003	0.013 ± 0.005	0.010 ± 0.006(a)	0.015 ± 0.003	0.014 ± 0.003	0.014
9-Aug	0.015 ± 0.003	0.016 ± 0.005	0.019 ± 0.003	0.014 ± 0.004	0.013 ± 0.003	0.015
16-Aug	0.016 ± 0.003	0.017 ± 0.005	0.017 ± 0.003	0.018 ± 0.004	0.016 ± 0.003	0.017
23-Aug	0.022 ± 0.004	0.023 ± 0.005	0.027 ± 0.004	0.023 ± 0.004	0.022 ± 0.003	0.023
30-Aug	0.018 ± 0.040	0.017 ± 0.005	0.016 ± 0.004	0.017 ± 0.004	0.013 ± 0.003	0.016
7-Sep	0.017 ± 0.003	0.013 ± 0.004	0.017 ± 0.003	0.014 ± 0.003	0.015 ± 0.003	0.015
14-Sep	0.011 ± 0.003	0.008 ± 0.005	0.011 ± 0.003	0.010 ± 0.003	0.008 ± 0.030	0.010
21-Sep	0.016 ± 0.003	0.011 ± 0.004	0.013 ± 0.003	0.016 ± 0.003	0.016 ± 0.003	0.014
28-Sep	0.032 ± 0.004	0.021 ± 0.005	0.027 ± 0.004	0.031 ± 0.004	0.026 ± 0.004	0.027
4-Oct	0.015 ± 0.003	0.016 ± 0.005	0.019 ± 0.004	0.012 ± 0.004	0.015 ± 0.003	0.015
11-Oct	0.024 ± 0.004	0.020 ± 0.005	0.018 ± 0.004	0.019 ± 0.004	0.017 ± 0.003	0.020
18-Oct	0.016 ± 0.003	0.010 ± 0.020	0.012 ± 0.003	0.013 ± 0.003	0.014 ± 0.003	0.013
25-Oct	0.007 ± 0.003	0.007 ± 0.003	0.004 ± 0.002	0.010 ± 0.003	0.008 ± 0.002	0.007
2-Nov	0.016 ± 0.003	0.017 ± 0.005	0.014 ± 0.003	0.015 ± 0.003	0.015 ± 0.003	0.015
8-Nov	0.013 ± 0.003	0.016 ± 0.005	0.015 ± 0.004	0.017 ± 0.004	0.015 ± 0.003	0.015
16-Nov	0.020 ± 0.003	0.015 ± 0.005	0.015 ± 0.003	0.018 ± 0.004	0.017 ± 0.003	0.017
22-Nov	0.026 ± 0.004	0.017 ± 0.005	0.024 ± 0.004	0.020 ± 0.004	0.024 ± 0.004	0.022
29-Nov	0.017 ± 0.003	0.029 ± 0.006	0.017 ± 0.003	0.010 ± 0.003	0.014 ± 0.003	0.017
6-Dec	0.022 ± 0.004	0.013 ± 0.005	0.021 ± 0.004	0.023 ± 0.004	0.016 ± 0.003	0.019
13-Dec	0.009 ± 0.003	0.005 ± 0.004	0.007 ± 0.003	0.009 ± 0.003	0.008 ± 0.003	0.008
20-Dec	0.015 ± 0.004	0.013 ± 0.005	0.016 ± 0.003	0.017 ± 0.004	0.013 ± 0.003	0.015
27-Dec	0.021 ± 0.004	0.029 ± 0.006	0.019 ± 0.004	0.017 ± 0.004	0.017 ± 0.003	0.021
Maximum	0.032 ± 0.040	0.029 ± 0.020	0.027 ± 0.004	0.031 ± 0.004	0.026 ± 0.030	
Average	0.017	0.015	0.016	0.016	0.015	
Minimum	0.007 ± 0.003	0.005 ± 0.003	0.004 ± 0.002	0.009 ± 0.003	0.008 ± 0.002	

(a) Sample collected for <84 hours in sample period

I = Indicator
C = Control

Table 3-4 A
13 Week Composite Air Sample Analysis
1st Quarter 2004

Radionuclide	LLD pCi/m3	#2 pCi/m3	#3 pCi/m3	#4 pCi/m3	#5 pCi/m3	#6 pCi/m3	#7 pCi/m3	#8 pCi/m3	#9 pCi/m3	#10 pCi/m3	#11 pCi/m3	#12 pCi/m3	#13 pCi/m3
Ra-226	NA	<1.77E-02	<9.91E-03	<9.68E-03	<8.91E-03	<1.20E-02	<1.70E-02	<1.41E-02	<2.01E-02	<9.81E-03	<1.06E-02	<1.26E-02	<1.75E-02
Cr-51	NA	<2.09E-02	<1.37E-02	<1.53E-02	<1.40E-02	<1.64E-02	<2.28E-02	<2.48E-02	<2.79E-02	<1.60E-02	<1.52E-02	<1.74E-02	<2.36E-02
I-131	7.00E-01	<1.42E-02	<9.52E-03	<7.49E-03	<1.19E-02	<9.85E-03	<1.99E-02	<1.23E-02	<2.39E-02	<8.93E-03	<1.14E-02	<1.14E-02	<1.78E-02
Be-7	NA	0.113±0.012	0.085±0.008	0.076±0.008	0.094±0.009	0.107±0.009	0.081±0.009	0.094±0.010	0.108±0.014	0.098±0.009	0.095±0.008	0.109±0.009	0.096±0.010
Cs-134	1.00E-02	<1.35E-03	<7.06E-04	<7.70E-04	<7.99E-04	<7.53E-04	<1.35E-03	<1.08E-03	<1.91E-03	<1.07E-03	<7.90E-04	<1.11E-03	<8.57E-04
Cs-137	1.00E-02	<1.17E-02	<7.13E-04	<7.24E-04	<7.04E-04	<9.36E-04	<1.16E-03	<1.10E-03	<1.46E-03	<9.36E-04	<3.63E-04	<1.08E-03	<1.42E-02
Zr-95	NA	<4.46E-03	<1.27E-03	<2.50E-03	<2.42E-03	<2.47E-03	<3.99E-03	<3.32E-03	<5.88E-03	<2.14E-03	<1.56E-03	<2.50E-03	<3.78E-03
Nb-95	NA	<3.72E-03	<1.91E-03	<1.77E-03	<1.53E-03	<2.32E-03	<2.88E-03	<2.09E-03	<4.60E-03	<2.35E-03	<2.25E-03	<2.34E-03	<3.37E-03
Co-58	NA	<2.74E-03	<9.39E-04	<1.32E-03	<1.27E-03	<1.49E-03	<2.27E-03	<1.86E-03	<1.45E-03	<1.19E-03	<8.85E-04	<1.41E-03	<1.80E-03
Mn-54	NA	<1.63E-03	<7.95E-04	<8.07E-04	<8.88E-04	<1.04E-03	<1.49E-03	<1.63E-03	<1.91E-03	<9.76E-04	<7.19E-04	<1.16E-03	<1.18E-02
Ru-103	NA	<2.29E-03	<1.31E-03	<1.71E-03	<1.20E-03	<1.53E-03	<2.23E-02	<2.26E-03	<2.93E-03	<1.60E-03	<1.47E-03	<2.07E-03	<2.70E-03
Ru-106	NA	<1.26E-02	<7.68E-03	<7.24E-03	<8.07E-03	<6.80E-03	<1.30E-02	<1.18E-02	<1.93E-02	<9.35E-03	<1.04E-02	<1.12E-02	<1.29E-02
Ce-141	NA	<2.68E-03	<1.75E-03	<1.94E-03	<1.29E-03	<2.35E-03	<3.15E-03	<1.73E-03	<4.00E-03	<2.07E-03	<1.42E-02	<2.28E-03	<3.45E-03
Ce-144	NA	<5.15E-03	<2.75E-03	<2.75E-03	<2.09E-03	<3.75E-03	<5.80E-03	<4.28E-03	<5.32E-03	<2.92E-03	<2.27E-03	<3.66E-03	<6.80E-03
Fe-59	NA	<6.54E-03	<3.40E-03	<4.38E-03	<4.83E-03	<3.42E-03	<6.40E-03	<7.66E-03	<7.61E-03	<6.41E-03	<3.24E-03	<3.46E-03	<5.52E-03
Zn-65	NA	<9.47E-04	<4.75E-04	<2.82E-03	<1.83E-03	<1.91E-03	<3.45E-03	<3.02E-03	<4.99E-03	<3.01E-03	<2.37E-03	<2.83E-03	<3.45E-03
Co-60	NA	<5.09E-04	<1.07E-03	<1.08E-03	<8.78E-04	<7.23E-04	<1.73E-03	<4.08E-04	<1.47E-03	<1.48E-03	<1.01E-03	<1.19E-02	<1.30E-03
K-40	NA	<5.15E-03	<8.71E-03	<6.72E-03	<9.23E-03	0.029±0.006	0.029±0.006	<1.49E-02	<5.67E-03	<9.51E-03	<2.41E-03	0.022±0.005	0.053±0.009
Ba/La-140	NA	<1.69E-02	<2.53E-03	<1.24E-02	<6.57E-03	<9.85E-03	<1.39E-02	<1.72E-02	<1.54E-02	<1.15E-02	<6.51E-03	<1.16E-02	<1.46E-02

Table 3-4 B
13 Week Composite Air Sample Analysis
2nd Quarter 2004

Radionuclide	LLD pCi/m3	#2 pCi/m3	#4 pCi/m3	#5 pCi/m3	#6 pCi/m3	#7 pCi/m3	#8 pCi/m3	#9 pCi/m3	#10 pCi/m3	#11 pCi/m3	#12 pCi/m3	#13 pCi/m3
Ra-226	NA	<1.61E-02	<1.41E-02	<1.15E-02	<1.01E-02	<1.75E-02	<1.43E-02	<1.93E-02	.007±.004	.013±.006	<1.18E-02	<1.20E-02
Cr-51	NA	<2.65E-02	<2.32E-02	<1.82E-02	<1.88E-02	<2.56E-02	<2.02E-02	<3.59E-02	<1.44E-02	<2.53E-02	<2.41E-02	<1.98E-02
I-131	7.00E-01	<2.13E-02	<2.20E-02	<1.67E-02	<1.47E-02	<1.83E-02	<1.91E-02	<2.89E-02	<1.41E-02	<2.14E-02	<2.06E-02	<1.82E-02
Be-7	NA	.097±.010	.108±.009	.096±.011	.095±.085	.105±.011	.110±.011	.119±.015	.125±.010	.090±.010	.106±.009	.111±.011
Cs-134	1.00E-02	<1.41E-03	<1.44E-03	<1.12E-03	<9.37E-04	<1.66E-03	<1.18E-03	<1.43E-03	<7.12E-04	<1.31E-03	<1.21E-03	<1.37E-03
Cs-137	1.00E-02	<1.05E-03	<1.03E-03	<1.06E-03	<5.21E-04	<1.17E-03	<9.49E-04	<1.44E-03	<6.65E-04	<1.03E-03	<7.33E-04	<1.15E-03
Zr-95	NA	<2.47E-03	<2.56E-03	<1.89E-03	<1.77E-03	<3.43E-03	<2.52E-03	<3.76E-03	<2.84E-03	<2.47E-03	<2.77E-03	<2.59E-03
Nb-95	NA	<2.00E-03	<2.45E-03	<2.58E-03	<1.80E-03	<3.96E-03	<2.35E-03	<5.37E-03	<2.11E-03	<3.01E-03	<2.50E-03	<1.90E-03
Co-58	NA	<1.57E-03	<1.67E-03	<1.88E-03	<7.09E-03	<1.96E-03	<1.77E-03	<2.18E-03	<1.05E-03	<1.55E-03	<1.46E-03	<1.57E-03
Mn-54	NA	<1.32E-03	<1.21E-03	<1.67E-03	<8.99E-04	<1.37E-03	<1.33E-03	<2.25E-03	<8.15E-04	<1.22E-03	<9.78E-04	<1.50E-03
Ru-103	NA	<2.49E-03	<2.19E-03	<1.79E-03	<1.99E-03	<2.45E-03	<2.16E-03	<3.56E-03	<1.46E-03	<1.66E-03	<2.00E-03	<2.22E-03
Ru-106	NA	<1.28E-02	<1.06E-02	<7.52E-03	<9.53E-03	<1.31E-02	<1.12E-02	<1.71E-02	<7.23E-03	<1.26E-02	<9.05E-03	<1.15E-02
Ce-141	NA	<2.93E-03	<2.76E-03	<2.09E-03	<1.79E-03	<3.43E-03	<2.32E-03	<3.90E-03	<1.89E-03	<3.01E-03	<2.59E-03	<2.44E-03
Ce-144	NA	<4.74E-03	<5.18E-03	<3.77E-03	<3.09E-03	<5.55E-03	<4.06E-03	<6.56E-03	<3.16E-03	<4.17E-03	<4.28E-03	<4.09E-03
Fe-59	NA	<6.89E-03	<5.95E-03	<7.95E-03	<4.87E-03	<4.59E-03	<2.11E-03	<1.03E-02	<3.94E-03	<9.38E-03	<4.63E-03	<8.65E-03
Zn-65	NA	<2.89E-03	<2.66E-03	<2.53E-03	<1.81E-03	<3.39E-03	<7.78E-04	<3.84E-03	<2.30E-03	<3.69E-03	<2.64E-03	<3.55E-03
Co-60	NA	<1.07E-03	<8.84E-04	<1.11E-03	<1.11E-03	<1.36E-03	<1.74E-03	<1.83E-03	<1.39E-03	<1.46E-03	<8.08E-04	<1.21E-03
K-40	NA	.029±.006	.041±.006	<3.95E-03	.024±.005	.045±.007	<1.19E-02	<1.52E-02	.020±.005	.043±.008	.036±.006	<4.29E-03
Ba/La-140	NA	<1.11E-02	<1.02E-02	<1.70E-02	<9.38E-03	<1.39E-02	<2.32E-02	<1.99E-02	<1.56E-02	<1.26E-02	<1.09E-02	<2.14E-02

Table 3-4 C
13 Week Composite Air Sample Analysis
3rd Quarter 2004

Radionuclide	LLD pCi/m3	#2 pCi/m3	#3 pCi/m3	#4 pCi/m3	#5 pCi/m3	#6 pCi/m3	#7 pCi/m3	#8 pCi/m3	#9 pCi/m3	#10 pCi/m3	#11 pCi/m3	#12 pCi/m3	#13 pCi/m3
Ra-226	NA	1.79E-02	1.86E-02	3.60E-02	2.12E-02	2.03E-02	1.48E-02	2.31E-02	3.40E-02	2.12E-02	1.59E-02	1.25E-02	1.89E-02
Cr-51	NA	2.58E-02	2.70E-02	4.74E-02	2.14E-02	2.37E-02	2.25E-02	3.27E-02	5.93E-02	3.26E-02	2.31E-02	1.46E-02	2.73E-02
I-131	7.00E-01	1.75E-02	1.68E-02	1.75E-02	1.85E-02	1.24E-02	1.32E-02	1.57E-02	1.97E-02	1.50E-02	1.99E-02	1.01E-02	1.65E-02
Be-7	NA	0.089±0.011	0.097±0.015	0.109±0.015	0.075±0.014	0.097±0.010	0.082±0.013	0.110±0.012	0.078±0.018	0.089±0.012	0.084±0.013	0.093±0.011	0.118±0.012
Cs-134	1.00E-02	2.05E-03	1.59E-03	2.87E-03	1.90E-03	1.41E-03	2.16E-03	2.32E-03	2.91E-03	2.31E-03	1.98E-03	1.19E-03	1.48E-03
Cs-137	1.00E-02	1.05E-03	1.38E-03	2.27E-03	1.02E-03	1.09E-03	3.87E-04	1.98E-03	2.00E-03	1.05E-03	1.20E-03	2.59E-04	1.39E-03
Zr-95	NA	3.81E-03	4.39E-03	7.61E-03	1.19E-03	3.37E-03	3.37E-03	3.71E-03	9.38E-03	4.32E-03	3.81E-03	3.50E-03	3.74E-03
Nb-95	NA	2.90E-03	2.85E-03	5.52E-03	3.35E-03	2.41E-03	1.02E-03	3.06E-03	5.29E-03	4.39E-03	2.47E-03	1.95E-03	2.89E-03
Co-58	NA	1.73E-03	2.10E-03	4.57E-03	3.24E-03	2.34E-03	7.07E-04	2.39E-03	4.92E-03	3.05E-03	1.92E-03	1.52E-03	1.60E-03
Mn-54	NA	1.61E-03	1.90E-03	3.11E-03	1.77E-03	1.24E-03	2.38E-03	1.98E-03	4.52E-03	1.81E-03	1.35E-03	1.71E-03	1.37E-03
Ru-103	NA	2.71E-03	2.25E-03	3.73E-03	2.69E-03	2.57E-03	2.19E-03	2.22E-03	3.32E-03	2.06E-03	1.60E-03	2.06E-03	2.20E-03
Ru-106	NA	1.57E-02	1.47E-02	2.34E-02	1.09E-02	1.02E-02	1.42E-02	1.38E-02	7.87E-03	1.59E-02	1.21E-02	1.23E-02	1.43E-02
Ce-141	NA	3.43E-03	3.27E-03	4.25E-03	2.61E-03	2.96E-03	2.61E-03	3.88E-03	6.44E-03	4.06E-03	2.63E-03	2.28E-03	2.86E-03
Ce-144	NA	5.31E-03	6.31E-03	1.01E-02	4.41E-03	4.41E-03	5.89E-03	5.69E-03	9.62E-03	7.36E-03	6.47E-03	4.34E-03	6.42E-03
Fe-59	NA	7.36E-03	1.22E-02	1.34E-02	3.32E-03	7.45E-03	3.46E-03	8.63E-03	6.58E-03	8.36E-03	2.81E-03	6.31E-03	7.60E-03
Zn-65	NA	3.04E-03	5.71E-03	5.09E-03	1.34E-03	3.32E-03	3.76E-03	5.35E-03	1.05E-02	3.83E-03	3.08E-03	8.93E-04	3.90E-03
Co-60	NA	1.60E-03	7.76E-04	2.06E-03	7.22E-04	1.48E-03	2.97E-03	1.43E-03	3.86E-03	1.55E-03	6.04E-04	1.36E-03	1.26E-02
K-40	NA	0.034±0.008	2.24E-02	0.058±0.011	2.08E-02	0.027±0.006	2.14E-02	0.045±0.009	1.44E-02	0.053±0.011	1.58E-02	4.79E-03	1.69E-02
Ba/La-140	NA	3.55E-03	7.09E-03	1.91E-02	6.61E-03	8.35E-03	2.32E-02	1.08E-02	3.52E-02	1.73E-02	5.67E-03	4.47E-03	9.55E-03

Table 3-4 D
13 Week Composite Air Sample Analysis
4th Quarter 2004

Radionuclide	LLD pCi/m3	#2 pCi/m3	#3 pCi/m3	#4 pCi/m3	#5 pCi/m3	#6 pCi/m3	#7 pCi/m3	#8 pCi/m3	#9 pCi/m3	#10 pCi/m3	#11 pCi/m3	#12 pCi/m3	#13 pCi/m3
Ra-226	NA	2.54E-02	1.22E-02	2.37E-02	1.87E-02	1.64E-02	1.96E-02	1.42E-02	3.11E-02	1.82E-02	2.73E-02	1.90E-02	1.01E-02
Cr-51	NA	2.53E-02	3.01E-02	3.92E-02	3.85E-02	2.98E-02	2.52E-02	3.68E-02	4.65E-02	2.50E-02	3.24E-02	2.47E-02	2.69E-02
I-131	7.00E-01	3.95E-02	1.95E-02	2.73E-02	2.91E-02	2.95E-02	2.80E-02	2.93E-02	5.73E-02	3.92E-02	3.40E-02	2.63E-02	2.40E-02
Be-7	NA	6.94E-2 ± .0141	7.17E-2 ± .0112	7.24E-2 ± .0140	1.05E-1 ± .0135	7.71E-2 ± .0123	1.06E-1 ± .0134	7.80E-2 ± .0125	7.45E-2 ± .0159	8.52E-2 ± .0132	1.03E-1 ± .0145	6.52E-2 ± .0126	1.14E-1 ± .0124
Cs-134	1.00E-02	1.63E-03	1.57E-03	1.31E-03	2.10E-03	1.56E-03	1.00E-03	1.85E-03	2.68E-03	1.97E-03	1.84E-03	2.01E-03	1.53E-03
Cs-137	1.00E-02	1.63E-03	1.11E-03	2.28E-03	1.28E-03	1.35E-03	1.59E-03	1.39E-03	2.21E-03	1.21E-03	1.57E-03	1.06E-03	1.00E-03
Zr-95	NA	5.61E-03	1.03E-03	1.40E-03	4.07E-03	3.20E-03	4.96E-03	4.79E-03	8.49E-03	3.81E-03	6.59E-03	3.70E-03	3.16E-03
Nb-95	NA	4.93E-03	3.86E-03	4.48E-03	3.57E-03	2.83E-03	1.10E-03	2.87E-03	7.50E-03	4.78E-03	4.96E-03	3.27E-03	3.25E-03
Co-58	NA	2.92E-03	1.89E-03	3.74E-03	2.79E-03	1.92E-03	2.58E-03	2.38E-03	4.58E-03	2.49E-03	1.93E-03	2.22E-03	1.00E-03
Mn-54	NA	1.54E-03	1.27E-03	2.50E-03	1.53E-03	1.00E-03	1.72E-03	2.07E-03	1.73E-03	1.42E-03	2.10E-03	1.48E-03	1.48E-03
Ru-103	NA	3.01E-03	2.44E-03	3.46E-03	3.22E-03	2.52E-03	3.24E-03	2.31E-03	3.65E-03	1.61E-03	4.00E-03	2.53E-03	1.77E-03
Ru-106	NA	1.52E-02	1.13E-02	1.21E-02	1.39E-02	1.63E-02	2.03E-02	1.58E-02	1.93E-02	1.47E-02	1.71E-02	1.45E-02	7.42E-03
Ce-141	NA	2.85E-03	3.23E-03	3.75E-03	3.85E-03	2.94E-03	2.84E-03	4.53E-03	5.58E-03	2.81E-03	5.79E-03	2.94E-03	2.41E-03
Ce-144	NA	5.44E-03	5.83E-03	5.72E-03	6.17E-03	4.89E-03	5.74E-03	6.32E-03	7.74E-03	4.42E-03	8.60E-03	5.65E-03	4.43E-03
Fe-59	NA	4.07E-03	1.09E-02	3.82E-03	7.58E-03	9.26E-03	9.81E-03	3.15E-03	1.80E-02	8.13E-03	1.38E-02	1.07E-02	6.31E-03
Zn-65	NA	5.12E-02	4.47E-03	5.65E-03	3.40E-03	4.24E-03	3.56E-03	1.15E-03	4.97E-03	4.18E-03	4.18E-03	4.90E-03	1.00E-03
Co-60	NA	7.91E-04	1.46E-03	7.40E-04	1.86E-03	1.78E-03	2.38E-03	1.00E-03	2.72E-03	1.43E-03	1.80E-03	2.06E-03	1.21E-03
K-40	NA	7.98E-03	5.60E-03	2.02E-02	1.53E-02	2.38E-02	6.99E-03	6.06E-03	2.50E-02	5.47E-03	1.87E-02	7.62E-03	1.26E-02
Ba/La-140	NA	3.59E-02	3.04E-02	2.74E-02	2.74E-02	2.46E-02	1.00E-02	2.34E-02	6.05E-02	7.76E-03	2.75E-02	1.09E-02	6.62E-03

Table 3-5
Charcoal Cartridges Gamma Analysis for Iodine
Results in pCi/M3

Collection Date	Station #2	Station #4	Station #7	Station #8	Station #9	Station #11
5-Jan	<0.022	<0.021	<0.018	<0.020	<0.039	<0.015
12-Jan	<0.017	<0.021	<0.023	<0.024	<0.041	<0.016
20-Jan	<0.023	<0.014	<0.013	<0.013	<0.035	<0.018
26-Jan	<0.034	<0.023	<0.024	<0.018	<0.053	<0.019
2-Feb	<0.030	<0.017	<0.026	<0.023	<0.046	<0.021
9-Feb	<0.033	<0.021	<0.021	<0.021	<0.053	<0.022
16-Feb	<0.025	<0.019	<0.026	<0.016	<0.041	<0.017
23-Feb	<0.025	<0.013	<0.023	<0.021	<0.044	<0.018
1-Mar	<0.021	<0.013	<0.017	<0.017	<0.029	<0.021
8-Mar	<0.022	<0.024	<0.027	<0.019	<0.035	<0.016
15-Mar	<0.026	<0.014	<0.016	<0.013	<0.030	<0.021
22-Mar	<0.062	<0.015	<0.027	<0.022	<0.032	<0.019
29-Mar	<0.030	<0.016	<0.016	<0.019	<0.044	<0.021
6-Mar	<0.013	<0.016	<0.019	<0.016	<0.039	<0.010
12-Apr	<0.022	<0.022	<0.023	<0.025	<0.025	<0.020
20-Apr	<0.026	<0.013	<0.015	<0.020	<0.037	<0.017
26-Apr	<0.035	<0.017	<0.011	<0.016	<0.035	<0.019
4-May	<0.021	<0.015	<0.022	<0.021	<0.035	<0.019
11-May	<0.015	<0.016	<0.017	<0.020	<0.043	<0.023
18-May	<0.019	<0.013	<0.017	<0.028	<0.051	<0.024
24-May	<0.025	<0.022	<0.029	<0.016	<0.048	<0.023
2-Jun	<0.016	<0.013	<0.019	<0.016	<0.019	<0.021
8-Jun	<0.034	<0.017	<0.026	<0.015	<0.040	<0.062
15-Jun	<0.006	<0.023	<0.017	<0.013	<0.031	<0.023
22-Jun	<0.021	<0.039	<0.029	<0.016	<0.036	<0.025
29-Jun	<0.018	<0.022	<0.029	<0.012	<0.027	<0.029
6-Jul	<0.017	<0.026	<0.024	<0.012	<0.034	<0.020
12-Jul	<0.026	<0.041	<0.030	<0.026	<0.041	<0.025
19-Jul	<0.017	<0.034	<0.026	<0.029	<0.029	<0.041
27-Jul	<0.019	<0.017	<0.014	<0.016	<0.025	<0.020
3-Aug	<0.023	<0.035	<0.027	<0.023	<0.050	<0.017
9-Aug	<0.019	<0.008	<0.018	<0.021	<0.029	<0.025
16-Aug	<0.020	<0.033	<0.018	<0.025	<0.044	<0.032
23-Aug	<0.022	<0.025	<0.018	<0.022	<0.041	<0.025
30-Aug	<0.027	<0.043	<0.028	<0.039	<0.054	<0.031
7-Sep	<0.020	<0.005	<0.013	<0.020	<0.036	<0.004
14-Sep	<0.011	<0.032	<0.017	<0.029	<0.050	<0.025
21-Sep	<0.019	<0.024	<0.025	<0.034	<0.027	<0.015
28-Sep	<0.024	<0.029	<0.015	<0.017	<0.030	<0.021
4-Oct	<0.026	<0.026	<0.017	<0.020	<0.030	<0.023
11-Oct	<0.021	<0.024	<0.021	<0.028	<0.036	<0.016
18-Oct	<0.017	<0.028	<0.012	<0.020	<0.041	<0.029
25-Oct	<0.024	<0.034	<0.017	<0.015	<0.030	<0.032
2-Nov	<0.018	<0.037	<0.015	<0.023	<0.049	<0.027
8-Nov	<0.019	<0.039	<0.02	<0.030	<0.058	<0.028
16-Nov	<0.024	<0.043	<0.012	<0.013	<0.028	<0.024
22-Nov	<0.022	<0.032	<0.018	<0.021	<0.043	<0.028
29-Nov	<0.016	<0.020	<0.015	<0.025	<0.034	<0.021
6-Dec	<0.018	<0.016	<0.019	<0.027	<0.046	<0.015
13-Dec	<0.017	<0.027	<0.014	<0.015	<0.038	<0.018
20-Dec	<0.020	<0.028	<0.022	<0.019	<0.037	<0.024
27-Dec	<0.023	<0.029	<0.012	<0.018	<0.043	<0.025

3.3 Water Samples

Water samples are collected on a schedule specified in the ODCM, 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.

Samples are collected weekly from Lake Ontario, upstream (Russell Station or Monroe County Water Authority - Shoremont) and downstream (Ontario Water District Plant - OWD), composited monthly, and analyzed for gross beta activity, Table 3-8. There was no statistically significant difference between the upstream and downstream sample concentrations. The 2004 averages were 2.23 pCi/liter and 2.62 pCi/liter for the upstream and downstream samples respectively. Gamma isotopic analysis of the monthly composite samples showed no statistically significant difference in activity between the upstream and downstream samples.

Gross beta peaks of up to 10 pCi/liter can occur when the lake is stirred up by wind and the weekly sample includes large quantities of suspended silt.

Weekly samples are taken from the plant circulating water intake (Circ In) and discharge canal (Circ Out), and composited monthly. The 2004 averages were 2.23 pCi/liter and 2.16 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 $\pm$ 1 sigma error band and range of the measurement.

Results for all water beta analyses are listed in Table 3-8 .

Samples of the creek which crosses the site are collected and analyzed monthly. Deer Creek gross beta values are typically higher than other surface water samples due to Radon progeny in the soils from which the creek recharges and over which the creek flows.

Isotopic Analysis

Gamma isotopic analysis is performed on each monthly composite sample. These are listed in Tables 3-9 to 3-14 and are separated by source of sample. No anomalous results were noted.

Tritium Analysis

Tritium analysis was performed on all water samples on a monthly basis. Composites are made from the weekly samples and a portion filtered to remove interferences for analysis by beta scintillation. Tritium data is given in Table 3-14.

Radioiodine analysis

All monthly composite water samples are analyzed for Iodine-131. The analysis allows the determination of Iodine-131 activity of <1pCi/liter. Radioiodine data is given in Table 3-15. Any positive counts and the 1 sigma error are reported. During 2004, no sample results indicated I-131 activity in excess of the LLD for the analysis.

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

Month	Control	O.W.D.	Circ In	Circ Out	Deer Creek
January	2.31 ± 0.46	3.84 ± 0.52	3.27 ± 0.50	3.74 ± 0.51	3.62 ± 0.58
February	2.27 ± 0.48	3.24 ± 0.52	1.53 ± 0.48	2.58 ± 0.49	4.37 ± 0.64
March	2.74 ± 0.53	2.37 ± 0.53	2.67 ± 0.53	2.10 ± 0.51	3.32 ± 0.54
April	2.36 ± 0.50	1.66 ± 0.49	2.58 ± 0.51	2.10 ± 0.50	2.27 ± 0.58
May	1.93 ± 0.50	1.29 ± 0.48	1.74 ± 0.49	1.46 ± 0.48	3.74 ± 0.64
June	0.79 ± 0.45	2.17 ± 0.48	1.51 ± 0.47	1.18 ± 0.47	4.05 ± 0.60
July	2.43 ± 0.50	3.52 ± 0.52	2.50 ± 0.48	1.91 ± 0.46	3.40 ± 0.52
August	2.92 ± 0.47	2.45 ± 0.46	1.86 ± 0.44	2.39 ± 0.43	4.14 ± 0.56
September	2.86 ± 0.54	2.11 ± 0.51	2.38 ± 0.50	1.76 ± 0.49	5.23 ± 0.59
October	2.42 ± 0.48	3.06 ± 0.51	2.06 ± 0.47	2.72 ± 0.49	5.43 ± 0.66
November	1.49 ± 0.48	3.15 ± 0.53	2.41 ± 0.52	1.87 ± 0.48	4.12 ± 0.62
December	2.73 ± 0.47	2.22 ± 0.44	2.72 ± 0.48	1.47 ± 0.55	6.53 ± 0.64
Maximum	2.92 ± 0.54	3.84 ± 0.53	3.27 ± 0.53	3.74 ± 0.55	6.53 ± 0.66
Average	2.23	2.62	2.23	2.16	3.97
Minimum	0.79 ± 0.45	1.29 ± 0.44	1.51 ± 0.44	1.18 ± 0.43	2.27 ± 0.52

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Table 3-9
Control Water Gamma Isotopic Analysis
Results in pCi/Liter

Month	7Be	51Cr	134Cs	137Cs	95Zr	95Nb	58Co	54Mn	103Ru	106Ru	141Ce	144Ce	59Fe	65Zn	60Co	140Ba	226Ra
January	< 22	< 29	< 2	< 2	< 5	< 4	< 2	< 2	< 3	< 25	< 6	< 15	< 7	< 5	< 2	< 9	79±20
February	< 29	< 34	< 2	< 3	< 6	< 4	< 3	< 3	< 4	< 31	< 6	< 18	< 8	< 4	< 4	< 11	121±22
March	< 25	< 30	< 1	< 3	< 5	< 4	< 3	< 2	< 3	< 24	< 6	< 18	< 9	< 5	< 3	< 8	70±20
April	< 36	< 48	< 3	< 4	< 7	< 5	< 4	< 3	< 6	< 34	< 8	< 25	< 12	< 10	< 3	< 14	68±32
May	< 26	< 32	< 3	< 3	< 6	< 4	< 3	< 2	< 4	< 27	< 6	< 19	< 9	< 6	< 3	< 8	71±22
June	< 30	< 36	< 4	< 3	< 7	< 5	< 4	< 3	< 4	< 37	< 6	< 21	< 10	< 8	< 5	< 9	80±30
July	< 41	< 46	< 3	< 4	< 8	< 5	< 5	< 4	< 5	< 51	< 9	< 28	< 12	< 9	< 4	< 13	95±32
August	< 48	< 56	< 6	< 6	< 10	< 6	< 7	< 5	< 6	< 57	< 11	< 37	< 16	< 12	< 7	< 15	87±36
September	< 41	< 42	< 3	< 4	< 8	< 5	< 5	< 5	< 5	< 38	< 7	< 24	< 14	< 10	< 4	< 12	118±29
October	< 25	< 35	< 4	< 3	< 6	< 5	< 4	< 3	< 4	< 30	< 5	< 18	< 10	< 8	< 3	< 9	155±24
November	< 35	< 43	< 5	< 4	< 9	< 5	< 5	< 4	< 6	< 41	< 8	< 26	< 11	< 6	< 4	< 11	109±31
December	< 30	< 40	< 4	< 4	< 6	< 5	< 4	< 4	< 5	< 33	< 8	< 23	< 11	< 9	< 4	< 11	60±31

R. E. Ginna Nuclear Power Plant

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

Month	7Be	51Cr	134Cs	137Cs	95Zr	95Nb	58Co	54Mn	103Ru	106Ru	141Ce	144Ce	59Fe	65Zn	60Co	140Ba	226Ra
January	< 37	< 40	< 3	< 4	< 7	< 5	< 4	< 3	< 5	< 40	< 8	< 22	< 10	< 9	< 4	< 10	69±29
February	< 28	< 31	< 3	< 3	< 5	< 4	< 2	< 3	< 4	< 28	< 6	< 18	< 9	< 8	< 3	< 6	53±22
March	< 29	< 33	< 2	< 3	< 6	< 4	< 3	< 3	< 4	< 34	< 6	< 21	< 9	< 7	< 3	< 8	105±26
April	< 32	< 45	< 4	< 4	< 7	< 5	< 4	< 3	< 5	< 32	< 5	< 25	< 9	< 8	< 3	< 8	66±27
May	< 48	< 59	< 4	< 6	< 9	< 7	< 5	< 5	< 6	< 54	< 10	< 29	< 17	< 12	< 5	< 15	83±44
June	< 23	< 29	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 27	< 4	< 15	< 7	< 6	< 3	< 7	115±21
July	< 36	< 44	< 2	< 4	< 8	< 5	< 5	< 3	< 5	< 35	< 8	< 28	< 13	< 8	< 3	< 10	< 92
August	< 49	< 47	< 6	< 6	< 9	< 6	< 6	< 5	< 7	< 49	< 9	< 29	< 17	< 12	< 4	< 13	< 101
September	< 23	< 31	< 2	< 2	< 5	< 3	< 3	< 3	< 2	< 27	< 6	< 19	< 7	< 3	< 2	< 6	69±20
October	< 29	< 25	< 4	< 3	< 7	< 5	< 4	< 3	< 5	< 31	< 7	< 23	< 10	< 7	< 4	< 7	44±27
November	< 24	< 32	< 4	< 3	< 6	< 4	< 4	< 4	< 4	< 32	< 5	< 17	< 11	< 8	< 3	< 8	135±23
December	< 35	< 39	< 5	< 4	< 8	< 6	< 5	< 4	< 6	< 42	< 8	< 24	< 13	< 10	< 4	< 12	88±30

R. E. Ginna Nuclear Power Plant

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

Month	7Be	51Cr	134Cs	137Cs	95Zr	95Nb	58Co	54Mn	103Ru	106Ru	141Ce	144Ce	59Fe	65Zn	60Co	140Ba	226Ra
January	< 29	< 38	< 2	< 3	< 5	< 4	< 3	< 3	< 4	< 32	< 7	< 21	< 7	< 7	< 3	< 7	92±26
February	< 21	< 28	< 1	< 2	< 4	< 3	< 3	< 2	< 3	< 24	< 5	< 18	< 6	< 3	< 2	< 5	71±19
March	< 24	< 27	< 1	< 2	< 5	< 3	< 3	< 2	< 3	< 23	< 5	< 17	< 8	< 6	< 3	< 5	72±23
April	< 30	< 37	< 4	< 4	< 7	< 5	< 4	< 4	< 5	< 35	< 7	< 22	< 11	< 8	< 4	< 11	< 66
May	< 35	< 44	< 4	< 3	< 9	< 5	< 4	< 4	< 5	< 36	< 7	< 21	< 13	< 8	< 4	< 10	131±31
June	< 26	< 31	< 3	< 3	< 5	< 3	< 3	< 3	< 4	< 28	< 6	< 19	< 9	< 6	< 3	< 8	< 54
July	< 47	< 50	< 5	< 5	< 9	< 7	< 6	< 5	< 7	< 51	< 9	< 30	< 16	< 15	< 4	< 15	148±41
August	< 39	< 50	< 6	< 4	< 9	< 6	< 5	< 4	< 5	< 45	< 10	< 32	< 16	< 13	< 5	< 14	< 96
September	< 29	< 33	< 3	< 3	< 6	< 4	< 3	< 2	< 4	< 35	< 6	< 20	< 10	< 7	< 3	< 8	62±22
October	< 38	< 44	< 5	< 4	< 8	< 6	< 5	< 5	< 6	< 40	< 8	< 26	< 17	< 10	< 5	< 10	88±39
November	< 26	< 34	< 2	< 3	< 5	< 4	< 4	< 3	< 4	< 30	< 7	< 23	< 9	< 7	< 3	< 7	69±26
December	< 30	< 40	< 4	< 4	< 6	< 5	< 4	< 4	< 5	< 33	< 8	< 23	< 11	< 9	< 4	< 11	< 76

R. E. Ginna Nuclear Power Plant

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

Month	7Be	51Cr	134Cs	137Cs	95Zr	95Nb	58Co	54Mn	103Ru	106Ru	141Ce	144Ce	59Fe	65Zn	60Co	140Ba	226Ra
January	< 31	< 41	< 3	< 3	< 7	< 4	< 4	< 3	< 4	< 35	< 7	< 22	< 11	< 8	< 3	< 9	153±31
February	< 27	< 28	< 3	< 3	< 5	< 3	< 3	< 3	< 4	< 26	< 6	< 19	< 8	< 6	< 3	< 6	< 62
March	< 21	< 25	< 3	< 2	< 5	< 3	< 3	< 3	< 3	< 24	< 3	< 14	< 8	< 5	< 3	< 5	145±19
April	< 23	< 31	< 2	< 3	< 5	< 4	< 3	< 3	< 3	< 25	< 6	< 19	< 7	< 3	< 3	< 6	76±22
May	< 34	< 42	< 2	< 3	< 6	< 4	< 4	< 3	< 4	< 33	< 7	< 25	< 10	< 8	< 3	< 8	58±28
June	< 26	< 28	< 1	< 3	< 5	< 3	< 3	< 2	< 4	< 26	< 5	< 19	< 9	< 5	< 3	< 8	70±25
July	< 47	< 49	< 4	< 5	< 8	< 7	< 5	< 6	< 5	< 40	< 9	< 27	< 14	< 9	< 5	< 14	138±36
August	< 41	< 47	< 5	< 5	< 10	< 5	< 5	< 4	< 6	< 42	< 8	< 32	< 14	< 10	< 5	< 11	76±33
September	< 31	< 39	< 3	< 3	< 7	< 5	< 4	< 3	< 4	< 40	< 7	< 23	< 12	< 9	< 4	< 10	96±27
October	< 33	< 36	< 4	< 4	< 7	< 4	< 4	< 4	< 5	< 29	< 7	< 22	< 11	< 8	< 5	< 9	< 66
November	< 45	< 41	< 3	< 4	< 7	< 6	< 6	< 5	< 6	< 41	< 8	< 27	< 16	< 10	< 5	< 12	93±34
December	< 33	< 38	< 4	< 4	< 8	< 5	< 4	< 3	< 5	< 33	< 8	< 22	< 11	< 7	< 4	< 8	< 76

R. E. Ginna Nuclear Power Plant

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

Month	7Be	51Cr	134Cs	137Cs	95Zr	95Nb	58Co	54Mn	103Ru	106Ru	141Ce	144Ce	59Fe	65Zn	60Co	140Ba	226Ra
January	< 39	< 46	< 3	< 5	< 7	< 5	< 5	< 6	< 5	< 42	< 8	< 38	< 11	< 12	< 5	< 5	< 117
February	< 34	< 48	< 6	< 5	< 6	< 6	< 5	< 5	< 5	< 49	< 9	< 31	< 17	< 14	< 7	< 8	129±44
March	< 40	< 42	< 6	< 6	< 8	< 5	< 6	< 7	< 5	< 59	< 7	< 34	< 17	< 14	< 6	< 10	< 109±46
April	< 38	< 44	< 3	< 5	< 8	< 5	< 5	< 5	< 5	< 48	< 9	< 36	< 11	< 11	< 5	< 4	< 113
May	< 37	< 39	< 6	< 5	< 8	< 4	< 5	< 5	< 5	< 52	< 8	< 36	< 12	< 10	< 5	< 6	< 109
June	< 34	< 42	< 3	< 5	< 7	< 4	< 5	< 4	< 5	< 49	< 8	< 36	< 12	< 12	< 4	< 5	101±44
July	< 44	< 46	< 6	< 6	< 9	< 6	< 6	< 5	< 6	< 60	< 9	< 37	< 15	< 15	< 5	< 7	< 128
August	< 40	< 36	< 5	< 5	< 10	< 5	< 4	< 6	< 6	< 49	< 7	< 28	< 14	< 11	< 8	< 8	139±44
September	< 34	< 34	< 4	< 4	< 8	< 4	< 4	< 5	< 4	< 39	< 6	< 24	< 12	< 11	< 3	< 4	167±34
October	< 35	< 32	< 5	< 5	< 8	< 5	< 4	< 5	< 5	< 51	< 8	< 36	< 11	< 11	< 5	< 6	< 113
November	< 37	< 44	< 4	< 5	< 9	< 5	< 5	< 5	< 4	< 49	< 9	< 34	< 13	< 13	< 5	< 5	86±39
December	< 38	< 37	< 4	< 4	< 10	< 6	< 5	< 5	< 5	< 46	< 8	< 33	< 14	< 13	< 6	< 6	< 119

R.E. Ginna Nuclear Power Plant
Table 3-14
2004 Environmental Water Samples Tritium Analysis
Results in pCi/Liter

Month	Control	O.W.D.	Circ In	Circ Out	Deer Creek
January	<215	<214	<215	<215	<225
February	<220	<219	<223	<218	<226
March	<221	<225	<222	<221	<225
April	<213	<212	<213	<211	<221
May	<214	<212	<214	<212	<226
June	<217	<218	<219	<226	<227
July	<206	<208	<214	<209	<221
August	<207	<200	<207	<204	<210
September	<631	<643	<628	<624	<649
October	<221	<223	<237	<221	<643
November	<609	<612	<616	<614	<639
December	<220	<220	<221	<218	<229

R. E. Ginna Nuclear Power Plant
Table 3-15
Radioiodine in Water
Results in pCi/Liter

Month	Control	O.W.D.	Circ In	Circ Out	Deer Creek
January	<0.67	<0.44	<0.56	<0.52	<0.45
February	<0.64	<0.49	<0.42	<0.49	<0.46
March	<0.91	<0.52	<0.41	<0.52	<0.44
April	<0.62	<0.51	<0.42	<0.47	<0.44
May	<0.59	<0.55	<0.41	<0.45	<0.40
June	<0.40	<0.52	<0.54	<0.41	<0.52
July	<0.51	<0.34	<0.40	<0.39	<0.41
August	<0.41	<0.51	<0.54	<0.45	<0.55
September	<0.58	<0.41	<0.48	<0.41	<0.48
October	<0.58	<0.43	<0.39	<0.39	<0.38
November	<0.73	<0.51	<0.54	<0.62	<0.34
December	<0.52	<0.42	<0.38	<0.42	<0.39

3.4 Milk Samples

There were two indicator dairy herds located three to five miles from the plant on 1/1/04. The owner of previous indicator farm C retired early In 2002, and a change to the ODCM was submitted to reflect this. Milk samples are collected monthly during November through May from one of the indicator farms 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 2004, no samples indicated I-131 activity that exceeded the LLD for the analysis.

Table 3-16 is a listing of all samples collected during 2004 with analytical results.

Table 3-16
Milk
Results in pCi/Liter

Farm	Date	K-40	Cs-134	Cs-137	Ba-140	I-131
FARM B	01/13/04	1463±81	<7	<7	<9	<0.37
FARM C	01/13/03	1577±67	<5	<5	<5	<0.37
FARM A	02/11/04	1470±90	<7	<8	<7	<0.54
FARM C	02/11/04	1690±76	<6	<6	<6	<0.42
FARM B	03/09/04	1450±80	<7	<6	<8	<0.53
FARM C	03/09/04	1460±64	<6	<6	<6	<0.45
FARM A	04/13/04	1590±82	<4	<8	<9	<0.37
FARM C	04/13/04	1500±80	<6	<7	<8	<0.36
FARM B	05/11/04	1440±83	<7	<8	<7	<0.47
FARM C	05/11/04	1500±68	<6	<7	<6	<0.41
FARM A	06/08/04	1710±80	<8	<7	<9	<0.41
FARM B	06/08/04	1490±101	<8	<9	<11	<0.46
FARM C	06/08/04	1500±79	<6	<7	<8	<0.53
FARM A	06/22/04	1570±104	<8	<7	<11	<0.52
FARM B	06/22/04	1490±80	<6	<7	<6	<0.42
FARM C	06/22/04	1520±79	<7	<7	<7	<0.38
FARM A	07/06/04	1500±71	<6	<5	<6	<0.36
FARM B	07/06/04	1720±81	<5	<7	<8	<0.48
FARM C	07/06/04	1690±57	<3	<5	<5	<0.38
FARM A	07/20/04	1780±101	<9	<9	<12	<0.41
FARM B	07/20/04	1660±69	<4	<5	<7	<0.35
FARM C	07/20/04	1620±115	<10	<9	<8	<0.37
FARM A	08/03/04	1400±80	<7	<6	<8	<0.45
FARM B	08/03/04	1570±93	<7	<7	<8	<0.53
FARM C	08/03/04	1450±84	<7	<7	<7	<0.41
FARM A	08/17/04	1560±92	<7	<9	<8	<0.39
FARM B	08/17/04	1440±79	<6	<7	<7	<0.36
FARM C	08/17/04	1380±78	<6	<8	<5	<0.40
FARM A	08/31/04	1470±103	<9	<10	<11	<0.48
FARM B	08/31/04	1590±84	<7	<7	<7	<0.36
FARM C	08/31/04	1660±61	<3	<5	<3	<0.34
FARM A	09/13/04	1540±81	<7	<6	<10	<0.57
FARM B	09/14/04	1320±75	<6	<7	<8	<0.44
FARM C	09/13/04	1520±77	<6	<7	<6	<0.37
FARM A	09/28/04	1510±79	<7	<8	<8	<0.48
FARM B	09/28/04	1410±76	<7	<6	<7	<0.37
FARM C	09/28/04	1700±88	<9	<8	<9	<0.33
FARM A	10/12/04	1560±102	<10	<9	<8	<0.43
FARM B	10/12/04	1410±77	<7	<7	<7	<0.37
FARM C	10/12/04	1560±82	<7	<7	<9	<0.53
FARM A	10/26/04	1370±96	<9	<9	<11	<0.49
FARM B	10/26/04	1660±83	<6	<6	<7	<0.34
FARM C	10/26/04	1480±78	<7	<6	<7	<0.34
FARM B	11/10/04	1390±81	<7	<8	<10	<0.79
FARM C	11/10/04	1430±62	<5	<5	<6	<0.68
FARM A	12/14/03	1580±86	<8	<7	<8	<0.37
FARM C	12/14/03	1760±73	<6	<6	<6	<0.39

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. E. Ginna Nuclear Power Plant environmental staff and are analyzed by gamma spectroscopy after being held for periods of less than one week to keep the LLD value for the shorter half-life isotopes realistic. Detection limits could also be affected by small mass samples, (< 2000 grams), in some species. Gamma isotopic concentrations (pCi/kilogram wet) are listed in Tables 3-17A, and 3-17B.

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Gamma isotopic concentrations (pCi/kilogram wet) are listed in Tables 3-17A, and 3-17B.

R. E. Ginna Nuclear Power Plant

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

Description	226Ra	51Cr	131 I	134Cs	137Cs	103Ru	106Ru	141Ce	144Ce
Indicator Fish									
First Half 2004									
Chinook Salmon	252±98	< 1570	< 1260	< 17	< 16	< 91	< 176	< 159	< 96
Carp	<520	< 426	< 350	< 31	< 29	< 37	< 300	< 62	< 164
Brown Trout	406±190	< 341	< 222	< 32	< 27	< 43	< 284	< 53	< 148
Small Mouth Bass	484±216	< 534	< 419	< 39	< 35	< 60	< 444	< 73	< 186
Small Mouth Bass	726±210	< 419	< 200	< 21	< 31	< 39	< 337	< 66	< 186
Second Half 2004									
Chinook Salmon	705±217	< 304	< 56	< 35	< 31	< 30	< 306	< 47	< 185
Lake Trout	726±156	< 201	< 43	< 26	< 25	< 24	< 268	< 27	< 100
Brown Trout	599±195	< 255	< 53	< 33	< 40	< 36	< 365	< 42	< 164
Small Mouth Bass	432±156	< 202	< 40	< 17	< 26	< 27	< 271	< 36	< 120
Background (Control) Fish									
First Half 2004									
Smallmouth Bass	<488	< 236	< 91	< 25	< 26	< 31	< 295	< 37	< 121
White Sucker	660±214	< 253	< 44	< 27	< 29	< 30	< 275	< 41	< 162
Freshwater Drum	418±1130	< 2620	< 5280	< 12	< 128	< 220	< 271	< 123	< 95
Carp	702±194	< 829	< 5570	< 27	< 25	< 65	< 289	< 102	< 150
Second Half 2004	<494	< 208	< 34	< 32	< 33	< 30	< 287	< 36	< 144
Chinook Salmon	411±135	< 188	< 37	< 17	< 20	< 21	< 194	< 27	< 99
Freshwater Drum	484±102	< 241	< 151	< 16	21±7	< 21	< 164	< 27	< 75
Brown Trout	394±115	< 150	< 33	< 18	< 19	< 19	< 188	< 25	< 85
White Sucker	703±168	< 233	< 81	< 31	< 24	< 29	< 332	< 36	< 107

R. E. Ginna Nuclear Power Plant

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

Description	95Zr	95Nb	58Co	54Mn	59Fe	65Zn	60Co	40K	140Ba
Indicator Fish									
First Half 2004									
Chinook Salmon	< 88	< 114	< 38	< 19	< 238	< 51	< 18	4700±158	< 4610
Carp	< 66	< 49	< 39	< 34	< 126	< 86	< 36	4590±308	< 198
Brown Trout	< 59	< 44	< 33	< 33	< 132	< 78	< 34	3680±266	< 150
Small Mouth Bass	< 86	< 56	< 52	< 37	< 169	< 108	< 48	5930±424	< 142
Small Mouth Bass	< 63	< 41	< 37	< 32	< 107	< 78	< 29	5630±270	< 88
Second Half 2004									
Chinook Salmon	< 52	< 37	< 37	< 35	< 90	< 75	< 31	6160±288	< 36
Lake Trout	< 47	< 28	< 25	< 28	< 73	< 57	< 26	4030±239	< 51
Brown Trout	< 60	< 41	< 31	< 36	< 107	< 92	< 46	6280±361	< 34
Small Mouth Bass	< 48	< 29	< 28	< 26	< 76	< 67	< 31	5250±253	< 53
Control (Background) Fish									
First Half 2004									
Smallmouth Bass	< 54	< 37	< 30	< 30	< 98	< 69	< 34	4780±261	< 68
White Sucker	< 50	< 31	< 28	< 30	< 70	< 70	< 29	5410±233	< 35
Freshwater Drum	< 95	< 161	< 53	< 22	< 241	< 31	< 17	4680±135	< 9910
Carp	< 95	< 85	< 40	< 31	< 177	< 48	< 30	5300±242	< 1050
Second Half 2004									
Chinook Salmon	< 37	< 23	< 20	< 18	< 61	< 44	< 21	4660±204	< 34
Freshwater Drum	< 30	< 28	< 18	< 19	< 65	< 41	< 19	3400±165	< 79
Brown Trout	< 34	< 24	< 19	< 19	< 61	< 43	< 18	4070±184	< 33
White Sucker	< 49	< 31	< 32	< 32	< 92	< 76	< 30	3300±260	< 56

3.6 Sediment Samples

Samples of shoreline sediment are taken upstream (Russell Station or Monroe County Water Authority - Shoremont) and downstream (Ontario Water District) of Ginna Station.

Results of the gamma isotopic analysis for sediment are included in Table 3-18, along with benthic sediment and cladaphora from Lake Ontario.

Rochester Gas and Electric

Table 3-18
Sediment Samples Gamma Isotopic Analysis
Results in pCi/kg (wet)

Description	Collection Date	226Ra	51Cr	131 I	134Cs	137Cs	103 Ru	Ru 106	141Ce	144Ce
Shoreline Sediment (I)	04/22/04	562±232	<286	<77	<36	22±12	<36	<43	<52	<182
Shoreline Sediment (C)	04/21/04	418±224	<300	<78	<34	<40	<33	<261	<186	<50
Shoreline Sediment (I)	09/17/04	637±26	<30	<61	<40	<40	<35	<301	<52	<197
Shoreline Sediment (C)	09/17/04	1190±249	<336	<59	<42	<33	<30	<288	<48	<156
Benthic Sediment (I)	09/25/04	2410±583	<815	<316	<79	131±34	<69	<781	<126	<384
Cladaphora (I)	10/7/2004	504±74	<78	<13	<6	11±4	<9	<84	<12	<45

		95Zr	95Nb	58Co	54Mn	59Fe	65Zn	60Co	40K	140Ba
Shoreline Sediment (I)	04/22/04	<68	<49	<43	<32	<116	<61	<45	11700±448	<67
Shoreline Sediment (C)	04/21/04	<68	<51	<49	<37	<119	<91	<38	7630±438	<89
Shoreline Sediment (I)	09/17/04	<81	<41	<36	<36	<119	<103	<45	11800±531	<55
Shoreline Sediment (C)	09/17/04	<56	<53	<35	<35	<120	<108	<38	9400±461	<65
Benthic Sediment (I)	09/25/04	<132	<120	<93	<77	<263	<141	<101	19200±976	<286
Cladaphora (I)	10/7/2004	<16	<11	<9	<9	<26	<13	<9	3160±108	<12

(I) = Indicator
(C) = Control

3.6 Vegetation Samples

Crops are grown on the plant property in a location with a highest off-site meteorological deposition parameter, and samples of the produce are collected at harvest time for analysis.
Control samples are purchased from farms greater than ten miles from the plant, (Gro-Moore Farm Market in Henrietta, New York).
There was no indication in the samples of any measurable activity other than naturally occurring K-40 and Ra-226.

Gamma isotopic data is given in Table 3-19.

Table 3-19
Vegetation Samples Gamma Isotopic Analysis
Results in pCi/kg (wet)

Description		Collection Date	226Ra	51Cr	131 I	134Cs	137Cs	103 Ru	Ru 106	141Ce	144Ce
Indicator Vegetation											
Cherries		07/09/04	235±45	<58	<16	<4	<6	<7	<61	<11	<39
Tomatoes	SSE	09/07/04	209±49	<49	<9	<7	<8	<8	<69	<9	<36
Lettuce	SSE	07/26/04	155±72	<83	<12	<8	<10	<10	<116	<14	<72
Lettuce	ESE	07/26/04	358±119	<112	<17	<16	<18	<14	<192	<19	<80
Tomatoes	ESE	09/07/04	<115	<47	<7	<7	<7	<6	<64	<8	<36
Apples	S	09/15/04	<112	<54	<11	<5	<7	<7	<57	<10	<36
Apples	SSE	09/15/04	194±57	<72	<15	<9	<9	<10	<82	<11	<45
Squash	ESE	08/16/04	352±115	<111	<17	<19	<16	<15	<155	<19	<82
Control (Background) Vegetation											
Squash		08/10/04	<254	<100	<12	<17	<17	<15	<131	<19	<84
Cherries		07/19/04	128±42	<43	<7	<6	<7	<6	<59	<7	<31
Lettuce		08/10/04	495±255	<219	<34	<45	<42	<32	<393	<38	<167
Tomatoes		08/10/04	<197	<66	<10	<11	<11	<11	<105	<12	<55
Apples		09/17/04	189±50	<53	<10	<4	<6	<6	<59	<10	<39
Tomatoes		09/07/04	155±51	<46	<8	<5	<7	<7	<73	<9	<33

Description		Collection Date	95Zr	95Nb	58Co	54Mn	59Fe	65Zn	60Co	40K	140Ba
Indicator Vegetation											
Cherries		07/09/04	<1	<8	<7	<7	<17	<8	<6	2680±61	<12
Tomatoes	SSE	09/07/04	<12	<8	<7	<7	<27	<19	<9	2360±84	<9
Lettuce	SSE	07/26/04	<18	<10	<12	<12	<26	<29	<13	3420±122	<14
Lettuce	ESE	07/26/04	<34	<16	<18	<18	<51	<47	<15	5130±215	<20
Tomatoes	ESE	09/07/04	<10	<7	<6	<6	<16	<19	<7	2220±78	<8
Apples	S	09/15/04	<11	<8	<8	<7	<21	<17	<7	938±57	<12
Apples	SSE	09/15/04	<15	<8	<8	<7	<25	<20	<10	1017±76	<18
Squash	ESE	08/16/04	<29	<17	<14	<17	<51	<41	<19	2800±175	<29
Control (Background) Vegetation											
Squash		08/10/04	<32	<17	<11	<16	<50	<47	<17	2260±156	<17
Cherries		07/19/04	<10	<7	<6	<7	<19	<15	<7	2050±72	<9
Lettuce		08/10/04	<65	<37	<39	<46	<109	<108	<46	3950±367	<11
Tomatoes		08/10/04	<21	<12	<11	<11	<35	<26	<10	2420±128	<11
Apples		09/17/04	<11	<7	<6	<6	<16	<9	<5	1180±51	<8
Tomatoes		09/07/04	<11	<7	<7	<7	<21	<18	<8	2020±74	<10

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 radioactive equipment storage areas and will normally read slightly higher than other locations. For the year of 2004, on-site exposure ranged between 8.8 – 17.0 mrem/quarter, with an average exposure of 12.0 mrem/quarter and off-site exposure ranged between 8.9 – 13.7 mrem/quarter with an average exposure of 10.7 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 the annual average of control TLD stations as background and the highest site boundary TLD, leads to 6.4 millirem direct radiation dose to the hypothetical maximally exposed member of the public, off-site. Table 3-20 gives TLD readings for each quarter.

Table 3-20
External Penetrating Radiation
Thermoluminescent Dosimetry 2004
Units mrem/91 Day Quarter

	Location	Type	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
#2 - #7 plus #13 are	2	I	11.1 ± 2.8	11.1 ± 2.8	12.0 ± 3.0	12.9 ± 3.2
on-site near the line	3	I	10.7 ± 2.7	11.5 ± 2.9	11.9 ± 3.0	13.2 ± 3.3
of the highest annual	4	I	11.7 ± 2.9	11.4 ± 2.9	12.1 ± 3.0	12.9 ± 3.2
average ground level	5	I	12.1 ± 3.0	13.4 ± 3.4	13.4 ± 3.4	13.5 ± 3.4
concentration.	6	I	8.8 ± 2.2	10.3 ± 2.6	12.0 ± 3.0	10.7 ± 2.7
	7	I	14.5 ± 3.6	16.3 ± 4.1	17.0 ± 4.3	15.7 ± 3.9
#8 - #12 are offsite at	8	C	10.7 ± 2.7	10.9 ± 2.7	11.4 ± 2.9	11.5 ± 2.9
a distance of 8 to 15 miles.	9	I	9.9 ± 2.5	10.6 ± 2.7	10.6 ± 2.7	11.2 ± 2.8
	10	C	10.0 ± 2.5	10.5 ± 2.6	10.2 ± 2.6	10.5 ± 2.6
	11	I	10.1 ± 2.5	10.7 ± 2.7	10.7 ± 2.7	10.8 ± 2.7
	12	C	9.1 ± 2.3	10.1 ± 2.5	10.0 ± 2.5	11.7 ± 2.9
	13	I	10.7 ± 2.7	12.7 ± 3.2	13.6 ± 3.4	13.5 ± 3.4
#14 - #16 are located	14	I	13.7 ± 3.4	11.5 ± 2.9	12.4 ± 3.1	12.4 ± 3.1
along a line 3000 ft. west	15	I	11.6 ± 2.9	12.6 ± 3.2	13.0 ± 3.3	13.1 ± 3.3
of the plant.	16	I	10.9 ± 2.7	11.2 ± 2.8	12.3 ± 3.1	12.8 ± 3.2
#17 - #21 are located	17	I	9.9 ± 2.5	11.2 ± 2.8	11.5 ± 2.9	11.8 ± 3.0
along Lake Road.	18	I	11.8 ± 3.0	12.4 ± 3.1	11.9 ± 3.0	11.4 ± 2.9
	19	I	9.5 ± 2.4	11.4 ± 2.9	10.3 ± 2.6	10.7 ± 2.7
	20	I	9.8 ± 2.5	11.9 ± 3.0	11.5 ± 2.9	12.3 ± 3.1
	21	I	10.8 ± 2.7	12.3 ± 3.1	11.9 ± 3.0	12.1 ± 3.0
#22 - #24 are located	22	I	10.3 ± 2.6	11.0 ± 2.8	10.9 ± 2.7	11.5 ± 2.9
along the east site	23	I	10.8 ± 2.7	11.8 ± 3.0	12.2 ± 3.1	12.7 ± 3.2
boundary line.	24	I	10.8 ± 2.7	11.7 ± 2.9	12.3 ± 3.1	12.4 ± 3.1
#25 - #30 are offsite	25	C	10.0 ± 2.5	11.2 ± 2.8	11.0 ± 2.8	11.1 ± 2.8
at a distance of 8	26	C	9.9 ± 2.5	10.4 ± 2.6	10.9 ± 2.7	11.2 ± 2.8
to 15 miles.	27	C	10.1 ± 2.5	11.0 ± 2.8	10.6 ± 2.7	11.3 ± 2.8
	28	C	9.8 ± 2.5	11.2 ± 2.8	11.4 ± 2.9	11.2 ± 2.8
	29	C	9.5 ± 2.4	10.7 ± 2.7	10.7 ± 2.7	11.1 ± 2.8
	30	C	8.9 ± 2.2	9.7 ± 2.4	10.2 ± 2.6	10.4 ± 2.6
#31 - #40 are located	31	I	9.5 ± 2.4	11.8 ± 3.0	12.4 ± 3.1	12.2 ± 3.1
in an arc at a distance	32	I	9.4 ± 2.4	10.2 ± 2.6	10.3 ± 2.6	10.5 ± 2.6
of 4 - 5 miles.	33	I	9.3 ± 2.3	10.7 ± 2.7	11.4 ± 2.9	11.2 ± 2.8
	34	I	9.8 ± 2.5	12.1 ± 3.0	12.6 ± 3.2	12.4 ± 3.1
	35	I	10.7 ± 2.7	12.2 ± 3.1	12.7 ± 3.2	12.4 ± 3.1
	36	I	9.3 ± 2.3	10.3 ± 2.6	10.7 ± 2.7	11.0 ± 2.8
	37	I	9.0 ± 2.3	10.2 ± 2.6	10.3 ± 2.6	10.3 ± 2.6
	38	I	10.2 ± 2.6	12.3 ± 3.1	12.1 ± 3.0	12.0 ± 3.0
	39	I	9.5 ± 2.4	12.3 ± 3.1	11.9 ± 3.0	11.8 ± 3.0
	40	I	9.5 ± 2.4	10.5 ± 2.6	10.7 ± 2.7	9.4 ± 2.4

4.0 LAND USE CENSUS

A land use census is performed 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 2004. The land use remains mainly agricultural in nature, although the long term trend is away from agriculture and towards residential use. There were several new private home developments of substantial size. The two dairy operations nearest to the plant began the year in operation with 40 to 50 milk cows. (Molino Farm ceased commercial operation early in 2002). There are no goats raised for human consumption of milk or meat within the five mile radius. Beef cattle are still raised on 3 farms within 5 miles of the plant as in past years.

An on-site garden is used for broad leaf vegetation and on-site crops are collected for indicator samples when available.

A copy of the Land Use Census that was completed in September 2004 is attached. Detailed land use census data is available on file at Ginna Station.

5.0 EXTERNAL INFLUENCES

During 2004, there were no external influences such as atmospheric weapons testing or accidents at other nuclear facilities which had an impact on the data.

Attachment I

Land Use Census

Sector	Distance to Nearest Residence	Distance to Nearest Garden	Distance to Milk Producing Animals
E	1260 m	N/A	N/A
ESE	1050 m	N/A	N/A
SE	610 m	N/A	8270 m
SSE	660 m	N/A	N/A
S	1560 m	N/A	N/A
SSW	760 m	N/A	N/A
SW	660 m	N/A	4680 m
WSW	1350 m	N/A	N/A
W	1160 m	N/A	N/A

Changes from previous year:

Development of single family homes is increasing over past years.
Interviews with area farmers indicates that the number of acres farmed will continue to decrease.
No new agricultural land use was noted.
No new food processing facilities were noted.

Milk animal locations:

No new milk producing animals were identified in the 2004 Census.

UFSAR change request: Y_____ N__X__

Land Use Census Completed by: H. Jones Date: 9/30/04

Reviewed by: RG-O Date: 10/15/04

6.0 QUALITY ASSURANCE

6.1 INTERLABORATORY BLIND SAMPLE COMPARISON

A Laboratory's participation in an interlaboratory comparison program provides a means for verifying the measurement accuracy of radioactive material in environmental sample media with another laboratory. 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 Analytics, Inc., Atlanta, Georgia for quality control blind spiked environmental sample media for interlaboratory comparison. Ginna Station submits blind spiked to our contract laboratory, James A. Fitzpatrick Environmental Laboratory (JAFEL), for analysis with field samples. JAFEL engages the services of Analytics and Environmental Measurements Laboratory (EML) for environmental sample media as blind sample spikes that are in addition to those submitted by Ginna Station. It should be noted that in 2004, the program provided by EML was scaled back as a result of the laboratory being reorganized under the Federal Department of Homeland Security as part of the Science and Technology directorate. Under the reorganization, the laboratory no longer provided spiked cross check samples to commercial laboratories. However, JAFEL was eligible to participate in the first of two annual quality assessment quality programs in 2004 before the program was restructured.

An assessment of the blind spiked sample media for accuracy was performed, 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 Laboratory's accuracy is evaluation by comparison to a reference as follows:

$$\text{Error Resolution} = \frac{\text{Reference Value}}{\text{Reference Uncertainty}}$$

$$\text{Comparison Ratio} = \frac{\text{Laboratory Analysis}}{\text{Reference Value}}$$

The reference value and uncertainty are Analytics values. Using Table 6.1A, the interval for the RATIO OF AGREEMENT is determined by the appropriate row under the ERROR RESOLUTION column. The RATIO OF AGREEMENT provides criteria for evaluating the comparison ratio as to being in agreement or disagreement. When the comparison ratio is found to be in agreement with the reference value a Laboratory's analysis does not have a statistically significant analysis error, either systematic or programmatic. If the comparison ratio is found to be in disagreement with the reference value the Laboratory's analysis has a statistically significant analysis error, which may be either systematic or programmatic.

Table 6.1A

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

A 5% reference uncertainty was applied to the reference value. According to ANSI N42.23-1996, 5% is the maximum acceptable bias for a reference laboratory that prepares blind spiked samples. The ERROR RESOLUTION for all the Analytics' spiked samples was determined to fall between 15.6 and 50.5 which correlates to RATIO OF AGREEMENT OF 0.75 to 1.33. Comparison ratios are displayed in Figures 6.1A, 6.1B, 6.1C and 6.1D along with a lower control limit (LCL) of 0.75 and an upper control limit (UCL) of 1.33.

6.2 ANALYTICS SAMPLE NON-CONFORMITIES

For 2004, two nuclides fell outside of the LCL and UCL, based on JAFEL acceptance criteria. Cs-137 (Figure 6.1B, QC-4) and Zn-65 (Figure 6.1E, QC-1). JAFEL investigation of these two non-conformities is discussed below.

Cs-137 Non-conformity

A spiked mixed gamma and I-131 milk sample supplied by Analytics, Inc. was submitted to the laboratory for analysis by Constellation/Ginna. The sample was analyzed in accordance with standard laboratory procedures. The sample contained a total of nine radionuclides for analysis. Nine of the nine radionuclides present were quantified. Eight of the nine radionuclides were quantified within the acceptable range. The mean result for Cs-137 was determined to be outside the QA Acceptance Criteria resulting in a sample nonconformity. The known result for the sample was 126 pCi/L as determined by the supplier. The reported mean result for the sample was 191 pCi/L. The reported laboratory results when compared to the reference or known value produced a ratio of 1.51. Discussions with the supplier indicated that the reference value was correct as reported and confirmed by the overall accuracy of the reported values from the other participating laboratories.

An evaluation of the Cs-137 result was performed. The spectrum and peak search results were examined with no anomalies identified. The 4 individual laboratory results had good precision with a range of 199 pCi/L for the high to 181 pCi/L for the low result. The results had a spread of 18 pCi/L or approximately 9.4% of the reference results. Based on the evaluation of the 4 results and corresponding analytical data it was determined that the result for Cs-137 were correct as reported with no identified deficiencies. In addition to Cs-137, the Co-60 results for this sample showed a relatively high result with a ratio of 1.21 in comparison with the reference value. The overall evaluation of the sample results indicated that the high result for Cs-137 and Co-60 was the result of contamination in the counting beaker from a previous spiked QA sample. This assessment is supported by the historical performance for laboratory analysis of spiked QA samples.

A review of the 5 year historical performance for Cs-137 spiked QA sample results showed very good performance with no non-conformities. As with Cs-137, Co-60 historical performance of QA samples is very good with no non-conformities or quality related problems.

As a corrective action, the laboratory technicians were briefed on the importance of not reusing counting containers for the analysis of spiked QA samples. The QA check sheet was revised to include verification that new counting containers are being used.

Zn-65 Non-conformity

A spiked mixed gamma in soil sample supplied by Analytics, Inc., was analyzed in accordance with standard laboratory procedures. The sample contained a total of nine radionuclides for analysis. Nine of the nine radionuclides present were quantified. Eight of the nine radionuclides were quantified within the acceptable range. The mean result for Zn-65 was determined to be outside the QA Acceptance Criteria resulting in a sample nonconformity. The soil sample was analyzed five times using four different detectors with the mean Zn-65 result reported as 334 pCi/kg. The known result for the sample was 262 pCi/kg as determined by the supplier. One of the five reported results was 292 pCi/kg and resulted in an agreement when compared to the known of 262 pCi/kg with a ratio of 1.11. The remaining 4 individual results were outside the acceptance criteria and had ratios to the known value that ranged from 1.29 to 1.34. All of the analysis had relatively high associated counting errors, which ranged from 8.3% to 18.3%.

An evaluation of the Zn-65 result was performed. The spectrum and peak search results were examined with no anomalies identified. Zn-65 decays by electron capture with a 244 day half-life and a gamma ray energy of 1115 KeV with a yield of 50.75%. No significant secondary gamma energies are produced in the Zn-65 decay scheme. The average net count rates of the five analyses were low and ranged from a high of 1.50 counts per minute to a low of 0.93 counts per minute. The low activity in the sample resulted in high associated counting errors as noted above.

In soil samples, Ra-226 is a naturally occurring radionuclide, which produces a secondary peak at 1120 KeV. The presence of Ra-226 (1120 KeV) and Zn-65 (1115 KeV) in the sample resulted in a doublet peak formation in this region of the spectrum. In most cases, the computer algorithm can differentiate the two adjacent peaks and correct for interferences from overlapping (doublet) peaks. In these sample spectrums, there was a low number of total counts in the 1110 to 1130 KeV area. The low count rate and subsequent poor peak shape made it difficult for the algorithm to select an exact background for determining the total counts in the peak. In addition, low count rate made it difficult to define the two peaks contained in the doublet. In addition to the complicated nature of the spectrum, the settling of the soil media in the counting geometry may have effected the homogeneity of the sample and produced a positive bias in the collective sample results. To determine if this was a programmatic or systematic error inherent to the software/analysis system, an extent of condition was performed using another spiked sample result for any similar nonconformities. In 2004, eleven spiked samples were analyzed which contained certified concentrations of Zn-65 and other radionuclides. This sample set included four additional soil samples.

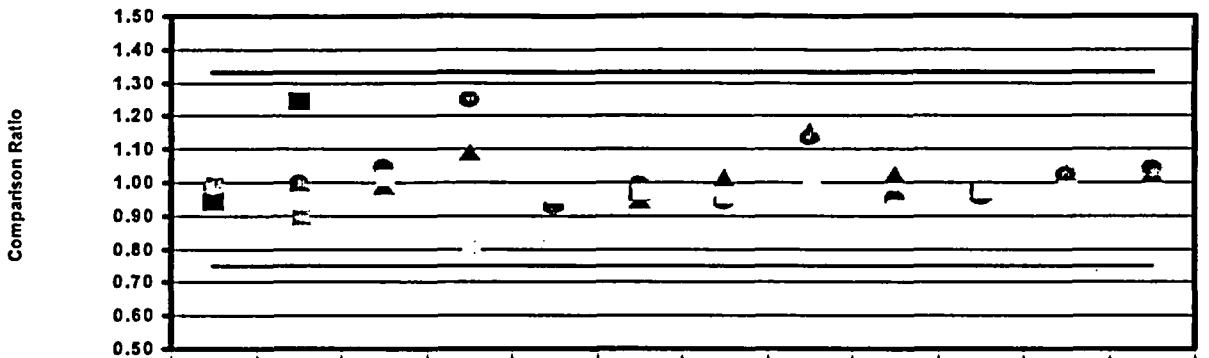
The results are as follows:

2004 Zn-65 Results

Sample ID	Medium	JAF	Supplier	Ratio
E-4053-05	Water pCi/L	146±6	143±5	1.03
E-4319-05	Water pCi/L	165±6	178±6	0.93
E-4054-05	Filter pCi/filter	98±5	95±3	1.03
E-4320-05	Filter pCi/filter	141±6	120±4	1.18
E-4321-05	Milk pCi/L	155±7	167±6	0.93
E-4165-05	Milk pCi/L	94±5	99±3	0.94
E-4168-05	Vegetation pCi/kg	260±17	232±8	1.12
E-4159-09	Soil pCi/kg	289±20	262±5	1.10
E-4051-09	Soil pCi/kg	289±17	252±6	1.15
E-4253-09	Soil pCi/kg	239±12	248±6	0.96
E-4373-09	Soil pCi/kg	336±22	329±6	1.02

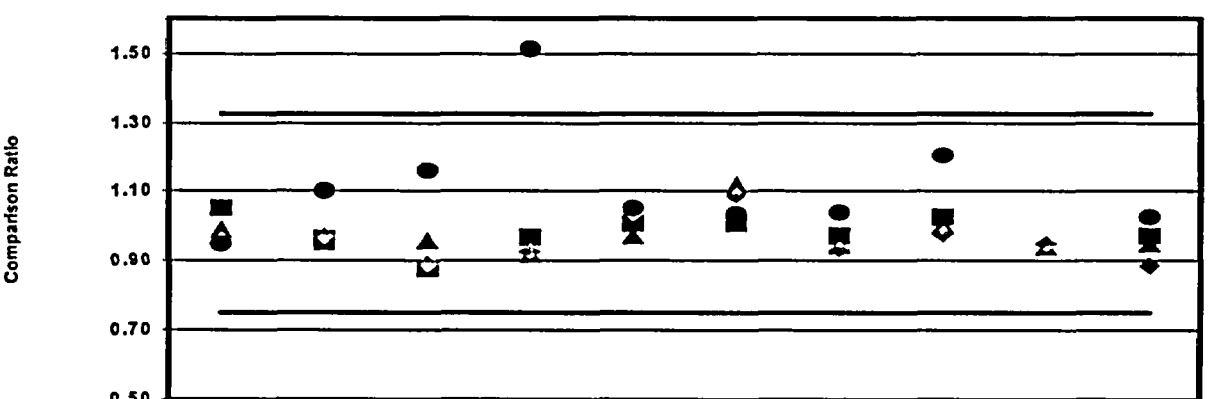
A duplicate sample of this sample (E-4166-05) was submitted to the laboratory as a blind spike (E-4154-09). This sample was made from the exact supplier stock as the non-conformity sample. The Zn-65 result for this duplicate sample was in full agreement with the known value on all five of the analysis performed. The mean Zn-65 result for the duplicate sample was 289+20 pCi/Kg for a ratio to the known value of 1.10 (See results in the table above). The mean ratio for all eleven Zn-65 results was 1.04. The mean ratio for the four soil sample Zn-65 results was 1.06. The mean ratio value for the eleven samples noted above and each individual ratio values for each of Zn-65 results are excellent indicators that the routine measurement of Zn-65 in environmental media is accurate. These results demonstrate that there is no systematic error or bias for the analysis of Zn-65 in soil or other environmental sample media. No corrective action was implemented as a result of this non-conformity.

Figure 6.1A Trend of Blind Spiked Water Samples



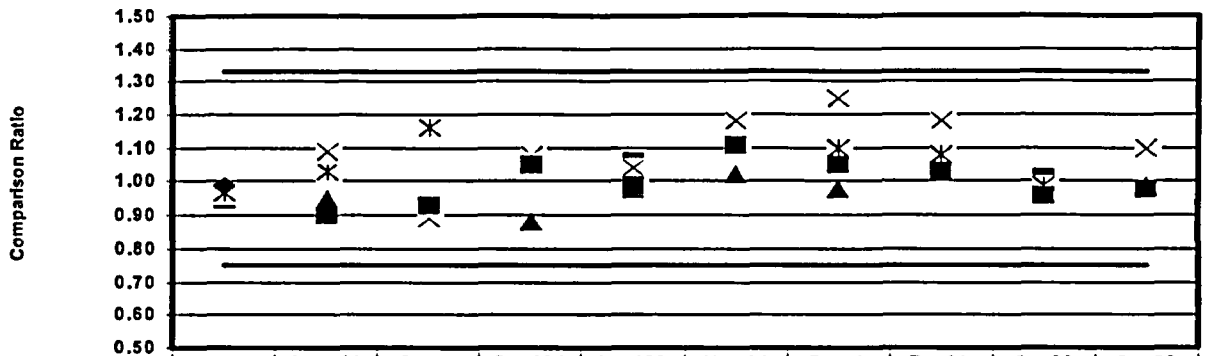
	beta	tritium	Ce-141	Cr-51	Cs-134	Cs-137	Mn-54	Fe-59	Zn-65	Co-60	Co-58	I-131
UCL	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
QC-1	0.94	1.25				0.97				0.98		
QC-2	0.99	1.00	0.99	1.09	0.94	0.95	1.02	1.15	1.02	0.97	1.03	1.03
QC-3	0.99	1.00	1.05	1.25	0.93	0.99	0.94	1.13	0.95	0.96	1.03	1.04
QC-4	1.00	0.90										
QC-5			1.02	0.81	0.97	0.98	0.97	1.02	0.93	0.98	0.99	0.98
LCL	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Figure 6.1B Trend of Blind Spiked Milk Samples



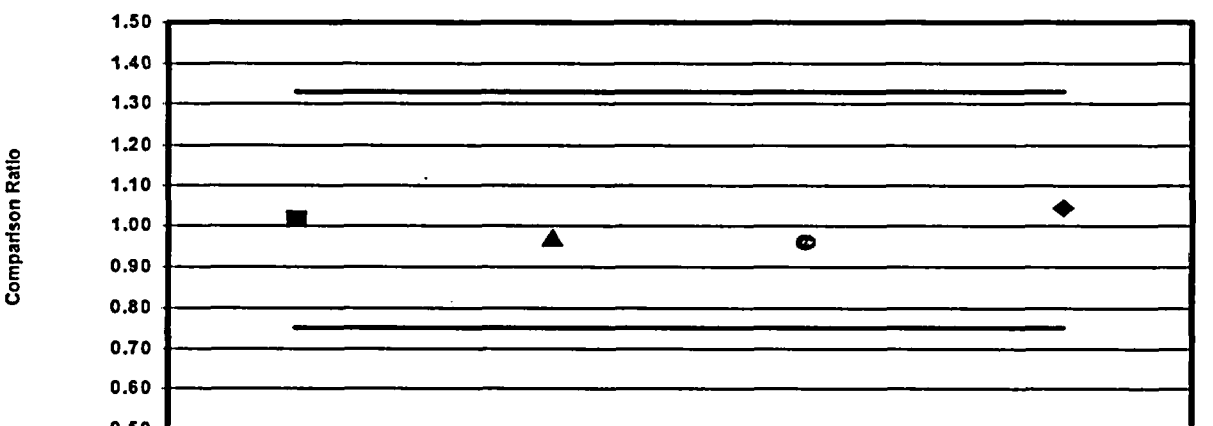
	Ce-141	Cr-51	Cs-134	Cs-137	Mn-54	Fe-59	Zn-65	Co-60	Co-58	I-131
UCL	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
QC-1	1.05	0.96	0.88	0.97	1.01	1.01	0.97	1.03		0.97
QC-2	0.99	0.95	0.96	0.92	0.97	1.12	0.94	1.00	0.94	0.95
QC-3	0.96	0.97	0.89	0.92	1.04	1.09	0.93	0.98	0.95	0.89
QC-4	0.95	1.10	1.16	1.52	1.05	1.03	1.04	1.21		1.02
LCL	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Figure 6.1C Trend of Blind Spiked Filter Samples



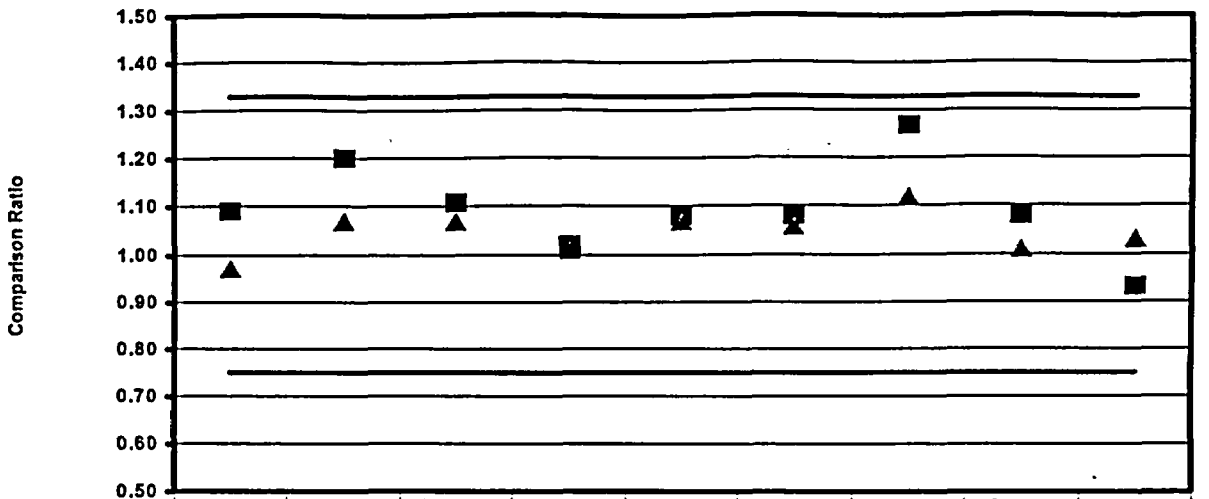
	beta	Ce-141	Cr-51	Cs-134	Cs-137	Mn-54	Fe-59	Zn-65	Co-60	Co-58
UCL	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
QC-1	0.95				1.06	1.10			1.01	
QC-2	0.95	0.95	0.92	0.88	0.98	1.02	0.98	1.03	0.95	0.99
QC-3	0.97	1.03	1.16	1.05	1.00	1.11	1.10	1.08	0.99	
QC-4	0.99	0.90	0.93	1.05	0.99	1.11	1.05	1.03	0.96	
QC-5		1.09	0.89	1.08	1.04	1.18	1.25	1.18	0.96	1.10
QC-6		0.90	0.93	1.05	0.99	1.11	1.05	1.03	0.96	0.98
LCL	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Figure 6.1D Trend of Blind Spiked Filter Samples



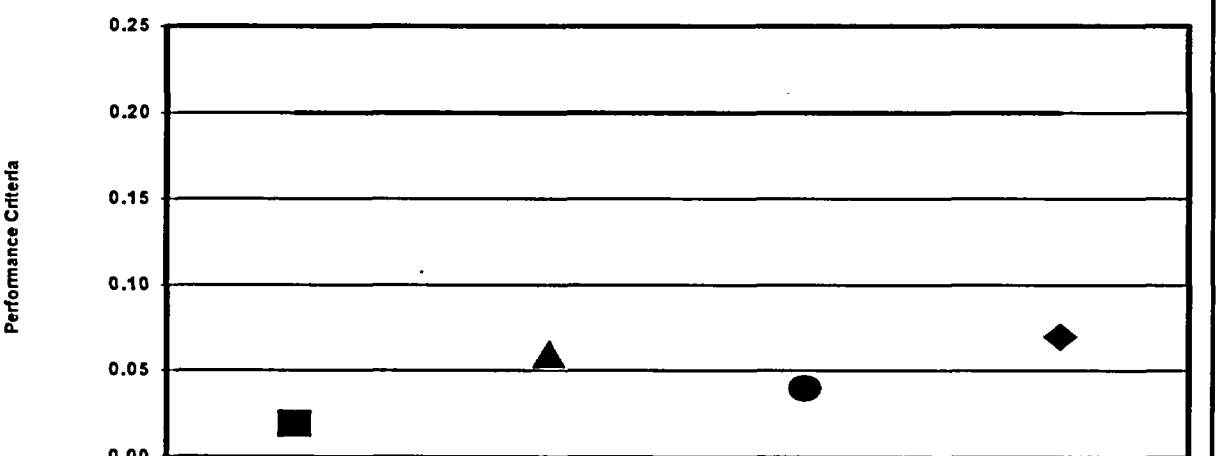
	I-131	I-131	I-131	I-131
UCL	1.33	1.33	1.33	1.33
QC-1	1.02			
QC-2		0.97		
QC-3			0.96	
QC-4				1.04
LCL	0.75	0.75	0.75	0.75

Figure 6.1E Trend of Blind Spiked Soil/Vegetation Samples



	Ce-141	Cr-51	Cs-134	Cs-137	Mn-54	Fe-59	Zn-65	Co-60	Co-58
UCL	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
QC-1	1.09	1.20	1.11	1.02	1.08	1.08	1.27	1.08	0.93
QC-2	0.97	1.07	1.07	1.01	1.07	1.06	1.12	1.01	1.03
LCL	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Figure 6.2A Trend of QC Blind Spiked TLDs



	m rem			
UCL	0.20	0.20	0.20	0.20
QC-1	0.02			
QC-2		0.06		
QC-3			0.04	
QC-4				0.07

6.3 INTRALABORATORY BLIND SAMPLE COMPARISON

A Laboratory's use of in-house quality control spiked samples provides a means for verifying measurement accuracy for analyzing environmental sample media. In 2004, Ginna Station implemented field spiked environmental TLDs by irradiating TLDs with a Cs-137 source to a known dose. The spiked TLDs were placed in the field and processed with each quarter's environmental TLDs. The reported dose was background corrected, using the average of the field control TLDs. The reported dose and delivered dose are used to calculate a performance quotient ((reported - delivered)/delivered) for each TLD within the set of spiked TLDs. The performance bias is the average of the performance quotients. The standard deviation of bias is the standard deviation of the performance quotients. For the set of spiked TLDs a performance criteria is calculated by adding the performance bias and standard deviation of the bias. The performance criteria limit was established to be 0.20. Spike performance criteria of less than 0.20 validate the TLD processing at Ginna Station. All blind TLD performance criteria for year 2004 were less than 0.20. Figure 6.2A displays the spike TLD performance criteria.

6.4 AUDIT OF CONTRACT LABORATORY

Ginna Station Quality Assurance personnel conducted audits of the ODCM and REMP during 2004. Report #AINT-2004-0002-BKS. In those audits, they examined the data and results from JAFEL to ensure that the information was properly gathered, validated and reviewed by Ginna personnel in accordance with the ODCM and REMP programs. There were no external surveillances done at JAFEL in 2004.

7.0 DEVIATIONS FROM SCHEDULE

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

1. Environmental Air Sample Station (ES) # 2 found off 3/22/04. GFI reset, no further failure. Sample period was 34.5 hours.
2. ES #11 found off 6/9/04. GFI reset. Sample period was 27.9 hours.
3. Weekly OWD water sample was missed due to suction tubing pulled away from sample bottle, reconnected 7/6/04.
4. ES #10 found off 8/4/04. Reset with no subsequent indications of problem. Sample period was 57.6 hours.
5. ES #3 found off. Reset successfully. Bees nest removed from breaker and breaker covered in plastic. Sample period was 1.7 hours.