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# **ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT: JANUARY 1, 2009 – DECEMBER 31, 2009**

**MAY 2010**



**R.E. Ginna Nuclear Power Plant**  
1503 Lake Road  
Ontario, New York 14519

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## I. 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 2009 results were consistent with data for the past five years and exhibited no adverse trends.

The analytical results from the 2009 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 2009, 1283 samples were collected for analysis by gross beta counting and/or gamma spectroscopy. These included 984 air samples, 64 water samples, 16 fish samples, 5 sediment samples, 21 vegetation samples, 38 milk samples, and 155 dosimeter measurements. During 2009 there were ten deviations from the REMP sampling schedule. The minimum number of samples required by the ODCM (Ref. 2) were collected for all pathways.

Samples were collected by R.E. Ginna Nuclear Power Plant's Chemistry personnel and analyzed by the Constellation Energy Ft. Smallwood Environmental Laboratory in Baltimore, Maryland. A summary of the content of the REMP and the results of the data collected for indicator and control locations are provided in Tables 1 and 2.

## **II. R. E. GINNA NUCLEAR POWER PLANT RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM**

### **II.A. INTRODUCTION**

The R.E. Ginna Nuclear Power Plant (Ginna) is an operating nuclear generating facility consisting of one pressurized water reactor. Ginna achieved criticality in September 1969 and commenced commercial operation in July 1970. The location of the plant in relation to local metropolitan areas is depicted in Appendix A, Figure A-1.

Results of the monitoring program for the pre-operational and previous operational periods through 2008 have been reported in a series of documents.

Results of the monitoring program for the current operational period are included in this report. The report presents the content of the REMP (Table 1), the sampling locations (Appendix A), the summary of the detectable activity analytical results (Table 2), a compilation of the analytical data (Appendix B), the results of the Quality Assurance Program (Appendix C), and the results of the Land Use Survey (Appendix D). Interpretation of the data and conclusions are presented in the body of the report.

The environmental surveillance data collected during this reporting period were compared with that generated in previous periods whenever possible to evaluate the environmental radiological impact of the R.E. Ginna Nuclear Power Plant.

### **II.B. PROGRAM**

#### **II.B.1 Objectives**

The objectives of the REMP for the R.E. Ginna Nuclear Power Plant are:

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

#### **II.B.2 Sample Collection**

The locations of the individual sampling stations are listed in Table A-1 and shown in Figures A-2 and A-3. All samples were collected by contractors to, or personnel of Constellation Energy according to R.E. Ginna Nuclear Power Plant procedures.

### **II.B.3 Data Interpretation**

Many results in environmental monitoring occur at or below the minimum detectable activity (MDA). In this report, all results below the relevant MDA are reported as being "less than" the MDA value. Typical MDA values are listed in Table B-10.

### **II.B.4 Program Exceptions**

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

1. February 17, 2009: The air sampler at Environmental Monitoring Station #8 was found off. Power was restored by Rochester Gas and Electric (RG&E). Approximately 343 cubic meters of air were collected by this air sampler during the February 2009 sampling period.
2. March 3, 2009: The air sampler at Environmental Monitoring Station #12 was found off. The ground fault interrupter (GFI) was successfully reset. Approximately 472 cubic meters of air were collected by this air sampler during the March 2009 sampling period.
3. June 2, 2009: The air sampler at Environmental Monitoring Station #11 was found off. The GFI was successfully reset. Approximately 323 cubic meters of air were collected by this air sampler during the sampling period.
4. July 10, 2009: The dosimeter at Environmental Monitoring Station #23 was found with moisture in the plastic sleeving. The outer plastic sleeving was found to be damaged and was replaced with a new plastic sleeving.
5. July 14, 2009: The air sampler at Environmental Monitoring Station #6 was found off. Power to the unit was successful restored. Approximately 429 cubic meters of air was collected by air sampler #6 during the sampling period.
6. July 14, 2009: The air sampler at Environmental Monitoring Station #7 was found off. Power to the unit was successful restored. Approximately 379 cubic meters of air was collected by air sampler #7 during the sampling period.
7. August 3, 2009: The air sampler at Environmental Monitoring Station #6 was found to have an alternate sampling head and torn particulate filter. Maintenance staff had incorrectly fitted air sampler #6 with a sampling head from an Emergency Response Organization (ERO) air sampler at the same location. Labels were installed on the REMP and ERO air sampler equipment to prevent reoccurrence.
8. August 17, 2009: The air sampler at Environmental Monitoring Station #9 was found off. The GFI was successfully reset. Approximately 342 cubic meters of air were collected by this air sampler during the sampling period.
9. August 24, 2009: The air sampler at Environmental Monitoring Station #9 was found off. The sample unit was replaced. Approximately 364 cubic meters of air were collected by this air sampler during the sampling period.
10. October 5, 2009: The dosimeter at Environmental Monitoring Station #31 was missing at the time of collection and suspected to have been removed by vandals during the sampling period. No direct radiation data could be collected at this location for this sampling period.

## **II.C. RESULTS AND DISCUSSIONS**

All the environmental samples collected during the year were analyzed using Constellation Energy laboratory procedures (Ref. 3). The analytical results for this reporting period are presented in Appendix B and the detectable activity results are also summarized in Table 2. For discussion, the analytical results are divided into four categories. The categories are the Aquatic Environment, the Atmospheric Environment, the Terrestrial Environment, and Direct Radiation.

### **II.C.1 Aquatic Environment**

The aquatic environment surrounding the plant was monitored by analyzing samples of surface and drinking water, aquatic organisms, and shoreline sediment. These samples were obtained from various sampling locations near the plant.

#### **II.C.1.a Surface and Drinking Water**

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 B-1). There was no statistically significant difference between the upstream and downstream sample concentrations. The 2009 averages were 2.09 pCi/liter and 2.07 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.

Weekly samples are taken from the plant circulating water intake (Circ In) and discharge canal (Circ Out), and composited monthly. The 2009 averages were 2.06 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 + 1 sigma error band and range of the measurement.

Samples of Deer Creek, which transects the site from west to east, are collected and analyzed monthly. The average gross beta concentration seen in the Deer Creek samples was 5.05 pCi/liter. Historically, 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.

Gamma isotopic analysis including I-131 is performed on each monthly composite sample. These are listed in Table B-1 and are separated by source of sample. No anomalous results were noted. The analysis allows the determination of Iodine-131 activity of < 1 pCi/liter. Any positive counts and the 1 sigma error are reported. During 2009, no sample results indicated I-131 activity in excess of the LLD for the 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. During 2009, no sample results indicated tritium activity.

### **II.C.1.b Aquatic Organisms**

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.

At a minimum, four different species of fish are analyzed during each half-year from the indicator and background 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 Table B-2.

During 2009, none of the indicator or control samples indicated gamma activity.

### **II.C.1.c Shoreline Sediment**

Samples of shoreline sediment are taken upstream (Town of Greece near Slater Creek) and downstream (Near the Ontario Water District) of R.E. Ginna Nuclear Power Plant.

Results of the gamma isotopic analysis for sediment are included in Table B-3, along with benthic sediment from Lake Ontario. During 2009, there was no indication in the samples of any activity other than naturally occurring radionuclides and trace levels of Cesium-137 consistent with background levels.

### **II.C.2 Atmospheric Environment**

Radioactive particles in air are collected by drawing approximately one standard cubic foot per minute (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 six 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, one additional sampling location is located on-site at 690 meters, and two others offsite at approximately 7 miles. In addition, there are three sampling stations located approximately 7 to 16 miles from the site that serve as control stations. See Figure A-2 and Figure A-4.

#### **II.C.2.a Air Particulate Filters**

Based on weekly comparisons, there was no statistical difference between the Control and Indicator radioactive particulate concentrations. The averages for the control samples (i.e., offsite sampling locations) were 0.0228 pCi/m<sup>3</sup> and the averages for the indicators (i.e., onsite

sampling locations) were 0.0230 pCi/m<sup>3</sup> for the period of January to December 2009. Maximum weekly concentrations for all control stations and all indicator stations were 0.041 and 0.041 pCi/m<sup>3</sup>, respectively.

The major airborne species released from the plant are noble gases and tritium. 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 B-5 provides a list of gross beta analysis values for the on-site sample stations. Table B-6 is 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. No positive analytical results were found on any sample. The results of these analyses are listed in Tables B-7.

#### **II.C.2.b Air Iodine**

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 B-4.

#### **II.C.3 Terrestrial Environment**

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.

##### **II.C.3.a Vegetation**

There was no indication in the vegetation samples of any measurable activity.

Gamma isotopic data is provided in Table B-8.

##### **II.C.3.b Milk**

There was one indicator dairy herd located within five miles from the plant in 2009. Milk samples are collected monthly during November through May from the indicator farm and biweekly during June through October. 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  $\pm 1$  sigma error are reported. During 2009, no samples indicated I-131 activity that exceeded the LLD for the analysis.

Table B-9 provides a listing of all samples collected during 2009 with analytical results.

#### **II.C.4 Direct Radiation**

Dosimeters with a sensitivity of 5 millirem/quarter are placed as part of the environmental monitoring program. Thirty-nine dosimeter badges are currently placed in four rings around the plant. These rings range from less than 1,000 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. Direct radiation readings at 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 2009, on-site exposure ranged between 8.9 – 16.4 mrem/quarter, with an average exposure of 12.5 mrem/quarter and off-site exposure ranged between 8.1 – 15.9 mrem/quarter with an average exposure of 11.2 mrem/quarter.

40 CFR 190 requires that the annual dose equivalent not exceed 25 millirem to the whole body of any member of the public. Comparing the quarterly average of 10.8 millirem observed at the control dosimeter stations as background (equivalent to 43.2 millirem annually) and the highest site boundary dosimeter annual reading (54.9 millirem observed at Station 15) indicates a 11.7 millirem hypothetical maximum direct radiation dose exposure to an offsite member of the public.

Table B-12 provides dosimeter readings at each location for each quarter.

#### **II.C.5 Groundwater Monitoring Wells**

In accordance with R.E. Ginna Nuclear Power Plant's Chemistry procedures, environmental groundwater monitoring wells are sampled quarterly. There is a total of 9 onsite groundwater monitoring wells:

- Three located adjacent to the All Volatiles Treatment (AVT) Building, screened at 3 depths to include groundwater from top of the water table down to bedrock.
- Three located east of the Screenhouse, screened at 3 depths to include groundwater from top of the water table down to bedrock.
- One to the west of the Screenhouse.
- One to the southeast of the Contaminated Storage Building (CSB).
- One located south of the Butler Building and upgradient from the reactor containment building, which serves as a control sample point.

Groundwater samples are analyzed for tritium to a detection limit of 500 pCi/L. In 2009, no radioactivity was detected in groundwater samples.

Results of the groundwater monitoring well sampling are presented in Table B-13.

#### **II.D. CONCLUSION**

It is concluded that operation of the R.E. Ginna Nuclear Power Plant produced radioactivity and ambient radiation levels significantly below the limits of the ODCM and 40 CFR 190.

Additionally, there was no significant buildup of plant-related radionuclides in the environment due to the operations of R.E. Ginna Nuclear Power Plant.

**Table 1**

**Synopsis of 2009 Ginna Nuclear Power Plant Radiological Environmental Monitoring Program**

Sample Type	Sampling Frequency <sup>1</sup>	Number of Locations	Number Collected	Analysis	Analysis Frequency <sup>1</sup>	Number Analyzed
<b>Aquatic Environment</b>						
Surface Water, Drinking Water	MC	5	64	Gamma Gross Beta	MC MC	64 64
Bottom Sediment	A	1	1	Gamma	A	1
Fish <sup>2</sup>	A	4	16	Gamma	SA	16
Shoreline Sediment	SA	2	4	Gamma	SA	4
<b>Atmospheric Environment</b>						
Air Iodine <sup>3</sup>	W	6	312	I-131	W	312
Air Particulates <sup>4</sup>	W	12	624	Gross Beta Gamma	W QC	624 48
<b>Direct Radiation</b> Ambient Radiation	Q	39	155	TLD	Q	155
<b>Terrestrial Environment</b>						
Milk <sup>5</sup>	M/BW	2	38	Gamma	M/BW	38
Vegetation <sup>6</sup>	A	8	21	Gamma	A	21

<sup>1</sup> W=Weekly, BW=BiWeekly (15 days), M=Monthly (31 days), Q=Quarterly (92 days), SA=Semiannual, A=Annual, C=Composite

<sup>2</sup> Twice during fishing season including at least four species

<sup>3</sup> The collection device contains activated charcoal

<sup>4</sup> Beta counting is performed >= 24 hours following filter change. Gamma spectroscopy performed on quarterly composite of weekly samples

<sup>5</sup> Bi-Weekly during growing season.

<sup>6</sup> Annual at time of harvest. Samples include broad leaf vegetation

**Table 2**

**Annual Summary of Radioactivity in the Environs of the  
Ginna Nuclear Power Plant**

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	Indicator Locations Mean (F)/Range <sup>1</sup>	Location with Highest Annual Mean Name/Distance & Direction <sup>2</sup>	Highest Annual Mean (F) / Range <sup>1</sup>	Control Locations Mean (F)/Range
<b>Atmospheric Environment</b>						
Air Particulates (10 <sup>-2</sup> pCi/m <sup>3</sup> )	Gross Beta (624)	0.5	2.3 (468/468) (0.7-4.1)	Substation 13 STATION-13 0.69 km SSW	2.4 (52/52) (1.1-3.7)	2.3 (156/156) (0.9-4.1)
<b>Direct Radiation</b>						
Ambient Radiation (mR/91 days)	Dosimeters 155	—	12.00 (119/120) (8.6 – 16.4)	Onsite-Utility Pole along West Plant Fence 2.2 km WSW	13.98 (4/4) (12.1 – 14.8)	11.58 (36/36) (8.9 – 14.6)
<b>Aquatic Environment</b>						
Bottom Sediment (pCi/kg)	Gamma (1) Cs-137	58	89 (1/1) —	North Sector NORTH 1.07 km N	89 (1/1) —	— —
Surface Water, Drinking Water (pCi/L)	Gross Beta (36)	0.75	2.79 (51/51) (1.31-7.13)	Deer Creek – DC 0.26 km ESE	7.13 (12/12) (3.58 – 7.13)	2.09 (12/12) (1.53 – 2.67)

<sup>1</sup> Mean and range based upon detectable measurements only. Fraction (F) of detectable measurements at specified location is indicated in parentheses

<sup>2</sup> From the center point of the containment building

**V. REFERENCES**

- (1) R.E. Ginna Nuclear Power Plant, Technical Specification 5.6.2; Annual Radiological Environmental Operating Report.
- (2) Offsite Dose Calculation Manual for the R.E. Ginna Nuclear Power Plant.
- (3) Constellation Energy Laboratory Procedures Manual, General Services Department.
- (4) Constellation Energy, "Land Use Survey Around R.E. Ginna Nuclear Power Plant, August 2009."

## **APPENDIX A**

### **REMP Sample Locations**

#### **Summary of Appendix A Content**

Appendix A contains information concerning the environmental samples which were collected during this operating period. Sample locations and specific information about individual locations for the Ginna are given in Table A-1. Figure A-1 shows the location of the R.E. Ginna Nuclear Power Plant in relation to New York State and Lake Ontario. Figures A-2, A-3, and A-4 show the locations of the power plant sampling sites in relation to the plant site at different degrees of detail.

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**TABLE A-1**  
**Locations of Environmental Sampling Stations**  
**for the R.E. Ginna Nuclear Plant**

Station	Description	Distance		Direction
		Meters	Miles	Sector
<b>Air Samplers</b>				
2	Manor House Yard	320	0.2	E
3	East Field	420	0.3	ESE
4	East of Training Center Parking Lot	280	0.2	SE
5	Creek Bridge	160	0.1	SSE
6	Main Parking Lot	225	0.1	SW
7	West Fence Line	220	0.1	WSW
8	Seabreeze	19200	11.9	WSW
9	Webster	11400	7.1	SW
10	Walworth	13100	8.1	S
11	Williamson	11500	7.1	ESE
12	Sodus Point	25100	15.6	E
13	Substation 13	690	0.4	SSW
<b>Direct Radiation</b>				
2	Onsite-Manor House Yard	320	0.2	E
3	Onsite-In field approximately 200 ft SE of station #2	420	0.3	ESE
4	Onsite- East of Training Center Parking Lot	280	0.2	SE
5	Onsite-Between creek and plant entry road	160	0.1	SSE
6	Onsite-SW side of plant parking lot	225	0.1	SW
7	Onsite-utility pole along West plant fence	220	0.1	WSW
8	Topper Drive-Irondequoit, Seabreeze Substation #51	19200	11.9	WSW
9	Phillips Road-Webster, intersection with Highway #104, Substation #74	11400	7.1	SW
10	Atlantic Avenue-Walworth, Substation #230	13100	8.1	S
11	W. Main Street-Williamson, Substation #207	11500	7.1	ESE
12	12 Seaman Avenue-Sodus Point-Off Lake Road by Sewer district, Substation #209	25100	15.6	E
13	Onsite - South of Meteorological Tower	260	0.2	WNW
14	NW corner of field along lake shore	770	0.5	WNW
15	Field access road, west of orchard, approximately 3000' West of plant	850	0.5	W
16	SW Corner of orchard, approximately 3000' West of plant, approximately 200' North of Lake Road	900	0.6	WSW
17	Utility pole in orchard, approximately 75" North of Lake Road	500	0.3	SSW
18	Substation 13A fence, North Side	650	0.4	SSW
19	On NW corner of house 100' East of plant access road	400	0.2	S
20	Approximately 150' West of Ontario Center Road and approximately 170' South of Lake Road	680	0.4	SSE

**TABLE A-1**  
**Locations of Environmental Sampling Stations**  
**for the R.E. Ginna Nuclear Plant**

Station	Description	Distance		Direction
		Meters	Miles	Sector
21	North side of Lake Road, approximately 200' East of Ontario Center Road	600	0.4	SE
22	North side of Lake Road, SE, property corner	810	0.5	SE
23	East property line, midway between Lake Road and Lake shore	680	0.4	ESE
24	Lake shore near NE corner of property	630	0.4	E
25	Substation #73, Klem Road, adjacent to 897 Klem Road	14350	8.9	WSW
26	Service Center, Plank Road, West of 250	14800	9.2	SW
27	Atlantic Avenue at Knollwood Drive utility pole, North side of road	14700	9.1	SSW
28	Substation #193, Marion, behind Stanton Ag. Service, North Main Street	17700	11.0	SE
29	Substation #208, Town Line Road (CR-118), 1000' North of Route 104	13800	8.6	ESE
30	District Office, Sodus, on pole, West side of bldg	20500	12.7	ESE
31	Lake Road, pole 20' North of road, 500' East of Salt Road	7280	4.5	W
32	Woodard Road at County Line Road, pole @ Northwest corner.	6850	4.2	WSW
33	County Line Road at RR tracks, pole approximately 100' East along tracks	7950	4.9	SW
34	Pole at Route 104, Lincoln Road, SW Corner.	6850	4.2	SSW
35	Transmission Right of Way, North of Clevenger Road on pole.	7600	4.7	SSW
36	Substation #205, Route 104, East of Ontario Center Road, North side of fence.	5650	3.5	S
37	Rail Road Avenue, pole at 2048	6000	3.7	SSE
38	Fisher Road at RR Tracks, pole East of road	7070	4.4	SE
39	Seeley Road, Pole South side 100' West of intersection with Stony Lonesome Road	6630	4.1	ESE
40	Lake Road at Stony Lonesome Road, pole at SE corner	6630	4.1	E
<b>Fish</b>				
	Lake Ontario Discharge Plume	2200	1.4	ENE
	Russell Station	25600	15.9	W
<b>Produce (Vegetation)</b>				
Indicator and background samples of lettuce, apples, tomatoes, and cabbage are collected from gardens grown on company property and purchased from farms >10 miles from the plant.				

**TABLE A-1**  
**Locations of Environmental Sampling Stations**  
**for the R.E. Ginna Nuclear Plant**

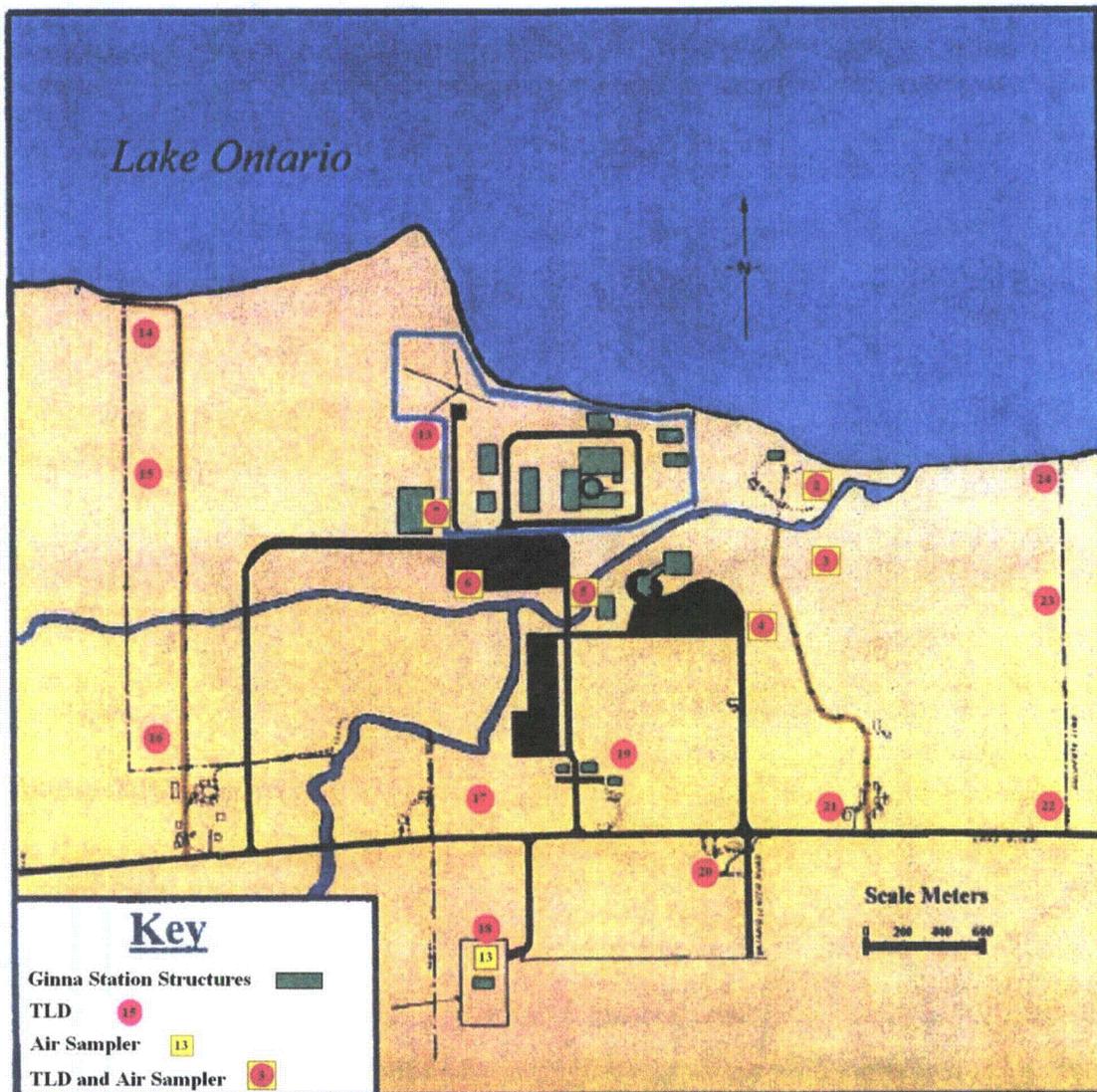
Station	Description	Distance		Direction
		Meters	Miles	Sector
Water				
	Shoremont/MCWA	27160	16.9	W
	Ontario Water District	2200	1.4	ENE
	Circ Water Intake	420	0.3	N
	Circ Water Discharge	130	0.1	NNE
	Deer Creek	260	0.2	ESE
Sediment				
	Lake Ontario Discharge Plume	2200	1.4	ENE
	Russell Station	25600	15.9	W
Milk				
	Eaton Farm, Williamson (Indicator)	8270	5.1	ESE
	Schultz Farm, S. Sodus (Control)	21000	13.0	SE

Figure A-1

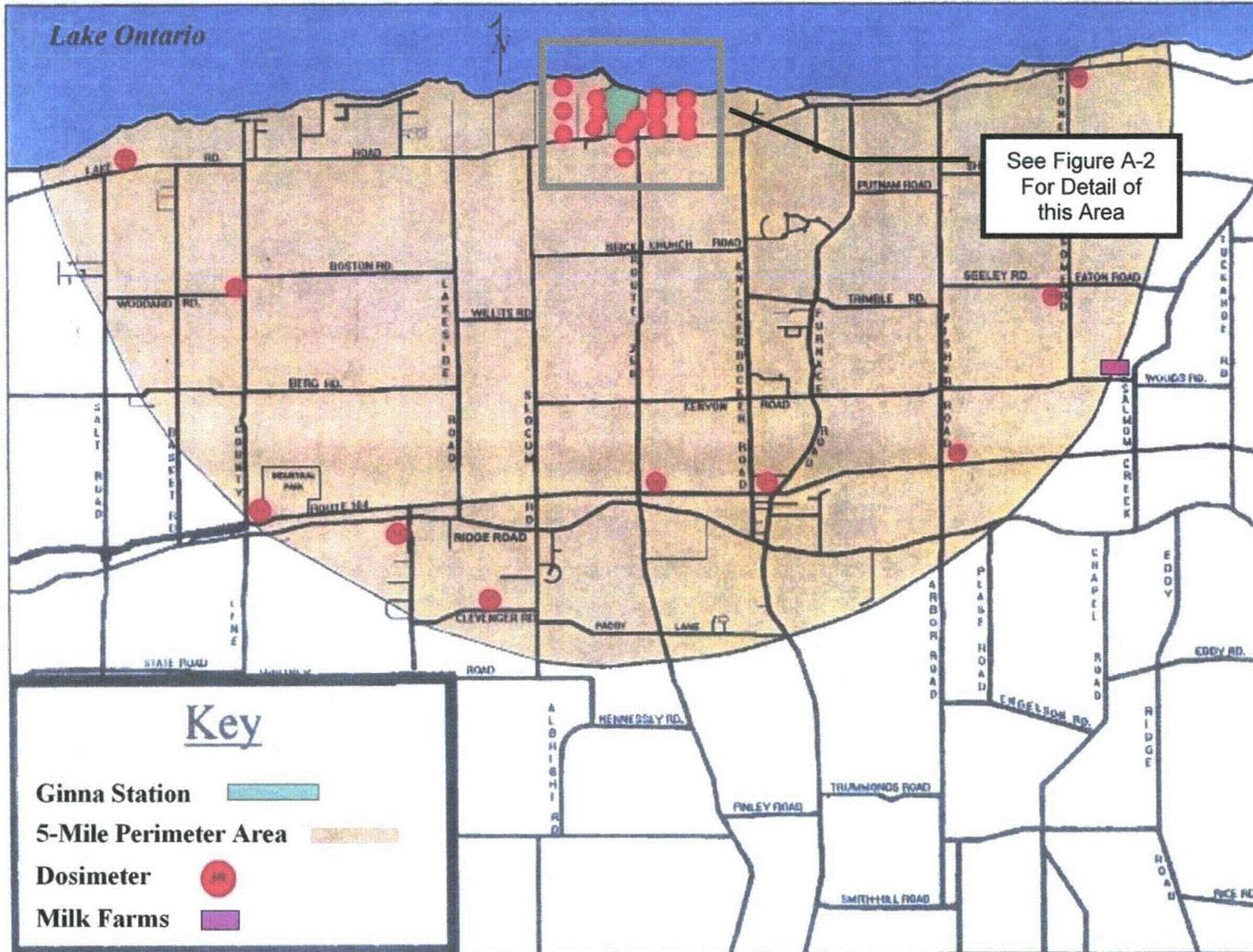
Map of New York State and Lake Ontario Showing Location of R.E. Ginna Nuclear Power Plant



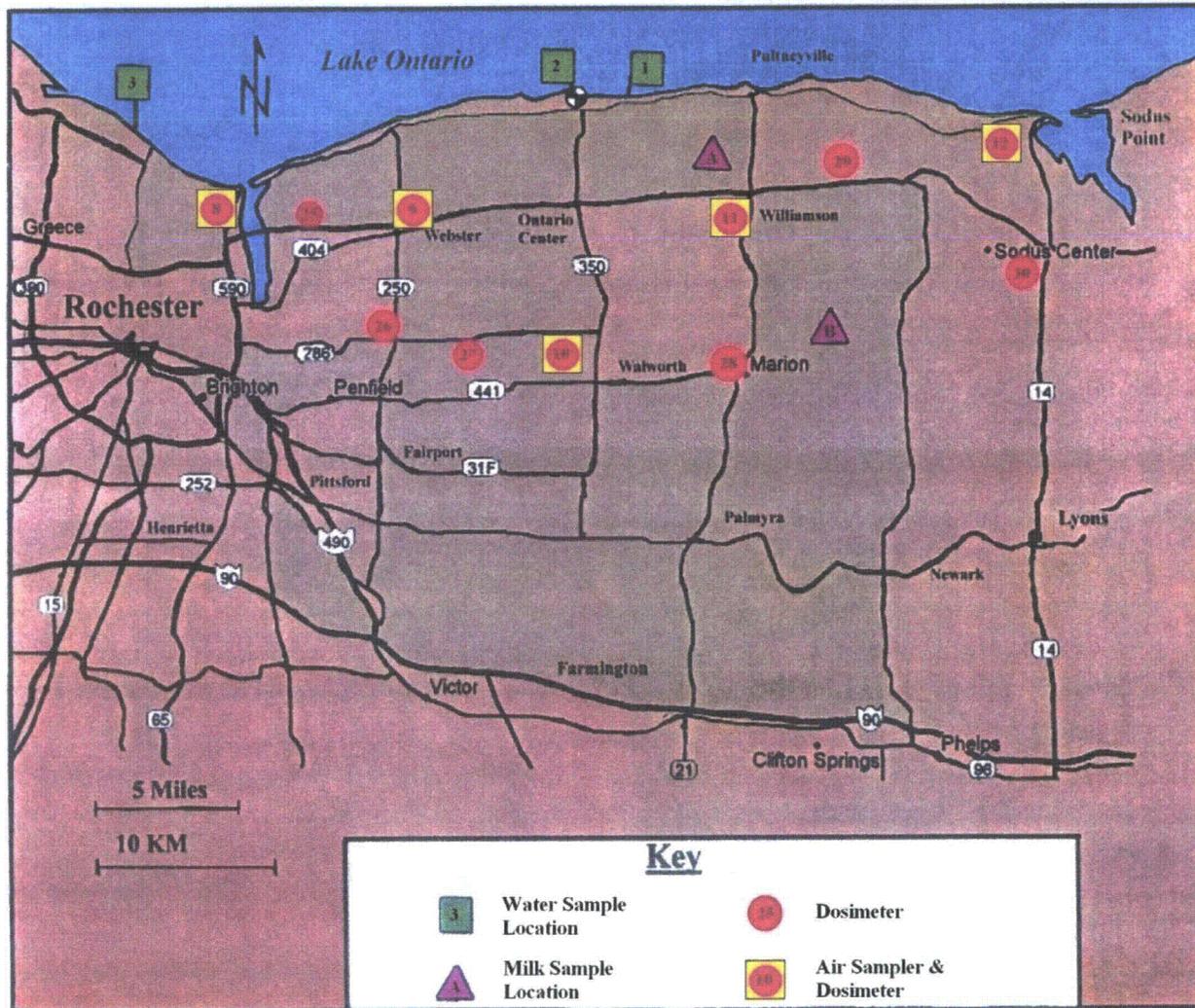
**Figure A-2**  
**Onsite Sample Locations**



**Figure A-3**  
**Offsite Sample Locations (TLDs and milk farms within 5 miles)**



**Figure A-4**  
**Water Sample, Milk Farms and TLD Locations**



## **APPENDIX B**

### **REMP Analytical Results**

#### **Summary of Appendix B Content**

Appendix B is a presentation of the analytical results for the R.E. Ginna Nuclear Power Plant radiological environmental monitoring programs.

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**Table B-1**

**Concentration of Tritium, Gamma Emitters and Gross Beta in Surface and Drinking Water  
(Results in units of pCi/L +/- 2σ)**

Sample Code	Sample Date	Cs-137	H-3	Gamma Emitters	Gross Beta
<b>CIRC-IN</b>					
Circulating Water					
Inlet - N	1/20/2009		*	*	2.53 +/- 0.61
	2/17/2009		*	*	2.50 +/- 0.53
	3/17/2009		*	*	2.17 +/- 0.56
	4/14/2009		*	*	2.22 +/- 0.53
	5/12/2009		*	*	2.26 +/- 0.56
	6/9/2009		*	*	2.16 +/- 0.55
	7/7/2009		*	*	1.31 +/- 0.50
	8/4/2009		*	*	2.33 +/- 0.53
	9/1/2009		*	*	1.77 +/- 0.52
	9/29/2009		*	*	1.88 +/- 0.53
	10/29/2009		*	*	1.91 +/- 0.53
	11/24/2009		*	*	1.92 +/- 0.54
	12/22/2009		*	*	1.80 +/- 0.54
<b>CIRC-OUT</b>					
Circulating Water					
Outlet - N	1/20/2009		*	*	2.02 +/- 0.54
	2/17/2009		*	*	2.46 +/- 0.53
	3/17/2009		*	*	2.14 +/- 0.56
	4/14/2009		*	*	2.91 +/- 0.57
	5/12/2009		*	*	1.94 +/- 0.53
	6/9/2009		*	*	2.34 +/- 0.56
	7/7/2009		*	*	2.39 +/- 0.58
	8/4/2009		*	*	2.26 +/- 0.53
	9/1/2009		*	*	1.95 +/- 0.54
	9/29/2009		*	*	2.01 +/- 0.55
	10/29/2009		*	*	1.74 +/- 0.53
	11/24/2009		*	*	1.78 +/- 0.54
	12/22/2009		*	*	2.09 +/- 0.57
<b>DC</b>					
Deer Creek - E					
	1/6/2009		*	*	3.67 +/- 0.78
	2/10/2009		*	*	5.79 +/- 0.74
	3/9/2009		*	*	4.75 +/- 0.67
	4/7/2009		*	*	5.08 +/- 0.73
	5/4/2009		*	*	3.58 +/- 0.75
	6/24/2009		*	*	5.72 +/- 0.78
	7/20/2009		*	*	4.57 +/- 0.88
	8/17/2009		*	*	4.61 +/- 0.93
	9/14/2009		*	*	3.78 +/- 0.90
	10/12/2009		*	*	5.26 +/- 0.88
	11/4/2009		*	*	6.64 +/- 0.88
	12/7/2009		*	*	7.13 +/- 0.93

**Table B-1**

**Concentration of Tritium, Gamma Emitters and Gross Beta in Surface and Drinking Water  
(Results in units of pCi/L +/- 2σ)**

Sample Code	Sample Date	Cs-137	H-3	Gamma Emitters	Gross Beta
<b>MCWA <sup>1</sup></b>					
Monroe County					
Water/Shoremont,					
Greece - W					
	1/20/2009		*	*	2.40 +/- 0.58
	2/16/2009		*	*	1.99 +/- 0.51
	3/16/2009		*	*	1.64 +/- 0.53
	4/13/2009		*	*	2.32 +/- 0.54
	5/11/2009		*	*	1.80 +/- 0.52
	6/8/2009		*	*	1.70 +/- 0.52
	7/6/2009		*	*	2.08 +/- 0.55
	8/3/2009		*	*	2.66 +/- 0.55
	8/31/2009		*	*	1.99 +/- 0.53
	9/28/2009		*	*	1.77 +/- 0.53
	10/26/2009		*	*	2.61 +/- 0.61
	11/23/2009		*	*	2.67 +/- 0.60
	12/21/2009		*	*	1.53 +/- 0.52
<b>OWD</b>					
Ontario Water					
District - E					
	1/20/2009		*	*	1.86 +/- 0.57
	2/16/2009		*	*	2.05 +/- 0.51
	3/16/2009		*	*	1.72 +/- 0.54
	4/13/2009		*	*	2.14 +/- 0.53
	5/11/2009		*	*	2.61 +/- 0.56
	6/8/2009		*	*	2.81 +/- 0.58
	7/6/2009		*	*	2.19 +/- 0.56
	8/3/2009		*	*	2.32 +/- 0.52
	8/31/2009		*	*	1.74 +/- 0.52
	9/28/2009		*	*	1.59 +/- 0.53
	10/26/2009		*	*	1.87 +/- 0.53
	11/23/2009		*	*	2.45 +/- 0.58
	12/21/2009		*	*	1.52 +/- 0.53

<sup>1</sup> Control Location

\* All Non-Natural Gamma Emitters, including I-131, and tritium less than MDA.

**Table B-2**

**Concentration of Gamma Emitters in the Flesh of Edible Fish  
(Results in units of pCi/kg (wet) +/- 2σ)**

Sample Code	Sample Date	Sample Type	Cs-137	Gamma Emitters
<b>EAST</b>				
East Sector	3/26/2009	Rainbow Trout		*
	5/19/2009	White Sucker Fish		*
	10/29/2009	Chinook Salmon		*
<b>GREECE<sup>1</sup></b>				
Control	2/24/2009	Smallmouth Bass		*
<b>HAMLIN<sup>1</sup></b>				
Control	5/29/2009	Chinook Salmon		*
	5/29/2009	Lake Trout		*
	5/29/2009	Rainbow Trout		*
	10/13/2009	Chinook Salmon		*
	10/13/2009	Pike		*
	10/13/2009	Rainbow Trout		*
	10/13/2009	White Sucker Fish		*
<b>NORTH</b>				
North Sector	1/23/2009	Lake Trout		*
	2/26/2009	Smallmouth Bass		*
	10/1/2009	Brown Trout		*
	12/11/2009	Smallmouth Bass		*
	12/16/2009	Carp		*

<sup>1</sup> Control Location

\* All Non-Natural Gamma Emitters <MDA

**Table B-3**

**Concentration of Gamma Emitters in Sediment  
(Results in units of pCi/kg (wet) +/- 2σ)**

Sample Code	Sample Date	Cs-137	Gamma Emitters
<b>Shoreline</b>			
EAST			
East Sector	4/27/2009		*
	8/3/2009		*
GREECE <sup>1</sup>			
Control	4/27/2009		*
	8/3/2009		*
<b>Benthic</b>			
NORTH	11/12/2009	89+/- 23	*

<sup>1</sup> Control Location

\* All Non-Natural Gamma Emitters <MDA

**Table B-4**

**Concentration of Iodine-131 in Filtered Air (Charcoal Cartridges)**  
**(Results in units of  $10^{-2}$  pCi/m<sup>3</sup> +/- 2 $\sigma$ )**

Start Date	Stop Date	STATION-02 Manor House Yard	STATION-04 Training Center Parking Lot	STATION-07 West Fence Line	STATION-08 <sup>1</sup> Seabreeze	STATION-09 Webster	STATION-11 Williamson
12/29/2008	1/5/2009	*	*	*	*	*	*
1/5/2009	1/12/2009	*	*	*	*	*	*
1/12/2009	1/19/2009	*	*	*	*	*	*
1/19/2009	1/26/2009	*	*	*	*	*	*
1/26/2009	2/2/2009	*	*	*	*	*	*
2/2/2009	2/9/2009	*	*	*	*	*	*
2/9/2009	2/16/2009	*	*	*	*	*	*
2/16/2009	2/23/2009	*	*	*	*	*	*
2/23/2009	3/2/2009	*	*	*	*	*	*
3/2/2009	3/9/2009	*	*	*	*	*	*
3/9/2009	3/16/2009	*	*	*	*	*	*
3/16/2009	3/23/2009	*	*	*	*	*	*
3/23/2009	3/30/2009	*	*	*	*	*	*
3/30/2009	4/6/2009	*	*	*	*	*	*
4/6/2009	4/13/2009	*	*	*	*	*	*
4/13/2009	4/20/2009	*	*	*	*	*	*
4/20/2009	4/27/2009	*	*	*	*	*	*
4/27/2009	5/4/2009	*	*	*	*	*	*
5/4/2009	5/11/2009	*	*	*	*	*	*
5/11/2009	5/18/2009	*	*	*	*	*	*
5/18/2009	5/25/2009	*	*	*	*	*	*
5/25/2009	6/1/2009	*	*	*	*	*	*
6/1/2009	6/8/2009	*	*	*	*	*	*
6/8/2009	6/15/2009	*	*	*	*	*	*
6/15/2009	6/22/2009	*	*	*	*	*	*
6/22/2009	6/29/2009	*	*	*	*	*	*
6/29/2009	7/6/2009	*	*	*	*	*	*
7/6/2009	7/13/2009	*	*	*	*	*	*
7/13/2009	7/20/2009	*	*	*	*	*	*
7/20/2009	7/27/2009	*	*	*	*	*	*
7/27/2009	8/3/2009	*	*	*	*	*	*
8/3/2009	8/10/2009	*	*	*	*	*	*
8/10/2009	8/17/2009	*	*	*	*	*	*
8/17/2009	8/24/2009	*	*	*	*	*	*
8/24/2009	8/31/2009	*	*	*	*	*	*

<sup>1</sup> Control Location  
\* <MDA (I-131)

**Table B-4**

**Concentration of Iodine-131 in Filtered Air (Charcoal Cartridges)**  
**(Results in units of  $10^{-2}$  pCi/m<sup>3</sup> +/- 2σ)**

Start Date	Stop Date	STATION-02 Manor House Yard	STATION-04 Training Center Parking Lot	STATION-07 West Fence Line	STATION-08 <sup>1</sup> Seabreeze	STATION-09 Webster	STATION-11 Williamson
8/31/2009	9/7/2009	*	*	*	*	*	*
9/7/2009	9/14/2009	*	*	*	*	*	*
9/14/2009	9/21/2009	*	*	*	*	*	*
9/21/2009	9/28/2009	*	*	*	*	*	*
9/28/2009	10/5/2009	*	*	*	*	*	*
10/5/2009	10/12/2009	*	*	*	*	*	*
10/12/2009	10/19/2009	*	*	*	*	*	*
10/19/2009	10/26/2009	*	*	*	*	*	*
10/26/2009	11/2/2009	*	*	*	*	*	*
11/2/2009	11/9/2009	*	*	*	*	*	*
11/9/2009	11/16/2009	*	*	*	*	*	*
11/16/2009	11/23/2009	*	*	*	*	*	*
11/23/2009	11/30/2009	*	*	*	*	*	*
11/30/2009	12/7/2009	*	*	*	*	*	*
12/7/2009	12/14/2009	*	*	*	*	*	*
12/14/2009	12/21/2009	*	*	*	*	*	*
12/21/2009	12/28/2009	*	*	*	*	*	*

<sup>1</sup> Control Location  
\* <MDA (I-131)

**Table B-5**

**Concentration of Beta Emitters in Air Particulates – Onsite Samples  
(Results in units of  $10^{-2}$  pCi/m<sup>3</sup> +/- 2 $\sigma$  Uncertainty)**

Start Date	Stop Date	STATION-02 Manor House Yard	STATION-03 East Field	STATION-04 Training Center Parking Lot	STATION-05 Creek Bridge	STATION-06 Main Parking Lot	STATION-07 West Fence Line	STATION-13 Substation 13
12/29/2008	1/5/2009	2.8 +/- 0.1	2.9 +/- 0.1	3.1 +/- 0.2	3.2 +/- 0.2	2.9 +/- 0.1	3.0 +/- 0.2	2.9 +/- 0.2
1/5/2009	1/12/2009	2.0 +/- 0.1	2.1 +/- 0.1	2.1 +/- 0.1	2.4 +/- 0.1	2.2 +/- 0.1	2.1 +/- 0.1	2.2 +/- 0.2
1/12/2009	1/19/2009	2.7 +/- 0.1	2.8 +/- 0.1	2.9 +/- 0.1	3.2 +/- 0.2	3.0 +/- 0.1	2.9 +/- 0.2	2.9 +/- 0.2
1/19/2009	1/26/2009	3.5 +/- 0.2	3.4 +/- 0.2	3.5 +/- 0.2	3.9 +/- 0.2	3.7 +/- 0.2	3.5 +/- 0.2	3.6 +/- 0.2
1/26/2009	2/2/2009	3.4 +/- 0.1	3.4 +/- 0.1	3.5 +/- 0.2	3.8 +/- 0.2	3.5 +/- 0.2	3.6 +/- 0.2	3.4 +/- 0.2
2/2/2009	2/9/2009	2.6 +/- 0.1	2.8 +/- 0.1	2.7 +/- 0.1	3.2 +/- 0.2	2.8 +/- 0.1	2.8 +/- 0.2	3.0 +/- 0.2
2/9/2009	2/16/2009	1.9 +/- 0.1	1.9 +/- 0.1	1.9 +/- 0.1	2.1 +/- 0.1	2.0 +/- 0.1	1.9 +/- 0.1	1.8 +/- 0.2
2/16/2009	2/23/2009	2.1 +/- 0.1	2.1 +/- 0.1	2.1 +/- 0.1	2.4 +/- 0.1	2.1 +/- 0.1	2.0 +/- 0.1	2.3 +/- 0.2
2/23/2009	3/2/2009	2.6 +/- 0.1	2.8 +/- 0.2	2.9 +/- 0.2	3.3 +/- 0.2	3.1 +/- 0.2	3.1 +/- 0.2	3.1 +/- 0.2
3/2/2009	3/9/2009	3.0 +/- 0.1	3.2 +/- 0.1	3.0 +/- 0.1	3.4 +/- 0.2	3.1 +/- 0.1	3.3 +/- 0.2	3.1 +/- 0.2
3/9/2009	3/16/2009	3.0 +/- 0.1	3.2 +/- 0.1	3.1 +/- 0.1	3.4 +/- 0.2	3.1 +/- 0.1	3.2 +/- 0.2	3.2 +/- 0.2
3/16/2009	3/23/2009	3.2 +/- 0.1	3.1 +/- 0.1	3.5 +/- 0.2	3.4 +/- 0.2	3.2 +/- 0.2	3.3 +/- 0.2	3.4 +/- 0.2
3/23/2009	3/30/2009	1.9 +/- 0.1	2.0 +/- 0.1	2.1 +/- 0.1	2.3 +/- 0.1	2.1 +/- 0.1	2.0 +/- 0.1	2.1 +/- 0.2
3/30/2009	4/6/2009	1.5 +/- 0.1	1.6 +/- 0.1	1.8 +/- 0.1	1.7 +/- 0.1	1.7 +/- 0.1	1.8 +/- 0.1	1.7 +/- 0.2
4/6/2009	4/13/2009	1.9 +/- 0.1	1.9 +/- 0.1	2.1 +/- 0.1	2.4 +/- 0.1	2.1 +/- 0.1	2.1 +/- 0.1	2.1 +/- 0.2
4/13/2009	4/20/2009	3.0 +/- 0.1	3.3 +/- 0.2	3.5 +/- 0.2	3.5 +/- 0.2	3.4 +/- 0.2	3.3 +/- 0.2	3.3 +/- 0.2
4/20/2009	4/27/2009	1.4 +/- 0.1	1.4 +/- 0.1	1.6 +/- 0.1	1.7 +/- 0.1	1.5 +/- 0.1	1.6 +/- 0.1	1.5 +/- 0.2
4/27/2009	5/4/2009	2.1 +/- 0.1	2.1 +/- 0.1	2.3 +/- 0.1	2.4 +/- 0.1	2.2 +/- 0.1	2.2 +/- 0.1	2.3 +/- 0.2
5/4/2009	5/11/2009	1.7 +/- 0.1	1.8 +/- 0.1	1.9 +/- 0.1	2.0 +/- 0.1	1.9 +/- 0.1	1.8 +/- 0.1	2.0 +/- 0.2
5/11/2009	5/18/2009	1.9 +/- 0.1	2.0 +/- 0.1	2.2 +/- 0.1	2.0 +/- 0.1	2.1 +/- 0.1	2.0 +/- 0.1	2.2 +/- 0.2
5/18/2009	5/25/2009	2.3 +/- 0.1	2.2 +/- 0.1	2.4 +/- 0.1	2.2 +/- 0.1	2.3 +/- 0.1	1.9 +/- 0.1	2.5 +/- 0.2
5/25/2009	6/1/2009	1.0 +/- 0.1	1.0 +/- 0.1	1.1 +/- 0.1	1.0 +/- 0.1	1.1 +/- 0.1	1.1 +/- 0.1	1.1 +/- 0.2

**Table B-5**

**Concentration of Beta Emitters in Air Particulates – Onsite Samples  
(Results in units of  $10^{-2}$  pCi/m<sup>3</sup> +/- 2 $\sigma$  Uncertainty)**

Start Date	Stop Date	STATION-02 Manor House Yard	STATION-03 East Field	STATION-04 Training Center Parking Lot	STATION-05 Creek Bridge	STATION-06 Main Parking Lot	STATION-07 West Fence Line	STATION-13 Substation 13
6/1/2009	6/8/2009	1.3 +/- 0.1	1.3 +/- 0.1	1.4 +/- 0.1	1.3 +/- 0.1	1.3 +/- 0.1	1.5 +/- 0.1	1.5 +/- 0.2
6/8/2009	6/15/2009	1.2 +/- 0.1	1.2 +/- 0.1	1.4 +/- 0.1	1.3 +/- 0.1	1.5 +/- 0.1	1.4 +/- 0.1	1.5 +/- 0.2
6/15/2009	6/22/2009	1.6 +/- 0.1	1.8 +/- 0.1	1.8 +/- 0.1	1.6 +/- 0.1	1.9 +/- 0.1	2.1 +/- 0.1	2.2 +/- 0.2
6/22/2009	6/29/2009	2.0 +/- 0.1	2.1 +/- 0.1	2.2 +/- 0.2	2.2 +/- 0.1	2.2 +/- 0.2	2.4 +/- 0.2	2.5 +/- 0.2
6/29/2009	7/6/2009	1.2 +/- 0.1	1.1 +/- 0.1	1.2 +/- 0.1	1.3 +/- 0.1	1.2 +/- 0.1	1.2 +/- 0.1	1.4 +/- 0.2
7/6/2009	7/13/2009	0.7 +/- 0.1	1.2 +/- 0.1	1.3 +/- 0.1	1.1 +/- 0.1	1.6 +/- 0.2	1.9 +/- 0.2	2.0 +/- 0.2
7/13/2009	7/20/2009	1.6 +/- 0.1	1.6 +/- 0.1	1.7 +/- 0.1	1.6 +/- 0.1	2.0 +/- 0.2	2.0 +/- 0.2	1.6 +/- 0.2
7/20/2009	7/27/2009	2.1 +/- 0.1	2.0 +/- 0.1	2.0 +/- 0.1	2.2 +/- 0.1	2.2 +/- 0.1	2.2 +/- 0.1	2.4 +/- 0.2
7/27/2009	8/3/2009	2.3 +/- 0.1	2.3 +/- 0.1	2.5 +/- 0.1	2.3 +/- 0.1	2.5 +/- 0.1	2.5 +/- 0.1	2.6 +/- 0.2
8/3/2009	8/10/2009	2.1 +/- 0.1	2.0 +/- 0.1	2.0 +/- 0.1	2.0 +/- 0.1	2.1 +/- 0.1	2.2 +/- 0.1	2.2 +/- 0.2
8/10/2009	8/17/2009	4.0 +/- 0.2	4.0 +/- 0.2	4.1 +/- 0.2	3.7 +/- 0.2	4.0 +/- 0.2	3.9 +/- 0.2	3.7 +/- 0.3
8/17/2009	8/24/2009	2.5 +/- 0.1	3.8 +/- 0.2	2.5 +/- 0.1	2.3 +/- 0.1	2.5 +/- 0.2	2.7 +/- 0.2	2.4 +/- 0.2
8/24/2009	8/31/2009	1.6 +/- 0.1	1.7 +/- 0.1	1.5 +/- 0.1	1.5 +/- 0.1	1.6 +/- 0.1	1.7 +/- 0.1	1.7 +/- 0.2
8/31/2009	9/7/2009	2.8 +/- 0.1	2.7 +/- 0.1	2.8 +/- 0.1	2.8 +/- 0.1	2.7 +/- 0.1	3.0 +/- 0.1	3.0 +/- 0.2
9/7/2009	9/14/2009	3.0 +/- 0.2	3.1 +/- 0.2	3.1 +/- 0.2	3.1 +/- 0.2	3.1 +/- 0.2	3.1 +/- 0.2	3.2 +/- 0.3
9/14/2009	9/21/2009	1.9 +/- 0.1	1.9 +/- 0.1	2.0 +/- 0.1	1.8 +/- 0.1	1.9 +/- 0.1	2.0 +/- 0.1	2.4 +/- 0.2
9/21/2009	9/28/2009	2.1 +/- 0.1	2.2 +/- 0.1	2.2 +/- 0.1	2.0 +/- 0.1	2.2 +/- 0.1	2.3 +/- 0.1	1.9 +/- 0.2
9/28/2009	10/5/2009	1.0 +/- 0.1	1.2 +/- 0.1	1.3 +/- 0.1	1.2 +/- 0.1	1.2 +/- 0.1	1.3 +/- 0.1	1.2 +/- 0.2
10/5/2009	10/12/2009	1.5 +/- 0.1	1.7 +/- 0.1	1.6 +/- 0.1	1.6 +/- 0.1	1.8 +/- 0.1	1.9 +/- 0.1	1.6 +/- 0.2
10/12/2009	10/19/2009	1.5 +/- 0.1	1.6 +/- 0.1	1.7 +/- 0.1	1.7 +/- 0.1	1.6 +/- 0.1	1.6 +/- 0.1	1.7 +/- 0.2
10/19/2009	10/26/2009	2.5 +/- 0.1	2.5 +/- 0.1	2.5 +/- 0.1	2.5 +/- 0.1	2.4 +/- 0.1	2.7 +/- 0.1	2.7 +/- 0.2
10/26/2009	11/2/2009	1.4 +/- 0.1	1.5 +/- 0.1	1.6 +/- 0.1	1.5 +/- 0.1	1.6 +/- 0.1	1.6 +/- 0.1	1.7 +/- 0.2

**Table B-5**

**Concentration of Beta Emitters in Air Particulates – Onsite Samples  
(Results in units of  $10^{-2}$  pCi/m<sup>3</sup> +/- 2 $\sigma$  Uncertainty)**

Start Date	Stop Date	STATION-02 Manor House Yard	STATION-03 East Field	STATION-04 Training Center Parking Lot	STATION-05 Creek Bridge	STATION-06 Main Parking Lot	STATION-07 West Fence Line	STATION-13 Substation 13
11/2/2009	11/9/2009	2.5 +/- 0.1	2.4 +/- 0.1	2.5 +/- 0.1	2.3 +/- 0.1	2.4 +/- 0.1	2.5 +/- 0.1	2.9 +/- 0.2
11/9/2009	11/16/2009	2.4 +/- 0.1	2.3 +/- 0.1	2.2 +/- 0.1	2.3 +/- 0.1	2.3 +/- 0.1	2.4 +/- 0.1	2.5 +/- 0.2
11/16/2009	11/23/2009	3.2 +/- 0.2	3.1 +/- 0.1	3.1 +/- 0.1	3.0 +/- 0.1	3.2 +/- 0.2	3.4 +/- 0.2	3.4 +/- 0.3
11/23/2009	11/30/2009	2.6 +/- 0.1	2.6 +/- 0.1	2.4 +/- 0.1	2.6 +/- 0.1	2.7 +/- 0.2	2.9 +/- 0.1	2.8 +/- 0.2
11/30/2009	12/7/2009	2.1 +/- 0.1	2.1 +/- 0.1	2.2 +/- 0.1	2.0 +/- 0.1	2.4 +/- 0.1	2.3 +/- 0.1	2.3 +/- 0.2
12/7/2009	12/14/2009	3.0 +/- 0.2	3.0 +/- 0.1	2.8 +/- 0.1	3.1 +/- 0.1	3.1 +/- 0.2	3.1 +/- 0.2	3.2 +/- 0.2
12/14/2009	12/21/2009	2.5 +/- 0.1	2.8 +/- 0.1	2.6 +/- 0.1	2.4 +/- 0.1	2.6 +/- 0.1	2.5 +/- 0.1	2.9 +/- 0.2
12/21/2009	12/28/2009	1.7 +/- 0.1	1.8 +/- 0.1	1.7 +/- 0.1	1.6 +/- 0.1	1.7 +/- 0.1	1.8 +/- 0.1	1.9 +/- 0.2

**Table B-6**

**Concentration of Beta Emitters in Air Particulates - Offsite Samples  
(Results in units of  $10^{-2}$  pCi/m<sup>3</sup> +/- 2σ Uncertainty)**

Start Date	Stop Date	STATION-08 <sup>1</sup> Seabreeze	STATION-09 Webster	STATION-10 <sup>1</sup> Walworth	STATION-11 Williamson	STATION-12 <sup>1</sup> Sodus Point
12/29/2008	1/5/2009	2.8 +/- 0.2	2.8 +/- 0.2	3.0 +/- 0.1	3.0 +/- 0.1	2.9 +/- 0.1
1/5/2009	1/12/2009	2.0 +/- 0.1	2.2 +/- 0.2	2.2 +/- 0.1	2.1 +/- 0.1	2.1 +/- 0.1
1/12/2009	1/19/2009	2.6 +/- 0.1	2.6 +/- 0.2	3.0 +/- 0.1	3.0 +/- 0.1	2.9 +/- 0.1
1/19/2009	1/26/2009	3.7 +/- 0.2	3.6 +/- 0.3	3.8 +/- 0.2	3.6 +/- 0.2	3.6 +/- 0.2
1/26/2009	2/2/2009	3.3 +/- 0.2	3.3 +/- 0.2	3.2 +/- 0.2	3.3 +/- 0.2	3.4 +/- 0.2
2/2/2009	2/9/2009	3.0 +/- 0.2	2.6 +/- 0.2	2.9 +/- 0.1	2.8 +/- 0.1	2.8 +/- 0.1
2/9/2009	2/16/2009	2.3 +/- 0.2	1.6 +/- 0.2	1.8 +/- 0.1	1.7 +/- 0.1	1.9 +/- 0.1
2/16/2009	2/23/2009	2.1 +/- 0.1	2.2 +/- 0.2	2.1 +/- 0.1	2.2 +/- 0.1	2.1 +/- 0.1
2/23/2009	3/2/2009	2.9 +/- 0.2	3.0 +/- 0.3	3.2 +/- 0.2	2.9 +/- 0.2	3.1 +/- 0.2
3/2/2009	3/9/2009	3.0 +/- 0.2	2.8 +/- 0.2	2.9 +/- 0.1	2.9 +/- 0.1	3.1 +/- 0.1
3/9/2009	3/16/2009	3.4 +/- 0.2	3.3 +/- 0.2	3.3 +/- 0.2	3.2 +/- 0.2	2.7 +/- 0.2
3/16/2009	3/23/2009	3.5 +/- 0.2	3.3 +/- 0.2	3.2 +/- 0.2	3.1 +/- 0.1	3.2 +/- 0.2
3/23/2009	3/30/2009	2.1 +/- 0.1	2.1 +/- 0.2	2.1 +/- 0.1	2.0 +/- 0.1	1.8 +/- 0.1
3/30/2009	4/6/2009	1.8 +/- 0.1	1.7 +/- 0.2	1.7 +/- 0.1	1.6 +/- 0.1	1.5 +/- 0.1
4/6/2009	4/13/2009	2.4 +/- 0.1	2.2 +/- 0.2	2.4 +/- 0.1	2.2 +/- 0.1	2.0 +/- 0.1
4/13/2009	4/20/2009	3.2 +/- 0.2	3.1 +/- 0.3	3.2 +/- 0.2	3.0 +/- 0.2	3.0 +/- 0.2
4/20/2009	4/27/2009	1.8 +/- 0.1	1.7 +/- 0.2	1.6 +/- 0.1	1.5 +/- 0.1	1.5 +/- 0.1
4/27/2009	5/4/2009	2.5 +/- 0.1	2.5 +/- 0.2	2.5 +/- 0.1	2.3 +/- 0.1	2.2 +/- 0.1
5/4/2009	5/11/2009	1.9 +/- 0.1	2.0 +/- 0.2	1.9 +/- 0.1	1.9 +/- 0.1	1.7 +/- 0.1
5/11/2009	5/18/2009	2.1 +/- 0.1	2.4 +/- 0.2	2.3 +/- 0.1	2.1 +/- 0.1	2.0 +/- 0.1
5/18/2009	5/25/2009	2.5 +/- 0.1	2.8 +/- 0.2	2.4 +/- 0.1	2.3 +/- 0.1	2.4 +/- 0.1
5/25/2009	6/1/2009	1.3 +/- 0.1	1.3 +/- 0.2	1.3 +/- 0.1	1.2 +/- 0.2	1.0 +/- 0.1
6/1/2009	6/8/2009	1.7 +/- 0.1	1.5 +/- 0.1	1.6 +/- 0.1	1.5 +/- 0.1	1.3 +/- 0.1
6/8/2009	6/15/2009	1.4 +/- 0.1	1.6 +/- 0.1	1.4 +/- 0.1	1.5 +/- 0.1	1.4 +/- 0.1
6/15/2009	6/22/2009	2.1 +/- 0.1	2.0 +/- 0.1	2.0 +/- 0.1	1.9 +/- 0.1	1.7 +/- 0.1
6/22/2009	6/29/2009	2.2 +/- 0.2	2.3 +/- 0.2	2.3 +/- 0.2	2.2 +/- 0.2	2.1 +/- 0.1
6/29/2009	7/6/2009	1.3 +/- 0.1	1.2 +/- 0.1	1.2 +/- 0.1	1.2 +/- 0.1	1.1 +/- 0.1
7/6/2009	7/13/2009	0.9 +/- 0.1	1.0 +/- 0.1	1.4 +/- 0.1	1.3 +/- 0.1	1.0 +/- 0.1
7/13/2009	7/20/2009	1.8 +/- 0.1	1.8 +/- 0.1	1.8 +/- 0.1	1.7 +/- 0.1	1.6 +/- 0.1
7/20/2009	7/27/2009	2.2 +/- 0.1	2.3 +/- 0.2	2.3 +/- 0.1	2.4 +/- 0.1	2.2 +/- 0.1
7/27/2009	8/3/2009	2.5 +/- 0.2	2.5 +/- 0.2	1.9 +/- 0.1	2.5 +/- 0.1	2.2 +/- 0.1
8/3/2009	8/10/2009	2.3 +/- 0.1	2.3 +/- 0.2	2.1 +/- 0.1	2.2 +/- 0.1	2.1 +/- 0.1
8/10/2009	8/17/2009	4.1 +/- 0.2	3.1 +/- 0.2	3.7 +/- 0.2	3.8 +/- 0.2	3.5 +/- 0.2
8/17/2009	8/24/2009	2.8 +/- 0.2	3.0 +/- 0.2	2.3 +/- 0.1	2.5 +/- 0.1	2.3 +/- 0.1
8/24/2009	8/31/2009	1.7 +/- 0.1	1.7 +/- 0.1	1.6 +/- 0.1	1.6 +/- 0.1	1.5 +/- 0.1

<sup>1</sup> Control Location

**Table B-6**

**Concentration of Beta Emitters in Air Particulates - Offsite Samples**  
**(Results in units of  $10^{-2}$  pCi/m<sup>3</sup> +/- 2σ Uncertainty)**

Start Date	Stop Date	STATION-08 <sup>1</sup> Seabreeze	STATION-09 Webster	STATION-10 <sup>1</sup> Walworth	STATION-11 Williamson	STATION-12 <sup>1</sup> Sodus Point
8/31/2009	9/7/2009	2.9 +/- 0.1	3.0 +/- 0.1	2.7 +/- 0.1	2.9 +/- 0.1	2.6 +/- 0.1
9/7/2009	9/14/2009	3.3 +/- 0.2	3.0 +/- 0.2	2.8 +/- 0.2	3.1 +/- 0.2	2.8 +/- 0.2
9/14/2009	9/21/2009	2.0 +/- 0.1	2.0 +/- 0.1	2.1 +/- 0.1	2.1 +/- 0.1	1.7 +/- 0.1
9/21/2009	9/28/2009	2.3 +/- 0.1	2.1 +/- 0.1	1.8 +/- 0.1	2.1 +/- 0.1	2.0 +/- 0.1
9/28/2009	10/5/2009	1.3 +/- 0.1	1.2 +/- 0.1	1.3 +/- 0.1	1.3 +/- 0.1	1.1 +/- 0.1
10/5/2009	10/12/2009	1.7 +/- 0.1	1.5 +/- 0.1	1.6 +/- 0.1	1.6 +/- 0.1	1.6 +/- 0.1
10/12/2009	10/19/2009	1.7 +/- 0.1	1.6 +/- 0.1	1.7 +/- 0.1	1.7 +/- 0.1	1.4 +/- 0.1
10/19/2009	10/26/2009	2.6 +/- 0.1	2.4 +/- 0.1	2.4 +/- 0.1	2.6 +/- 0.1	2.4 +/- 0.1
10/26/2009	11/2/2009	1.6 +/- 0.1	1.6 +/- 0.1	1.5 +/- 0.1	1.4 +/- 0.1	1.4 +/- 0.1
11/2/2009	11/9/2009	2.5 +/- 0.1	2.4 +/- 0.1	2.3 +/- 0.1	2.3 +/- 0.1	2.1 +/- 0.1
11/9/2009	11/16/2009	2.4 +/- 0.1	2.2 +/- 0.1	2.4 +/- 0.1	2.4 +/- 0.1	2.3 +/- 0.1
11/16/2009	11/23/2009	3.3 +/- 0.2	3.1 +/- 0.2	3.3 +/- 0.1	3.1 +/- 0.2	3.1 +/- 0.1
11/23/2009	11/30/2009	2.8 +/- 0.1	2.6 +/- 0.1	2.9 +/- 0.1	2.7 +/- 0.1	2.5 +/- 0.1
11/30/2009	12/7/2009	2.3 +/- 0.1	2.0 +/- 0.1	2.1 +/- 0.1	2.2 +/- 0.1	2.2 +/- 0.1
12/7/2009	12/14/2009	3.0 +/- 0.2	2.7 +/- 0.1	3.1 +/- 0.1	3.0 +/- 0.1	2.9 +/- 0.1
12/14/2009	12/21/2009	2.5 +/- 0.1	2.5 +/- 0.1	2.6 +/- 0.1	2.6 +/- 0.1	2.5 +/- 0.1
12/21/2009	12/28/2009	1.7 +/- 0.1	1.6 +/- 0.1	1.8 +/- 0.1	1.7 +/- 0.1	1.7 +/- 0.1

<sup>1</sup> Control Location

**Table B-7**

**Concentration of Gamma Emitters in Air Particulates  
(Results in units of  $10^{-3}$  pCi/m<sup>3</sup> +/- 2σ)**

Sample Date	STATION-02 Manor House Yard	STATION-03 East Field	STATION-04 Training Center Parking Lot	STATION-05 Creek Bridge	STATION-06 Main Parking Lot	STATION-07 West Fence Line
3/30/2009	*	*	*	*	*	*
6/29/2009	*	*	*	*	*	*
9/28/2009	*	*	*	*	*	*
12/28/2009	*	*	*	*	*	*

Sample Date	STATION-08 <sup>1</sup> Seabreeze	STATION-09 Webster	STATION-10 <sup>1</sup> Walworth	STATION-11 Williamson	STATION-12 <sup>1</sup> Sodus Point	STATION-13 Substation 13
3/30/2009	*	*	*	*	*	*
6/29/2009	*	*	*	*	*	*
9/28/2009	*	*	*	*	*	*
12/28/2009	*	*	*	*	*	*

\* All Non-Natural Gamma Emitters <MDA

**Table B-8**

**Concentration of Gamma Emitters in Vegetation Samples  
(Results in units of pCi/kg (wet) +/- 2σ)**

Sample Code	Sample Date	Sample Type	Cs-137	Gamma Emitters
<b>CONTROL<sup>1</sup></b>				
Local Sites in Control Sectors	7/27/2009	Raspberries		*
	8/13/2009	Greens		*
	8/13/2009	Squash		*
	8/13/2009	Tomato		*
	10/1/2009	Apples		*
	10/1/2009	Grapes		*
<b>EAST</b>				
East Sector	7/21/2009	Greens		*
	8/18/2009	Tomato		*
<b>ESE</b>				
East South East Sector	7/15/2009	Raspberries		*
	7/21/2009	Greens		*
	8/13/2009	Squash		*
	8/18/2009	Tomato		*
	10/29/2009	Apples		*
<b>SE</b>				
South East Garden	9/17/2009	Grapes		*
<b>SOUTH</b>				
South Garden	9/16/2009	Apples		*
<b>SSE</b>				
South South East Garden	6/25/2009	Greens		*
	8/18/2009	Tomato		*
	9/30/2009	Apples		*
<b>SSW</b>				
South South West Garden	9/30/2009	Apples		*
<b>SW</b>				
Intake	9/30/2009	Apples		*
<b>WEST<sup>2</sup></b>				
On site West Sector	10/8/2009	Apples		*

<sup>1</sup> Control Location

<sup>2</sup> LLD for I-131 not met due to Long Decay time

\* All Non-Natural Gamma Emitters <MDA

**Table B-9**

**Concentration of Gamma Emitters (including I-131) in Milk  
(Results in units of pCi/Liter +/- 2 $\sigma$ )**

Sample Code	Sample Date	Cs-137	Gamma Emitters
EATON ESE Indicator	1/27/2009		*
	2/24/2009		*
	3/25/2009		*
	4/21/2009		*
	5/19/2009		*
	6/2/2009		*
	6/16/2009		*
	6/30/2009		*
	7/14/2009		*
	7/28/2009		*
	8/11/2009		*
	8/25/2009		*
	9/9/2009		*
	9/22/2009		*
	10/6/2009		*
	10/20/2009		*
	11/3/2009		*
12/1/2009		*	
12/29/2009		*	
SCHULTZ <sup>1</sup> South Sodus Control	1/27/2009		*
	2/24/2009		*
	3/25/2009		*
	4/21/2009		*
	5/19/2009		*
	6/2/2009		*
	6/16/2009		*
	6/30/2009		*
	7/14/2009		*
	7/28/2009		*
	8/11/2009		*
	8/25/2009		*
	9/9/2009		*
	9/22/2009		*
	10/6/2009		*
	10/20/2009		*
	11/3/2009		*
12/1/2009		*	
12/29/2009		*	

<sup>1</sup> Control Location

\* All Non-Natural Gamma Emitters <MDA

**Table B-10**

**Typical MDA Ranges for Gamma Spectrometry**

Selected Nuclides	Air Particulates (10 <sup>-2</sup> pCi/m <sup>3</sup> )	Surface Water, Drinking Water (pCi/L)	Fish	Ground water	Milk	Oysters (pCi/kg)	Shoreline Sediment	Soil (pCi/kg)	Vegetation (pCi/L)
Na-22	0 - .8	2.8 - 5.8	22.6 - 48	1.9 - 6.3	5.3 - 7.8	23.9 - 35.1	40.9 - 65.4	18.1 - 91.2	18.8 - 59.5
K-40	0 - 9.7	26.5 - 63.8	220 - 370	0 - 0	46.2 - 62.6	179 - 295	405.8 - 607.7	163.3 - 670	163 - 468
Cr-51	0 - 7	18.7 - 39.1	191 - 480	12.2 - 39.2	28.6 - 41.1	221 - 384	238 - 561	84.7 - 721	99.4 - 339
Mn-54	0 - .7	2.4 - 5.1	21.5 - 32.7	1.6 - 5.3	4 - 5.8	20.1 - 28.9	35.6 - 52.1	14.7 - 76	15.2 - 47.4
Co-58	0 - .8	2.4 - 5.1	22.1 - 51.2	1.5 - 5.2	4 - 5.8	25.7 - 32.5	34.1 - 57	13.5 - 83.6	15.1 - 49.4
Fe-59	0 - 1.9	5.2 - 11.1	28 - 232.1	3.4 - 10.8	9.7 - 14.1	62.2 - 96.8	71.4 - 136	30.7 - 205	34.9 - 115
Co-60	0 - .7	2.7 - 5.6	25.8 - 40.5	1.8 - 5.9	4.6 - 7.4	22.3 - 34.2	38.7 - 57.8	17.4 - 84.7	18.2 - 56
Zn-65	0 - 1.4	5.3 - 11.2	56.9 - 97.4	4 - 14.2	10.5 - 15	47.8 - 76.9	89.8 - 140	33.4 - 209	37.9 - 119
Nb-95	0 - 1	2.6 - 5.4	26.7 - 67.1	1.8 - 6.2	4.1 - 6.1	32.6 - 49.7	41.1 - 85.1	11.3 - 107	15.7 - 49.7
Zr-95	0 - 1.4	4.2 - 8.8	37.6 - 74.1	2.8 - 9.1	6.8 - 10	43.7 - 54.4	62.1 - 101	23.2 - 142	26.7 - 80.5
Ru-106	0 - 5.4	20.9 - 43.8	133 - 263	14.2 - 46	33.5 - 47.8	179 - 226	280 - 368	130 - 606	123.6 - 395
Ag-110m	0 - .6	2.3 - 4.8	16.8 - 30.6	1.5 - 4.8	3.7 - 5.3	19.3 - 22.5	29.6 - 45	12.3 - 85.2	13.7 - 43.3
I-131	0 - 278	0 - 5	22.2 - 1136	1.4 - 5.6	.6 - .8	119 - 1086	54 - 662	15.7 - 447	5.5 - 81.6
Cs-134	0 - .6	2.2 - 4.6	18.4 - 25.7	1.4 - 4.8	3.4 - 5.1	17 - 23.7	27.1 - 52.3	12.5 - 81	13.1 - 42.8
Cs-137	0 - .6	2.4 - 5.2	19.4 - 30.6	1.6 - 5.6	3.7 - 6	19.6 - 24.6	29 - 51.4	12 - 75.3	14.2 - 47.5
Ba-140	0 - 6.1	4.1 - 9.5	83.8 - 462	2.5 - 8.3	5.1 - 8.9	71.7 - 365	16 - 336	27.3 - 329	17.6 - 97
La-140	0 - 6.1	4.1 - 9.5	83.8 - 462	2.5 - 8.3	5.1 - 8.9	71.7 - 365	16 - 336	27.3 - 329	17.6 - 97.1
Ce-144	0 - 1.8	12.1 - 24.7	49.8 - 87.3	8.5 - 27.8	18.8 - 27.6	60.4 - 74.8	135 - 180	56.9 - 284	56.3 - 170

<sup>1</sup> This MDA range for I-131 on a silver zeolite cartridge is typically 4.16 x 10<sup>-3</sup> to 3.40 x 10<sup>-2</sup>

**Table B-11**

**Typical LLDs for Gamma Spectrometry**

<b>Selected Nuclides</b>	<b>Water pCi/l</b>	<b>Fish pCi/Kg</b>	<b>Sediment pCi/Kg</b>	<b>Particulate* 10<sup>-3</sup> pCi/m<sup>3</sup></b>	<b>Vegetation pCi/Kg</b>	<b>Milk pCi/l</b>
Na-22	4.1	24	59	3.7	29	6
Cr-51	26	120	327	16	144	30
Mn-54	3.8	20	49	2.8	24	5
Co-58	3.9	20	36	2.8	19	5
Fs-59	7.8	45	103	2.8	50	11
Co-60	4.4	24	60	2.7	26	6
Zn-65	7.9	54	141	7.0	57	12
Nb-95	4.2	18	60	2.4	24	4
Zr-95	6.5	35	79	5.0	43	8
Ru-106	35	172	458	25	196	39
Ag-110m	3.6	15	42	2.2	21	4
Te-129m	41	170	551	27	248	50
I-131	3.2*	13	41	1.9**	19	4*
Cs-134	3.3	17	44	2.4	20	4
Cs-137	3.9	17	58	2.8	26	5
Ba-140	4.8	19	67	3.9	33	5
La-140	4.8	19	67	3.9	33	5
Ce-144	17	58	191	8.9	81	20

\* The LLD for I-131 measured in drinking water and milk is 0.5 pCi/L

\*\*The LLD for I-131 measured on charcoal filter is  $9.4 \times 10^{-3}$  pCi/m<sup>3</sup>

**Table B-12**  
**Direct Radiation**  
**(Results in Units of mR/90 days +/- 2σ)**

Station	Location	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2	Onsite-Manor House Yard	12.6 ± 1.4	11.5 ± 0.9	14.8 ± 0.9	11.6 ± 0.6
3	Onsite-In field approximately 200 ft SE of station #2	12.1 ± 0.9	11.3 ± 1.1	15.4 ± 1	12.1 ± 0.5
4	Onsite-Training Center yard driveway circle	12.7 ± 0.7	11.7 ± 0.9	14.1 ± 0.8	10.8 ± 0.5
5	Onsite-Between creek and plant entry road	13.7 ± 0.9	12.8 ± 0.9	15.9 ± 1.3	12 ± 0.8
6	Onsite-SW side of plant parking lot	10.2 ± 0.9	9.0 ± 0.8	12.4 ± 0.8	8.9 ± 0.6
7	Onsite-utility pole along West plant fence	14.4 ± 0.9	12.1 ± 1.0	14.6 ± 0.9	14.8 ± 0.6
8 <sup>1</sup>	Topper Drive-Irondequoit, Seabreeze Substation #51	11.2 ± 0.9	10.4 ± 0.9	12.8 ± 0.7	10.2 ± 0.6
9	Phillips Road-Webster, intersection with Highway #104, Substation #74	11.1 ± 0.7	9.7 ± 0.9	13.4 ± 0.7	9.8 ± 0.6
10 <sup>1</sup>	Atlantic Avenue-Walworth, Substation #230	10.2 ± 1.1	8.9 ± 0.8	12.7 ± 0.7	8.9 ± 0.6
11	W. Main Street-Williamson, Substation #207	11.1 ± 0.8	9.1 ± 0.8	13.4 ± 0.6	9.8 ± 0.8
12 <sup>1</sup>	12 Seaman Avenue-Sodus Point-Off Lake Road by Sewer district, Substation #209	10.7 ± 1.0	10.5 ± 0.9	14.6 ± 0.8	10.5 ± 0.6
13	Onsite- South of Meteorological Tower	12.1 ± 0.8	10.8 ± 0.8	14.3 ± 1.0	11 ± 0.7
14	NW corner of field along lake shore	12.2 ± 0.9	11.1 ± 1.0	15.0 ± 1.3	11.1 ± 0.7
15	Field access road, west of orchard, approximately 3000' West of plant	13.6 ± 0.9	12.7 ± 0.9	16.4 ± 0.7	12.2 ± 0.6

**TABLE B-12 (Continued)**  
**Direct Radiation**  
(Results in Units of mR/90 days  $\pm 2\sigma$ )

Station	Location	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
16	SW Corner of orchard, approximately 3000' West of plant, approximately 200' North of Lake Road	13.0 $\pm$ 0.8	11.8 $\pm$ 0.9	14.2 $\pm$ 0.7	12.3 $\pm$ 0.7
17	Utility pole in orchard, approximately 75' North of Lake Road	12.7 $\pm$ 1.0	11.3 $\pm$ 0.9	14.3 $\pm$ 0.7	10.9 $\pm$ 0.9
18	Approximately 30' North of NE corner of Substation 13A fence	10.7 $\pm$ 1.0	9.1 $\pm$ 0.8	12.4 $\pm$ 1.1	9.2 $\pm$ 0.4
19	On NW corner of house 100' East of plant access road	11.3 $\pm$ 1.4	9.6 $\pm$ 1.0	13.6 $\pm$ 0.6	9.6 $\pm$ 0.6
20	Approximately 150' West of Ontario Center Road and approximately 170' South of Lake Road	13.2 $\pm$ 0.8	11.2 $\pm$ 0.9	14.4 $\pm$ 0.7	12 $\pm$ 0.7
21	North side of Lake Road, approximately 200' East of Ontario Center Road	12.8 $\pm$ 0.8	11.1 $\pm$ 0.9	14.2 $\pm$ 1.1	11.7 $\pm$ 0.7
22	North side of Lake Road, SE, property owner	11.9 $\pm$ 0.8	9.7 $\pm$ 0.9	13.7 $\pm$ 0.7	10.1 $\pm$ 0.6
23	East property line, midway between Lake Road and Lake shore	12.9 $\pm$ 0.7	14.0 $\pm$ 1.3	14.7 $\pm$ 0.7	11.3 $\pm$ 0.9
24	Lake shore near NE corner of property	12.5 $\pm$ 0.8	11.1 $\pm$ 0.9	14.9 $\pm$ 1.1	12.1 $\pm$ 0.6
25 <sup>1</sup>	Substation #73, Klem Road, adjacent to 897 Klem Road	11.7 $\pm$ 0.9	9.2 $\pm$ 0.9	13.3 $\pm$ 0.6	9.9 $\pm$ 0.6
26 <sup>1</sup>	Service Center, Plank Road, West of 250	11.3 $\pm$ 0.7	9.3 $\pm$ 0.9	13.6 $\pm$ 0.8	10.2 $\pm$ 0.5
27 <sup>1</sup>	Atlantic Avenue at Knollwood Drive utility pole, North side of road	11.3 $\pm$ 0.7	10.0 $\pm$ 0.8	13.9 $\pm$ 1.2	10.3 $\pm$ 0.6

**TABLE B-12 (Continued)**  
**Direct Radiation**  
(Results in Units of mR/90 days  $\pm 2\sigma$ )

Station	Location	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
28 <sup>1</sup>	Substation #193, Marion, behind Stanton Ag. Service, North Main Street	11.3 $\pm$ 0.7	9.6 $\pm$ 0.9	13.1 $\pm$ 0.7	9.7 $\pm$ 0.7
29 <sup>1</sup>	Substation #208, Town Line Road (CR-118), 1000' North of Route 104	10.5 $\pm$ 0.8	9.0 $\pm$ 1.0	13 $\pm$ 0.6	9.7 $\pm$ 0.6
30 <sup>1</sup>	District Office, Sodus, on pole, West side of bldg	9.6 $\pm$ 0.6	8.1 $\pm$ 0.8	12.1 $\pm$ 0.6	8.9 $\pm$ 0.5
31	Lake Road, pole 20' North of road, 500' East of Salt Road	12.5 $\pm$ 1.2	11.1 $\pm$ 0.9	* $\pm$ *	11.5 $\pm$ 0.6
32	Woodard Road at County Line Road, pole @ BW corner	11.1 $\pm$ 1.1	9.2 $\pm$ 1.0	12.5 $\pm$ 0.6	9.3 $\pm$ 0.4
33	County Line Road at RR tracks, pole approximately 100' East along tracks	11.6 $\pm$ 1.1	9.1 $\pm$ 1.0	12.3 $\pm$ 0.6	9.7 $\pm$ 0.8
34	Lincoln Road, pole midway between Ridge Road and Route 104	13.4 $\pm$ 1.2	12.0 $\pm$ 1.2	15.9 $\pm$ 0.8	12.1 $\pm$ 0.6
35	Transmission Right of Way, North of Clevenger Road on pole	12.5 $\pm$ 0.8	11.4 $\pm$ 1.0	15.2 $\pm$ 1.0	11.7 $\pm$ 0.6
36	Substation #205, Route 104, East of Ontario Center Road, North side of fence	11.9 $\pm$ 0.7	9.8 $\pm$ 0.9	13.1 $\pm$ 0.7	10.2 $\pm$ 1.0
37	Rail Road Avenue, pole at 2048	11.0 $\pm$ 0.8	8.6 $\pm$ 0.7	12.4 $\pm$ 0.6	9.6 $\pm$ 0.6
38	Fisher Road at RR Tracks, pole East of road	13.1 $\pm$ 1.0	10.2 $\pm$ 0.8	14.6 $\pm$ 0.7	11.3 $\pm$ 0.8
39	Seeley Road, Pole South side 100' West of intersection with Stony Lonesome Road	12.6 $\pm$ 1.6	10.6 $\pm$ 0.9	14.3 $\pm$ 0.7	10.8 $\pm$ 0.7
40	Lake Road at Stoney Lonesome Road, pole at SE corner	12.0 $\pm$ 0.9	9.1 $\pm$ 1.1	12.9 $\pm$ 0.9	9.4 $\pm$ 0.9

1 - Control Location

\* - The Dosimeter was missing at the time of collection and suspected to have been removed by vandals during the sampling period. Accordingly, no direct radiation data could be collected at this location for this sampling period.

**TABLE B-13**  
**Groundwater Monitoring Wells**

Location	Sample Date	Tritium
AVT, S. 13'	03/17/09	*
	06/09/09	*
	09/10/09	*
	12/18/09	*
AVT, M. 17'	03/17/09	*
	06/09/09	*
	09/10/09	*
	12/18/09	*
AVT, N. 6'	03/17/09	*
	06/09/09	*
	09/10/09	*
	12/18/09	*
Screen House East, N. 24' <sup>1</sup>	03/17/09	*
	06/09/09	*
	09/10/09	*
	11/10/09	*
Screen House East, M. 20' <sup>1</sup>	03/17/09	*
	06/09/09	*
	09/10/09	*
	11/10/09	*
Screen House East, So. 15.5' <sup>1</sup>	03/17/09	*
	06/09/09	*
	09/10/09	*
	11/10/09	*
Screen House West	03/17/09	*
	06/09/09	*
	09/10/09	*
	11/10/09	*
	11/18/09	*
CSB, 24'	03/17/09	*
	06/09/09	*
	09/10/09	*
	12/18/09	*

## **APPENDIX C**

### **Quality Assurance Program**

#### **Summary of Appendix C Content:**

Appendix C is a summary of Constellation Energy Laboratory's quality assurance program for 2009. It consists of Table C-1 which is a compilation of the results of the Constellation Energy Laboratory's participation in an intercomparison program with Environmental Resource Associates (ERA) located in Arvada, Colorado and Analytics, Inc. located in Atlanta, Georgia. It also includes Table C-2 which is a compilation of the results of the Constellation Energy Laboratory's participation in a split sample program with Teledyne Brown Engineering located in Knoxville, Tennessee and Table C-3 which is a list of typical MDA's achieved by Teledyne Brown for Gamma Spectroscopy.

All the Constellation Energy Laboratory's results contained in Table C-1 generally agree with the intercomparison laboratory's results within the range of  $\pm 2 \sigma$  of each other. In addition, all but two sets of intercomparison results in the table are in full agreement when they were further evaluated using the NRC Resolution Test Criteria<sup>1</sup>. The two sets in question were the Ba-133 and Cs-137 results, which were part of the April 6, 2009 performance standard obtained from ERA. An investigation into the matter revealed that the discrepancies between the results may have been due to a dilution error in preparing the sample for counting; but more probably were due to errors on the part of ERA in preparing the original standard. The uncertainties for the Constellation Energy Laboratory's results and Analytics' results are  $\pm 2\sigma$  while the ERA laboratory's uncertainty is based on USEPA guidelines<sup>2</sup>.

All the results contained in Table C-2 agree within the range of  $\pm 2 \sigma$  of each other with their respective Constellation Energy Laboratory original, replicate and/or Teledyne Brown Engineering's split laboratory samples, except for the comparisons of four samples involving Cs-137 results: vegetation samples from Ib3, Ib6, and Ib9 collected 7/27/2009 and a fish sample from Ia5 collected on 8/23/2009. In all four cases low levels of Cs-137 were observed in one of the results of the comparison set and not observed in the other two. These minor discrepancies, occurring very close to or below the analyses MDA's, are most probably due to counting statistical fluctuations and/or the non-homogeneous nature of the sample-splitting process. Other samples whose nature generally precludes sample splitting are marked "\*\*\*" in the Split Analysis column.

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<sup>1</sup> NRC Inspection Manual, Inspection Procedure 84750, March 15, 1994

<sup>2</sup> National Standards for Water Proficiency Testing Studies Criteria Document, December 1998

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**TABLE C-1**  
**Results of Participation in Cross Check Programs**

Sample Date	Sample Type and Units	Isotope Observed	Reported Laboratory's Results <sup>1</sup>	Cross Check Lab Results <sup>1</sup>
3/19/09	Milk-pCi/L	I-131	77±14	79±1
		Cs-134	81±6	94±2
		Cs-137	110±11	111±2
		Ce-141	92±11	95±2
		Cr-51	255±67	305±5
		Mn-54	135±12	128±2
		Co-58	123±12	119±2
		Fe-59	108±15	100±2
		Co-60	151±10	142±2
		Zn-65	171±23	156±3
3/19/09	Charcoal Cartridge-pCi	I-131	87±7	80±1
3/19/09	Water-pCi/L	Gross β	212±3	203±3
3/20/09	Filter-pCi/Filter	Gross β	70±2	66±1
4/06/09	Water-pCi/L	Ba-133	32±4	53±5
		Co-60	60±4	89±9
		Cs-134	44±3	73±7
		Cs-137	110±6	168±19
		Zn-65	64±8	84±8
4/06/09	Water-pCi/L	I-131	26±5	26±6
6/18/09	Water-pCi/L	I-131	83±25	88±1
		Cs-134	119±8	126±2
		Cs-137	147±13	146±2
		Ce-141	206±21	216±4
		Co-58	70±12	70±1
		Fe-59	99±16	93±2
		Cr-51	301±77	304±5
		Co-60	250±13	237±4
		Mn-54	102±12	104±2
		Zn-65	141±24	133±2

<sup>1</sup> See discussion at the beginning of the Appendix.

**TABLE C-1 - Continued**  
**Results of Quality Assurance Program**

Sample Date	Sample Type and Units	Isotope Observed	Reported Laboratory's Results <sup>1</sup>	Cross Check Lab Results <sup>1</sup>
6/18/09	Filter-pCi/Filter	Ce-141	178±9	163±3
		Cr-51	265±48	236±4
		Cs-134	83±5	98±2
		Cs-137	117±9	113±2
		Mn-54	82±7	81±1
		Fe-59	78±11	72±1
		Zn-65	120±15	103±2
		Co-60	190±8	184±3
		Co-58	51±7	54±1
8/14/09	Water-µCi/L	H-3	1.00	1.09
9/17/09	Filter-pCi/Filter	Gross β	77±2	75±1
9/21/09	Filter-pCi/Filter	Cs-134	502±14	524±183
		Cs-137	464±17	405±101
		Zn-65	616±35	409±151
		Co-60	802±18	694±157
10/05/09	Water-pCi/L	I-131	25±6	22±4
12/10/09	Charcoal Cartridge-pCi	I-131	121±7	94±2
12/10/09	Milk-pCi/L	I-131	96±30	87±1
		Ce-141	195±17	202±3
		Cr-51	523±93	548±9
		Cs-134	215±8	253±4
		Cs-137	183±14	179±3
		Co-58	194±15	211±4
		Mn-54	177±13	178±3
		Fe-59	187±20	178±3
		Zn-65	369±30	345±6
		Co-60	253±12	256±4

<sup>1</sup> See discussion at the beginning of the Appendix

**TABLE C-1 - Continued**

**Results of Quality Assurance Program**

Sample Date	Sample Type and Units	Isotope Observed	Reported Laboratory's Results <sup>1</sup>	Cross Check Lab Results <sup>1</sup>
12/10/09	Water-pCi/L	Gross $\beta$	257 $\pm$ 3	230 $\pm$ 4
12/10/09	Filter-pCi/Filter	Ce-141	96 $\pm$ 6	83 $\pm$ 1
		Cr-51	281 $\pm$ 43	225 $\pm$ 4
		Cs-134	90 $\pm$ 6	104 $\pm$ 2
		Cs-137	83 $\pm$ 7	73 $\pm$ 1
		Co-58	93 $\pm$ 8	87 $\pm$ 1
		Mn-54	81 $\pm$ 7	73 $\pm$ 1
		Fe-59	83 $\pm$ 10	73 $\pm$ 1
		Zn-65	170 $\pm$ 17	141 $\pm$ 2
		Co-60	111 $\pm$ 7	105 $\pm$ 2

<sup>1</sup> See discussion at the beginning of the Appendix

**TABLE C-2**

**Results of Quality Assurance Program**

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
				$10^{-2}$ pCi/m <sup>3</sup>	
Air Iodine-SFA3	1/5/09	I-131	<MDA	<MDA	**
Air Iodine-SFA4	1/5/09	I-131	<MDA	<MDA	**
Air Filter -A1	1/5/09	Beta	3.1±0.3	2.9±0.3	**
Air Filter -A2	1/5/09	Beta	2.9±0.2	3.0±0.3	**
Air Filter -A3	1/5/09	Beta	3.4±0.3	3.2±0.3	**
Air Filter -A4	1/5/09	Beta	2.7±0.2	2.7±0.2	**
Air Filter -A5	1/5/09	Beta	2.6±0.2	2.5±0.2	**
Air Filter -SFA1	1/5/09	Beta	2.9±0.3	3.1±0.3	**
Air Filter -SFA2	1/5/09	Beta	6.0±0.5	5.5±0.5	**
Air Filter -SFA3	1/5/09	Beta	2.7±0.2	2.7±0.3	**
Air Filter -SFA4	1/5/09	Beta	2.7±0.3	2.7±0.2	**
				$10^{-2}$ pCi/m <sup>3</sup>	
Air Filter-A1	2/8/09	Beta	2.9±0.3	3.1±0.3	**
Air Filter-A2	2/8/09	Beta	2.1±0.2	2.0±0.2	**
Air Filter-A3	2/8/09	Beta	2.9±0.3	3.0±0.3	**
Air Filter-A4	2/8/09	Beta	2.4±0.3	2.5±0.3	**
Air Filter-A5	2/8/09	Beta	2.4±0.2	2.4±0.2	**
Air Filter-SFA1	2/8/09	Beta	2.8±0.3	2.7±0.3	**
Air Filter-SFA2	2/8/09	Beta	2.7±0.3	2.6±0.3	**
Air Filter-SFA3	2/8/09	Beta	2.7±0.3	2.8±0.3	**
Air Filter-SFA4	2/8/09	Beta	2.4±0.2	2.8±0.3	**
Air Iodine-A1	2/8/09	I-131	<MDA	<MDA	**
Air Iodine-A2	2/8/09	I-131	<MDA	<MDA	**
				pCi/L	
Bay Water-Wa2	2/27/09	Gamma	<MDA	<MDA	<MDA
				$10^{-2}$ pCi/m <sup>3</sup>	
Air Filter-A1	3/09/09	Beta	3.7±0.3	3.2±0.3	**

\*\* The nature of these samples precluded splitting them with an independent laboratory.

**TABLE C-2 - Continued**  
**Results of Quality Assurance Program**

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
				$10^{-2}$ pCi/m <sup>3</sup>	
Air Filter-A2	3/9/09	Beta	3.4±0.3	3.0±0.3	**
Air Filter-A3	3/9/09	Beta	4.7±0.4	4.3±0.3	**
Air Filter-A4	3/9/09	Beta	3.4±0.3	3.2±0.3	**
Air Filter-A5	3/9/09	Beta	3.2±0.3	2.8±0.3	**
Air Filter-SFA1	3/9/09	Beta	3.6±0.3	3.3±0.3	**
Air Filter-SFA2	3/9/09	Beta	3.9±0.3	3.6±0.3	**
Air Filter-SFA3	3/9/09	Beta	3.5±0.3	3.3±0.3	**
Air Filter-SFA4	3/9/09	Beta	3.2±0.3	3.3±0.3	**
Air Iodine-A1	3/9/09	I-131	<MDA	< MDA	**
Air Iodine-A2	3/9/09	I-131	< MDA	< MDA	**
				pCi/Kg	
Oysters-Ia3	3/25/09	Gamma	<MDA	<MDA	<MDA
				$10^{-2}$ pCi/m <sup>3</sup>	
Air Filter-A1	4/06/09	Beta	1.2±0.2	1.4±0.2	**
Air Filter-A2	4/06/09	Beta	1.2±0.3	1.4±0.3	**
Air Filter-A3	4/06/09	Beta	1.5±0.3	1.5±0.3	**
Air Filter-A4	4/06/09	Beta	1.1±0.2	1.2±0.2	**
Air Filter-A5	4/06/09	Beta	1.1±0.2	1.0±0.2	**
Air Filter-SFA1	4/06/09	Beta	1.2±0.3	1.4±0.3	**
Air Filter-SFA2	4/06/09	Beta	1.5±0.3	1.9±0.3	**
Air Filter-SFA3	4/06/09	Beta	1.0±0.2	1.3±0.2	**
Air Filter-SFA4	4/06/09	Beta	1.1±0.2	1.3±0.2	**
				$10^{-2}$ pCi/m <sup>3</sup>	
Air Iodine-A4	4/06/09	I-131	<MDA	<MDA	**
Air Iodine-A5	4/06/09	I-131	<MDA	<MDA	**

\*\* The nature of these samples precluded splitting them with an independent laboratory.

**TABLE C-2 - Continued**  
**Results of Quality Assurance Program**

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
				$10^{-2}$ pCi/m <sup>3</sup>	
Air Filters-A1	4/15/09	Gamma	<MDA	<MDA	<MDA
Air Filters-A2	4/15/09	Gamma	<MDA	<MDA	<MDA
Air Filters-A3	4/15/09	Gamma	<MDA	<MDA	<MDA
Air Filters-A4	4/15/09	Gamma	<MDA	<MDA	<MDA
Air Filters-A5	4/15/09	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA1	4/15/09	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA2	4/15/09	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA3	4/15/09	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA4	4/15/09	Gamma	<MDA	<MDA	<MDA
				$10^{-2}$ pCi/m <sup>3</sup>	
Air Iodine-A1	5/04/09	I-131	<MDA	<MDA	**
Air Iodine-A2	5/04/09	I-131	<MDA	<MDA	**
Air Filter-A1	5/04/09	Beta	1.3±0.2	1.6±0.2	**
Air Filter-A2	5/04/09	Beta	1.3±0.2	1.4±0.2	**
Air Filter-A3	5/04/09	Beta	1.5±0.2	1.6±0.2	**
Air Filter-A4	5/04/09	Beta	2.2±0.4	2.6±0.4	**
Air Filter-A5	5/04/09	Beta	1.9±0.2	2.0±0.2	**
Air Filter-SFA1	5/04/09	Beta	1.9±0.3	1.9±0.3	**
Air Filter-SFA2	5/04/09	Beta	2.0±0.3	2.0±0.3	**
Air Filter-SFA3	5/04/09	Beta	2.5±0.3	2.5±0.3	**
Air Filter-SFA4	5/04/09	Beta	1.9±0.3	1.9±0.3	**
				pCi/Kg	
Soil-SFS1	5/24/09	Gamma	<MDA	<MDA	<MDA
Soil-SFS5	5/24/09	Cs-137	191±47	239±44	239±72
Vegetation-SFB1	5/24/09	Gamma	<MDA	<MDA	<MDA
Vegetation-SFB5	5/24/09	Gamma	<MDA	<MDA	<MDA

\*\* The nature of these samples precluded splitting them with an independent laboratory.

**TABLE C-2 - Continued**

**Results of Quality Assurance Program**

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
				pCi/L	
Bay Water-Wa2	5/29/09	Gamma	MDA	MDA	MDA
				10 <sup>-2</sup> pCi/m <sup>3</sup>	
Air Iodine-SFA2	6/8/09	I-131	<MDA	<MDA	**
Air Iodine-SFA3	6/8/09	I-131	<MDA	<MDA	**
				10 <sup>-2</sup> pCi/m <sup>3</sup>	
Air Filter-A1	6/8/09	Beta	1.0±0.2	1.0±0.2	**
Air Filter-A2	6/8/09	Beta	1.1±0.2	1.1±0.2	**
Air Filter-A3	6/8/09	Beta	1.0±0.2	1.0±0.2	**
Air Filter-A4	6/8/09	Beta	1.5±0.2	1.5±0.3	**
Air Filter-A5	6/8/09	Beta	1.6±0.2	1.5±0.2	**
Air Filter-SFA1	6/8/09	Beta	1.7±0.3	1.7±0.3	**
Air Filter-SFA2	6/8/09	Beta	1.4±0.3	1.3±0.3	**
Air Filter-SFA3	6/8/09	Beta	1.3±0.2	1.3±0.3	**
Air Filter-SFA4	6/8/09	Beta	1.2±0.2	1.1±0.2	**
				pCi/Kg	
Oysters-Ia3	6/25/09	Gamma	<MDA	<MDA	<MDA
				pCi/Kg	
Shoreline Wb1	6/30/09	Gamma	<MDA	<MDA	<MDA
				mR/90 Days	
DR05	7/01/09	TLD	14.38±2.02	13.82±1.72	**
DR06	7/01/09	TLD	12.74±1.81	13.34±1.33	**
DR07	7/01/09	TLD	12.64±0.51	13.38±0.39	**
DR08	7/01/09	TLD	17.58±1.66	19.91±1.08	**
DR09	7/01/09	TLD	13.71±0.96	14.25±1.99	**
DR10	7/01/09	TLD	12.55±0.98	13.85±0.86	**
DR11	7/01/09	TLD	12.41±0.76	12.05±1.28	**
SFDR14	7/01/09	TLD	18.20±2.58	20.33±1.39	**
SFDR15	7/01/09	TLD	22.16±4.31	24.85±4.72	**

\*\* The nature of these samples precluded splitting them with an independent laboratory.

**TABLE C-2 - Continued**

**Results of Quality Assurance Program**

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
				mR/90 Days	
DR29	7/01/09	TLD	17.33±1.63	17.22±0.86	**
DR31	7/01/09	TLD	18.26±0.74	17.87±1.23	**
				10 <sup>-2</sup> pCi/m <sup>3</sup>	
Air Filter-A1	7/06/09	Beta	1.6±0.3	1.7±0.3	**
Air Filter-A3	7/06/09	Beta	1.6±0.3	1.8±0.3	**
Air Filter-A4	7/06/09	Beta	1.8±0.3	2.1±0.3	**
Air Filter-A5	7/06/09	Beta	2.2±0.3	1.8±0.3	**
Air Filter-SFA1	7/06/09	Beta	2.1±0.3	1.8±0.3	**
Air Filter-SFA2	7/06/09	Beta	1.9±0.3	1.3±0.2	**
Air Filter-SFA3	7/06/09	Beta	1.7±0.3	2.0±0.4	**
Air Filter-SFA4	7/06/09	Beta	1.8±0.3	1.4±0.3	**
Air Iodine-A1	7/02/09	I-131	<MDA	<MDA	**
Air Iodine-SFA1	7/02/09	I-131	<MDA	<MDA	**
				pCi /kg	
Vegetation-Ib1	7/27/09	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib3	7/27/09	Cs-137	10±7	<MDA	<MDA
Vegetation-Ib4	7/27/09	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib6	7/27/09	Cs-137	<MDA	12±9	<MDA
Vegetation-Ib7	7/27/09	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib9	7/27/09	Cs-137	<MDA	7±6	<MDA
				10 <sup>-2</sup> pCi/m <sup>3</sup>	
Air Filter-A1	8/10/09	Beta	2.6±0.3	2.4±0.3	**
Air Filter-A2	8/10/09	Beta	1.9±0.2	1.8±0.2	**
Air Filter-A3	8/10/09	Beta	2.2±0.3	2.2±0.2	**

\*\* The nature of these samples precluded splitting them with an independent laboratory.

TABLE C-2 - Continued

Results of Quality Assurance Program

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
$10^{-2}$ pCi/m <sup>3</sup>					
Air Filter-A4	8/10/09	Beta	2.6±0.3	2.9±0.3	**
Air Filter-A5	8/10/09	Beta	5.3±0.5	5.8±0.5	**
Air Filter-SFA1	8/10/09	Beta	3.6±0.4	3.9±0.4	**
Air Filter-SFA2	8/10/09	Beta	3.0±0.3	3.2±0.3	**
Air Filter-SFA3	8/10/09	Beta	2.5±0.2	3.0±0.3	**
Air Filter-SFA4	8/10/09	Beta	2.5±0.3	2.6±0.3	**
$10^{-2}$ pCi/m <sup>3</sup>					
Air Iodine-A1	8/06/09	I-131	<MDA	<MDA	**
Air Iodine-A5	8/06/09	I-131	<MDA	<MDA	**
pCi/kg					
Fish-Ia5 <sup>1</sup>	8/23/09	Gamma	<MDA	14±6	<MDA
pCi/L					
Vegetation-Ib1	8/24/09	Gamma	<MDA	<MDA	<MDA
Vegetation-Ib4	8/24/09	Gamma	29±19	51±25	67±14
Vegetation-Ib8	8/24/09	Gamma	<MDA	<MDA	<MDA
pCi/L					
Bay Water-Wa2	8/31/09	Gamma	<MDA	<MDA	**
$10^{-2}$ pCi/m <sup>3</sup>					
Air Iodine-A3	9/04/09	I-131	<MDA	<MDA	**
Air Iodine-A4	9/04/09	I-131	<MDA	<MDA	**
Air Filter-A1	10/05/09	Beta	1.9±0.2	1.8±0.2	**
Air Filter-A2	10/05/09	Beta	1.5±0.2	1.5±0.2	**
Air Filter-A3	10/05/09	Beta	1.9±0.2	1.8±0.2	**
Air Filter-A4	10/05/09	Beta	2.9±0.3	2.9±0.3	**
Air Filter-A5	10/05/09	Beta	1.9±0.2	1.9±0.2	**
Air Filter-SFA1	10/05/09	Beta	2.4±0.3	2.5±0.3	**
Air Filter-SFA2	10/05/09	Beta	2.3±0.2	2.2±0.2	**
Air Filter-SFA3	10/05/09	Beta	3.4±0.4	3.6±0.4	**
Air Filter-SFA4	10/05/09	Beta	2.1±0.2	2.1±0.2	**

<sup>1</sup> See Discussion at beginning of Appendix

**TABLE C-2 - Continued**  
**Results of Quality Assurance Program**

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
<hr/> $10^{-3}$ pCi/m <sup>3</sup> <hr/>					
Air Filters-A1	9/14/09	Gamma	<MDA	<MDA	<MDA
Air Filters-A2	9/14/09	Gamma	<MDA	<MDA	<MDA
Air Filters-A3	9/14/09	Gamma	<MDA	<MDA	<MDA
Air Filters-A4	9/14/09	Gamma	<MDA	<MDA	<MDA
Air Filters-A5	9/14/09	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA1	9/14/09	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA2	9/14/09	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA3	9/14/09	Gamma	<MDA	<MDA	<MDA
Air Filters-SFA4	9/14/09	Gamma	<MDA	<MDA	<MDA
<hr/> $10^{-2}$ pCi/m <sup>3</sup> <hr/>					
Air Iodine-A1	10/08/09	I-131	<MDA	<MDA	**
Air Iodine-A2	10/08/09	I-131	<MDA	<MDA	**
<hr/> $10^{-2}$ pCi/m <sup>3</sup> <hr/>					
Air Filter-A1	10/19/09	Beta	1.7±0.2	1.7±0.2	**
Air Filter-A2	10/19/09	Beta	1.2±0.2	1.2±0.2	**
Air Filter-A3	10/19/09	Beta	1.4±0.2	1.3±0.2	**
Air Filter-A4	10/19/09	Beta	2.1±0.3	2.2±0.4	**
Air Filter-A5	10/19/09	Beta	1.3±0.2	1.3±0.2	**
Air Filter-SFA1	10/19/09	Beta	1.9±0.3	2.1±0.4	**
Air Filter-SFA2	10/19/09	Beta	1.9±0.3	2.0±0.3	**
Air Filter-SFA3	10/19/09	Beta	3.3±0.6	3.5±0.6	**
Air Filter-SFA4	10/19/09	Beta	1.9±0.3	1.8±0.3	**
<hr/> mR/90 Days <hr/>					
DR05	10/01/09	TLD	12.14±1.06	13.39±0.80	**
DR06	10/01/09	TLD	10.24±0.66	11.66±1.20	**
DR07	10/01/09	TLD	10.41±1.31	11.47±1.19	**
DR08	10/01/09	TLD	14.98±1.31	16.62±1.34	**
DR09	10/01/09	TLD	11.11±1.23	13.41±0.93	**
DR10	10/01/09	TLD	10.42±0.97	11.12±2.30	**
DR11	10/01/09	TLD	10.69±1.55	11.04±1.75	**
SFDR14	10/01/09	TLD	16.72±1.50	15.74±2.50	**
SFDR15	10/01/09	TLD	20.72±4.62	22.37±4.98	**

**TABLE C-2 – Continued**

**Results of Quality Assurance Program**

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
				mR/90 Days	
DR29	10/01/09	TLD	15.01±0.71	15.08±1.92	**
DR31	10/01/09	TLD	15.56±1.38	16.36±1.88	**
				pCi/Kg	
Bottom Sediment Wbs2	10/29/09	Cs-137	279±57	346±72	**
				10 <sup>-2</sup> pCi/m <sup>3</sup>	
Air Filter-A1	11/08/09	Beta	2.6±0.3	2.5±0.3	**
Air Filter-A2	11/08/09	Beta	2.1±0.3	2.2±0.3	**
Air Filter-A3	11/08/09	Beta	2.9±0.4	2.8±0.4	**
Air Filter-A4	11/08/09	Beta	4.1±0.5	4.2±0.5	**
Air Filter-A5	11/08/09	Beta	2.2±0.3	2.3±0.2	**
Air Filter-SFA1	11/08/09	Beta	2.8±0.4	3.1±0.4	**
Air Filter-SFA2	11/08/09	Beta	2.6±0.3	2.7±0.3	**
Air Filter-SFA3	11/08/09	Beta	8.8±1.1	9.4±1.2	**
Air Filter-SFA4	11/08/09	Beta	2.7±0.4	2.5±0.4	**
				10 <sup>-2</sup> pCi/m <sup>3</sup>	
Air Iodine-A3	11/06/09	I-131	<MDA	<MDA	**
Air Iodine-A5	11/06/09	I-131	<MDA	<MDA	**
				pCi/L	
Bay Water-Wa2	11/30/09	Gamma	<MDA	<MDA	<MDA
				pCi/Kg	
Vegetation- SFB2	11/30/09	Gamma	<MDA	<MDA	<MDA
Vegetation- SFB5	11/30/09	Gamma	<MDA	<MDA	<MDA
Soil-SFS2	11/30/09	Cs-137	104±39	57±41	88±57
Soil-SFS5	11/30/09	Cs-137	301±60	271±43	329±54

**TABLE C-2 - Continued**  
**Results of Quality Assurance Program**

Sample Type And Location	Sample Date	Type of Analysis	Original Analysis	Replicate Analysis	Split Analysis
			$10^{-2}$ pCi/m <sup>3</sup>		
Air Filter-A1	12/07/09	Beta	1.8±0.2	1.5±0.2	**
Air Filter-A2	12/07/09	Beta	1.4±0.2	1.7±0.2	**
Air Filter-A4	12/07/09	Beta	3.7±0.6	3.9±0.6	**
Air Filter-A5	12/07/09	Beta	1.6±0.2	1.5±0.2	**
Air Filter-SFA1	12/07/09	Beta	1.3±0.2	1.5±0.2	**
Air Filter-SFA2	12/07/09	Beta	2.0±0.3	2.1±0.3	**
Air Filter-SFA3	12/07/09	Beta	1.9±0.2	1.9±0.2	**
Air Filter-SFA4	12/07/09	Beta	1.6±0.3	1.5±0.2	**
			$10^{-2}$ pCi/m <sup>3</sup>		
Air Iodine-A1	12/03/09	I-131	<MDA	<MDA	**
Air Iodine-A2	12/03/09	I-131	<MDA	<MDA	**
			pCi/L		
Bay Water- Wa2	12/31/09	Gamma	<MDA	**	<MDA

\*\* The nature of these samples precluded splitting them with an independent laboratory.

**TABLE C-3**

**Teledyne Brown Engineering's Typical MDAs for Gamma Spectrometry**

Selected Nuclides	Bay Water pCi/l	Fish pCi/kg	Shellfish pCi/kg	Sediment pCi/kg	Vegetation pCi/kg	Particulates 10 <sup>-3</sup> pCi/m <sup>3</sup>
H-3	175	--	--	--	--	--
Na-22	1	8	3	12	6	5
Cr-51	12	105	4	104	50	63
Mn-54	1	9	3	12	5	4
Co-58	1	9	4	9	4	5
Fe-59	3	28	9	24	10	12
Co-60	1	9	4	12	5	6
Zn-65	2	20	8	25	10	9
Nb-95	1	12	7	14	6	9
Zr-95	2	18	8	20	9	9
Ru-106	9	75	30	90	41	40
Ag-110m	1	10	10	10	5	4
Te-129m	16	131	60	162	79	95
I-131	4	65	30	35	22	74
Cs-134	1	8	4	10	5	4
Cs-137	1	9	4	10	5	4
BaLa-140	3	32	15	25	14	36
Ce-144	7	40	16	54	26	18

## **APPENDIX D**

### **Land Use Survey**

#### **Summary of Appendix D Content:**

Appendix D contains the results of a Land Use Survey conducted around R.E. Ginna Nuclear Power Plant during this operating period. A table listing the raw data of this survey and a discussion of the results are included in this appendix.

**APPENDIX D**  
**Land Use Survey**

**Discussion**

A Land Use Survey was conducted to identify the location of the nearest milk animal, the nearest residence, and the nearest garden greater than 50 square meters in each of the nine sectors within a 5-mile radius of the power plant. A detailed description of the Land Use Survey is given in a separate document (Ref. 4). The position of the nearest residence and garden and animals producing milk for human consumption in each sector is provided in Table D-1.

**Table D-1**  
**Land Use Survey Distances**

<b>Sector</b>	<b>Distance to Nearest Residence</b>	<b>Distance to Nearest Garden</b>	<b>Distance to Milk Producing Animals</b>
E	1170 m	580 m Onsite Supplemental Garden	N/A
ESE	1660 m	390 m Onsite Garden	N/A
SE	570 m	N/A	8270 m
SSE	610 m	620 Onsite Supplemental Garden	N/A
S	1500 m	N/A	N/A
SSW	620 m	N/A	N/A
SW	740 m	N/A	N/A
WSW	1470 m	N/A	N/A
W	2420 m	N/A	N/A

The closest residence is situated in the SE sector (570 meters from the power plant), the nearest garden is in the ESE sector (390 meters), and the nearest milk producing animals was in the SE sector (8,270 meters).

**Changes from Previous Years:**

The following land use changes have occurred over the within a 5-mile radius of the power plant:

- Some homes/buildings were demolished on R.E. Ginna Nuclear Power Plant property in late 2008/early 2009.

- Distances to all “nearest residences” were reevaluated and re-measured in all sectors using improved mapping and measurement techniques (handheld Global Positioning System (GPS) and Google Earth software). Distances were found to be different from the previous reporting years, with the revised directions and distances noted in the above table. Condition Report No. CR-2009-007273 was issued to document this change in the site’s Corrective Action Process.
- The pace of the development of single family homes has slowed compared to previous years.
- No new agricultural land use was identified.
- No new food producing facilities were identified.

**Milk Animal Locations:**

The milk animal location with a 5-mile radius of the power plant are as follows:

- Eaton Farm -- 6747 Salmon Creek Road, Williamson, NY
- No new milk producing animals were identified in the 2009 Census.