2009

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 and is submitted in accordance with the requirements of Technical Specification Section 5.6.3. The report covers the period from January 1, 2009 through December 31, 2009.

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 which 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 which would yield $\leq$ 1500 mrem/yr to any organ if allowed to continue for a full year.

The dose to an individual, as calculated in the ODCM, from radioiodine, radioactive materials in particulate form and radionuclides other than noble gases with half-lives greater than eight days released with gaseous effluents from the site shall be limited to the following:

(i) During any calendar quarter to $\leq$ 7.5 mrem to any organ.

(ii) During any calendar year to $\leq$ 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 as calculated in the ODCM from radioactive materials in liquid effluents released to unrestricted areas shall be limited:

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

(ii) During any calendar year to $\leq$ 3 mrem to the total body and to $\leq$ 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 2009 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:	1.44 E+02
2. Total time period for batch releases:	3.00 E+04 min
3. Maximum time period for a batch release:	1.23 E+04 min
4. Average time period for batch releases:	2.09 E+02 min
5. Minimum time period for a batch release:	3.0 E+00 min
6. Average blowdown in liters per minute (LPM) during periods of effluent release into the discharge canal.	4.68 E+02 LPM

2.5.2 Gaseous

1. Number of batch releases:	3.7 E+01
2. Total time period for batch releases:	5.46 E+05 min
3. Maximum time period for a batch release:	4.46 E+04 min
4. Average time period for batch releases:	1.48 E+04 min
5. Minimum time period for a batch release:	4.90 E+01 min

2.6 Abnormal Releases

There was one abnormal or unplanned release in 2009. On August 19, 2009 a local radiation emergency (CR 2009-005783) due to a mispositioned valve in the Auxiliary Building was declared at 1245. A slight increase on plant vent effluent radiation monitors was noted shortly thereafter (CR 2009-005815). Chemistry personnel obtained grab samples at the plant vent and calculated the release as 1.38E-01 Curies of noble gas and 4.73E-02 Curies of tritium. This activity was included in August 2009 Effluents summary.

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. In 2009, Ginna completed installation of new counting room gamma spectroscopy equipment and effluent calculation software. Verification and validation against past equipment and software was performed and the results were acceptable. The response of the new higher efficiency detectors has resulted in more accurate response to cross-check standards.

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 the site 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 who reduces the volume and then sends the waste for burial.

6.0 LOWER LIMIT OF DETECTION

The required Lower Limit of Detection, (LLD), as defined in the ODCM, was met for all samples used in reporting effluent releases for 2009.

The following sample failed to meet the *a posteriori* MDA for high background activity in the samples.

"A" Monitor Tank Release 2009004 failed to meet MDA for Fe-59 at 5.53E-07 uCi/cc and Zn-65 at 6.82E-07 uCi/cc.

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:

$\leq$ 25 mrem total body or any organ and;
$\leq$ 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:

11.7 mrem total body (11.7 mrem direct radiation plus 1.4E-2 mrem all other pathways).
1.03E-2 mrem GI-LLI (maximum organ dose).

8.0 METEOROLOGICAL DATA

The annual summary of hourly meteorological data collected during 2009 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

There were no major changes in critical receptor location for dose calculations during the reporting period. Minor changes in critical receptor locations and distances came from utilizing updated mapping technologies (hand held global positioning system and Google Earth software). There were no significant changes in land use within 5 miles of the plant. Additional new homes are being built at a rate comparable to recent years.

10.0 CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

The ODCM was revised to remove unnecessary dosimeter terminology (Thermoluminescent). This revision does not change the number of or location of REMP dosimeters. ODCM revision 24 is included with this submittal.

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

- RM-14A was out of service from 3/23/09 through 3/30/09 for corrective maintenance.
- RM-15 was out of service from 3/25/09 through 4/20/09 for corrective maintenance.
- R-11 out of service due to paper tearing 6/24/09 through 7/2/09.

14.0 CHANGES TO PREVIOUS ANNUAL EFFLUENT OPERATING REPORTS

RPA-RW-PCP, "Process Control Program", was revised in 2007 under Procedure Change Request 2007-3427-001. These changes were to update titles, remove references that no longer existed, remove a configuration that is no longer utilized, and to remove the Green is Clean process that is no longer employed. The changes did not change the intent of the Procedure or the PCP. This change was not included in the 2007 Annual Radioactive Release report as required under Section 6.2 of the ODCM.

RPA-RW-PCP, "Process Control Program", was revised in 2008 under Procedure Change Request 2008-2107-001. This change provided clarification of when Ce-144 may be used to determine transuranics. The change does not change the intent of the PCP. This change was not included in the 2008 Annual Radioactive Release report as required under Section 6.2 of the ODCM.

15.0 GROUNDWATER MONITORING

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 5.

Table 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

January - June 2009

A. Fission & activation gases	Unit	Quarter 1st	Quarter 2nd	Est. Total Error, %
1. Total release	Ci	7.19E-01	6.53E-01	1.50E+01
2. Average release rate for period	uCi/sec	9.12E-02	8.28E-02	
3. Percent of technical specification limit	%	1.45E-05	1.31E-05	
B. Iodines				
1. Total iodine-131	Ci		3.04E-06	1.50E+01
2. Average release rate for period	uCi/sec		3.85E-07	
3. Percent of technical specification limit	%		8.37E-04	
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	1.20E+01	1.53E+01	9.20E+00
2. Average release rate for period	uCi/sec	1.53E+00	1.94E+00	
3. Percent of technical specification limit	%	1.79E-04	2.27E-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 2009

A. Fission & activation gases	Unit	Quarter 3rd	Quarter 4th	Est. Total Error, %
1. Total release	Ci	1.75E+00	4.08E-01	1.50E+01
2. Average release rate for period	uCi/sec	2.22E-01	5.18E-02	
3. Percent of technical specification limit	%	3.52E-05	8.22E-06	
B. Iodines				
1. Total iodine-131	Ci	5.95E-07	4.17E-07	1.50E+01
2. Average release rate for period	uCi/sec	7.54E-08	5.29E-08	
3. Percent of technical specification limit	%	1.64E-04	1.15E-04	
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	1.82E+01	1.58E+01	9.20E+00
2. Average release rate for period	uCi/sec	2.30E+00	2.01E+00	
3. Percent of technical specification limit	%	2.69E-04	2.35E-04	

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 2009

A. Fission and activation products	Unit	Quarter 1st	Quarter 2nd	Est.Total Error, %
1. Total release (not including tritium, gases, alpha)	Ci	8.88E-04	6.46E-05	9.90E+00
2. Average diluted concentration during period	uCi/ml	2.09E-12	1.35E-13	
3. Percent of applicable limit	%	2.09E-05	1.35E-06	
B. Tritium				
1. Total release	Ci	4.27E+01	1.25E+02	9.20E+00
2. Average diluted concentration during period	uCi/ml	1.01E-07	2.61E-07	
3. Percent of applicable limit	%	1.01E-03	2.61E-03	
C. Dissolved and entrained gases				
1. Total release	Ci		3.35E-05	9.90E+00
2. Average diluted concentration during period	uCi/ml		7.03E-14	
3. Percent of applicable limit	%		3.52E-08	
D. Gross alpha radioactivity				
1. Total release	Ci			
E. Vol. of waste released (prior to dilution)	Liters	9.75E+07	9.97E+07	
F. Vol. of dilution water used during period	Liters	4.24E+11	4.77E+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 2009

A. Fission and activation products	Unit	Quarter 3rd	Quarter 4th	Est.Total Error, %
1. Total release (not including tritium, gases, alpha)	Ci	1.05E-03	2.72E-03	9.90E+00
2. Average diluted concentration during period	uCi/ml	2.14E-12	4.88E-12	
3. Percent of applicable limit	%	2.14E-05	4.88E-05	
B. Tritium				
1. Total release	Ci	9.59E+01	7.04E+01	9.20E+00
2. Average diluted concentration during period	uCi/ml	1.95E-07	1.26E-07	
3. Percent of applicable limit	%	1.95E-03	1.26E-03	
C. Dissolved and entrained gases				
1. Total release	Ci	1.32E-04		9.90E+00
2. Average diluted concentration during period	uCi/ml	2.69E-13		
3. Percent of applicable limit	%	1.35E-07		
D. Gross alpha radioactivity				
1. Total release	Ci			
E. Vol. of waste released (prior ro dilution)	Liters	9.11E+07	1.00E+08	
F. Vol. of dilution water used during period	Liters	4.90E+11	5.57E+11	

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 2009

		Continuous Mode		Batch Mode	
Nuclides released	Unit	Quarter	Quarter	Quarter	Quarter
		1st	2nd	1st	2nd
1. Fission gases					
argon-41	Ci			7.62E-02	8.49E-02
krypton-85	Ci				
krypton-85m	Ci			1.90E-04	3.93E-04
krypton-87	Ci				
krypton-88	Ci				
xenon-131m	Ci				
xenon-133	Ci			6.18E-01	5.42E-01
xenon-133m	Ci			5.70E-03	6.47E-03
xenon-135	Ci			1.93E-02	1.85E-02
xenon-135m	Ci				
xenon-138	Ci				
others (specify)	Ci				
	Ci				
Total for period	Ci			7.19E-01	6.52E-01
2. Iodines					
iodine-131	Ci		3.04E-06		
iodine-132	Ci				
iodine-133	Ci				
iodine-135	Ci				
Total for period	Ci		3.04E-06		
3. Particulates					
strontium-89	Ci				
strontium-90	Ci				
cesium-134	Ci				
cesium-137	Ci				
cobalt-58	Ci				
unidentified	Ci				
Total for period	Ci				
4. Tritium					
Hydrogen-3	Ci	1.20E+01	1.52E+01	7.05E-02	9.60E-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 2009

		Continuous Mode		Batch Mode	
Nuclides released	Unit	Quarter	Quarter	Quarter	Quarter
		3rd	4th	3rd	4th
1. Fission gases					
argon-41	Ci	3.43E-01	5.67E-02	9.93E-02	6.97E-02
krypton-85	Ci				
krypton-85m	Ci			7.23E-05	
krypton-87	Ci				
krypton-88	Ci				
xenon-131m	Ci			1.87E-03	
xenon-133	Ci	7.30E-01	1.12E-01	4.76E-01	1.65E-01
xenon-133m	Ci	3.68E-03		3.96E-03	
xenon-135	Ci	2.57E-02	1.89E-03	6.42E-02	2.89E-03
xenon-135m	Ci				
xenon-138	Ci				
others (specify)	Ci				
	Ci				
unidentified	Ci				
Total for period	Ci	1.10E+00	1.71E-01	6.46E-01	2.38E-01
2. Iodines					
iodine-131	Ci			5.95E-07	4.17E-07
iodine-133	Ci				
iodine-135	Ci				
Total for period	Ci			5.95E-07	4.17E-07
3. Particulates					
strontium-89	Ci				
strontium-90	Ci				
cesium-134	Ci				
cesium-137	Ci				
cobalt-58	Ci				
unidentified	Ci				
Total for period	Ci				
4. Tritium					
Hydrogen-3	Ci	1.81E+01	1.56E+01	4.18E-02	2.18E-01

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

Table 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

Liquid Effluents

January - June 2009

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter	Quarter	Quarter	Quarter
		1st	2nd	1st	2nd
chromium-51	Ci				
manganese-54	Ci				
iron-55	Ci			2.25E-04	
iron-59	Ci				
cobalt-58	Ci			5.05E-04	4.16E-05
cobalt-60	Ci			1.59E-04	2.30E-05
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				5.02E-08
barium/lanthanum-140	Ci				
cerium-141	Ci				
Te-132	Ci				
Zr-95	Ci				
Co-57	Ci				
Total for period (above)	Ci			8.89E-04	6.47E-05
unidentified	Ci				
Tritium	Ci	1.07E-01	5.29E-02	4.26E+01	1.25E+02
xenon-133	Ci				3.35E-05
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

July - December 2009

		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			1.05E-03	2.72E-03
cobalt-60	Ci			2.43E-09	
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			4.02E-09	9.92E-07
barium/lanthanum-140	Ci				
cerium-141	Ci				
Te-132	Ci				
Zr-95	Ci				
Co-57	Ci				
Total for period (above)	Ci			1.05E-03	2.72E-03
unidentified	Ci				
Tritium	Ci		2.44E-02	9.59E+01	7.04E+01
xenon-133	Ci			1.32E-04	
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 1, 2009 - December 31, 2009

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 Ci	12.91 90.42	7.0 E+00 1.4 E+01
b. Dry compressible waste, contaminated equip, etc.	m^3 Ci	262.4 1.64	7.0 E+00 1.4 E+01
c.Irradiated components, control rods, etc.	m^3 Ci	None	N/A N/A
d.Other:	m^3 Ci	None	N/A N/A

2.Estimate of major nuclide composition (by type of waste)								
a.			b.			d.		
Co-58	%	10.8	Co-58	%	3.6	None	%	None
Ni-63	%	21.1	Fe-55	%	17.8		%	
Ag-110m	%	0.4	Sb-125	%	1.3		%	
Cs-137	%	0.1	Co-60	%	10.7		%	
Co-60	%	4.9	Ni-63	%	58.2		%	
Fe-55	%	21.3	Mn-54	%	2.2		%	
Mn-54	%	0.3	Ni-59	%	0.8		%	
Ce-144	%	0.4	Co-57	%	0.3		%	
H-3	%	35.6	Cs-137	%	4.2		%	
Sb-125	%	3.5		%			%	
Nb-95	%	0.3		%			%	
Total		98.8%	Total		99.1	Total		0

3. Solid Waste Disposition		
Number of Shipments	Mode of Transportation	Destination
2	Sole Use Truck	Energy Solutions
16	Sole Use Truck	Studsvic

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
None		

Table 4A

Radiation Dose to Maximum Individual Receptor

First Quarter 2009

(Units In milliRem)

	All	**All**	**Adult**	**Teen**	**Child**	**Infant**
	Gamma Air	Beta Air	THYRD	THYRD	THYRD	THYRD
N	2.62E-06	2.58E-06				
NNE	2.20E-06	2.17E-06				
NE	2.53E-06	2.49E-06				
ENE	3.22E-06	3.17E-06				
E	5.86E-06	5.38E-05	3.36E-04	3.68E-04	5.06E-04	2.21E-04
ESE	7.45E-06	7.35E-06	4.28E-04	4.65E-04	6.44E-04	2.81E-04
SE	4.51E-06	4.45E-06	2.58E-04	2.05E-04	3.89E-04	1.70E-04
SSE	1.86E-06	1.83E-06	1.06E-04	1.16E-04	1.60E-04	6.99E-04
S	3.25E-06	3.20E-06	1.86E-04	2.04E-04	2.81E-04	1.23E-04
SSW	3.25E-06	3.20E-06	1.85E-04	2.04E-04	2.81E-04	1.23E-04
SW	3.26E-06	3.20E-06	1.86E-04	2.04E-04	2.81E-04	1.22E-04
WSW	3.46E-06	3.41E-06	1.98E-04	2.17E-04	2.99E-04	1.31E-04
W	2.20E-06	2.17E-06	1.26E-04	1.38E-04	1.90E-04	8.33E-05
WNW	1.86E-07	1.86E-07				
NW	6.11E-07	6.02E-07				
NNW	1.91E-06	1.88E-06				
MAX.	7.45E-06	5.38E-05	4.28E-04	4.65E-04	6.44E-04	6.99E-04

Table 4A

Radiation Dose to Maximum Individual Receptor

Second Quarter 2009

(Units In milliRem)

	All	**All**	**Adult**	**Teen**	**Child**	**Infant**
	Gamma Air	Beta Air	THYRD	THYRD	THYRD	THYRD
N	2.76E-06	2.44E-06				
NNE	2.31E-06	2.04E-06				
NE	2.67E-06	2.36E-06				
ENE	3.39E-06	2.78E-06				
E	6.17E-06	5.46E-06	6.06E-04	6.63E-04	9.12E-04	3.98E-04
ESE	7.85E-06	6.96E-06	7.71E-04	8.43E-04	1.16E-03	5.07E-04
SE	4.75E-06	4.21E-06	4.67E-04	5.10E-04	7.02E-04	3.07E-04
SSE	1.95E-06	1.73E-06	1.92E-04	2.10E-04	2.89E-04	1.26E-04
S	3.42E-06	3.03E-06	3.36E-04	3.68E-04	5.06E-04	2.21E-04
SSW	3.41E-06	3.02E-06	3.35E-04	3.68E-04	5.06E-04	2.21E-04
SW	3.42E-06	3.03E-06	3.36E-04	3.67E-04	5.06E-04	2.22E-04
WSW	3.65E-06	3.14E-06	3.58E-04	3.92E-04	5.39E-04	2.05E-04
W	2.30E-06	2.04E-06	2.27E-04	2.48E-04	3.42E-04	1.49E-04
WNW	2.32E-07	2.06E-07				
NW	6.43E-07	5.70E-07				
NNW	2.01E-06	1.78E-06				
MAX.	7.85E-06	6.96E-06	7.71E-04	8.43E-04	1.16E-03	5.07E-04

Table 4A

Radiation Dose to Maximum Individual Receptor

Third Quarter 2009

(Units In milliRem)

	All	**All**	**Adult**	**Teen**	**Child**	**Infant**
	Gamma Air	Beta Air	THYRD	THYRD	THYRD	THYRD
N	2.87E-05	2.05E-05				
NNE	2.41E-05	1.72E-05				
NE	2.77E-05	1.98E-05				
ENE	3.53E-05	2.52E-05				
E	6.41E-05	4.58E-05	7.01E-04	8.43E-04	1.16E-03	5.07E-04
ESE	8.15E-05	5.83E-05	9.90E-04	1.08E-03	1.49E-03	6.51E-04
SE	4.94E-05	3.53E-05	5.99E-04	6.55E-04	9.01E-04	6.70E-04
SSE	2.03E-05	1.45E-05	2.46E-04	2.68E-04	3.70E-04	1.61E-04
S	3.56E-05	2.54E-05	4.30E-04	4.69E-04	6.48E-04	2.83E-04
SSW	3.56E-05	2.55E-05	4.29E-04	4.69E-04	6.47E-04	2.83E-04
SW	3.55E-05	2.54E-05	4.30E-04	4.70E-04	6.47E-04	2.82E-04
WSW	3.79E-05	2.71E-05	4.60E-04	5.03E-04	6.92E-04	3.02E-04
W	2.41E-05	1.72E-05	2.92E-04	3.19E-04	4.39E-04	1.92E-04
WNW	2.03E-06	1.45E-06				
NW	6.69E-06	4.78E-06				
NNW	2.08E-05	1.49E-05				
MAX.	8.15E-05	5.83E-05	9.90E-04	1.08E-03	1.49E-03	6.70E-04

Table 4A

Radiation Dose to Maximum Individual Receptor

Fourth Quarter 2009

(Units In milliRem)

	All	**All**	**Adult**	**Teen**	**Child**	**Infant**
	Gamma Air	Beta Air	THYRD	THYRD	THYRD	THYRD
N	3.32E-06	1.87E-06				
NNE	2.91E-06	1.63E-06				
NE	3.34E-06	1.88E-06				
ENE	4.25E-06	2.39E-06				
E	7.72E-06	4.34E-06	5.27E-04	5.76E-04	7.93E-04	3.46E-04
ESE	9.88E-06	5.53E-06	6.71E-04	7.34E-04	1.01E-03	4.41E-04
SE	5.94E-06	3.34E-06	4.06E-04	4.44E-04	6.11E-04	2.67E-04
SSE	2.45E-06	1.38E-06	1.67E-04	1.82E-04	2.51E-04	1.10E-04
S	4.28E-06	2.41E-06	2.92E-04	3.19E-04	4.40E-04	1.92E-04
SSW	4.28E-06	2.41E-06	2.93E-04	3.19E-04	4.40E-04	1.92E-04
SW	4.29E-06	2.40E-06	2.92E-04	3.20E-04	4.40E-04	1.91E-04
WSW	4.41E-06	2.48E-06	3.12E-04	3.41E-04	4.69E-04	2.05E-04
W	2.90E-06	1.63E-06	1.98E-04	9.43E-05	2.97E-04	1.30E-04
WNW	2.45E-07	1.38E-07				
NW	8.09E-07	4.53E-07				
NNW	2.51E-06	1.41E-06				
MAX.	9.88E-06	5.53E-06	6.71E-04	7.34E-04	1.01E-03	4.41E-04

Table 4B

Radiation Dose To Maximum Individual Receptor

From Liquid Release 2009

(Units in milliRem)

	Adult	Teen	Child	Infant
First Quarter				
T. Body	3.60E-04	2.54E-04	4.85E-04	4.77E-04
GI-LLI	3.61E-04	2.55E-04	4.88E-04	4.80E-04
Thyroid	3.85E-04	2.53E-04	4.84E-04	4.76E-04
Second Quarter				
T. Body	9.65E-04	7.01E-04	1.30E-03	1.28E-04
GI-LLI	9.65E-04	7.01E-04	1.30E-03	1.28E-04
Thyroid	9.65E-04	7.02E-04	1.30E-03	1.28E-04
Third Quarter				
T. Body	5.22E-03	3.68E-03	7.04E-03	6.93E-03
GI-LLI	5.25E-03	3.70E-03	7.08E-03	6.97E-03
Thyroid	5.20E-03	3.66E-03	7.02E-03	6.91E-03
Fourth Quarter				
T. Body	5.52E-04	3.89E-04	7.44E-04	7.32E-04
GI-LLI	5.56E-04	3.94E-04	7.51E-04	7.37E-04
Thyroid	5.52E-04	3.80E-04	7.43E-04	7.31E-04

TABLE 5

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'[1]	03/17/09	*
	06/09/09	*
	09/10/09	*
	11/10/09	*
Screen House East, M. 20'[1]	03/17/09	*
	06/09/09	*
	09/10/09	*
	11/10/09	*
Screen House East, So. 15.5'[1]	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	*