Enclosure (1)

2011 Annual Radioactive Effluent Release Report
Including
Revision 27 of the Offsite Dose Calculation Manual

2011

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

R. E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

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1.0 INTRODUCTION

This Annual Radioactive Effluent Release Report is for the R.E. Ginna Nuclear Power Plant (Ginna) and is submitted in accordance with the requirements of Technical Specification Section 5.6.3. The report covers the period from January 1, 2011 through December 31, 2011.

This report includes a summary of the quantities of radioactive gaseous and liquid effluents and solid waste released from the plant presented in the format outlined in Appendix B of Regulatory Guide 1.21, Revision 1, June, 1974.

All gaseous and liquid effluents discharged during this reporting period were in compliance with the limits of the R.E. Ginna Technical Specifications as defined in the Offsite Dose Calculation Manual (ODCM).

2.0 SUPPLEMENTAL INFORMATION

2.1 Regulatory Limits

The ODCM limits applicable to the release of radioactive material in liquid and gaseous effluents are:

2.1.1 Fission and Activation Gases

The instantaneous dose rate, as calculated in the ODCM, due to noble gases released in gaseous effluents from the site shall be limited to a release rate that would yield $\leq$ 500 mrem/yr to the total body and $\leq$ 3000 mrem/yr to the skin if allowed to continue for a full year.

The air dose, as calculated in the ODCM, due to noble gases released in gaseous effluents from the site shall be limited to the following:

(i) During any calendar quarter to $\leq$ 5 mrad for gamma radiation and to $\leq$ 10 mrad for beta radiation.

(ii) During any calendar year to $\leq$ 10 mrad for gamma radiation and to $\leq$ 20 mrad for beta radiation.

2.1.2 Radioiodine, Tritium and Particulates

The instantaneous dose rate, as calculated in the ODCM, due to radioactive materials released in gaseous effluents from the site as radioiodines,

radioactive materials in particulate form, and radionuclides other than noble gases with half-lives greater than 8 days shall be limited to a release rate that would yield ≤ 1500 mrem/yr to any organ if allowed to continue for a full year.

Dose to an individual, from radioiodine, radioactive materials in particulate form and radionuclides other than noble gases with half-lives greater than eight days released with gaseous effluents is calculated in accordance with ODCM methodology. The dose to an individual shall be limited to:

(i) During any calendar quarter to ≤ 7.5 mrem to any organ.

(ii) During any calendar year to ≤ 15 mrem to any organ.

2.1.3 Liquid Effluents

The release of radioactive liquid effluents shall be such that the concentration in the circulating water discharge does not exceed the limits specified in accordance with Appendix B, Table II, Column 2 and notes thereto of 10CFR20, as explained in Section 1 of the ODCM. For dissolved or entrained noble gases the total activity due to dissolved or entrained noble gases shall not exceed 2E-04 uCi/ml.

The dose or dose commitment to an individual from radioactive materials in liquid effluents released to unrestricted areas is calculated according to ODCM methodology and is limited to:

(i) During any calendar quarter to ≤ 1.5 mrem to the total body and to ≤ 5 mrem to any organ, and

(ii) During any calendar year to ≤ 3 mrem to the total body and to ≤ 10 mrem to any organ.

2.2 Effluent Concentration Limit (ECL)

2.2.1 For gaseous effluents, effluent concentration limits are not directly used in release rate calculations since the applicable limits are stated in terms of dose rate at the unrestricted area boundary, in accordance with Technical Specification 5.5.4.g.

2.2.2 For liquid effluents, ten times the effluent concentration values specified in 10CFR20, Appendix B, Table II, column 2, are used to calculate release rates and permissible concentrations at the unrestricted area boundary as

permitted by Technical Specification 5.5.4.b. A value of 2E-04 uCi/ml is used as the ECL for dissolved and entrained noble gases in liquid effluents.

2.3 Release Rate Limits Based on Average Nuclide Energy

The release rate limits for fission and activation gases from the R.E. Ginna Nuclear Power Plant are not based on the average energy of the radionuclide mixture in gaseous effluents; therefore, this value is not applicable. However the 2011 average beta/gamma energy of the radionuclide mixture in fission and activation gases released from Ginna is available for review upon request.

2.4 Measurements and Approximations of Total Radioactivity

Gamma spectroscopy was the primary analysis method used to determine the radionuclide composition and concentration of gaseous and liquid effluents. Composite samples were analyzed for Sr-89, Sr-90, and Fe-55 by a contract laboratory. Tritium and alpha analysis were performed using liquid scintillation and gas flow proportional counting respectively.

The total radioactivity in effluent releases was determined from the measured concentration of each radionuclide present and the total volume of effluents released.

2.5 Batch Releases

2.5.1 Liquid

1. Number of batch releases:	1.69 E+02
2. Total time period for batch releases:	2.33 E+04 min
3. Maximum time period for a batch release:	7.59 E+02 min
4. Average time period for batch releases:	1.38 E+02 min
5. Minimum time period for a batch release:	1.8 E+01 min
6. Average blowdown in liters per minute (LPM) during periods of effluent release into the discharge canal.	4.15 E+02 LPM

2.5.2 Gaseous

1. Number of batch releases:	5.0 E+01
2. Total time period for batch releases:	5.37 E+05 min
3. Maximum time period for a batch release:	4.46 E+04 min
4. Average time period for batch releases:	1.07 E+04 min
5. Minimum time period for a batch release:	2.60 E+01 min

2.6 Abnormal Releases

There were two abnormal releases that occurred during this reporting period. Both were unplanned gaseous releases. They are:

1. The contents of a Gas Decay Tank was unintentionally released into the Containment Building. The Containment Building ventilation to the Plant Ventilation was in-service at the time of unintentional release. The Plant Ventilation is a monitored pathway and no challenges to gaseous effluent release limits were observed. This event occurred on 4/24/2011 and permit number G-2011032 was created as a result. This event is documented in Ginna's corrective action program under CR-2011-002626.

2. A continuous air-sampler placed outside the Containment Building Equipment Hatch during the Refueling Outage yielded a positive result for radioactivity. The week of concern was 5/8 – 5/15/2011 and permit number G-2011041 was created as a result. This event is documented in Ginna's corrective action program under CR-2011-003654.

3.0 SUMMARY OF GASEOUS RADIOACTIVE EFFLUENTS

The quantities of radioactive material released in gaseous effluents are summarized in Tables 1A and 1B. Plant Vent and Containment Vent releases are modeled as mixed mode and the Air Ejector is modeled as ground level release.

4.0 SUMMARY OF LIQUID RADIOACTIVE EFFLUENTS

The quantities of radioactive material released in liquid effluents are summarized in tables 2A and 2B.

5.0 SOLID WASTE

The quantities of radioactive material released in shipments of solid waste transported from Ginna during the reporting period are summarized in Table 3. Principal nuclides were determined by gamma spectroscopy and non-gamma emitters were calculated from scaling factors determined by an independent laboratory from representative samples of that waste type. The majority of Dry Active Waste is processed utilizing an off-site processor that reduces the volume and then transports the waste to a permitted landfill for disposal.

6.0 LOWER LIMIT OF DETECTION

The required LLD per Table 2-1 of the ODCM were not satisfied for Auxiliary Building Ventilation on three occasions. They were:

1. The Auxiliary Building Ventilation continuous radioactive iodine monitor (R-10B) did not meet the required LLD on 5/10/2011. This is due to procedural requirements mandating the replacement of the Charcoal Cartridge upon receiving an alarm. The sample volume for this Charcoal Cartridge did not meet the statistical requirements necessary to achieve the appropriate LLD.

2. The Auxiliary Building Ventilation continuous radioactive particulate monitor (R-13) did not meet the required LLD on 5/12/2011. This can be attributed to the same reason noted in number 1.

3. The Auxiliary Building Ventilation continuous radioactive iodine monitor (R-10B) did not meeting the required LLD on 5/12/2011. This can be attributed to the same reason noted in number 1.

7.0 RADIOLOGICAL IMPACT

An assessment of doses to the hypothetical maximally exposed individual member of the public from gaseous and liquid effluents was performed for locations representing the maximum calculated dose in occupied sectors. Meteorological sectors from WNW through ENE are entirely over Lake Ontario. In all cases, doses were well below Technical Specification limits as defined in the ODCM. Doses were assessed based upon historical meteorological conditions considering the noble gas exposure, inhalation, ground plane exposure, and ingestion pathways. The ingestion pathways considered were the fruit, vegetable, fish, drinking water, goat's milk, cow's milk and cow meat pathways. Results of this assessment are presented in Tables 4A and 4B.

7.1 Total Dose

40CFR190 limits the total dose to members of the public due to radiation and radioactivity from uranium fuel cycle sources to:

≤ 25 mrem total body or any organ and;
≤ 75 mrem thyroid for a calendar year.

Using the maximum exposure and uptake pathways, the maximum liquid pathways, and the maximum direct radiation measurements at the site boundary, yield the following dose summaries to the hypothetical maximally exposed individual member of the public. Dose to any real member of the public should be conservatively bounded by this calculated dose.

- 12.4 mrem total body (12.4 mrem direct radiation plus 4.73E-02 mrem all other pathways).

- 2.41E-02 mrem maximum organ dose (Thyroid).

8.0 METEOROLOGICAL DATA

The annual summary of hourly meteorological data collected during 2011 is not included with this report, but can be made available at the R. E. Ginna Nuclear Power Plant.

9.0 LAND USE CENSUS CHANGES

In September 2011, 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. The Land Use Survey is conducted in accordance with Ginna procedures.

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

- The closest residential dwelling in the SE sector (1601 Lake Road) is no longer occupied. The new nearest residence is located in the SE sector, approximately 840 meters from the reactor.
- The Monroe County Water Authority (MCWA) continues construction of a new municipal water treatment facility on Lake Road between Salt Road and

Basket Road. While this facility not yet in service, its construction will be tracked and added to the REMP upon completion.

- The construction of two small subdivisions occurred on the south side of Boston Rd. (eastern end).
- The Summer Lake Subdivision expanded into its final construction phase, adding 14 additional homes.
- No new agricultural land use was identified.
- No new food producing facilities were identified.
- No new milk producing animals were identified.

10.0 CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

There was one change made to the ODCM during 2011. The change went into effect on May 3, 2011. This change is summarized as follows.

1. Section 2.1: This section was deleted to be consistent with ODCM Industry Best Practices and include the conservatism to restrict gas decay tank releases to ALARA in the Waste Gas Decay Tank release procedures.

2. Section 2.5: This change clarifies the wording to better describe and allow for the rare events/evolutions that create a release pathway that is not monitored by installed plant radiological monitoring instrumentation.

3. Table 3.2-1: The purpose of this change is to adopt the requirements outlined in Action 45 of Table 3.3-13 in NUREG-1301 that would allow the release of a Waste Gas Decay Tank with R-14 (Plant Vent Noble Gas Monitor) out-of-service.

4. Section 5.4.1: Editorial correction to change the referenced procedure from CHA-QC-INTERLAB to CH-QC-INTERLAB.

A copy of the latest revision of the ODCM is attached at the end of this report.

11.0 CHANGES TO THE PROCESS CONTROL PROGRAM

There were no changes to the Process Control Program during the reporting period.

12.0 MAJOR CHANGES TO RADWASTE TREATMENT SYSTEMS

There were no major changes to the Radwaste Treatment Systems during the reporting period.

13.0 INOPERABLE MONITORS

There were four occurrences satisfying the requirement stated in Section 3.3 and Table 3.3-1, Action 1 of the ODCM for reporting inoperable radiation monitors. Two occurrences surpassed 30-days of inoperability and two occurrences were inoperable for greater than 7 days and less than 30 days. They are:

1. Radiation Monitor R-14A, Channel 3, Plant Vent Iodine Accident Range Radiation Monitor, was inoperable for greater than 30 days. The special report was sent to the NRC on 8/2/2011 outlining cause of inoperability and actions taken to restore the monitor to operable.

2. Radiation Monitor R-14A, Channel 7, Plant Vent Mid Range Noble Gas Accident Monitor became inoperable on 8/29/2011. The radiation monitor discontinued working and subsequent troubleshooting failed. The monitor was returned to operable status on 9/9/2011 following monitor replacement. The duration of inoperability was 10 days.

3. Radiation Monitor R-14A, Channel 3, Plant Vent Iodine Accident Range Radiation Monitor became inoperable on 9/30/2011. The monitor failed to meet the source check range during the monthly surveillance. R-14A, Channel 3 was was subsequently calibrated and source check verified to be within acceptable range. The monitor was returned to operable status on 10/7/2011. The duration of the inoperability was 7 days.

4. Radiation Monitors R-31 and R-32, "A" and "B" Main Steam Radiation Monitors, respectively, were inoperable for greater than 30 days. The special report was sent to the NRC on 12/6/2011 outlining cause of inoperability and plan to restore the monitors to operable.

14.0 CHANGES TO PREVIOUS ANNUAL EFFLUENT OPERATING REPORTS

There was a transcriptional error identified in the 2007 Annual Radiological Effluent Release Report. Section 7.1, Total Dose, states the maximum organ dose as 4.86E-03 mrem and the total dose from all other pathways as 4.81E-03 mrem. These values are written backwards. The actual maximum organ dose is 4.81E-03 mrem and the dose from all other pathways is 4.86E-03 mrem.

15.0 GROUNDWATER MONITORING

In accordance with R. E. Ginna Nuclear Power Plant's Chemistry procedures, at a minimum, environmental groundwater monitoring wells are sampled quarterly. During 2011, Ginna sampled from 10 groundwater monitoring wells:

- GW01: Warehouse Access Road (Control)
- GW03: Screenhouse West, South Well
- GW04: Screenhouse West, North Well
- GW05: Screenhouse East, South (15.5')
- GW06: Screenhouse East, Middle (20.0')
- GW07: Screenhouse East, North (24.0')
- GW08: All Volatiles Treatment Building
- GW09: Technical Support Center, North
- GW10: Technical Support Center, South
- GW11: Contaminated Storage Building, SE (24.0')

Groundwater samples are analyzed for tritium to a detection limit of 500 pCi/L, and for gamma emitting radionuclides to the environmental LLDs. Results of the 10 groundwater monitoring well sampled in 2011 are presented in Table 5.

There were positive tritium results (> MDA) in GW03, GW04, GW09 and GW11 on 2/9/2011. Condition Report CR-2011-001113 was initiated in the Ginna Corrective Action Program and an Apparent Cause Evaluation was performed. The subsequent information was gathered regarding the positive results:

- GW03, GW09 and GW11 were re-sampled on 2/18/2011. The results indicated positive tritium concentrations.
- GW04 was not re-sampled due to ground surrounding well location being submerged in standing water due to inadequate ground gradient. It was determined the standing water compromised the integrity of the groundwater sample. Sampling of this well continued after the surrounding ground gradient was corrected to improve drainage in the area surrounding the groundwater well.
- GW03 was declared out of service due to the depth to water being 3 feet higher than adjacent groundwater monitoring well, GW04. The discrepancy in water height is indicative of a degraded well material condition.
- GW09 was declared out of service due to a significant amount of clay and silt observed in the sample. These conditions are indicative of well screen damage.
- The apparent cause of the positive results in February was a significant snow melt that occurred the week prior to groundwater well sampling. The snow contained tritium due to tritium recapture from the Auxiliary Building Plant Ventilation.

All other samples taken during 2011 did not indicate positive results for tritium.

Table 1A
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
January - June 2011

A. Fission & Activation Gases	Unit	Quarter 1st	Quarter 2nd	Est. Total Error, %
1. Total release	Ci	2.35E-01	1.58E+00	1.50E+01
2. Average release rate for period	uCi/sec	2.98E-02	2.01E-01	
3. Percent of technical specification limit	%	4.73E-06	3.19E-05	
B. Iodines				
1. Total iodine-131	Ci	6.03E-08	1.66E-04	1.50E+01
2. Average release rate for period	uCi/sec	7.65E-09	2.10E-05	
3. Percent of technical specification limit	%	1.66E-05	4.57E-02	
C. Particulates				
1. Particulates with half-lives > 8days	Ci		1.16E-03	1.50E+01
2. Average release rate for period	uCi/sec		1.47E-04	
3. Percent of technical specification limit	%			
4. Gross alpha radioactivity	Ci			
D. Tritium				
1. Total release	Ci	1.79E+01	2.18E+01	9.20E+00
2. Average release rate for period	uCi/sec	2.28E+00	2.77E+00	
3. Percent of technical specification limit	%	2.67E-04	3.24E-04	

Note: Isotopes for which no value is given were not identified in applicable releases.

Table 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

July - December 2011

A. Fission & Activation Gases	Unit	Quarter 3rd	Quarter 4th	Est. Total Error, %
1. Total release	Ci	2.77E-01	2.69E-01	1.50E+01
2. Average release rate for period	uCi/sec	3.51E-02	3.41E-02	
3. Percent of technical specification limit	%	5.57E-06	5.41E-06	
B. Iodines				
1. Total iodine-131	Ci			
2. Average release rate for period	uCi/sec			
3. Percent of technical specification limit	%			
C. Particulates				
1. Particulates with half-lives > 8days	Ci			
2. Average release rate for period	uCi/sec			
3. Percent of technical specification limit	%			
4. Gross alpha radioactivity	Ci			
D. Tritium				
1. Total release	Ci	2.32E-01	1.01E+01	9.20E+00
2. Average release rate for period	uCi/sec	2.94E+00	1.28E+00	
3. Percent of technical specification limit	%	3.44E-04	1.50E-04	

Note: Isotopes for which no value is given were not identified in applicable releases.

Table 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

GASEOUS EFFLUENTS - CONTINUOUS AND BATCH RELEASES

January - June 2011

		Continuous Mode		Batch Mode	
Nuclides released	Unit	Quarter	Quarter	Quarter	Quarter
		1st	2nd	1st	2nd
1. Fission gases					
argon-41	Ci		3.20E-01	9.35E-02	4.81E-02
krypton-85	Ci				
krypton-85m	Ci			2.01E-04	
krypton-87	Ci				
krypton-88	Ci				
xenon-131m	Ci				3.81E-04
xenon-133	Ci		1.07E+00	1.35E-01	8.92E-02
xenon-133m	Ci				1.43E-04
xenon-135	Ci		4.32E-02	6.76E-03	1.55E-02
xenon-135m	Ci				
xenon-138	Ci				
others (specify)	Ci				
	Ci				
Total for period	Ci		1.43E+00	2.35E-01	1.53E-01
2. Iodines					
iodine-131	Ci		1.66E-04	6.03E-08	1.80E-08
iodine-132	Ci				
iodine-133	Ci				
iodine-135	Ci				
Total for period	Ci		1.66E-04	6.03E-08	1.80E-08
3. Particulates					
strontium-89	Ci				
strontium-90	Ci				
cesium-137	Ci				
cobalt-57	Ci		1.28E-06		
cobalt-58	Ci		1.07E-03		
cobalt-60	Ci		9.23E-05		5.24E-09
unidentified	Ci				
Total for period	Ci		1.16E-03	0.00E+00	5.24E-09
4. Tritium					
Hydrogen-3	Ci	1.79E+01	2.18E+01	1.47E-02	1.48E-02

Note: Isotopes for which no value is given were not identified in applicable releases.

Table 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

GASEOUS EFFLUENTS - CONTINUOUS AND BATCH RELEASES

July - December 2011

		Continuous Mode		Batch Mode	
Nuclides released	Unit	Quarter	Quarter	Quarter	Quarter
		3rd	4th	3rd	4th
1. Fission gases					
argon-41	Ci			7.21E-02	7.55E-02
krypton-85	Ci				
krypton-85m	Ci				
krypton-87	Ci				
krypton-88	Ci				
xenon-131m	Ci				
xenon-133	Ci			2.03E-01	1.92E-01
xenon-133m	Ci				
xenon-135	Ci			1.98E-03	1.64E-03
xenon-135m	Ci				
xenon-138	Ci				
others (specify)	Ci				
	Ci				
unidentified	Ci				
Total for period	Ci			2.77E-01	2.69E-01
2. Iodines					
iodine-131	Ci				
iodine-133	Ci				
iodine-135	Ci				
Total for period	Ci				
3. Particulates					
strontium-89	Ci				
strontium-90	Ci				
cesium-137	Ci				
cobalt-57	Ci				
cobalt-58	Ci				
cobalt-60	Ci				
unidentified	Ci				
Total for period	Ci				
4. Tritium					
Hydrogen-3	Ci	2.32E+01	1.01E+01	1.17E-02	7.14E-03

Note: Isotopes for which no value is given were not identified in applicable releases.

Table 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

January - June 2011

A. Fission and activation products	Unit	Quarter 1st	Quarter 2nd	Est.Total Error, %
1. Total release (not including tritium, gases, alpha)	Ci		2.77E-03	9.90E+00
2. Average diluted concentration during period	uCi/ml		9.50E-12	
3. Percent of applicable limit	%		9.50E-05	
B. Tritium				
1. Total release	Ci	1.30E+02	1.84E+02	9.20E+00
2. Average diluted concentration during period	uCi/ml	3.31E-07	6.31E-07	
3. Percent of applicable limit	%	3.31E-03	6.31E-03	
C. Dissolved and entrained gases				
1. Total release	Ci		1.86E-03	2.00E+01
2. Average diluted concentration during period	uCi/ml		6.38E-12	
3. Percent of applicable limit	%			
D. Gross alpha radioactivity				
1. Total release	Ci			
E. Vol. of waste released (prior to dilution)	Liters	1.01E+08	7.50E+07	
F. Vol. of dilution water used during period	Liters	3.93E+11	2.92E+11	

Note: Isotopes for which no value is given were not identified in applicable releases.

Table 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

July - December 2011

A. Fission and activation products	Unit	Quarter 3rd	Quarter 4th	Est.Total Error, %
1. Total release (not including tritium, gases, alpha)	Ci	2.51E-03	6.91E-04	9.90E+00
2. Average diluted concentration during period	uCi/ml	4.96E-12	1.39E-12	
3. Percent of applicable limit	%	4.96E-05	1.39E-05	
B. Tritium				
1. Total release	Ci	8.78E+01	1.23E+02	9.20E+00
2. Average diluted concentration during period	uCi/ml	1.73E-07	2.47E-07	
3. Percent of applicable limit	%	1.73E-03	2.47E-03	
C. Dissolved and entrained gases				
1. Total release	Ci			
2. Average diluted concentration during period	uCi/ml			
3. Percent of applicable limit	%			
D. Gross alpha radioactivity				
1. Total release	Ci			
E. Vol. of waste released (prior ro dilution)	Liters	1.26E+08	1.21E+08	
F. Vol. of dilution water used during period	Liters	5.06E+11	4.97E+11	

Note: Isotopes for which no value is given were not identified in applicable releases.

Table 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

LIQUID EFFLUENTS – CONTINUOUS AND BATCH RELEASES

January - June 2011

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter	Quarter	Quarter	Quarter
		1st	2nd	1st	2nd
chromium-51	Ci				
manganese-54	Ci				
iron-55	Ci				
iron-59	Ci				
cobalt-58	Ci				2.76E-03
cobalt-60	Ci				
zinc-65	Ci				
strontium-89	Ci				
strontium-90	Ci				
niobium-95	Ci				
molybdenum-99	Ci				
silver-110m	Ci				
antimony-122	Ci				
antimony-124	Ci				
antimony-125	Ci				
iodine-131	Ci				
iodine-132	Ci				
iodine-135	Ci				
cesium-134	Ci				
cesium-136	Ci				
cesium-137	Ci				
barium/lanthanum-140	Ci				
cerium-141	Ci				
Te-123m	Ci				9.71E-06
Zr-95	Ci				
Co-57	Ci				
Total for period (above)	Ci			0.00E+00	2.77E-03
unidentified	Ci				
Tritium	Ci	9.97E-02	6.90E-02	1.30E+02	1.84E+02
xenon-133	Ci				1.86E-03
xenon-135	Ci				

Note: Isotopes for which no value is given were not identified in applicable releases.

Table 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

LIQUID EFFLUENTS - CONTINUOUS AND BATCH RELEASES

July - December 2011

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter	Quarter	Quarter	Quarter
		3rd	4th	3rd	4th
chromium-51	Ci				
manganese-54	Ci				
iron-55	Ci				
iron-59	Ci				
cobalt-58	Ci			2.51E-03	5.57E-04
cobalt-60	Ci				1.33E-04
zinc-65	Ci				
strontium-89	Ci				
strontium-90	Ci				
niobium-95	Ci				
molybdenum-99	Ci				
silver-110m	Ci				
antimony-122	Ci				
antimony-124	Ci				
antimony-125	Ci				
iodine-131	Ci				
iodine-132	Ci				
iodine-135	Ci				
cesium-134	Ci				
cesium-136	Ci				
cesium-137	Ci				
barium/lanthanum-140	Ci				
cerium-141	Ci				
Te-123m	Ci				
Zr-95	Ci				
Co-57	Ci				
Total for period (above)	Ci			2.51E-03	6.90E-04
unidentified	Ci				
Tritium	Ci	5.22E-02	4.70E-02	8.77E+01	1.23E+02
xenon-133	Ci				
xenon-135	Ci				

Note: Isotopes for which no value is given were not identified in applicable releases.

Table 3

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

January - December 2011

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL- (Not irradiated fuel)

1. Type of Waste	Unit	12 month period	Est. total Error (%)
a.Spent resins, filter sludges, evaporator bottoms, etc.	m^3	2.69E+00	7.00E+00
	Ci	7.64E+01	1.40E+01
b. Dry compressible waste, contaminated equip, etc.	m^3	5.90E+02	7.00E+00
	Ci	2.58E-01	1.40E+01
c. Irradiated compnents, control rods, etc.	m^3	None	N/A
	Ci		
d. Other: None	m^3	4.00E+01	7.00E+00
	Ci	3.72E-01	1.40E+01

2. Estimate of major nuclide composition (by type of waste)				
Isotope	**Unit**	**a.**	**b.**	**d.**
H-3	%			12.4
C-14	%			1.8
Cr-51	%		9.1	0.6
Mn-54	%	0.7	1.7	0.1
Fe-55	%	9.0	19.1	3.6
F-59	%		0.3	
Co-57	%	0.2	0.1	
Co-58	%	0.7	12.7	0.7
Co-60	%	8.4	17.1	4.2
Ni-59	%	0.4		
Ni-63	%	76.5	18.9	62.8
Sr-90	%			0.3
Zr-95	%		7.5	0.2
Nb-95	%		10.6	0.2
Ag-110m	%		0.4	

2. Estimate of major nuclide composition (by type of waste) continued.				
Sn-113	%		0.4	
Sb-125	%	1.7	0.9	0.1
Cs-137	%	2.0	0.2	12.8
Ce-144	%		0.2	
Eu-154	%		0.2	
Pu-241	%		0.2	

3. Solid Waste Disposition		
Number of shipments	**Mode of Transportation**	**Destination**
4	Sole Use Truck	Energy Solutions
16	Sole Use Truck	Studsvik

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of shipments	Mode of Transportation	Destination
None	N/A	N/A

Table 4A

Radiation Dose to Maximum Individual Receptor from Gaseous Effluents

First Quarter 2011

(Units In milliRem)

	All	All	Adult	Teen	Child	Infant
	Gamma Air	Beta Air	THYRD	THYRD	THYRD	THYRD
N	3.66E-06	2.67E-06	2.25E-04	2.47E-04	3.40E-04	1.53E-04
NNE	3.07E-06	2.23E-06	1.89E-04	2.07E-04	2.85E-04	1.28E-04
NE	3.54E-06	2.57E-06	2.18E-04	2.39E-04	3.28E-04	1.48E-04
ENE	4.50E-06	3.27E-06	2.77E-04	3.03E-04	4.17E-04	1.87E-04
E	8.18E-06	5.95E-06	5.03E-04	5.52E-04	7.59E-04	3.41E-04
ESE	1.04E-05	7.57E-06	6.40E-04	7.02E-04	9.66E-04	4.34E-04
SE	6.30E-06	4.58E-06	3.87E-04	4.25E-04	5.84E-04	2.63E-04
SSE	2.59E-06	1.89E-06	1.59E-04	1.75E-04	2.41E-04	1.08E-04
S	4.54E-06	3.30E-06	2.79E-04	3.06E-04	4.21E-04	1.89E-04
SSW	4.54E-06	3.30E-06	2.79E-04	3.06E-04	4.21E-04	1.89E-04
SW	4.54E-06	3.30E-06	2.79E-04	3.06E-04	4.21E-04	1.89E-04
WSW	4.84E-06	3.52E-06	2.98E-04	3.26E-04	4.49E-04	2.02E-04
W	3.08E-06	2.24E-06	1.89E-04	2.08E-04	2.86E-04	1.28E-04
WNW	2.60E-07	1.89E-07	1.60E-05	1.76E-05	2.42E-05	1.09E-05
NW	8.54E-07	6.21E-07	5.25E-05	5.76E-05	7.92E-05	3.56E-05
NNW	2.66E-06	1.94E-06	1.64E-04	1.80E-04	2.47E-04	1.11E-04
MAX.	1.04E-05	7.57E-06	6.40E-04	7.02E-04	9.66E-04	4.34E-04

Table 4A

Radiation Dose to Maximum Individual Receptor from Gaseous Effluents

Second Quarter 2011

(Units In milliRem)

	All	**All**	**Adult**	**Teen**	**Child**	**Infant**
	Gamma Air	Beta Air	THYRD	THYRD	THYRD	THYRD
N	2.04E-05	3.29E-05	3.12E-03	4.15E-03	7.53E-03	1.50E-02
NNE	1.71E-05	2.76E-05	2.61E-03	3.48E-03	6.31E-03	1.26E-02
NE	1.97E-05	3.18E-05	3.01E-03	4.01E-03	7.28E-03	1.45E-02
ENE	2.51E-05	4.04E-05	3.82E-03	5.10E-03	9.24E-03	1.84E-02
E	4.56E-05	7.35E-05	6.96E-03	9.27E-03	1.68E-02	3.35E-02
ESE	5.80E-05	9.35E-05	8.85E-03	1.18E-02	2.14E-02	4.26E-02
SE	3.51E-05	5.66E-05	5.35E-03	7.14E-03	1.29E-02	2.58E-02
SSE	1.44E-05	2.33E-05	2.20E-03	2.94E-03	5.33E-03	1.06E-02
S	2.53E-05	4.08E-05	3.86E-03	5.14E-03	9.33E-03	1.86E-02
SSW	2.53E-05	4.08E-05	3.86E-03	5.14E-03	9.33E-03	1.86E-02
SW	2.53E-05	4.08E-05	3.86E-03	5.14E-03	9.33E-03	1.86E-02
WSW	2.70E-05	4.35E-05	4.12E-03	5.49E-03	9.95E-03	1.98E-02
W	1.72E-05	2.77E-05	2.62E-03	3.49E-03	6.33E-03	1.26E-02
WNW	1.45E-06	2.34E-06	2.21E-04	2.95E-04	5.35E-04	1.07E-03
NW	4.76E-06	7.67E-06	7.26E-04	9.68E-04	1.75E-03	3.49E-03
NNW	1.48E-05	2.39E-05	2.27E-03	3.02E-03	5.48E-03	1.09E-02
MAX.	5.80E-05	9.35E-05	8.85E-03	1.18E-02	2.14E-02	4.26E-02

Table 4A

Radiation Dose to Maximum Individual Receptor from Gaseous Effluents

Third Quarter 2011

(Units In milliRem)

	All	All	Adult	Teen	Child	Infant
	Gamma Air	Beta Air	THYRD	THYRD	THYRD	THYRD
N	2.02E-06	1.23E-06	2.90E-04	3.18E-04	4.36E-04	1.91E-04
NNE	1.70E-06	1.03E-06	2.43E-04	2.66E-04	3.66E-04	1.60E-04
NE	1.96E-06	1.19E-06	2.81E-04	3.07E-04	4.22E-04	1.84E-04
ENE	2.48E-06	1.51E-06	3.56E-04	3.90E-04	5.36E-04	2.34E-04
E	4.52E-06	2.75E-06	6.48E-04	7.10E-04	9.75E-04	4.26E-04
ESE	5.75E-06	3.50E-06	8.25E-04	9.03E-04	1.24E-03	5.42E-04
SE	3.48E-06	2.12E-06	4.99E-04	5.46E-04	7.50E-04	3.28E-04
SSE	1.43E-06	8.72E-07	2.05E-04	2.25E-04	3.09E-04	1.35E-04
S	2.51E-06	1.53E-06	3.60E-04	3.94E-04	5.41E-04	2.36E-04
SSW	2.51E-06	1.53E-06	3.60E-04	3.94E-04	5.41E-04	2.36E-04
SW	2.51E-06	1.53E-06	3.60E-04	3.94E-04	5.41E-04	2.36E-04
WSW	2.67E-06	1.63E-06	3.84E-04	4.20E-04	5.77E-04	2.52E-04
W	1.70E-06	1.04E-06	2.44E-04	2.67E-04	3.67E-04	1.60E-04
WNW	1.44E-07	8.75E-08	2.06E-05	2.26E-05	3.10E-05	1.36E-05
NW	4.72E-07	2.87E-07	6.77E-05	7.40E-05	1.02E-04	4.44E-05
NNW	1.47E-06	8.96E-07	2.11E-04	2.31E-04	3.17E-04	1.39E-04
MAX.	5.75E-06	3.50E-06	8.25E-04	9.03E-04	1.24E-03	5.42E-04

Table 4A

Radiation Dose to Maximum Individual Receptor from Gaseous Effluents

Fourth Quarter 2011

(Units In milliRem)

	All	All	Adult	Teen	Child	Infant
	Gamma Air	Beta Air	THYRD	THYRD	THYRD	THYRD
N	2.10E-06	1.23E-06	1.27E-04	1.39E-04	1.91E-04	8.34E-05
NNE	1.76E-06	1.03E-06	1.06E-04	1.17E-04	1.60E-04	6.99E-05
NE	2.03E-06	1.19E-06	1.23E-04	1.34E-04	1.84E-04	8.06E-05
ENE	2.57E-06	1.51E-06	1.56E-04	1.71E-04	2.34E-04	1.02E-04
E	4.68E-06	2.74E-06	2.84E-04	3.10E-04	4.26E-04	1.86E-04
ESE	5.96E-06	3.49E-06	3.61E-04	3.95E-04	5.42E-04	2.37E-04
SE	3.61E-06	2.11E-06	2.18E-04	2.39E-04	3.28E-04	1.43E-04
SSE	1.48E-06	8.69E-07	8.99E-05	9.84E-05	1.35E-04	5.90E-05
S	2.60E-06	1.52E-06	1.57E-04	1.72E-04	2.36E-04	1.03E-04
SSW	2.60E-06	1.52E-06	1.57E-04	1.72E-04	2.36E-04	1.03E-04
SW	2.60E-06	1.52E-06	1.57E-04	1.72E-04	2.36E-04	1.03E-04
WSW	2.77E-06	1.62E-06	1.68E-04	1.84E-04	2.52E-04	1.10E-04
W	1.76E-06	1.03E-06	1.07E-04	1.17E-04	1.60E-04	7.02E-05
WNW	1.49E-07	8.73E-08	9.03E-06	9.88E-06	1.36E-05	5.93E-06
NW	4.89E-07	2.86E-07	2.96E-05	3.24E-05	4.44E-05	1.94E-05
NNW	1.53E-06	8.93E-07	9.24E-05	1.01E-04	1.39E-04	6.07E-05
MAX.	5.96E-06	3.49E-06	3.61E-04	3.95E-04	5.42E-04	2.37E-04

Table 4B

Radiation Dose To Maximum Individual Receptor

From Liquid Effluents for 2011

(Units in milliRem)

	Adult	Teen	Child	Infant
First Quarter				
T. Body	5.88E-04	4.47E-04	4.43E-04	1.27E-04
GI-LLI	5.88E-04	4.47E-04	4.43E-04	1.27E-04
Thyroid	5.88E-04	4.47E-04	4.43E-04	1.27E-04
Second Quarter				
T. Body	1.05E-02	8.02E-03	7.96E-03	2.25E-03
GI-LLI	1.11E-02	8.36E-03	8.02E-03	2.25E-03
Thyroid	1.05E-02	7.96E-03	7.89E-03	2.25E-03
Third Quarter				
T. Body	3.20E-04	2.44E-04	2.43E-04	6.74E-05
GI-LLI	3.73E-04	2.78E-04	2.49E-04	6.74E-05
Thyroid	3.13E-04	2.38E-04	2.36E-04	6.73E-05
Fourth Quarter				
T. Body	4.45E-04	3.39E-04	3.36E-04	9.52E-05
GI-LLI	4.64E-04	3.51E-04	3.38E-04	9.52E-05
Thyroid	4.42E-04	3.36E-04	3.33E-04	9.52E-05

TABLE 5
Groundwater Monitoring Wells

Location	Sample Date	Tritium (uCi/ml)
GW01: Warehouse Access Road (Control)	02/09/11	*
	03/03/11	*
	06/22/11	*
	08/30/11	*
	12/08/11	*
GW03: Screenhouse West, South Well	02/09/11	3.53E-07
	02/18/11	1.82E-06
GW04: Screenhouse West, North Well	01/21/11	*
	02/09/11	3.49E-07
	06/29/11	*
	07/21/11	*
	08/30/11	*
	09/29/11	*
	10/27/11	*
	11/29/11	*
	12/14/11	*
GW05: Screenhouse East, South (15.5')	02/09/11	*
	06/22/11	*
	08/30/11	*
	12/08/11	*
GW06: Screenhouse East, Middle (20.0')	02/09/11	*
	06/22/11	*
	07/21/11	*
	08/30/11	*
	12/08/11	*
GW07: Screenhouse East, North (24.0')	02/09/11	*
	03/03/11	*
	03/18/11	*
	04/01/11	*
	05/06/11	*
	06/22/11	*
	08/30/11	*
	12/08/11	*
GW08: All Volatiles Treatment Building	01/21/11	*
	02/09/11	*
	06/29/11	*
	09/29/11	*
	10/27/11	*
	11/29/11	*
	12/08/11	*
GW09: Technical Support Center, North	02/09/11	4.98E-07
	02/18/11	9.73E-07
GW10: Technical Support Center, South	02/09/11	*
	03/03/11	*

Groundwater Monitoring Wells (continued)		
	06/22/11	*
	08/30/11	*
GW10: Technical Support Center, South	12/08/11	*
GW11: Contaminated Service Building, SE (24.0')	02/09/11	4.36E-07
	02/18/11	9.66E-07
	03/03/11	*
	06/22/11	*
	08/30/11	*
	12/08/11	*

* - Activity less than MDA (Tritium)

Table 6

2011 Offsite Dose Due to Carbon-14 in Gaseous and Liquid Effluents

R E Ginna Nuclear Power Plant

A study of Carbon-14 in effluent releases from Ginna was conducted in 1982 by Charles Kunz of New York State Department of Health, Center for Laboratories and Research. Results of this study are used as the basis for current Carbon-14 production and releases at Ginna. Using the Carbon-14 releases measured in the Kunz study at 4.3 Curies, adjusted for power uprate from 490 MWe to 580 MWe, and adjusted for increased capacity factor, leads to a conservative estimate of 6.8 Curies released in gaseous effluents in 2011. Kunz further determined the chemical form of the Carbon-14 at Ginna to be approximately 10% CO2.

As a cross-check, the EPRI Carbon-14 Source Term Calculator was used to estimate Carbon-14 releases from Ginna, using Ginna specific reactor core data and reactor coolant chemistry to estimate the products of the activation reactions. The resulting estimate of 6.9 Curies per EFPY agrees with the Kunz data.

Dose due to Carbon-14 in gaseous effluents was calculated using the following conditions:

a. 6.8 Curies of C-14 released to atmosphere in 2011
b. Release was consistent throughout the year. There was an outage in 2011, however it has little or no impact on the C-14 effluents.
c. 10% of the C-14 was in the chemical form of CO2, which is the only dose contributor. The bulk of C-14 in the chemical form of methane (CH4) would exhibit high upward velocity due to its low density relative to air. In addition CH4 does not have an uptake pathway for humans.
d. Meteorological dispersion factor, (X/Q), at the site boundary to the hypothetical maximally exposed member of the public is 2.43E-07 sec/m^3.
e. Dose calculations and dose factors are from Regulatory Guide 1.109 methodology.
f. Pathways considered were inhalation and vegetation ingestion.
g. Critical receptor is child at the site boundary in the ESE direction.

MAXIMUM DOSE VALUES DUE TO C-14 IN GASEOUS EFFLUENTS IN 2010

Organ	Age	mRem/yr
RG-1.109 Bone	Child	1.94E-02
RG-1.109 T.Body/Other	Child	3.86E-03

Dose due to Carbon-14 in liquid effluents was calculated using the following conditions:

a. The liquid waste processing system at Ginna has not been evaluated for efficiency of removal of Carbon-14. Therefore no removal term was used in estimation of offsite dose.
b. Average concentration of C-14 in waste water as measured in the Kunz study was adjusted for current operating conditions and was 6.0E-7 uCi/cc.
c. 2.69E6 liters of liquid waste were released in 2011 with total dilution flow of 1.69E12 liters.
d. Average diluted concentration of C-14 released was 9.55E-13 uCi/cc.
e. Liquid effluent dilution factor for potable water pathway is 200.
f. Liquid effluent dilution factor for fish pathway is 1.
g. Dose calculations and dose factors are from Regulatory Guide 1.109 methodology.
h. Critical receptor is teen for both potable water and fish pathways.

MAXIMUM DOSE VALUES DUE TO C-14 IN LIQUID EFFLUENTS IN 2010

Organ	Age	mRem/yr
RG-1.109 Bone	Teen	2.57E-04
RG-1.109 T.Body/Other	Teen	5.12E-05