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October 20, 2016

L-MT-16-035

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Monticello Nuclear Generating Plant  
Docket No. 50-263  
Renewed Facility Operating License No. DPR-22

Corrections to 2011, 2012, 2013, and 2014 Annual Radiological Environmental Operating Reports

This letter submits changes to the 2011, 2012, 2013, and 2014 Annual Radiological Environmental Operating Reports (AREORs). The changes do not impact the conclusions of the reports. Four Enclosures attached to this letter identify the specific corrections, affected pages, and the corrected pages in their entirety.

If you have any questions concerning this information, please contact Mr. Stephen Sollom at (763) 295-1611.

Summary of Commitments

This letter makes no new commitments and no revisions to existing commitments.

A handwritten signature in black ink, appearing to read 'Peter A. Gardner'.

Peter A. Gardner  
Site Vice President, Monticello Nuclear Generating Plant  
Northern States Power Company – Minnesota

Enclosures:

- Enclosure 1: Corrections to the 2011 AREOR
  - Attachment 1: Replacement pages for 2011 AREOR
  - Attachment 2: Additional pages for the 2011 AREOR
- Enclosure 2: Corrections to the 2012 AREOR
  - Attachment 1: Replacement pages for 2012 AREOR
  - Attachment 2: Additional pages for the 2012 AREOR
- Enclosure 3: Corrections to the 2013 AREOR
  - Attachment 1: Replacement pages for the 2013 AREOR
- Enclosure 4: Correction to the 2014 AREOR
  - Attachment 1: Replacement pages for the 2014 AREOR

cc: Administrator, Region III, USNRC  
Project Manager, Monticello,  
Resident Inspector, Monticello  
Minnesota Department of Commerce

**ENCLOSURE 1**

**CORRECTIONS TO THE 2011 AREOR**

Broadleaf vegetation samples were not collected since 2011 due to unavailability; these samples were not included as missed samples, because they were considered to be above and beyond required samples. Since they were included in the Offsite Dose Calculation Manual (ODCM) ODCM-07.01 Table 1, they were required samples for Monticello Nuclear Generating Plant and should have been included as missed samples. The affected pages have been included in their entirety (Attachment 1) and should replace existing pages (5 and 17), ML12135A041.

The complete data tables were to be submitted as part of the report; however, this data was not included with the annual reports prior to 2013. Attachment 2 will be added to the back of the annual report as submitted; this will be an addition to the report and will not be replacing any pages in the report.

**ENCLOSURE 1**

**ATTACHMENT 1**

**REPLACEMENT PAGES FOR THE 2011 AREOR**

2 Pages to Follow

### 3.3 Program Execution

The Program was executed as described in the preceding section with the following exceptions:

(1) Air Particulates / Air Iodine:

No air particulate / air iodine sample was available from location M-01 for the week ending June 29, 2011. There was no power, due to an open fuse.

No air particulate/air iodine sample was available from location M-03 for the week ending September 14, 2011. Run-time was significantly lower than expected.

(2) Thermoluminescent Dosimeters:

The TLD for location M-05S was missing in the field for the third quarter, 2011.  
The TLD for location M-1B was missing in the field for the fourth quarter, 2011.

(3) Surface Water:

Surface water was not collected at location M-08 during the months of January and February, 2011, due to unsafe ice conditions. The June 14, 2011 sample for composite was damaged in transit.

(4) Well Water:

Well water was not collected at location MW-1 in January, 2011.  
The January, 2011 sample collected from MW-12A sample was damaged in transit.

Well water from location MW-13A, October 17, 2011, was damaged in transit.

(5) Milk

Milk was not available from locations M-16 and M-17 for January and February, 2011 collections. No milk was available from location M-17 after November 9, 2011.

(6) Invertebrates

Bottom organisms were not collected in the Spring of 2011, due to high river levels.  
Bottom organisms could not be collected from control location M-8 in the Fall of 2011, due to high river levels.

(7) Broad Leaf Vegetables

Broad Leaf Vegetables were not collected in 2011 due to unavailability. The previous Critical Garden ceased to be used and attempts to obtain a sample from the new Critical Garden were unsuccessful.

Deviations from the program are summarized in Table 5.3.

### 3.4 Laboratory Procedures

The iodine-131 analyses in milk and drinking water were made using a sensitive radiochemical procedure which involves separation of the iodine using an ion-exchange method and solvent extraction and subsequent beta counting.

Gamma-spectroscopic analyses are performed using high-purity germanium (HPGe) detectors. Levels of iodine-131 in cabbage and natural vegetation and concentrations of airborne iodine-131 in charcoal samples were determined by gamma spectroscopy.

Table 5.3. MISSED COLLECTIONS AND ANALYSES

All required samples were collected and analyzed as scheduled with the following exceptions:					
Sample Type	Analysis	Location	Collection Date or Period	Reason for not conducting REMP as required	Plans for Preventing Recurrence
SW	Gamma	M-08	January	Water frozen.	None Required
SW	Gamma	M-08	February	Water frozen.	None Required
SW	For composite	M-08	6/14/2011	Sample damaged in transit.	None Required
WW	Gamma, H-3	MW-1	1/17/2011	Well not sampled, frozen.	None Required
WW	Gamma, H-3	MW-12A	1/17/2011	Container damaged in transit.	None Required
WW	Gamma, H-3	MW-13A	10/17/2011	Container damaged in transit.	None Required
TLD	Gamma	M-5S	10/3/2011	TLD missing in field.	Replaced, vandalism
TLD	Gamma	M-1B	1/4/2012	TLD missing in field.	Replaced, vandalism
AP/AI	Beta, I-131	M-1	6/29/2011	No power at sampler.	Power restored by utility.
AP/AI	Beta, I-131	M-3	9/14/2011	Elapsed time low.	Replaced with spare, repaired affected pump.
MI	Gamma, I-131	M-16, 17	1/31/2011	Milking discontinued until Spring.	None Required
MI	Gamma, I-131	M-17	12/14/2011	Milking discontinued for the year.	None Required
BO	Gamma	M-8, M-9	Spring	High water prevented sampling.	None Required
BO	Gamma	M-8	Fall	High water prevented sampling.	None Required
VE	I-131	Highest D/Q Garden and Control	At Harvest	Samples became unavailable when previous Critical Garden ceased to be used.	Attempted to obtain a sample from new Critical Garden

**ENCLOSURE 1**

**ATTACHMENT 2**

**ADDITIONAL PAGES FOR THE 2011 AREOR**





FINAL REPORT  
TO  
XCEL ENERGY CORPORATION

RADIOLOGICAL ENVIRONMENTAL  
MONITORING PROGRAM (REMP)

MONTICELLO NUCLEAR GENERATING PLANT  
DOCKET NO. 50-263 LICENSE NO. DPR-22

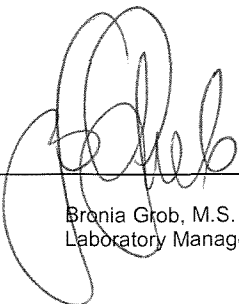
COMPLETE ANALYSES DATA TABLES  
January - December, 2011

Prepared under contract by

ENVIRONMENTAL, INC.  
MIDWEST LABORATORY

PROJECT NO. 8010

Reviewed and  
Approved



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Bronia Grob, M.S.  
Laboratory Manager

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## 1.0 INTRODUCTION

The following constitutes the final 2011 report for the Environmental Radiological Monitoring Program conducted at the Monticello Nuclear Generating Plant in Monticello, Minnesota. Results of completed analyses are presented in the attached tables.

All concentrations, except gross beta, are decay corrected to the time of collection.

All samples were collected within the scheduled period unless noted otherwise in the Listing of Missed Samples.

2.0. LISTING of MISSED SAMPLES

All required samples were collected and analyzed as scheduled with the following exceptions:					
Sample Type	Analysis	Location	Collection Date or Period	Reason for not conducting REMP as required	Plans for Preventing Recurrence
SW	Gamma	M-08	January	Water frozen.	None Required
SW	Gamma	M-08	February	Water frozen.	None Required
SW	For composite	M-08	6/14/2011	Sample damaged in transit.	None Required
WW	Gamma, H-3	MW-1	1/17/2011	Well not sampled, frozen.	None Required
WW	Gamma, H-3	MW-12A	1/17/2011	Container damaged in transit.	None Required
WW	Gamma, H-3	MW-13A	10/17/2011	Container damaged in transit.	None Required
TLD	Gamma	M-5S	10/3/2011	TLD missing in field.	Replaced, vandalism
TLD	Gamma	M-1B	1/4/2012	TLD missing in field.	Replaced, vandalism
AP/AI	Beta, I-131	M-1	6/29/2011	No power at sampler.	Power restored by utility.
AP/AI	Beta, I-131	M-3	9/14/2011	Elapsed time low.	Replaced with spare, repaired affected pump.
MI	Gamma, I-131	M-16, 17	1/31/2011	Milking discontinued until Spring.	None Required
MI	Gamma, I-131	M-17	12/14/2011	Milking discontinued for the year.	None Required
BO	Gamma	M-8, M-9	Spring	High water prevented sampling.	None Required
BO	Gamma	M-8	Fall	High water prevented sampling.	None Required
VE	I-131	Highest D/Q Garden and Control	At Harvest	Samples became unavailable when previous Critical Garden ceased to be used.	Attempted to obtain a sample from new Critical Garden

### 3.0 DATA TABLES

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Table 1. Ambient gamma radiation as measured by thermoluminescent dosimeters (TLD's).

Location	mRem/91 days				Cumulative Average	Previous Annual Average
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.		
<u>Indicators (Inner Ring, General Area of Site Boundary)</u>						
M-01A	11.2 ± 1.0	12.1 ± 0.9	13.1 ± 1.0	15.0 ± 1.1	12.9	12.8
M-02A	13.5 ± 1.1	13.7 ± 0.6	15.2 ± 0.9	17.5 ± 1.0	15.0	14.7
M-03A	13.7 ± 1.6	13.5 ± 1.2	15.5 ± 1.5	16.4 ± 1.4	14.8	14.3
M-04A	11.9 ± 1.0	13.9 ± 0.9	14.1 ± 1.1	17.3 ± 1.0	14.3	14.3
M-05A	11.8 ± 0.9	14.4 ± 0.7	14.3 ± 1.0	17.8 ± 0.9	14.6	14.6
M-06A	12.7 ± 0.9	14.7 ± 0.8	15.6 ± 0.7	18.0 ± 0.9	15.3	15.1
M-07A	12.6 ± 0.7	14.8 ± 0.7	15.3 ± 0.9	17.9 ± 0.9	15.2	14.5
M-08A	14.2 ± 1.2	14.6 ± 0.6	14.4 ± 1.0	16.4 ± 1.0	14.9	15.0
M-09A	13.1 ± 1.0	14.7 ± 0.7	16.2 ± 1.2	17.3 ± 0.9	15.3	15.5
M-10A	12.4 ± 0.9	14.4 ± 0.8	15.3 ± 1.1	17.2 ± 0.9	14.8	15.1
M-11A	14.5 ± 0.8	15.0 ± 0.7	17.1 ± 0.9	18.5 ± 0.8	16.3	15.9
M-12A	12.8 ± 0.9	15.2 ± 0.6	15.5 ± 0.8	18.4 ± 0.9	15.5	15.3
M-13A	12.2 ± 0.8	12.9 ± 0.8	13.8 ± 0.8	15.1 ± 0.9	13.5	13.3
M-14A	12.6 ± 0.6	13.9 ± 0.7	15.4 ± 0.9	16.7 ± 0.7	14.7	15.0
Mean ± s.d.	12.8 ± 0.9	14.1 ± 0.9	15.1 ± 1.0	17.1 ± 1.1	14.8	14.7
<u>Indicators (Outer Ring, 4-5 Miles Distant)</u>						
M-01B	12.4 ± 0.6	12.9 ± 0.8	13.7 ± 0.6	ND <sup>a</sup>	13.0	14.1
M-02B	13.5 ± 0.7	13.8 ± 1.1	14.7 ± 0.9	16.0 ± 0.7	14.5	14.4
M-03B	11.0 ± 0.7	11.1 ± 0.8	11.7 ± 0.8	13.5 ± 1.0	11.8	12.1
M-04B	11.6 ± 0.6	13.3 ± 0.6	13.5 ± 0.6	15.5 ± 0.8	13.5	13.6
M-05B	13.9 ± 0.6	13.7 ± 0.9	14.6 ± 0.6	16.1 ± 1.2	14.6	14.4
M-06B	12.6 ± 0.9	14.3 ± 0.7	14.9 ± 1.0	17.0 ± 0.9	14.7	14.6
M-07B	15.1 ± 1.0	14.5 ± 0.9	16.4 ± 1.0	16.9 ± 1.1	15.7	15.6
M-08B	13.4 ± 0.9	13.9 ± 0.7	13.6 ± 1.4	16.3 ± 1.0	14.3	13.9
M-09B	12.9 ± 0.9	16.2 ± 0.8	15.6 ± 1.0	18.6 ± 0.8	15.8	15.3
M-10B	12.9 ± 0.7	15.1 ± 0.9	16.5 ± 0.8	17.3 ± 1.1	15.5	15.3
M-11B	11.9 ± 0.9	15.3 ± 1.0	15.4 ± 0.8	17.8 ± 0.9	15.1	15.1
M-12B	12.1 ± 0.8	15.3 ± 0.8	14.7 ± 1.0	17.7 ± 0.8	15.0	14.5
M-13B	13.0 ± 0.6	13.9 ± 0.9	13.7 ± 0.7	15.5 ± 0.9	14.0	14.0
M-14B	12.4 ± 0.9	15.1 ± 0.7	14.0 ± 1.2	17.3 ± 0.8	14.7	14.6
M-15B	11.7 ± 0.8	14.9 ± 1.0	13.5 ± 0.7	15.9 ± 0.9	14.0	13.6
M-16B	11.7 ± 0.6	13.0 ± 1.0	12.3 ± 0.6	14.5 ± 1.0	12.9	13.5
Mean ± s.d.	12.6 ± 1.0	14.1 ± 1.2	14.3 ± 1.3	16.4 ± 1.3	14.3	14.3

<sup>a</sup> ND = No data; see Table 2.0, Listing of Missed Samples.

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Table 1. Ambient gamma radiation as measured by thermoluminescent dosimeters (TLD's),  
(continued).

Location	mRem/91 days				Cumulative Average	Previous Annual Average
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.		
<u>Control</u>						
M-01C	12.6 ± 0.9	14.1 ± 1.0	16.5 ± 1.5	16.0 ± 1.2	14.8	14.5
M-02C	12.1 ± 0.9	15.1 ± 0.7	17.1 ± 1.0	17.1 ± 0.9	15.4	15.0
M-03C	13.6 ± 0.6	15.8 ± 0.8	18.3 ± 0.7	18.2 ± 1.1	16.5	16.1
M-04C	12.6 ± 0.6	14.2 ± 0.6	17.9 ± 0.6	16.2 ± 0.8	<u>15.2</u>	<u>15.1</u>
Mean ± s.d.	12.7 ± 0.6	14.8 ± 0.8	17.5 ± 0.8	16.9 ± 1.0	15.5	15.2
<u>Indicators (Special Interest Areas)</u>						
M-01S	10.8 ± 0.9	13.0 ± 0.7	11.2 ± 0.9	15.6 ± 0.7	12.7	12.2
M-02S	9.8 ± 0.8	12.5 ± 0.7	11.3 ± 0.6	13.9 ± 0.8	11.9	12.0
M-03S	12.2 ± 0.9	14.5 ± 0.9	13.6 ± 0.9	16.5 ± 1.2	14.2	14.3
M-04S	13.4 ± 0.8	14.6 ± 0.7	14.9 ± 0.7	15.8 ± 1.0	14.7	14.9
M-05S	13.1 ± 0.9	14.3 ± 0.8	ND <sup>a</sup>	16.0 ± 1.1	14.5	14.5
M-06S	15.6 ± 0.8	15.8 ± 0.8	18.6 ± 0.7	17.8 ± 0.9	<u>17.0</u>	<u>16.4</u>
Mean ± s.d.	12.5 ± 2.1	14.1 ± 1.2	13.9 ± 3.1	15.9 ± 1.3	14.1	14.0
<u>Special TLDs</u>						
M-I-01	62.9 ± 1.5	46.5 ± 1.6	88.6 ± 2.4	72.9 ± 2.7	67.7	89.1
M-I-02	52.8 ± 2.2	38.3 ± 0.8	74.9 ± 3.4	61.7 ± 1.1	56.9	73.3
M-I-03	34.9 ± 0.9	28.2 ± 1.6	46.5 ± 1.5	40.0 ± 1.3	37.4	49.8
M-I-04	29.8 ± 1.2	25.6 ± 1.3	39.4 ± 1.5	35.4 ± 2.0	32.6	40.1
M-I-05	37.8 ± 2.4	39.7 ± 2.0	52.3 ± 1.9	49.5 ± 1.8	44.8	53.8
M-I-06	22.6 ± 1.0	23.7 ± 0.8	29.5 ± 1.2	28.5 ± 1.5	26.1	30.4
M-I-07	27.2 ± 1.4	26.6 ± 1.3	32.6 ± 1.7	33.0 ± 1.5	29.9	35.6
M-I-08	25.3 ± 1.5	21.9 ± 1.5	32.1 ± 2.0	28.0 ± 1.2	26.8	33.4
M-I-09	44.9 ± 1.3	49.0 ± 2.7	56.4 ± 2.8	56.2 ± 3.0	51.6	66.4
M-I-10	41.9 ± 0.9	29.6 ± 1.5	55.5 ± 2.0	41.4 ± 1.7	42.1	53.5
M-I-11	14.0 ± 1.0	14.1 ± 0.6	17.5 ± 0.7	16.4 ± 0.7	15.5	16.2
M-I-12	12.0 ± 0.6	14.4 ± 0.7	16.5 ± 0.6	16.9 ± 0.8	15.0	15.1
M-I-13	13.9 ± 1.6	14.4 ± 0.8	18.8 ± 2.1	16.8 ± 0.9	16.0	16.2
Mean ± s.d.	32.3 ± 15.6	28.6 ± 11.7	43.1 ± 22.2	38.2 ± 17.9	35.6	44.1

<sup>a</sup> ND = No data; see Table 2.0, Listing of Missed Samples.



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Table 2. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-1 (C)

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-05-11	328	0.045 ± 0.004	07-06-11	292	0.017 ± 0.003
01-12-11	323	0.040 ± 0.004	07-13-11	384	0.023 ± 0.003
01-19-11	351	0.033 ± 0.003	07-20-11	379	0.027 ± 0.003
01-26-11	324	0.038 ± 0.004	07-27-11	383	0.020 ± 0.003
02-02-11	353	0.027 ± 0.003	08-03-11	387	0.028 ± 0.003
02-09-11	331	0.024 ± 0.003	08-10-11	384	0.025 ± 0.003
02-16-11	344	0.028 ± 0.003	08-17-11	347	0.029 ± 0.003
02-23-11	295	0.022 ± 0.003	08-24-11	354	0.022 ± 0.003
03-02-11	294	0.039 ± 0.004	08-31-11	359	0.022 ± 0.003
03-09-11	292	0.028 ± 0.004	09-07-11	346	0.027 ± 0.003
03-16-11	295	0.028 ± 0.004	09-14-11	358	0.029 ± 0.003
03-23-11	293	0.019 ± 0.003 <sup>b</sup>	09-21-11	350	0.015 ± 0.003
03-30-11	294	0.034 ± 0.004 <sup>b</sup>	09-28-11	355	0.021 ± 0.003
1st Quarter Mean ± s.d.		<u>0.031 ± 0.008</u>	3rd Quarter Mean ± s.d.		<u>0.023 ± 0.005</u>
04-06-11	294	0.034 ± 0.004 <sup>b</sup>	10-05-11	349	0.026 ± 0.003
04-13-11	295	0.022 ± 0.003 <sup>b</sup>	10-12-11	354	0.040 ± 0.004
04-20-11	299	0.033 ± 0.004	10-19-11	354	0.022 ± 0.003
04-27-11	293	0.022 ± 0.003	10-26-11	354	0.023 ± 0.003
05-04-11	292	0.016 ± 0.003	11-02-11	381	0.022 ± 0.003
05-11-11	293	0.017 ± 0.003	11-09-11	356	0.029 ± 0.003
05-18-11	352	0.007 ± 0.002	11-16-11	351	0.037 ± 0.003
05-25-11	384	0.013 ± 0.002	11-23-11	356	0.032 ± 0.003
06-01-11	382	0.016 ± 0.002	11-30-11	322	0.056 ± 0.004
06-08-11	383	0.021 ± 0.003	12-07-11	354	0.036 ± 0.003
06-14-11	336	0.009 ± 0.002	12-14-11	355	0.062 ± 0.004
06-22-11	359	0.018 ± 0.003	12-21-11	323	0.041 ± 0.004
06-29-11		ND <sup>c</sup>	12-28-11	318	0.024 ± 0.003
2nd Quarter Mean ± s.d.		<u>0.019 ± 0.008</u>	4th Quarter Mean ± s.d.		<u>0.035 ± 0.013</u>
			Cumulative Average		0.027
			Previous Annual Average		0.026

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> Air iodine activity detected; noted in Appendix A.

<sup>c</sup> ND = No data; see Table 2.0, Listing of Missed Samples.

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Table 3. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-2

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>			<u>0.010</u>
01-05-11	332	0.052 ± 0.004	07-06-11	416	0.021 ± 0.003
01-12-11	319	0.039 ± 0.004	07-13-11	376	0.024 ± 0.003
01-19-11	353	0.031 ± 0.003	07-20-11	380	0.028 ± 0.003
01-26-11	323	0.046 ± 0.004	07-27-11	384	0.020 ± 0.003
02-02-11	352	0.025 ± 0.003	08-03-11	415	0.025 ± 0.003
02-09-11	300	0.029 ± 0.003	08-10-11	414	0.022 ± 0.003
02-16-11	344	0.028 ± 0.003	08-17-11	346	0.027 ± 0.003
02-23-11	295	0.030 ± 0.003	08-24-11	353	0.023 ± 0.003
03-02-11	294	0.042 ± 0.004	08-31-11	361	0.022 ± 0.003
03-09-11	291	0.028 ± 0.004	09-07-11	344	0.027 ± 0.003
03-16-11	295	0.029 ± 0.004	09-14-11	389	0.027 ± 0.003
03-23-11	294	0.023 ± 0.003 <sup>b</sup>	09-21-11	351	0.015 ± 0.003
03-30-11	293	0.037 ± 0.004 <sup>b</sup>	09-28-11	353	0.020 ± 0.003
1st Quarter Mean ± s.d.		<u>0.034 ± 0.009</u>	3rd Quarter Mean ± s.d.		<u>0.023 ± 0.004</u>
04-06-11	294	0.035 ± 0.004 <sup>b</sup>	10-05-11	349	0.028 ± 0.003
04-13-11	295	0.028 ± 0.003 <sup>b</sup>	10-12-11	354	0.045 ± 0.004
04-20-11	299	0.036 ± 0.004	10-19-11	353	0.019 ± 0.003
04-27-11	293	0.021 ± 0.003	10-26-11	355	0.025 ± 0.003
05-04-11	292	0.018 ± 0.003	11-02-11	381	0.027 ± 0.003
05-11-11	293	0.020 ± 0.003	11-09-11	355	0.028 ± 0.003
05-18-11	295	0.013 ± 0.003	11-16-11	351	0.037 ± 0.003
05-25-11	383	0.012 ± 0.002	11-23-11	356	0.030 ± 0.003
06-01-11	381	0.018 ± 0.003	11-30-11	323	0.053 ± 0.004
06-08-11	384	0.024 ± 0.003	12-07-11	353	0.033 ± 0.003
06-14-11	336	0.012 ± 0.002	12-14-11	356	0.066 ± 0.004
06-22-11	437	0.017 ± 0.002	12-21-11	293	0.045 ± 0.004
06-29-11	407	0.014 ± 0.002	12-28-11	318	0.026 ± 0.003
2nd Quarter Mean ± s.d.		<u>0.021 ± 0.008</u>	4th Quarter Mean ± s.d.		<u>0.035 ± 0.013</u>
Cumulative Average					0.028
Previous Annual Average					0.026

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> Air iodine activity detected; noted in Appendix A.

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Table 4. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-3

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>		<u>0.010</u>	
01-05-11	332	0.049 ± 0.004	07-06-11	357	0.024 ± 0.003
01-12-11	319	0.042 ± 0.004	07-13-11	347	0.025 ± 0.003
01-19-11	353	0.038 ± 0.003	07-20-11	350	0.028 ± 0.003
01-26-11	323	0.045 ± 0.004	07-27-11	355	0.019 ± 0.003
02-02-11	352	0.027 ± 0.003	08-03-11	355	0.029 ± 0.003
02-09-11	300	0.033 ± 0.004	08-10-11	355	0.023 ± 0.003
02-16-11	344	0.031 ± 0.003	08-17-11	347	0.025 ± 0.003
02-23-11	295	0.025 ± 0.003	08-24-11	353	0.023 ± 0.003
03-02-11	294	0.039 ± 0.004	08-31-11	331	0.024 ± 0.003
03-09-11	291	0.028 ± 0.003	09-07-11	344	0.027 ± 0.003
03-16-11	295	0.033 ± 0.004	09-14-11		ND <sup>c</sup>
03-23-11	294	0.023 ± 0.003 <sup>b</sup>	09-21-11	321	0.017 ± 0.003
03-30-11	293	0.039 ± 0.004 <sup>b</sup>	09-28-11	323	0.022 ± 0.003
1st Quarter Mean ± s.d.		0.035 ± 0.008	3rd Quarter Mean ± s.d.		0.024 ± 0.004
04-06-11	294	0.052 ± 0.004 <sup>b</sup>	10-05-11	349	0.028 ± 0.003
04-13-11	295	0.024 ± 0.003	10-12-11	354	0.039 ± 0.004
04-20-11	299	0.046 ± 0.004	10-19-11	353	0.020 ± 0.003
04-27-11	293	0.021 ± 0.003	10-26-11	355	0.024 ± 0.003
			11-02-11	351	0.028 ± 0.003
05-04-11	292	0.016 ± 0.003			
05-11-11	293	0.020 ± 0.003	11-09-11	326	0.033 ± 0.004
05-18-11	296	0.012 ± 0.003	11-16-11	351	0.035 ± 0.003
05-25-11	352	0.014 ± 0.003	11-23-11	326	0.033 ± 0.003
06-01-11	381	0.013 ± 0.002	11-30-11	323	0.050 ± 0.004
06-08-11	354	0.021 ± 0.003	12-07-11	353	0.034 ± 0.003
06-14-11	310	0.011 ± 0.003	12-14-11	327	0.067 ± 0.005
06-22-11	403	0.013 ± 0.002	12-21-11	293	0.053 ± 0.004
06-29-11	349	0.014 ± 0.003	12-28-11	289	0.027 ± 0.004
2nd Quarter Mean ± s.d.		0.021 ± 0.013	4th Quarter Mean ± s.d.		0.036 ± 0.013
Cumulative Average					0.029
Previous Annual Average					0.026

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> Air iodine activity detected; noted in Appendix A.

<sup>c</sup> ND = No data; see Table 2.0, Listing of Missed Samples.

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Table 5. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-4

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>			<u>0.010</u>
01-05-11	318	0.048 ± 0.004	07-06-11	413	0.020 ± 0.003
01-12-11	312	0.040 ± 0.004	07-13-11	378	0.022 ± 0.003
01-19-11	351	0.036 ± 0.003	07-20-11	380	0.027 ± 0.003
01-26-11	274	0.053 ± 0.005	07-27-11	384	0.017 ± 0.002
02-02-11	312	0.027 ± 0.003	08-03-11	385	0.026 ± 0.003
02-09-11	240	0.043 ± 0.005	08-10-11	416	0.022 ± 0.003
02-16-11	286	0.027 ± 0.004	08-17-11	346	0.026 ± 0.003
02-23-11	196	0.034 ± 0.005	08-24-11	353	0.022 ± 0.003
03-02-11	196	0.053 ± 0.006	08-31-11	332	0.023 ± 0.003
03-09-11	194	0.039 ± 0.005	09-07-11	318	0.029 ± 0.003
03-16-11	196	0.034 ± 0.005	09-14-11	331	0.039 ± 0.004
03-23-11	196	0.027 ± 0.005 <sup>b</sup>	09-21-11	323	0.017 ± 0.003
03-30-11	195	0.044 ± 0.006 <sup>b</sup>	09-28-11	326	0.021 ± 0.003
1st Quarter Mean ± s.d.		<u>0.039 ± 0.009</u>	3rd Quarter Mean ± s.d.		<u>0.024 ± 0.006</u>
04-06-11	195	0.047 ± 0.005 <sup>b</sup>	10-05-11	349	0.028 ± 0.003
04-13-11	196	0.029 ± 0.005	10-12-11	354	0.041 ± 0.004
04-20-11	199	0.041 ± 0.005	10-19-11	353	0.021 ± 0.003
04-27-11	195	0.024 ± 0.004	10-26-11	354	0.025 ± 0.003
05-04-11	194	0.020 ± 0.004	11-02-11	351	0.028 ± 0.003
05-11-11	195	0.018 ± 0.004	11-09-11	328	0.030 ± 0.003
05-18-11	275	0.010 ± 0.003	11-16-11	351	0.036 ± 0.003
05-25-11	382	0.010 ± 0.002	11-23-11	328	0.031 ± 0.003
06-01-11	382	0.013 ± 0.002	11-30-11	325	0.051 ± 0.004
06-08-11	384	0.022 ± 0.003	12-07-11	353	0.036 ± 0.003
06-14-11	362	0.011 ± 0.002	12-14-11	328	0.070 ± 0.005
06-22-11	437	0.011 ± 0.002	12-21-11	297	0.043 ± 0.004
06-29-11	378	0.015 ± 0.002	12-28-11	294	0.025 ± 0.003
2nd Quarter Mean ± s.d.		<u>0.021 ± 0.012</u>	4th Quarter Mean ± s.d.		<u>0.036 ± 0.013</u>
Cumulative Average					0.030
Previous Annual Average					0.027

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> Air iodine activity detected; noted in Appendix A.

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Table 6. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-5

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>			<u>0.010</u>
01-05-11	329	0.045 ± 0.004	07-06-11	381	0.020 ± 0.003
01-12-11	323	0.043 ± 0.004	07-13-11	349	0.024 ± 0.003
01-19-11	352	0.034 ± 0.003	07-20-11	350	0.028 ± 0.003
01-26-11	324	0.041 ± 0.004	07-27-11	354	0.019 ± 0.003
02-02-11	352	0.027 ± 0.003	08-03-11	356	0.025 ± 0.003
02-09-11	300	0.031 ± 0.004	08-10-11	354	0.023 ± 0.003
02-16-11	344	0.025 ± 0.003	08-17-11	372	0.025 ± 0.003
02-23-11	295	0.027 ± 0.003	08-24-11	380	0.020 ± 0.003
03-02-11	294	0.038 ± 0.004	08-31-11	388	0.021 ± 0.003
03-09-11	291	0.028 ± 0.003	09-07-11	371	0.026 ± 0.003
03-16-11	295	0.032 ± 0.004	09-14-11	387	0.033 ± 0.003
03-23-11	293	0.023 ± 0.003	<sup>b</sup> 09-21-11	350	0.016 ± 0.003
03-30-11	293	0.041 ± 0.004	<sup>b</sup> 09-28-11	354	0.017 ± 0.003
1st Quarter Mean ± s.d.		0.033 ± 0.007	3rd Quarter Mean ± s.d.		0.023 ± 0.005
04-06-11	294	0.036 ± 0.004	<sup>b</sup> 10-05-11	376	0.026 ± 0.003
04-13-11	295	0.024 ± 0.003	10-12-11	354	0.039 ± 0.004
04-20-11	299	0.035 ± 0.004	10-19-11	353	0.018 ± 0.003
04-27-11	293	0.019 ± 0.003	10-26-11	354	0.025 ± 0.003
			11-02-11	378	0.027 ± 0.003
05-04-11	292	0.017 ± 0.003			
05-11-11	293	0.019 ± 0.003	11-09-11	383	0.028 ± 0.003
05-18-11	353	0.010 ± 0.002	11-16-11	351	0.032 ± 0.003
05-25-11	382	0.012 ± 0.002	11-23-11	356	0.027 ± 0.003
06-01-11	382	0.015 ± 0.002	11-30-11	352	0.046 ± 0.004
06-08-11	354	0.026 ± 0.003	12-07-11	354	0.037 ± 0.004
06-14-11	322	0.011 ± 0.002	12-14-11	296	0.068 ± 0.005
06-22-11	402	0.015 ± 0.002	12-21-11	293	0.048 ± 0.004
06-29-11	349	0.012 ± 0.002	12-28-11	289	0.022 ± 0.003
2nd Quarter Mean ± s.d.		0.019 ± 0.009	4th Quarter Mean ± s.d.		0.034 ± 0.014
Cumulative Average					0.027
Previous Annual Average					0.025

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> Air iodine activity detected; noted in Appendix A.

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Table 7. Airborne particulate data, gross beta analyses, monthly averages, minima and maxima.

<b>January</b>			
Location	Average	Minima	Maxima
Control	0.037	0.027	0.045
M-1	0.037	0.027	0.045
Indicators	0.040	0.025	0.053
M-2	0.039	0.025	0.052
M-3	0.040	0.027	0.049
M-4	0.041	0.027	0.053
M-5	0.038	0.027	0.045

<b>April</b>			
Location	Average	Minima	Maxima
Control	0.028	0.022	0.034
M-1	0.028	0.022	0.034
Indicators	0.032	0.019	0.052
M-2	0.030	0.021	0.036
M-3	0.036	0.021	0.052
M-4	0.035	0.024	0.047
M-5	0.028	0.019	0.036

<b>February</b>			
Location	Average	Minima	Maxima
Control	0.028	0.022	0.039
M-1	0.028	0.022	0.039
Indicators	0.033	0.025	0.053
M-2	0.032	0.028	0.042
M-3	0.032	0.025	0.039
M-4	0.039	0.027	0.053
M-5	0.030	0.025	0.038

<b>May</b>			
Location	Average	Minima	Maxima
Control	0.014	0.007	0.017
M-1	0.014	0.007	0.017
Indicators	0.015	0.010	0.020
M-2	0.016	0.012	0.020
M-3	0.015	0.012	0.020
M-4	0.015	0.010	0.020
M-5	0.015	0.010	0.019

<b>March</b>			
Location	Average	Minima	Maxima
Control	0.027	0.019	0.034
M-1	0.027	0.019	0.034
Indicators	0.032	0.023	0.044
M-2	0.029	0.023	0.037
M-3	0.031	0.023	0.039
M-4	0.036	0.027	0.044
M-5	0.031	0.023	0.041

<b>June</b>			
Location	Average	Minima	Maxima
Control	0.016	0.009	0.021
M-1	0.016	0.009	0.021
Indicators	0.016	0.011	0.026
M-2	0.017	0.012	0.024
M-3	0.015	0.011	0.021
M-4	0.015	0.011	0.022
M-5	0.016	0.011	0.026

Note: unless otherwise specified, samples collected on the first, second or third day of the month are grouped with data of the previous month.

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Table 7. Airborne particulate data, gross beta analyses, monthly averages, minima and maxima.

<b>July</b>			
Location	Average	Minima	Maxima
Control	0.023	0.017	0.028
M-1	0.023	0.017	0.028
Indicators	0.024	0.017	0.029
M-2	0.024	0.020	0.028
M-3	0.025	0.019	0.029
M-4	0.022	0.017	0.027
M-5	0.023	0.019	0.028

<b>October</b>			
Location	Average	Minima	Maxima
Control	0.028	0.022	0.040
M-1	0.028	0.022	0.040
Indicators	0.028	0.018	0.045
M-2	0.029	0.019	0.045
M-3	0.028	0.020	0.039
M-4	0.029	0.021	0.041
M-5	0.027	0.018	0.039

<b>August</b>			
Location	Average	Minima	Maxima
Control			
M-1	0.025	0.022	0.029
Indicators	0.023	0.020	0.027
M-2	0.024	0.022	0.027
M-3	0.024	0.023	0.025
M-4	0.023	0.022	0.026
M-5	0.022	0.020	0.025

<b>November</b>			
Location	Average	Minima	Maxima
Control	0.033	0.029	0.037
M-1	0.033	0.029	0.037
Indicators	0.032	0.027	0.037
M-2	0.032	0.028	0.037
M-3	0.034	0.033	0.035
M-4	0.032	0.030	0.036
M-5	0.029	0.027	0.032

<b>September</b>			
Location	Average	Minima	Maxima
Control			
M-1	0.023	0.015	0.029
Indicators	0.023	0.015	0.039
M-2	0.022	0.015	0.027
M-3	0.022	0.017	0.027
M-4	0.027	0.017	0.039
M-5	0.023	0.016	0.033

<b>December</b>			
Location	Average	Minima	Maxima
Control	0.041	0.024	0.062
M-1	0.041	0.024	0.062
Indicators	0.044	0.022	0.070
M-2	0.043	0.026	0.066
M-3	0.045	0.027	0.067
M-4	0.044	0.025	0.070
M-5	0.044	0.022	0.068

Note: unless otherwise specified, samples collected on the first, second or third day of the month are grouped with data of the previous month.

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Table 8. Airborne particulates, quarterly composites from each location, analysis for gamma-emitting isotopes.

Activity (pCi/m <sup>3</sup> )						
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Cumulative Average	Previous Average
M-1 (C)						
Lab Code	MAP- 2234	MAP- 4840	MAP- 7040	MAP- 9202		
Volume(m <sup>3</sup> )	4116	3963	4677	4526		
Be-7	0.065 ± 0.016	0.078 ± 0.014	0.074 ± 0.012	0.056 ± 0.009	0.065	0.077
Mn-54	< 0.0006	< 0.0005	< 0.0007	< 0.0003	<0.0007	<0.0006
Co-58	< 0.0003	< 0.0005	< 0.0008	< 0.0005	<0.0008	<0.0008
Co-60	< 0.0008	< 0.0006	< 0.0007	< 0.0003	<0.0008	<0.0006
Zn-65	< 0.0018	< 0.0007	< 0.0004	< 0.0004	<0.0018	<0.0008
Zr-Nb-95	< 0.0011	< 0.0007	< 0.0010	< 0.0004	<0.0011	<0.0006
Ru-103	< 0.0006	< 0.0007	< 0.0008	< 0.0007	<0.0008	<0.0007
Ru-106	< 0.0049	< 0.0050	< 0.0070	< 0.0049	<0.0070	<0.0049
Cs-134	< 0.0006	< 0.0008	< 0.0008	< 0.0004	<0.0008	<0.0005
Cs-137	< 0.0005	< 0.0008	< 0.0007	< 0.0002	<0.0008	<0.0004
Ba-La-140	< 0.0024	< 0.0021	< 0.0018	< 0.0013	<0.0024	<0.0017
Ce-141	< 0.0019	< 0.0015	< 0.0013	< 0.0008	<0.0019	<0.0013
Ce-144	< 0.0050	< 0.0039	< 0.0042	< 0.0022	<0.0050	<0.0035
M-2						
Lab Code	MAP- 2235	MAP- 4841	MAP- 7041	MAP- 9203		
Volume(m <sup>3</sup> )	4086	4388	4880	4497		
Be-7	0.067 ± 0.015	0.085 ± 0.014	0.070 ± 0.012	0.053 ± 0.016	0.063	0.073
Mn-54	< 0.0009	< 0.0007	< 0.0005	< 0.0005	<0.0009	<0.0005
Co-58	< 0.0007	< 0.0005	< 0.0005	< 0.0006	<0.0007	<0.0005
Co-60	< 0.0007	< 0.0005	< 0.0004	< 0.0008	<0.0007	<0.0006
Zn-65	< 0.0007	< 0.0006	< 0.0005	< 0.0006	<0.0007	<0.0006
Zr-Nb-95	< 0.0008	< 0.0008	< 0.0005	< 0.0010	<0.0008	<0.0006
Ru-103	< 0.0011	< 0.0011	< 0.0006	< 0.0008	<0.0011	<0.0007
Ru-106	< 0.0043	< 0.0035	< 0.0026	< 0.0064	<0.0043	<0.0040
Cs-134	< 0.0005	< 0.0007	< 0.0006	< 0.0003	<0.0007	<0.0005
Cs-137	< 0.0003	< 0.0007	< 0.0004	< 0.0005	<0.0007	<0.0005
Ba-La-140	< 0.0028	< 0.0020	< 0.0015	< 0.0026	<0.0028	<0.0016
Ce-141	< 0.0008	< 0.0018	< 0.0009	< 0.0015	<0.0018	<0.0013
Ce-144	< 0.0038	< 0.0039	< 0.0021	< 0.0024	<0.0039	<0.0034



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Table 8. Airborne particulates, quarterly composites from each location, analysis for gamma-emitting isotopes.

Activity (pCi/m <sup>3</sup> )						
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Cumulative Average	Previous Average
M-3						
Lab Code	MAP- 2236	MAP- 4842	MAP- 7042	MAP- 9204		
Volume(m <sup>3</sup> )	4086	4211	4137	4349		
Be-7	0.068 ± 0.014	0.093 ± 0.014	0.081 ± 0.014	0.061 ± 0.015	0.070	0.075
Mn-54	< 0.0008	< 0.0006	< 0.0003	< 0.0007	<0.0008	<0.0006
Co-58	< 0.0004	< 0.0004	< 0.0006	< 0.0009	<0.0006	<0.0007
Co-60	< 0.0005	< 0.0004	< 0.0006	< 0.0007	<0.0006	<0.0009
Zn-65	< 0.0007	< 0.0014	< 0.0008	< 0.0008	<0.0014	<0.0008
Zr-Nb-95	< 0.0008	< 0.0011	< 0.0008	< 0.0010	<0.0011	<0.0010
Ru-103	< 0.0010	< 0.0008	< 0.0007	< 0.0009	<0.0010	<0.0014
Ru-106	< 0.0033	< 0.0064	< 0.0075	< 0.0074	<0.0075	<0.0058
Cs-134	< 0.0005	0.0013 ± 0.0005 <sup>a</sup>	< 0.0006	< 0.0006	0.0013	<0.0008
Cs-137	< 0.0005	0.0014 ± 0.0008 <sup>a</sup>	< 0.0005	< 0.0007	0.0014	<0.0009
Ba-La-140	< 0.0028	< 0.0015	< 0.0020	< 0.0024	<0.0028	<0.0016
Ce-141	< 0.0011	< 0.0010	< 0.0014	< 0.0020	<0.0014	<0.0019
Ce-144	< 0.0050	< 0.0041	< 0.0029	< 0.0037	<0.0050	<0.0054
M-4						
Lab Code	MAP- 2237	MAP- 4843	MAP- 7043	MAP- 9205		
Volume(m <sup>3</sup> )	3264	3774	4684	4365		
Be-7	0.076 ± 0.016	0.080 ± 0.015	0.074 ± 0.011	0.057 ± 0.015	0.069	0.084
Mn-54	< 0.0007	< 0.0010	< 0.0006	< 0.0004	<0.0010	<0.0006
Co-58	< 0.0010	< 0.0012	< 0.0005	< 0.0006	<0.0012	<0.0007
Co-60	< 0.0010	< 0.0006	< 0.0002	< 0.0006	<0.0010	<0.0009
Zn-65	< 0.0013	< 0.0017	< 0.0004	< 0.0006	<0.0017	<0.0011
Zr-Nb-95	< 0.0009	< 0.0012	< 0.0008	< 0.0006	<0.0012	<0.0012
Ru-103	< 0.0013	< 0.0011	< 0.0007	< 0.0008	<0.0013	<0.0009
Ru-106	< 0.0089	< 0.0098	< 0.0050	< 0.0055	<0.0098	<0.0065
Cs-134	< 0.0011	< 0.0008	< 0.0005	< 0.0006	<0.0011	<0.0006
Cs-137	< 0.0008	< 0.0010	< 0.0004	< 0.0004	<0.0010	<0.0010
Ba-La-140	< 0.0022	< 0.0035	< 0.0010	< 0.0025	<0.0035	<0.0025
Ce-141	< 0.0023	< 0.0015	< 0.0009	< 0.0012	<0.0023	<0.0020
Ce-144	< 0.0063	< 0.0049	< 0.0021	< 0.0024	<0.0063	<0.0056

<sup>a</sup> Low levels of Cs-134 and 137 found in air particulates throughout the U.S. due to the Fukushima Daiichi event.

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Table 8. Airborne particulates, quarterly composites from each location, analysis for gamma-emitting isotopes.

	Activity (pCi/m <sup>3</sup> )				Cumulative Average	Previous Average
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.		
M-5						
Lab Code	MAP- 2238	MAP- 4844	MAP- 7044	MAP- 9206		
Volume(m <sup>3</sup> )	4085	4311	4744	4488		
Be-7	0.064 ± 0.012	0.078 ± 0.015	0.067 ± 0.012	0.061 ± 0.013	0.064	0.070
Mn-54	< 0.0009	< 0.0004	< 0.0006	< 0.0006	<0.0009	<0.0006
Co-58	< 0.0006	< 0.0009	< 0.0007	< 0.0006	<0.0009	<0.0008
Co-60	< 0.0007	< 0.0008	< 0.0006	< 0.0005	<0.0008	<0.0007
Zn-65	< 0.0010	< 0.0006	< 0.0007	< 0.0005	<0.0010	<0.0009
Zr-Nb-95	< 0.0010	< 0.0014	< 0.0008	< 0.0010	<0.0014	<0.0010
Ru-103	< 0.0007	< 0.0009	< 0.0011	< 0.0008	<0.0011	<0.0008
Ru-106	< 0.0079	< 0.0043	< 0.0058	< 0.0052	<0.0079	<0.0072
Cs-134	< 0.0004	< 0.0008	< 0.0005	< 0.0004	<0.0008	<0.0005
Cs-137	< 0.0007	< 0.0006	< 0.0009	< 0.0005	<0.0009	<0.0007
Ba-La-140	< 0.0034	< 0.0021	< 0.0019	< 0.0027	<0.0034	<0.0019
Ce-141	< 0.0014	< 0.0017	< 0.0014	< 0.0015	<0.0017	<0.0013
Ce-144	< 0.0050	< 0.0026	< 0.0033	< 0.0035	<0.0050	<0.0045

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Table 9. Milk, analysis for iodine-131 and gamma-emitting isotopes.  
 Collection: Monthly - November through April.  
 Biweekly - May through October.

Location	Date Collected	Lab Code	Concentration (pCi/L)					
			I-131	K-40	Cs-134	Cs-137	Ba-La-140	
Kitzman	01-31-11			NS <sup>a</sup>				
M-16	03-30-11	MMI -1538	1.5 ± 0.2 <sup>d</sup>	1655 ± 123	< 5	< 5	< 5	
	04-27-11	MMI -2523	1.3 ± 0.2 <sup>b</sup>	1792 ± 126	< 5	< 5	< 5	
	05-11-11	MMI -2824	1.1 ± 0.2 <sup>d</sup>	1868 ± 126	< 5	< 5	< 5	
	05-25-11	MMI -3214	< 0.5	1826 ± 127	< 5	< 5	< 5	
	06-08-11	MMI -3660	< 0.5	1837 ± 99	< 5	< 5	< 5	
	06-22-11	MMI -3921	< 0.5	1717 ± 127	< 5	< 5	< 5	
	07-06-11	MMI -4307	< 0.5	1754 ± 119	< 5	< 5	< 5	
	07-20-11	MMI -4710	< 0.5	1889 ± 129	< 5	< 5	< 5	
	08-03-11	MMI -5282	< 0.5	1869 ± 112	< 5	< 5	< 5	
	08-17-11	MMI -5605	< 0.5	1790 ± 126	< 5	< 5	< 5	
	08-31-11	MMI -5898	< 0.5	1869 ± 103	< 5	< 5	< 5	
	09-14-11	MMI -6242	< 0.5	1856 ± 125	< 5	< 5	< 5	
	09-28-11	MMI -6471	< 0.5	1835 ± 119	< 5	< 5	< 5	
	10-12-11	MMI -6891	< 0.5	1867 ± 99	< 5	< 5	< 5	
	10-26-11	MMI -7455	< 0.5	1922 ± 117	< 5	< 5	< 5	
	11-09-11	MMI -7865	< 0.5	1743 ± 99	< 5	< 5	< 5	
	12-14-11	MMI -8668	< 0.5	1815 ± 125	< 5	< 5	< 5	
Cumulative Average			1.4	1818	< 5	< 5	< 5	
Previous Annual Average			< 0.5	1762	< 5	< 5	< 5	
Greniger (C)	01-31-11			NS <sup>a</sup>				
M-17C	03-30-11	MMI -1539	1.5 ± 0.2 <sup>b</sup>	1756 ± 131	< 5	< 5	< 5	
	04-27-11	MMI -2524	< 0.5	1629 ± 115	< 5	< 5	< 5	
	05-13-11	MMI -3011	< 0.5	1777 ± 120	< 5	< 5	< 5	
	05-25-11	MMI -3215	< 0.5	1717 ± 129	< 5	< 5	< 5	
	06-10-11	MMI -3728	< 0.5	1920 ± 107	< 5	< 5	< 5	
	06-22-11	MMI -3922	< 0.5	1878 ± 129	< 5	< 5	< 5	
	07-06-11	MMI -4308	< 0.5	1805 ± 122	< 5	< 5	< 5	
	07-20-11	MMI -4711	< 0.5	1906 ± 130	< 5	< 5	< 5	
	08-03-11	MMI -5283	< 0.5	1794 ± 114	< 5	< 5	< 5	
	08-17-11	MMI -5606	< 0.5	1793 ± 137	< 5	< 5	< 5	
	08-31-11	MMI -5899	< 0.5	1781 ± 104	< 5	< 5	< 5	
	09-14-11	MMI -6243	< 0.5	1725 ± 121	< 5	< 5	< 5	
	09-28-11	MMI -6472	< 0.5	1994 ± 121	< 5	< 5	< 5	
	10-12-11	MMI -6892	< 0.5	1847 ± 88	< 5	< 5	< 5	
	10-26-11	MMI -7456	< 0.5	1920 ± 121	< 5	< 5	< 5	
	11-09-11	MMI -7866	< 0.5	1896 ± 103	< 5	< 5	< 5	
	12-14-11			NS <sup>a</sup>				
Cumulative Average			1.5	1821	< 5	< 5	< 5	
Previous Annual Average			< 0.5	1788	< 5	< 5	< 5	

<sup>a</sup> NS = No sample; see Table 2.0, Listing of Missed Samples.

<sup>b</sup> The low levels of I-131 detected are attributed to the Fukushima Daiichi event.

Table 9A. Pasture grass, vegetation, analysis for gamma-emitting isotopes.  
Collection: 3x per year

Sample Description and Concentration (pCi/g wet)		Annual Average	Previous Annual Average
Location: M-41 (Training Center)			
Date Collected	08-31-11      09-21-11		
Lab Code	MVE- 5900      MVE- 6427		
Mn-54	< 0.007      < 0.008	< 0.008	< 0.015
Fe-59	< 0.026      < 0.013	< 0.026	< 0.040
Co-58	< 0.012      < 0.008	< 0.012	< 0.013
Co-60	< 0.006      < 0.008	< 0.008	< 0.013
Zn-65	< 0.024      < 0.012	< 0.024	< 0.036
Nb-95	< 0.013      < 0.005	< 0.013	< 0.018
I-131	< 0.020      < 0.012	< 0.020	< 0.018
Cs-134	< 0.009      < 0.007	< 0.009	< 0.014
Cs-137	< 0.012      < 0.010	< 0.012	< 0.017
Location: M-42 (Biology Station Road)			
Date Collected	08-31-11      09-21-11		
Lab Code	MVE- 5901      MVE- 6428		
Mn-54	< 0.007      < 0.010	< 0.010	< 0.017
Fe-59	< 0.027      < 0.015	< 0.027	< 0.038
Co-58	< 0.006      < 0.010	< 0.010	< 0.015
Co-60	< 0.008      < 0.009	< 0.009	< 0.019
Zn-65	< 0.016      < 0.035	< 0.035	< 0.026
Nb-95	< 0.012      < 0.010	< 0.012	< 0.015
I-131	< 0.020      < 0.017	< 0.020	< 0.022
Cs-134	< 0.007      < 0.013	< 0.013	< 0.014
Cs-137	< 0.007      < 0.014	< 0.014	< 0.020
Location: M-43 (Imholte Farm, Control)			
Date Collected	08-31-11      09-21-11		
Lab Code	MVE- 5902      MVE- 6429		
Mn-54	< 0.011      < 0.010	< 0.011	< 0.016
Fe-59	< 0.022      < 0.027	< 0.027	< 0.038
Co-58	< 0.009      < 0.009	< 0.009	< 0.012
Co-60	< 0.006      < 0.009	< 0.009	< 0.011
Zn-65	< 0.017      < 0.017	< 0.017	< 0.020
Nb-95	< 0.007      < 0.011	< 0.011	< 0.017
I-131	< 0.020      < 0.021	< 0.021	< 0.027
Cs-134	< 0.010      < 0.007	< 0.010	< 0.013
Cs-137	< 0.009      < 0.012	< 0.012	< 0.013

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Table 10. River water, analysis of monthly composites for gamma-emitting isotopes.

Location: M-8 (C)

Collection: Weekly

Sample Description and Concentration (pCi/L)					
Period Collected	January	February	March	April	May
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	MSW-2118	MSW-3004	MSW-3675
Mn-54	-	-	< 10	< 10	< 10
Fe-59	-	-	< 30	< 30	< 30
Co-58	-	-	< 10	< 10	< 10
Co-60	-	-	< 10	< 10	< 10
Zn-65	-	-	< 30	< 30	< 30
Zr-Nb-95	-	-	< 15	< 15	< 15
Cs-134	-	-	< 10	< 10	< 10
Cs-137	-	-	< 10	< 10	< 10
Ba-La-140	-	-	< 15	< 15	< 15
Ce-144	-	-	< 15	< 15	< 20
Period Collected	June	July	August	September	October
Lab Code	MSW-4721 <sup>b</sup>	MSW-5357	MSW-6273	MSW-6830	MSW-8088
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 14	< 15	< 16	< 16	< 15
Period Collected	November	December	Cumulative		Previous
Lab Code	MSW-8649	MSW-9238	Average		Annual
					Average
Mn-54	< 10	< 10	< 10		< 10
Fe-59	< 30	< 30	< 30		< 30
Co-58	< 10	< 10	< 10		< 10
Co-60	< 10	< 10	< 10		< 10
Zn-65	< 30	< 30	< 30		< 30
Zr-Nb-95	< 15	< 15	< 15		< 15
Cs-134	< 10	< 10	< 10		< 10
Cs-137	< 10	< 10	< 10		< 10
Ba-La-140	< 15	< 15	< 15		< 15
Ce-144	< 21	< 26	< 26		< 28

<sup>a</sup> ND = No data; see Table 2.0, Listing of Missed Samples.

<sup>b</sup> Composite of three samples for month; see Table 2.0, Listing of Missed Samples.

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Table 10. River water, analysis of monthly composites for gamma-emitting isotopes.

Location: M-9  
Collection: Weekly

Sample Description and Concentration (pCi/L)					
Period Collected	January	February	March	April	May
Lab Code	MSW-528	MSW-1009	MSW-2119	MSW-3005	MSW-3676
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 25	< 17	< 16	< 11	< 17
Period Collected	June	July	August	September	October
Lab Code	MSW-4722	MSW-5358	MSW-6274	MSW-6831	MSW-8089
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 16	< 20	< 16	< 22	< 34
Period Collected	November	December		Cumulative	Previous
Lab Code	MSW-8650	MSW-9240		Average	Annual
Mn-54	< 10	< 10		< 10	< 10
Fe-59	< 30	< 30		< 30	< 30
Co-58	< 10	< 10		< 10	< 10
Co-60	< 10	< 10		< 10	< 10
Zn-65	< 30	< 30		< 30	< 30
Zr-Nb-95	< 15	< 15		< 15	< 15
Cs-134	< 10	< 10		< 10	< 10
Cs-137	< 10	< 10		< 10	< 10
Ba-La-140	< 15	< 15		< 15	< 15
Ce-144	< 43	< 22		< 43	< 40

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Table 11. Drinking water, City of Minneapolis, M-14, analysis of monthly composites for gross beta, iodine-131, and gamma-emitting isotopes.  
Collection: Weekly

Sample Description and Concentration (pCi/L)					
Period Collected	January	February	March	April	May
Lab Code	MDW-497	MDW-951	MDW-1597	MDW-2624	MDW-3587
Gross beta	1.7 ± 0.4	2.6 ± 0.8	2.7 ± 1.3	3.0 ± 1.6	2.4 ± 1.0
I-131	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 19	< 19	< 26	< 18	< 19
Period Collected	June	July	August	September	October
Lab Code	MDW-4270	MDW-5240	MDW-5943	MDW-6606	MDW-7781
Gross beta	2.2 ± 0.7	1.7 ± 0.9	2.2 ± 1.0	1.4 ± 0.6	2.7 ± 1.3
I-131	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 21	< 21	< 22	< 19	< 23
Period Collected	November	December		Cumulative	Previous
Lab Code	MDW-8464	MDW-9116		Average	Average
Gross beta	3.0 ± 1.1	1.0 ± 0.5		2.2	2.9
I-131	< 1.0	< 1.0		< 1.0	< 1.0
Mn-54	< 10	< 10		< 10	< 10
Fe-59	< 30	< 30		< 30	< 30
Co-58	< 10	< 10		< 10	< 10
Co-60	< 10	< 10		< 10	< 10
Zn-65	< 30	< 30		< 30	< 30
Zr-Nb-95	< 15	< 15		< 15	< 15
Cs-134	< 10	< 10		< 10	< 10
Cs-137	< 10	< 10		< 10	< 10
Ba-La-140	< 15	< 15		< 15	< 15
Ce-144	< 27	< 25		< 27	< 38

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Table 12. River water and drinking water, analysis of quarterly composites for tritium.  
Collection: Quarterly composites of weekly collections.

Sample Type, Location and Collection Period	Lab Code	<u>Concentration (pCi/L)</u> H-3	
<u>River Water Upstream, M-8 (C)</u>			
1st Quarter <sup>a</sup>	MSW - 2120	< 500	< 142
2nd Quarter	MSW - 4727	< 500	< 152
3rd Quarter	MSW - 6835	< 500	< 144
4th Quarter	MSW - 9235	< 500	< 143
Cumulative Average		< 500	< 145
Previous Annual Average		< 500	< 160
<u>River Water Downstream, M-9</u>			
1st Quarter	MSW - 2121	< 500	< 142
2nd Quarter	MSW - 4728	< 500	< 152
3rd Quarter	MSW - 6836	< 500	< 144
4th Quarter	MSW - 9236	< 500	< 143
Cumulative Average		< 500	< 145
Previous Annual Average		< 500	< 159
<u>Drinking Water Minneapolis, M-14</u>			
1st Quarter	MDW 2122,3	< 500	< 142
2nd Quarter	MDW - 4728	< 500	< 152
3rd Quarter	MDW - 6837	< 500	< 145
4th Quarter	MDW - 9237	< 500	< 143
Cumulative Average		< 500	< 146
Previous Annual Average		< 500	< 153

<sup>a</sup> Composite consists of samples from 03-16, 03-23 and 03-30-11; water frozen remainder of quarter.



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Table 13. Well water, analysis for tritium and gamma-emitting isotopes.

Sample Description and Concentration (pCi/L)												
Date Collected	Lab Code	H-3 ( $< 500$ pCi/L)	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	Cs-134	Cs-137	Ba-La-140	Ce-144
<u>Monticello (M-11)</u>												
1/26/2011	MWW-435	$< 154$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 46$
4/20/2011	MWW-2423	$< 153$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 30$
7/27/2011	MWW-5142	$< 171$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 21$
10/19/2011	MWW-7387	$< 145$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 36$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 46$
<u>Plant Well No. 1 (M-12)</u>												
1/26/2011	MWW-436	$< 154$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 33$
4/20/2011	MWW-2424	$< 153$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 41$
7/27/2011	MWW 5143	$< 171$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 22$
10/19/2011	MWW-7388	$< 145$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 20$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 41$
<u>Wise (M-27)</u>												
1/26/2011	MWW-437	$< 154$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 27$
4/20/2011	MWW-2425	$< 153$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 35$
7/27/2011	MWW 5144	$< 171$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 21$
10/19/2011	MWW-7389	$< 145$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 25$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 35$
<u>Imholte (M-43) Control</u>												
1/26/2011	MWW-438	$< 154$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 29$
4/20/2011	MWW-2426	$< 153$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 33$
7/27/2011	MWW 5145	$< 171$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 20$
10/19/2011	MWW-7390	$< 145$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 22$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 33$



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Table 13. Well water, analysis for tritium and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)												
Date Collected	Lab Code	H-3 ( $< 500$ pCi/L)	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	Cs-134	Cs-137	Ba-La-140	Ce-144
<u>Monitoring Well #3 (M-35)</u>												
01-17-11	MWW- 311	427 ± 88	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 30
02-25-11	MWW- 808	329 ± 96	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 28
03-30-11	MWW- 1550	318 ± 120	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 29
04-25-11	MWW- 2567	240 ± 101	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 43
05-16-11	MWW- 3089	< 134	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 10
06-20-11	MWW- 3960	285 ± 87	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 43
07-27-11	MWW- 5200	215 ± 87	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 18
08-17-11	MWW- 5651	< 152	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 31
09-22-11	MWW- 6450	313 ± 104	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 35
10-17-11	MWW- 7423	256 ± 86	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 22
11-29-11	MWW- 8496	< 157					ND <sup>b</sup>					
12-18-12	MWW- 8890	< 153					ND <sup>b</sup>					
Cumulative Averages		< 500	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 43
<u>Monitoring Well #4 (M-36)</u>												
01-18-11	MWW- 312	224 ± 79	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 27
02-25-11	MWW- 809	172 ± 89	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 24
04-25-11	MWW- 2568	185 ± 98	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 43
07-27-11	MWW- 5201	184 ± 85	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 35
10-17-11	MWW- 7424	< 148	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 17
Cumulative Averages		< 500	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 43

<sup>b</sup> ND = No data; gamma isotopic analysis not required.

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Table 13. Well water, analysis for tritium and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)												
Date Collected	Lab Code	H-3 ( $< 500$ pCi/L)	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	Cs-134	Cs-137	Ba-La-140	Ce-144
<u>Monitoring Well #5 (M-37)</u>												
01-18-11	MWW- 313	$< 138$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 54$
02-24-11	MWW- 810	$< 160$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 20$
04-25-11	MWW- 2569	$< 148$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 29$
07-27-11	MWW- 5202	$< 144$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 28$
10-16-11	MWW- 7425	$< 148$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 22$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 54$
<u>Monitoring Well #6 (M-38)</u>												
01-17-11	MWW- 314	$< 138$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 18$
02-24-11	MWW- 811	$< 160$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 24$
04-25-11	MWW- 2570	$< 148$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 41$
07-27-11	MWW- 5203	$< 144$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 18$
10-16-11	MWW- 7426	$< 148$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 36$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 41$
<u>Monitoring Well #7 (M-39)</u>												
01-17-11	MWW- 315	$< 138$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 46$
02-24-11	MWW- 812	$< 160$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 22$
04-25-11	MWW- 2571	$< 148$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
07-27-11	MWW- 5204	$< 144$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 28$
10-16-11	MWW- 7428	$< 148$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 19$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 46$
<u>Monitoring Well #8 (M-40)</u>												
01-17-11	MWW- 316	$< 138$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 42$
02-24-11	MWW- 813	$< 160$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 27$
04-25-11	MWW- 2572	$< 148$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 18$
07-27-11	MWW- 5205	$< 144$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
10-16-11	MWW- 7429	$< 148$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 42$

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Table 13. Well water, analysis for tritium and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)												
Date Collected	Lab Code	H-3 ( $< 500$ pCi/L)	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	Cs-134	Cs-137	Ba-La-140	Ce-144
<u>Monitoring Well #9A (M-44)</u>												
01-18-11	MWW- 288	2317 $\pm$ 159	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 24$
02-23-11	MWW- 905	820 $\pm$ 126	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 28$
03-30-11	MWW- 1551	246 $\pm$ 118	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 29$
04-25-11	MWW- 2573	231 $\pm$ 100	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 27$
05-17-11	MWW- 3126	1197 $\pm$ 116	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 14$
06-20-11	MWW- 4006	499 $\pm$ 97	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 17$
07-19-11	MWW- 4916	312 $\pm$ 100	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
08-16-11	MWW- 5815	262 $\pm$ 90	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 15$
09-22-11	MWW- 6451	192 $\pm$ 99	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 48$
10-16-11	MWW- 7430	216 $\pm$ 85	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
11-29-11	MWW- 8497	$< 147$										
12-18-11	MWW- 8984	$< 150$										
								ND <sup>a</sup>				
								ND <sup>a</sup>				
Cumulative Averages		629 (10/10)	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 48$
<u>Monitoring Well #9B (M-51)</u>												
01-18-11	MWW- 289	181 $\pm$ 90	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 34$
02-23-11	MWW- 905	$< 177$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 27$
03-30-11	MWW- 1552	$< 178$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 20$
04-25-11	MWW- 2575	$< 137$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 34$
05-17-11	MWW- 3127	$< 134$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
06-20-11	MWW- 4007	$< 145$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 18$
07-19-11	MWW- 4917	$< 163$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
08-16-11	MWW- 5816	$< 146$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 25$
09-22-11	MWW- 6452	$< 150$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 26$
10-16-11	MWW- 7431	$< 141$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 24$
11-29-11	MWW- 8498	$< 147$										
12-18-11	MWW- 8985	$< 150$										
								ND <sup>a</sup>				
								ND <sup>a</sup>				
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 34$
<u>Monitoring Well #10 (M-45)</u>												
01-18-11	MWW- 317	711 $\pm$ 99	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 31$
02-25-11	MWW- 814	769 $\pm$ 115	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
03-30-11	MWW- 1553	685 $\pm$ 133	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 29$
04-25-11	MWW- 2576	694 $\pm$ 104	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 23$
05-16-11	MWW- 3090	552 $\pm$ 94	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 17$
06-20-11	MWW- 3961	570 $\pm$ 100	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 30$
07-27-11	MWW- 5206	615 $\pm$ 104	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 17$
08-16-11	MWW- 5652	540 $\pm$ 107	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 25$
09-23-11	MWW- 6453	585 $\pm$ 114	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 36$
10-17-11	MWW- 7432	482 $\pm$ 97	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 18$
11-29-11	MWW- 8499	601 $\pm$ 104										
12-18-11	MWW- 8891	395 $\pm$ 98										
Cumulative Averages		619 (11/11)	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 36$

<sup>a</sup> ND = No data; gamma isotopic analysis not required.

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Table 13. Well water, analysis for tritium and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)												
Date Collected	Lab Code	H-3 ( < 500 pCi/L)	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	Cs-134	Cs-137	Ba-La-140	Ce-144
<u>Monitoring Well #11 (M-46)</u>												
01-18-11	MWW- 318	< 138	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 34
02-25-11	MWW- 815	258 ± 93	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 21
03-30-11	MWW- 1554	239 ± 118	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 22
04-25-11	MWW- 2577	277 ± 86	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 43
05-16-11	MWW- 3091	183 ± 79	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 27
06-20-11	MWW- 3962	< 145	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 29
07-27-11	MWW- 5207	212 ± 86	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 23
08-16-11	MWW- 5653	< 152	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 13
09-23-11	MWW- 6454	< 149	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 36
10-17-11	MWW- 7433	< 148	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 26
11-29-11	MWW- 8500	< 147					ND <sup>b</sup>					
12-18-11	MWW- 8892	< 153					ND <sup>b</sup>					
Cumulative Averages		< 500	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 43
<u>Monitoring Well #12A (M-47)</u>												
ND <sup>a</sup>												
01-17-11												
02-25-11	MWW- 816	< 160	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 28
03-30-11	MWW- 1555	< 156	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 27
04-25-11	MWW- 2578	< 137	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 50
05-16-11	MWW- 3092	< 134	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 27
06-20-11	MWW- 3963	272 ± 86	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 21
07-24-11	MWW- 5208	< 144	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 12
08-17-11	MWW- 5654	< 139	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 21
09-23-11	MWW- 6455	< 149	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 56
10-17-11	MWW- 7434	< 148	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 14
11-30-11	MWW- 8501	< 147					ND <sup>b</sup>					
12-18-11	MWW- 8893	< 153					ND <sup>b</sup>					
Cumulative Averages		< 500	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 56
<u>Monitoring Well #12B (M-48)</u>												
01-18-11	MWW- 319	< 11	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 22
02-25-11	MWW- 817	< 113	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 22
03-30-11	MWW- 1556	< 156	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 21
04-25-11	MWW- 2579	< 139	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 19
05-16-11	MWW- 3093	< 134	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 36
06-20-11	MWW- 3964	< 145	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 25
07-24-11	MWW- 5209	< 144	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 10
08-17-11	MWW- 5655	< 139	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 34
09-23-11	MWW- 6457	< 149	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 24
10-17-11	MWW- 7435	< 148	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 25
11-30-11	MWW- 8502	< 147					ND <sup>b</sup>					
12-18-11	MWW- 8894	< 153					ND <sup>b</sup>					
Cumulative Averages		< 500	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 36

<sup>a</sup> ND = No data; See Table 2.0, Listing of Missed Samples.

<sup>b</sup> ND = No data; gamma isotopic analysis not required.

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Table 13. Well water, analysis for tritium and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)												
Date Collected	Lab Code	H-3 ( < 500 pCi/L)	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	Cs-134	Cs-137	Ba-La-140	Ce-144
<u>Monitoring Well #13A (M-49)</u>												
01-18-11	MWW- 320	154 ± 76	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 29
02-25-11	MWW- 818	201 ± 201	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 25
03-30-11	MWW- 1557	194 ± 194	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 19
04-25-11	MWW- 2580	180 ± 180	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 19
05-16-11	MWW- 3094	< 134	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 27
06-20-11	MWW- 3965	< 145	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 28
07-24-11	MWW- 5210	188 ± 85	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 18
08-17-11	MWW- 5656	< 152	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 38
09-23-11	MWW- 6458	< 149	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 23
10-17-11	-						ND <sup>a</sup>					
11-30-11	MWW- 8503	< 147					ND <sup>d</sup>					
12-18-11	MWW- 8895	< 153					ND <sup>d</sup>					
Cumulative Averages		< 500	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 38
<u>Monitoring Well #13B (M-50)</u>												
01-18-11	MWW- 321	150 ± 76	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 42
02-25-11	MWW- 819	< 160	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 23
03-30-11	MWW- 1558	< 159	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 28
04-25-11	MWW- 2581	192 ± 192	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 26
05-16-11	MWW- 3095	180 ± 79	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 23
06-20-11	MWW- 3966	160 ± 81	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 31
07-24-11	MWW- 5211	164 ± 59	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 30
08-17-11	MWW- 5657	< 152	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 36
09-23-11	MWW- 6459	< 149	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 17
10-17-11	MWW- 7436	< 148	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 20
11-30-11	MWW- 8504	178 ± 86					ND <sup>d</sup>					
12-18-11	MWW- 8896	< 153					ND <sup>d</sup>					
Cumulative Averages		< 500	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 42
<u>Monitoring Well #14</u>												
01-17-11	MWW- 322	< 138	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 42
02-24-11	MWW- 820	< 160	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 23
03-30-11	<sup>b</sup> MWW- 1559	176 ± 176	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 33
04-25-11	MWW- 2587	231 ± 84	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 18
05-16-11	MWW- 3096	< 134	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 23
06-20-11	<sup>c</sup> MWW- 3967	189 ± 82	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 24
07-19-11	MWW- 4715	< 152	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 25
08-16-11	MWW- 5658	< 152	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 30
09-23-11	MWW- 6460	< 150	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 23
10-16-11	MWW- 7437	< 148	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 23
11-29-11	MWW- 8505	< 147					ND <sup>d</sup>					
12-18-11	MWW- 8897	< 153					ND <sup>d</sup>					
Cumulative Averages		< 500	< 10	< 30	< 10	< 10	< 30	< 15	< 10	< 10	< 15	< 42

<sup>a</sup> ND = No data; See Table 2.0, Listing of Missed Samples.

<sup>b</sup> Recounted, result of recount: <162 pCi/L.

<sup>c</sup> Recounted, result of recount: <167 pCi/L.

<sup>d</sup> "ND" = No data; gamma isotopic analysis not required.

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Table 14. Fish, analysis of edible portions for gamma-emitting isotopes.  
Collection: Semiannually

Sample Description and Concentration (pCi/g wet)				Cumulative Average	Previous Average
<u>Upstream 1000' M-8 (C)</u>					
Date Collected	05-31-11	05-31-11	05-31-11		
Lab Code	MF- 3378	MF- 3380	MF- 3382		
Sample Type	Smallmouth Buffalo	White Sucker	Redhorse		
K-40	3.21 ± 0.39	2.74 ± 0.36	2.86 ± 0.38	2.98	3.09
Mn-54	< 0.014	< 0.013	< 0.015	< 0.014	< 0.010
Fe-59	< 0.021	< 0.017	< 0.023	< 0.021	< 0.029
Co-58	< 0.010	< 0.007	< 0.008	< 0.010	< 0.013
Co-60	< 0.010	< 0.013	< 0.008	< 0.013	< 0.012
Zn-65	< 0.012	< 0.010	< 0.012	< 0.012	< 0.032
Nb-95	< 0.013	< 0.010	< 0.010	< 0.013	< 0.016
Zr-95	< 0.018	< 0.019	< 0.025	< 0.019	< 0.027
Cs-134	< 0.011	< 0.011	< 0.013	< 0.011	< 0.015
Cs-137	< 0.014	< 0.013	< 0.010	< 0.014	< 0.014
Ba-La-140	< 0.018	< 0.015	< 0.019	< 0.018	< 0.058
Ce-144	< 0.075	< 0.092	< 0.074	< 0.092	< 0.072
<u>Downstream 1000' M-9</u>					
Date Collected	05-31-11	05-31-11	05-31-11		
Lab Code	MF- 3379	MF- 3381	MF- 3383		
Sample Type	Smallmouth Buffalo	White Sucker	Redhorse		
K-40	3.58 ± 0.40	2.55 ± 0.35	3.29 ± 0.39	3.06	2.67
Mn-54	< 0.012	< 0.017	< 0.016	< 0.017	< 0.007
Fe-59	< 0.019	< 0.033	< 0.032	< 0.033	< 0.030
Co-58	< 0.009	< 0.011	< 0.010	< 0.011	< 0.017
Co-60	< 0.010	< 0.009	< 0.009	< 0.010	< 0.012
Zn-65	< 0.023	< 0.015	< 0.008	< 0.023	< 0.023
Nb-95	< 0.009	< 0.009	< 0.011	< 0.009	< 0.017
Zr-95	< 0.026	< 0.024	< 0.018	< 0.026	< 0.027
Cs-134	< 0.013	< 0.010	< 0.012	< 0.013	< 0.010
Cs-137	< 0.015	0.024 ± 0.012	< 0.011	0.024	< 0.016
Ba-La-140	< 0.017	< 0.021	< 0.020	< 0.021	< 0.044
Ce-144	< 0.073	< 0.082	< 0.070	< 0.082	< 0.090



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Table 14. Fish, analysis of edible portions for gamma-emitting isotopes.  
Collection: Semiannually

Sample Description and Concentration (pCi/g wet)			Cumulative Average	Previous Average
<u>Upstream 1000' M-8 (C)</u>				
Date Collected	10-26-11	10-26-11		
Lab Code	MF- 7457	MF- 7458		
Sample Type	Short heads	Smallmouth Bass		
K-40	2.75 ± 0.45	3.05 ± 0.40	2.90	3.09
Mn-54	< 0.021	< 0.015	< 0.021	< 0.010
Fe-59	< 0.044	< 0.030	< 0.044	< 0.029
Co-58	< 0.016	< 0.009	< 0.016	< 0.013
Co-60	< 0.016	< 0.017	< 0.017	< 0.012
Zn-65	< 0.032	< 0.020	< 0.032	< 0.032
Nb-95	< 0.018	< 0.017	< 0.018	< 0.016
Zr-95	< 0.024	< 0.030	< 0.030	< 0.027
Cs-134	< 0.020	< 0.010	< 0.020	< 0.015
Cs-137	< 0.023	< 0.015	< 0.023	< 0.014
Ba-La-140	< 0.048	< 0.047	< 0.048	< 0.058
Ce-144	< 0.158	< 0.095	< 0.158	< 0.072
<u>Downstream 1000' M-9</u>				
Date Collected	10-26-11	10-26-11		
Lab Code	MF- 7459	MF- 7460		
Sample Type	Short heads	Smallmouth Bass		
K-40	3.34 ± 0.52	2.84 ± 0.57	3.09	2.67
Mn-54	< 0.017	< 0.015	< 0.017	< 0.007
Fe-59	< 0.030	< 0.062	< 0.062	< 0.030
Co-58	< 0.022	< 0.028	< 0.028	< 0.017
Co-60	< 0.025	< 0.019	< 0.025	< 0.012
Zn-65	< 0.024	< 0.033	< 0.033	< 0.023
Nb-95	< 0.027	< 0.029	< 0.029	< 0.017
Zr-95	< 0.031	< 0.044	< 0.044	< 0.027
Cs-134	< 0.024	< 0.017	< 0.024	< 0.010
Cs-137	< 0.028	< 0.026	< 0.028	< 0.016
Ba-La-140	< 0.067	< 0.053	< 0.067	< 0.044
Ce-144	< 0.103	< 0.130	< 0.130	< 0.090

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Table 15. Algae or aquatic insects, analysis for gamma-emitting isotopes.  
Collection: Semiannually

Sample Description and Concentration (pCi/g wet)	Cumulative Average	Previous Average
<u>Upstream 1000' M-8 (C)<sup>a</sup></u>		
Date Collected		
Lab Code		
Be-7		< 0.64
K-40		< 1.35
Mn-54		< 0.07
Fe-59		< 0.09
Co-58		< 0.06
Co-60		< 0.03
Zn-65		< 0.13
Zr-Nb-95		< 0.08
Ru-103		< 0.06
Ru-106		< 0.45
Cs-134		< 0.05
Cs-137		< 0.05
Ba-La-140		< 0.17
Ce-144		< 0.24
<u>Downstream 1000' M-9</u>		
Date Collected	09-29-11	
Lab Code	MBO- 6608	
Be-7	< 0.33	< 0.33 < 0.60
K-40	< 0.65	< 0.65 < 1.89
Mn-54	< 0.02	< 0.02 < 0.07
Fe-59	< 0.07	< 0.07 < 0.07
Co-58	< 0.04	< 0.04 < 0.07
Co-60	< 0.02	< 0.02 < 0.07
Zn-65	< 0.06	< 0.06 < 0.14
Zr-Nb-95	< 0.04	< 0.04 < 0.09
Ru-103	< 0.05	< 0.05 < 0.06
Ru-106	< 0.31	< 0.31 < 0.42
Cs-134	< 0.04	< 0.04 < 0.06
Cs-137	< 0.04	< 0.04 < 0.07
Ba-La-140	< 0.07	< 0.07 < 0.15
Ce-144	< 0.12	< 0.12 < 0.37

<sup>a</sup> ND = No data; see Table 2.0, Listing of Missed Samples.

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Table 16. Edible cultivated (irrigated) crops, analysis for iodine-131 and gamma-emitting isotopes.  
Collection: Annually

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Sample Description and Concentration (pCi/g wet)	
Location:	Control (Cabbage)
Date Collected	
Lab Code	ND <sup>a</sup>
Mn-54	-
Fe-59	-
Co-58	-
Co-60	-
Zn-65	-
Nb-95	-
I-131	-
Cs-134	-
Cs-137	-

---

Location:	M-27 (Cabbage)
Date Collected	
Lab Code	ND <sup>a</sup>
Mn-54	-
Fe-59	-
Co-58	-
Co-60	-
Zn-65	-
Nb-95	-
I-131	-
Cs-134	-
Cs-137	-

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<sup>a</sup> ND = No data; sample not collected.

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Table 17. Shoreline (SS) sediments, analysis for gamma-emitting isotopes.  
Collection: Semiannually

Sample Description and Concentration (pCi/g dry)			Cumulative Average	Previous Average
<u>Upstream 1000' M-8 (C)</u>				
Date Collected	07-13-11	10-26-11		
Lab Code	MSS- 4607	MSS- 7494		
Be-7	< 0.20	< 0.073	< 0.20	< 0.21
K-40	11.48 ± 0.63	9.51 ± 0.53	10.50	10.03
Mn-54	< 0.012	< 0.014	< 0.014	< 0.026
Fe-59	< 0.040	< 0.027	< 0.040	< 0.053
Co-58	< 0.018	< 0.017	< 0.018	< 0.029
Co-60	< 0.011	< 0.006	< 0.011	< 0.024
Zn-65	< 0.032	< 0.034	< 0.034	< 0.073
Nb-95	< 0.026	< 0.021	< 0.026	< 0.023
Zr-95	< 0.038	< 0.020	< 0.038	< 0.041
Ru-103	< 0.022	< 0.016	< 0.022	< 0.027
Ru-106	< 0.16	< 0.093	< 0.16	< 0.14
Cs-134	< 0.013	< 0.012	< 0.013	< 0.023
Cs-137	< 0.013	< 0.014	< 0.014	< 0.031
Ba-La-140	< 0.064	< 0.043	< 0.064	< 0.025
Ce-144	< 0.11	< 0.098	< 0.11	< 0.13
<u>Downstream 1000' M-9</u>				
Date Collected	07-13-11	10-26-11		
Lab Code	MSS- 4608	MSS- 7495		
Be-7	< 0.27	< 0.18	< 0.27	0.20
K-40	11.35 ± 0.71	10.16 ± 0.55	10.75	10.55
Mn-54	< 0.022	< 0.020	< 0.022	< 0.025
Fe-59	< 0.068	< 0.033	< 0.068	< 0.051
Co-58	< 0.021	< 0.018	< 0.021	< 0.029
Co-60	< 0.018	< 0.010	< 0.018	< 0.018
Zn-65	< 0.040	< 0.039	< 0.040	< 0.068
Nb-95	< 0.034	< 0.022	< 0.034	< 0.037
Zr-95	< 0.048	< 0.019	< 0.048	< 0.049
Ru-103	< 0.027	< 0.022	< 0.027	< 0.012
Ru-106	< 0.16	< 0.13	< 0.16	< 0.17
Cs-134	< 0.015	< 0.016	< 0.016	< 0.020
Cs-137	0.091 ± 0.027	0.040 ± 0.023	0.065	0.082
Ba-La-140	< 0.055	< 0.046	< 0.055	< 0.025
Ce-144	< 0.14	< 0.090	< 0.14	< 0.139

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Table 17. Shoreline (SS) sediments, analysis for gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/g dry)			Cumulative Average	Previous Average
<u>Montissippi Park M-15</u>				
Date Collected	07-13-11	10-26-11		
Lab Code	MSS- 4609	MSS- 7497		
Be-7	< 0.18	< 0.18	< 0.18	0.17
K-40	9.92 ± 0.55	9.78 ± 0.53	9.85	11.04
Mn-54	< 0.015	< 0.014	<0.015	<0.015
Fe-59	< 0.046	< 0.042	<0.046	<0.051
Co-58	< 0.012	< 0.015	<0.015	<0.020
Co-60	< 0.009	< 0.013	<0.013	<0.011
Zn-65	< 0.042	< 0.042	<0.042	<0.059
Nb-95	< 0.021	< 0.038	<0.038	<0.016
Zr-95	< 0.039	< 0.020	<0.039	<0.022
Ru-103	< 0.018	< 0.018	<0.018	<0.021
Ru-106	< 0.067	< 0.12	< 0.117	< 0.130
Cs-134	< 0.013	< 0.010	<0.013	<0.013
Cs-137	< 0.015	0.028 ± 0.016	0.028	0.060
Ba-La-140	< 0.039	< 0.034	<0.039	<0.025
Ce-144	< 0.084	< 0.092	< 0.092	< 0.108

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Table 18. Storm run-off, analysis for tritium and gamma-emitting isotopes.  
Sewer lift station, analysis for tritium.

Sample Description and Concentration (pCi/L)				
Date Collected	02-22-11	04-26-11	05-31-11	06-15-11
Lab Code	MXW- 657	MXW- 2525	MXW- 3401	MXW- 3869
H-3 <sup>a</sup>	772 ± 125	585 ± 108	<144	< 146
Mn-54	< 2.6	< 6.6	< 3.4	< 4.3
Fe-59	< 3.5	< 7.9	< 5.9	< 5.7
Co-58	< 1.9	< 4.0	< 3.1	< 3.8
Co-60	< 3.3	< 4.3	< 3.2	< 4.4
Zn-65	< 4.0	< 8.4	< 7.8	< 5.5
Zr-Nb-95	< 2.2	< 7.1	< 3.4	< 4.7
I-131	< 5.3	< 11.5	< 4.3	< 8.3
Cs-134	< 2.6	< 6.7	< 4.0	< 2.7
Cs-137	< 3.1	< 4.6	< 4.1	< 4.7
La-140	< 3.2	< 9.8	< 6.4	< 6.4
Ce-144	< 26.3	< 45.3	< 27.1	< 29.7
Date Collected	07-15-11	10-12-11	11-29-11	
Lab Code	MXW- 5213	MXW- 7391	MXW- 8446	
H-3 <sup>a</sup>	< 144	< 145	< 147	
Mn-54	< 0.8	< 2.1	< 4.1	
Fe-59	< 2.0	< 5.7	< 7.1	
Co-58	< 0.7	< 2.6	< 5.5	
Co-60	< 1.1	< 2.1	< 2.5	
Zn-65	< 2.5	< 4.7	< 7.6	
Zr-Nb-95	< 1.9	< 3.3	< 3.6	
I-131	< 6.4	< 10.8	< 9.3	
Cs-134	< 0.9	< 2.2	< 5.1	
Cs-137	< 1.0	< 2.5	< 4.7	
La-140	< 4.6	< 4.3	< 2.7	
Ce-144	< 9.6	< 27.5	< 33.5	

<sup>a</sup> Required LLD, < 500 pCi/L.

APPENDIX A

IODINE-131 ACTIVITY DETECTED IN REMP AIR SAMPLES

A-1. Iodine-131 Activity Detected in REMP Air Samples

Location	Coll. Date	Lab Code	Vol (m <sup>3</sup> )	I-131 (pCi/m <sup>3</sup> )
M-01	03/23/11	MCH- 1671	294.5	0.059 ± 0.026
M-02	03/23/11	MCH- 1672	295.0	0.076 ± 0.018
M-03	03/23/11	MCH- 1673	295.1	0.071 ± 0.020
M-04	03/23/11	MCH- 1674	195.6	0.098 ± 0.021
M-05	03/23/11	MCH- 1675	294.5	0.077 ± 0.022
M-01	03/30/11	MCH- 1861	293.6	0.066 ± 0.027
M-02	03/30/11	MCH- 1862	292.8	0.055 ± 0.027
M-03	03/30/11	MCH- 1863	292.7	0.050 ± 0.026
M-04	03/30/11	MCH- 1864	194.7	0.061 ± 0.027
M-05	03/30/11	MCH- 1865	293.2	0.047 ± 0.026
M-01	04/06/11	MCH- 1961	294.0	0.112 ± 0.025
M-02	04/06/11	MCH- 1962	293.7	0.089 ± 0.022
M-03	04/06/11	MCH- 1963	293.7	0.098 ± 0.019
M-04	04/06/11	MCH- 1964	195.3	0.134 ± 0.031
M-05	04/06/11	MCH- 1965	294.0	0.113 ± 0.031
M-01	04/13/11	MCH- 2091	295.2	0.031 ± 0.017
M-02	04/13/11	MCH- 2092	295.0	0.036 ± 0.018



**ENCLOSURE 2**

**CORRECTIONS TO THE 2012 AREOR**

Broadleaf vegetation samples were not collected since 2011 due to unavailability; these samples were not included as missed samples, because they were considered to be above and beyond required samples. Since they were included in the Offsite Dose Calculation Manual (ODCM) ODCM-07.01 Table 1, they were required samples for Monticello Nuclear Generating Plant and should have been included as missed samples. The affected pages have been included in their entirety (Attachment 1) and should replace existing pages (5 and 17), ML13135A006.

The complete data tables were to be submitted as part of the report; however, this data was not included with the annual reports prior to 2013. Attachment 2 will be added to the back of the annual report as submitted; this this will be an addition to the report and will not be replacing any pages in the report.

**ENCLOSURE 2**

**ATTACHMENT 1**

**REPLACEMENT PAGES FOR THE 2012 AREOR**

2 Pages to Follow

### 3.3 Program Execution

The Program was executed as described in the preceding section with the following exceptions:

(1) Air Particulates / Air Iodine:

- M-02. Volume for the week ending January 4, 2012 was lower than expected. A short power outage is suspected.  
No air particulate sample was collected for the week ending June 27, 2012, the filter was misaligned in the holder.
- M-03. No air particulate / air iodine sample was available for the week ending May 9, 2012, the timer reading was low due to power interruption.  
No air particulate sample was collected for the week ending June 27, 2012, the filter was misaligned in the holder.  
No air particulate / air iodine sample was available for the week ending July 18, 2012, low volume due to power interruption.
- M-04. No air particulate / air iodine sample was available for the week ending May 30, 2012, the timer reading was low due to power interruption.
- M-05. No air particulate / air iodine sample was available for the week ending May 30, 2012, the volume was low due to power interruption.

(2) Thermoluminescent Dosimeters:

The TLD for location M-01B was missing in the field for the first quarter, 2012.  
The TLD for location M-08A was missing in the field for the first quarter, 2012.  
The TLD for location M-11A was missing in the field for the fourth quarter, 2012.

(3) Surface Water:

Surface water was not collected at location M-08 for the weeks ending January 25 through February 15, 2012. The water was not collected due to unsafe ice conditions. Both the January and February monthly composite samples were made up from available collections.

(4) Well Water:

Well water was not collected at location MW-27 in January, 2012. The outside well was locked and the residence was vacant.

(5) Milk

Milk was not available from locations M-16 and M-17 for the January through March, 2012 collections. No milk was available after November 7, 2012.

(6) Invertebrates

Bottom organisms were not collected in the Spring of 2012, due to high river levels.

(7) Shoreline Sediments

Shoreline sediment was not collected in the Spring of 2012, due to high river levels.

(8) Broad Leaf Vegetable

Broad Leaf Vegetables were not collected in 2012 due to unavailability. The previous Critical Garden ceased to be used and attempts to obtain a sample from the new Critical Garden were unsuccessful.

Deviations from the program are summarized in Table 5.3.

Table 5.3. MISSED COLLECTIONS AND ANALYSES

All required samples were collected and analyzed as scheduled with the following exceptions:					
Sample Type	Analysis	Location (s)	Collection Date or Period	Reason for not conducting REMP as required	Plans for Preventing Recurrence
AP/AI	Beta, I-131	M-2	1/4/2012	Low sample volume. Short power outage suspected.	Power restored.
AP/AI	Beta, I-131	M-3	5/9/2012	Low timer reading, possible power failure.	Power restored.
AP/AI	Beta, I-131	M-3, M-4, M-5	5/30/2012	Low timer reading, power interruption.	Power restored.
AP	Beta, I-131	M-2, M-3	6/27/2012	Filters misaligned in holder, no particulate accumulation.	Technician training reviewed
SW	For composite	M-08	1/25/2012	Water frozen.	None Required
SW	For composite	M-08	2/1, 2/8, 2/15, 2012	Water frozen.	None Required
SW	For composite	M-08	12/15/2012	Water frozen.	None Required
WW	Gamma, H-3	M-27	1/18/2012	Outside well locked; residence vacant.	None Required
WW	Gamma, H-3	MW-14	10/17/2012	Well not collected.	Well contents frozen.
MI	Gamma, I-131	M-16, 17	1/31/2012	Milking discontinued until Spring.	None Required
MI	Gamma, I-131	M-16, 17	12/31/2012	Milking discontinued for the year.	None Required
TLD	Gamma	M-1B, M-8A	1st Qtr. 2012	TLD missing in field.	Replaced, vandalism
TLD	Gamma	M-11A	4th Qtr. 2012	TLD missing in field.	Replaced, vandalism
BO	Gamma	M-8, M-9	Spring	High water prevented sampling.	None Required
SS	Gamma	M-8, M-9	Spring	High water prevented sampling.	None Required
VE	I-131	Highest D/Q Garden and Control	At Harvest	Samples became unavailable when previous critical garden ceased to be used.	Attempted to obtain a sample from new Critical Garden

**ENCLOSURE 2**

**ATTACHMENT 2**

**ADDITIONAL PAGES FOR THE 2012 AREOR**

30 Pages to Follow



FINAL REPORT  
TO  
XCEL ENERGY CORPORATION

RADIOLOGICAL ENVIRONMENTAL  
MONITORING PROGRAM (REMP)

MONTICELLO NUCLEAR GENERATING PLANT  
DOCKET NO. 50-263 LICENSE NO. DPR-22

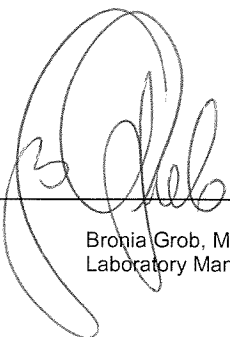
COMPLETE ANALYSES DATA TABLES  
January - December, 2012

Prepared under contract by

ENVIRONMENTAL, INC.  
MIDWEST LABORATORY

PROJECT NO. 8010

Reviewed and  
Approved



04/17/13

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Bronia Grob, M.S.  
Laboratory Manager

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## 1.0 INTRODUCTION

The following constitutes the final 2012 report for the Environmental Radiological Monitoring Program conducted at the Monticello Nuclear Generating Plant in Monticello, Minnesota. Results of completed analyses are presented in the attached tables.

All concentrations, except gross beta, are decay corrected to the time of collection.

All samples were collected within the scheduled period unless noted otherwise in the Listing of Missed Samples.

2.0. LISTING of MISSED SAMPLES

All required samples were collected and analyzed as scheduled with the following exceptions:					
Sample Type	Analysis	Location (s)	Collection Date or Period	Reason for not conducting REMP as required	Plans for Preventing Recurrence
AP/AI	Beta, I-131	M-2	1/4/2012	Low sample volume. Short power outage suspected.	Power restored.
AP/AI	Beta, I-131	M-3	5/9/2012	Low timer reading, possible power failure.	Power restored.
AP/AI	Beta, I-131	M-3, M-4, M-5	5/30/2012	Low timer reading, power interruption.	Power restored.
AP	Beta, I-131	M-2, M-3	6/27/2012	Filters misaligned in holder, no particulate accumulation.	Technician training reviewed
SW	For composite	M-08	1/25/2012	Water frozen.	None Required
SW	For composite	M-08	2/1, 2/8, 2/15, 2012	Water frozen.	None Required
SW	For composite	M-08	12/15/2012	Water frozen.	None Required
WW	Gamma, H-3	M-27	1/18/2012	Outside well locked; residence vacant.	None Required
WW	Gamma, H-3	MW-14	10/17/2012	Well not collected.	Well contents frozen.
MI	Gamma, I-131	M-16, 17	1/31/2012	Milking discontinued until Spring.	None Required
MI	Gamma, I-131	M-16, 17	12/31/2012	Milking discontinued for the year.	None Required
TLD	Gamma	M-1B, M-8A	1st Qtr. 2012	TLD missing in field.	Replaced, vandalism
TLD	Gamma	M-11A	4th Qtr. 2012	TLD missing in field.	Replaced, vandalism
BO	Gamma	M-8, M-9	Spring	High water prevented sampling.	None Required
SS	Gamma	M-8, M-9	Spring	High water prevented sampling.	None Required
VE	I-131	Highest D/Q Garden and Control	At Harvest	Samples became unavailable when previous critical garden ceased to be used.	Attempted to obtain a sample from new Critical Garden

### 3.0 DATA TABLES

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Table 1. Ambient gamma radiation as measured by thermoluminescent dosimeters (TLD's).

Location	mRem/91 days				Cumulative Average	Previous Annual Average
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.		
<u>Indicators (Inner Ring, General Area of Site Boundary)</u>						
M-01A	12.7 ± 1.2	14.2 ± 1.2	13.1 ± 1.4	16.0 ± 1.3	14.0	12.9
M-02A	14.9 ± 0.8	15.8 ± 0.8	15.5 ± 1.1	18.5 ± 0.7	16.2	15.0
M-03A	15.2 ± 1.3	15.7 ± 1.2	15.8 ± 1.2	17.0 ± 1.1	15.9	14.8
M-04A	14.1 ± 0.9	16.0 ± 0.8	14.6 ± 1.0	18.0 ± 0.7	15.7	14.3
M-05A	14.6 ± 0.9	16.9 ± 1.0	14.6 ± 1.0	18.4 ± 0.9	16.1	14.6
M-06A	15.4 ± 0.8	16.8 ± 0.8	16.0 ± 1.1	18.8 ± 0.8	16.8	15.3
M-07A	15.7 ± 0.8	17.3 ± 0.8	15.7 ± 1.0	17.8 ± 0.6	16.6	15.2
M-08A	ND <sup>a</sup>	16.0 ± 1.0	17.4 ± 0.8	18.8 ± 0.7		
M-09A	16.2 ± 1.0	16.6 ± 0.9	15.8 ± 1.7	17.9 ± 0.8	16.6	15.3
M-10A	15.5 ± 1.0	17.7 ± 1.0	15.1 ± 1.0	18.7 ± 1.0	16.8	14.8
M-11A	18.0 ± 0.7	18.3 ± 0.8	17.0 ± 1.2	ND <sup>a</sup>	17.8	16.3
M-12A	15.7 ± 0.9	18.3 ± 0.8	15.4 ± 1.0	19.1 ± 0.7	17.1	15.5
M-13A	14.1 ± 0.8	14.3 ± 0.9	14.2 ± 1.1	15.4 ± 0.7	14.5	13.5
M-14A	15.5 ± 0.6	16.5 ± 0.9	15.6 ± 0.9	17.3 ± 0.8	16.2	14.7
Mean ± s.d.	15.2 ± 1.2	16.5 ± 1.3	15.4 ± 1.1	17.8 ± 1.1	16.2	14.8
<u>Indicators (Outer Ring, 4-5 Miles Distant)</u>						
M-01B	ND <sup>a</sup>	15.5 ± 1.5	15.2 ± 1.4	16.3 ± 1.2		
M-02B	14.9 ± 0.8	15.8 ± 1.2	14.7 ± 1.1	15.9 ± 0.6	15.3	14.5
M-03B	12.2 ± 0.7	12.5 ± 0.9	12.6 ± 1.5	14.0 ± 0.7	12.8	12.4
M-04B	13.4 ± 0.4	15.2 ± 0.9	13.5 ± 0.8	15.8 ± 0.7	14.5	13.6
M-05B	15.3 ± 0.6	15.6 ± 1.2	14.8 ± 0.9	17.1 ± 1.5	15.7	14.8
M-06B	15.3 ± 0.8	16.6 ± 1.0	14.6 ± 0.8	16.8 ± 0.7	15.8	14.8
M-07B	17.1 ± 1.1	16.9 ± 1.6	16.7 ± 1.1	17.0 ± 1.1	16.9	15.8
M-08B	14.4 ± 0.6	15.9 ± 1.0	13.4 ± 0.7	16.3 ± 0.7	15.0	14.5
M-09B	16.2 ± 0.9	18.3 ± 0.9	15.9 ± 1.0	18.2 ± 0.9	17.2	15.5
M-10B	16.8 ± 0.9	16.9 ± 1.1	16.6 ± 1.1	17.2 ± 1.0	16.9	15.3
M-11B	15.8 ± 0.9	17.7 ± 1.0	15.6 ± 1.2	17.6 ± 1.1	16.7	15.0
M-12B	15.2 ± 1.0	17.4 ± 1.0	15.0 ± 0.9	17.3 ± 0.7	16.2	14.9
M-13B	14.2 ± 0.5	15.6 ± 0.9	14.0 ± 0.9	15.4 ± 0.8	14.8	13.8
M-14B	16.4 ± 1.4	17.2 ± 0.9	15.3 ± 1.3	17.2 ± 0.7	16.5	14.4
M-15B	15.0 ± 0.7	15.9 ± 1.1	14.0 ± 1.1	15.8 ± 0.8	15.2	14.0
M-16B	13.2 ± 0.7	14.3 ± 1.1	12.1 ± 0.8	14.1 ± 1.1	13.4	13.2
Mean ± s.d.	15.0 ± 1.4	16.1 ± 1.4	14.6 ± 1.3	16.4 ± 1.2	15.5	14.3

<sup>a</sup> ND = No Data; see Table 2.0, Listing of Missed Samples.

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Table 1. Ambient gamma radiation as measured by thermoluminescent dosimeters (TLD's),  
(continued).

Location	mRem/91 days				Cumulative Average	Previous Annual Average
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.		
<u>Control</u>						
M-01C	16.0 ± 0.8	16.0 ± 1.1	16.3 ± 1.1	15.5 ± 0.8	16.0	14.8
M-02C	16.7 ± 1.2	17.3 ± 0.9	17.4 ± 1.5	16.7 ± 0.8	17.0	15.4
M-03C	18.3 ± 0.5	18.7 ± 0.9	18.3 ± 0.7	17.3 ± 0.7	18.2	16.5
M-04C	17.0 ± 0.6	16.9 ± 1.4	16.4 ± 0.8	16.0 ± 0.5	<u>16.6</u>	<u>15.2</u>
Mean ± s.d.	17.0 ± 1.0	17.2 ± 1.1	17.1 ± 0.9	16.4 ± 0.8	16.9	15.5
<u>Indicators (Special Interest Areas)</u>						
M-01S	13.0 ± 1.1	14.9 ± 0.8	12.0 ± 1.2	15.3 ± 0.5	13.8	12.7
M-02S	12.4 ± 0.9	13.7 ± 0.8	12.0 ± 0.8	13.5 ± 0.7	12.9	11.9
M-03S	15.2 ± 1.0	16.1 ± 1.0	14.4 ± 1.1	15.7 ± 1.0	15.4	14.2
M-04S	16.1 ± 0.9	15.8 ± 1.2	15.4 ± 1.1	15.5 ± 0.7	15.7	14.7
M-05S	11.9 ± 0.6	17.0 ± 1.2	12.6 ± 0.8	16.1 ± 1.0	14.4	14.5
M-06S	17.9 ± 0.8	17.9 ± 0.9	17.3 ± 1.2	17.2 ± 0.8	<u>17.6</u>	<u>17.0</u>
Mean ± s.d.	14.4 ± 2.4	15.9 ± 1.5	14.0 ± 2.1	15.6 ± 1.2	15.0	14.1
<u>Special TLDs</u>						
M-I-01	94.7 ± 2.6	108.3 ± 3.5	83.4 ± 4.7	115.4 ± 5.5	100.5	67.7
M-I-02	80.4 ± 2.8	89.0 ± 1.2	70.9 ± 3.4	93.7 ± 1.1	83.5	56.9
M-I-03	50.6 ± 2.7	64.9 ± 1.9	53.1 ± 3.8	60.1 ± 2.1	57.2	37.4
M-I-04	41.4 ± 1.8	42.8 ± 1.9	36.5 ± 1.6	40.7 ± 2.0	40.4	32.6
M-I-05	52.2 ± 2.8	57.0 ± 2.1	48.6 ± 3.1	54.0 ± 1.9	53.0	44.8
M-I-06	30.9 ± 1.5	33.9 ± 1.1	29.2 ± 1.7	32.4 ± 1.0	31.6	26.1
M-I-07	35.1 ± 1.0	40.4 ± 1.3	32.8 ± 1.7	37.7 ± 1.9	36.5	29.9
M-I-08	34.0 ± 2.0	36.1 ± 2.8	32.1 ± 2.1	32.6 ± 1.6	33.7	26.8
M-I-09	63.3 ± 1.8	70.3 ± 4.2	56.9 ± 2.9	63.4 ± 3.5	63.5	51.6
M-I-10	54.4 ± 2.1	57.7 ± 2.3	50.3 ± 2.1	53.4 ± 2.8	54.0	42.1
M-I-11	17.9 ± 1.2	16.7 ± 0.7	17.9 ± 1.4	16.4 ± 0.6	17.2	15.5
M-I-12	16.5 ± 0.5	17.7 ± 0.9	16.4 ± 0.7	17.3 ± 0.6	17.0	15.0
M-I-13	18.8 ± 1.9	18.0 ± 1.2	18.5 ± 1.9	17.4 ± 1.1	<u>18.2</u>	<u>16.0</u>
Mean ± s.d.	45.4 ± 24.0	50.2 ± 28.0	42.0 ± 20.8	48.8 ± 29.7	46.6	35.6

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Table 2. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-1 (C)

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-04-12	328	0.035 ± 0.004	07-11-12	475	0.021 ± 0.003
01-11-12	324	0.028 ± 0.003	07-18-12	409	0.036 ± 0.003
01-18-12	323	0.036 ± 0.004	07-25-12	414	0.026 ± 0.003
01-25-12	353	0.044 ± 0.004	08-01-12	413	0.020 ± 0.003
02-01-12	324	0.036 ± 0.004			
			08-07-12	323	0.026 ± 0.003
02-08-12	351	0.025 ± 0.003	08-14-12	414	0.018 ± 0.003
02-15-12	327	0.035 ± 0.004	08-21-12	382	0.019 ± 0.003
02-22-12	322	0.033 ± 0.004	08-28-12	355	0.038 ± 0.004
02-29-12	300	0.036 ± 0.004			
			09-05-12	401	0.037 ± 0.003
03-07-12	314	0.033 ± 0.004	09-11-12	303	0.018 ± 0.003
03-15-12	369	0.033 ± 0.003	09-19-12	405	0.025 ± 0.003
03-21-12	303	0.021 ± 0.003	09-26-12	323	0.016 ± 0.003
03-28-12	321	0.016 ± 0.003	10-03-12	353	0.037 ± 0.004
1st Quarter Mean ± s.d.		<u>0.032 ± 0.007</u>	3rd Quarter Mean ± s.d.		<u>0.026 ± 0.008</u>
04-04-12	325	0.015 ± 0.003	10-10-12	351	0.016 ± 0.003
04-11-12	325	0.017 ± 0.003	10-17-12	326	0.036 ± 0.004
04-18-12	355	0.020 ± 0.003	10-24-12	352	0.027 ± 0.003
04-25-12	323	0.022 ± 0.003	10-31-12	383	0.031 ± 0.003
05-02-12	353	0.022 ± 0.003			
			11-07-12	354	0.031 ± 0.003
05-09-12	381	0.014 ± 0.003	11-14-12	366	0.036 ± 0.004
05-16-12	349	0.018 ± 0.003	11-21-12	355	0.084 ± 0.005
05-23-12	370	0.026 ± 0.003	11-28-12	351	0.036 ± 0.004
05-30-12	349	0.011 ± 0.003			
			12-05-12	353	0.081 ± 0.005
06-06-12	366	0.020 ± 0.003	12-12-12	325	0.054 ± 0.004
06-13-12	380	0.022 ± 0.003	12-19-12	351	0.061 ± 0.004
06-20-12	384	0.018 ± 0.003	12-27-12	403	0.050 ± 0.004
06-27-12	382	0.020 ± 0.003	01-02-13	279	0.097 ± 0.006
07-03-12	302	<u>0.034 ± 0.004</u>			
2nd Quarter Mean ± s.d.		<u>0.020 ± 0.006</u>	4th Quarter Mean ± s.d.		<u>0.049 ± 0.025</u>
			Cumulative Average		0.031
			Previous Annual Average		0.027

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

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Table 3. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-2

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>		<u>0.010</u>	
01-04-12	300	0.033 ± 0.004	07-11-12	406	0.023 ± 0.003
01-11-12	324	0.026 ± 0.003	07-18-12	348	0.034 ± 0.004
01-18-12	298	0.035 ± 0.004	07-25-12	353	0.028 ± 0.003
01-25-12	349	0.044 ± 0.004	08-01-12	349	0.023 ± 0.003
02-01-12	326	0.031 ± 0.003			
			08-07-12	325	0.020 ± 0.003
02-08-12	350	0.029 ± 0.003	08-14-12	358	0.015 ± 0.003
02-15-12	357	0.029 ± 0.003	08-21-12	349	0.020 ± 0.003
02-22-12	324	0.033 ± 0.004	08-28-12	353	0.039 ± 0.004
02-29-12	331	0.033 ± 0.004			
			09-05-12	401	0.036 ± 0.003
03-07-12	319	0.034 ± 0.004	09-11-12	303	0.019 ± 0.003
03-15-12	371	0.029 ± 0.003	09-19-12	376	0.026 ± 0.003
03-21-12	303	0.022 ± 0.003	09-26-12	325	0.016 ± 0.003
03-28-12	322	0.018 ± 0.003	10-03-12	326	0.036 ± 0.004
1st Quarter Mean ± s.d.		<u>0.031 ± 0.006</u>	3rd Quarter Mean ± s.d.		<u>0.026 ± 0.008</u>
04-04-12	326	0.013 ± 0.003	10-10-12	350	0.020 ± 0.003
04-11-12	329	0.019 ± 0.003	10-17-12	305	0.042 ± 0.004
04-18-12	353	0.017 ± 0.003	10-24-12	328	0.031 ± 0.004
04-25-12	326	0.020 ± 0.003	10-31-12	377	0.028 ± 0.003
05-02-12	329	0.024 ± 0.004			
			11-07-12	382	0.030 ± 0.003
05-09-12	375	0.015 ± 0.003	11-14-12	378	0.039 ± 0.004
05-16-12	375	0.018 ± 0.003	11-21-12	385	0.083 ± 0.005
05-23-12	411	0.024 ± 0.003	11-28-12	348	0.037 ± 0.004
05-30-12	381	0.013 ± 0.003			
			12-05-12	353	0.084 ± 0.005
06-06-12	378	0.019 ± 0.003	12-12-12	327	0.047 ± 0.004
06-13-12	404	0.018 ± 0.003	12-19-12	350	0.058 ± 0.004
06-20-12	405	0.020 ± 0.003	12-27-12	403	0.045 ± 0.004
06-27-12	358	ND <sup>b</sup>	01-02-13	281	0.083 ± 0.006
07-03-12	301	0.028 ± 0.004			
2nd Quarter Mean ± s.d.		<u>0.019 ± 0.004</u>	4th Quarter Mean ± s.d.		<u>0.048 ± 0.022</u>
			Cumulative Average		0.031
			Previous Annual Average		0.028

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> ND = No Data; see Table 2.0, Listing of Missed Samples.



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Table 4. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-3

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>			<u>0.010</u>
01-04-12	328	0.033 ± 0.003	07-11-12	441	0.019 ± 0.003
01-11-12	324	0.028 ± 0.003	07-18-12		ND <sup>b</sup>
01-18-12	294	0.042 ± 0.004	07-25-12	353	0.030 ± 0.003
01-25-12	324	0.046 ± 0.004	08-01-12	349	0.022 ± 0.003
02-01-12	324	0.033 ± 0.003			
			08-07-12	328	0.020 ± 0.003
02-08-12	351	0.027 ± 0.003	08-14-12	359	0.014 ± 0.003
02-15-12	327	0.032 ± 0.003	08-21-12	350	0.018 ± 0.003
02-22-12	293	0.038 ± 0.004	08-28-12	354	0.028 ± 0.003
02-29-12	298	0.037 ± 0.004			
			09-05-12	402	0.034 ± 0.003
03-07-12	266	0.038 ± 0.004	09-11-12	278	0.020 ± 0.004
03-15-12	368	0.029 ± 0.003	09-19-12	374	0.023 ± 0.003
03-21-12	277	0.021 ± 0.004	09-26-12	324	0.017 ± 0.003
03-28-12	320	0.015 ± 0.003	10-03-12	235	0.046 ± 0.005
1st Quarter Mean ± s.d.		0.032 ± 0.008	3rd Quarter Mean ± s.d.		0.024 ± 0.009
04-04-12	324	0.014 ± 0.003	10-10-12	351	0.023 ± 0.003
04-11-12	328	0.017 ± 0.003	10-17-12	298	0.040 ± 0.004
04-18-12	324	0.017 ± 0.003	10-24-12	359	0.026 ± 0.003
04-25-12	324	0.018 ± 0.003	10-31-12	350	0.029 ± 0.003
05-02-12	357	0.021 ± 0.003			
			11-07-12	355	0.031 ± 0.003
05-09-12		ND <sup>b</sup>	11-14-12	351	0.039 ± 0.004
05-16-12	378	0.019 ± 0.003	11-21-12	357	0.075 ± 0.005
05-23-12	371	0.023 ± 0.003	11-28-12	348	0.037 ± 0.004
05-30-12	354	0.011 ± 0.003			
			12-05-12	353	0.081 ± 0.005
06-06-12	439	0.014 ± 0.002	12-12-12	327	0.049 ± 0.004
06-13-12	379	0.023 ± 0.003	12-19-12	350	0.062 ± 0.004
06-20-12	385	0.021 ± 0.003	12-27-12	372	0.055 ± 0.004
06-27-12	354	ND <sup>b</sup>	01-02-13	281	0.082 ± 0.006
07-03-12	300	0.029 ± 0.004			
2nd Quarter Mean ± s.d.		0.019 ± 0.005	4th Quarter Mean ± s.d.		0.048 ± 0.021
Cumulative Average					0.031
Previous Annual Average					0.029

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> ND = No Data; see Table 2.0, Listing of Missed Samples.

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Table 5. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-4

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>		<u>0.010</u>	
01-04-12	303	0.037 ± 0.004	07-11-12	406	0.021 ± 0.003
01-11-12	325	0.026 ± 0.003	07-18-12	320	0.044 ± 0.004
01-18-12	272	0.041 ± 0.004	07-25-12	354	0.025 ± 0.003
01-25-12	326	0.049 ± 0.004	08-01-12	350	0.022 ± 0.003
02-01-12	298	0.035 ± 0.004			
			08-07-12	327	0.024 ± 0.003
02-08-12	323	0.029 ± 0.003	08-14-12	358	0.016 ± 0.003
02-15-12	302	0.034 ± 0.004	08-21-12	320	0.020 ± 0.003
02-22-12	297	0.041 ± 0.004	08-28-12	354	0.036 ± 0.004
02-29-12	304	0.037 ± 0.004			
			09-05-12	400	0.040 ± 0.004
03-07-12	292	0.036 ± 0.004	09-11-12	303	0.023 ± 0.003
03-15-12	340	0.034 ± 0.004	09-19-12	405	0.027 ± 0.003
03-21-12	280	0.021 ± 0.004	09-26-12	352	0.013 ± 0.003
03-28-12	295	0.017 ± 0.003	10-03-12	352	0.037 ± 0.004
1st Quarter Mean ± s.d.		0.034 ± 0.009	3rd Quarter Mean ± s.d.		0.027 ± 0.010
04-04-12	326	0.014 ± 0.003	10-10-12	352	0.016 ± 0.003
04-11-12	302	0.018 ± 0.003	10-17-12	329	0.040 ± 0.004
04-18-12	326	0.020 ± 0.003	10-24-12	355	0.032 ± 0.004
04-25-12	298	0.017 ± 0.003	10-31-12	350	0.030 ± 0.003
05-02-12	328	0.024 ± 0.004			
			11-07-12	355	0.031 ± 0.003
05-09-12	320	0.016 ± 0.003	11-14-12	351	0.041 ± 0.004
05-16-12	319	0.020 ± 0.003	11-21-12	342	0.082 ± 0.005
05-23-12	297	0.031 ± 0.004	11-28-12	349	0.038 ± 0.004
05-30-12		ND <sup>b</sup>			
			12-05-12	353	0.084 ± 0.005
06-06-12	352	0.019 ± 0.003	12-12-12	327	0.051 ± 0.004
06-13-12	379	0.019 ± 0.003	12-19-12	350	0.063 ± 0.004
06-20-12	386	0.018 ± 0.003	12-27-12	403	0.053 ± 0.004
06-27-12	381	0.018 ± 0.003	01-02-13	281	0.087 ± 0.006
07-03-12	303	0.026 ± 0.004			
2nd Quarter Mean ± s.d.		0.020 ± 0.005	4th Quarter Mean ± s.d.		0.050 ± 0.023
Cumulative Average					0.033
Previous Annual Average					0.030

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> ND = No Data; see Table 2.0, Listing of Missed Samples.

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Table 6. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: M-5

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>		<u>0.010</u>	
01-04-12	298	0.032 ± 0.004	07-11-12	406	0.032 ± 0.003
01-11-12	323	0.026 ± 0.003	07-18-12		ND <sup>b</sup>
01-18-12	296	0.036 ± 0.004	07-25-12	354	0.032 ± 0.003
01-25-12	294	0.050 ± 0.004	08-01-12	351	0.022 ± 0.003
02-01-12	293	0.033 ± 0.004	08-07-12	326	0.023 ± 0.003
02-08-12	322	0.030 ± 0.003	08-14-12	358	0.019 ± 0.003
02-15-12	327	0.033 ± 0.004	08-21-12	350	0.017 ± 0.003
02-22-12	322	0.035 ± 0.004	08-28-12	355	0.038 ± 0.004
02-29-12	300	0.038 ± 0.004	09-05-12	367	0.037 ± 0.004
03-07-12	317	0.036 ± 0.004	09-11-12	278	0.020 ± 0.004
03-15-12	368	0.033 ± 0.003	09-19-12	405	0.023 ± 0.003
03-21-12	279	0.022 ± 0.004	09-26-12	323	0.017 ± 0.003
03-28-12	320	0.018 ± 0.003	10-03-12	353	0.036 ± 0.003
1st Quarter Mean ± s.d.		0.033 ± 0.008	3rd Quarter Mean ± s.d.		0.026 ± 0.008
04-04-12	324	0.013 ± 0.003	10-10-12	352	0.017 ± 0.003
04-11-12	327	0.021 ± 0.003	10-17-12	297	0.046 ± 0.004
04-18-12	353	0.021 ± 0.003	10-24-12	349	0.028 ± 0.003
04-25-12	324	0.021 ± 0.003	10-31-12	357	0.029 ± 0.003
05-02-12	355	0.024 ± 0.003	11-07-12	355	0.031 ± 0.003
05-09-12	408	0.014 ± 0.002	11-14-12	366	0.038 ± 0.004
05-16-12	434	0.018 ± 0.003	11-21-12	326	0.077 ± 0.005
05-23-12	445	0.026 ± 0.003	11-28-12	350	0.040 ± 0.004
05-30-12	442	0.016 ± 0.003	12-05-12	353	0.071 ± 0.005
06-06-12	499	0.021 ± 0.002	12-12-12	325	0.051 ± 0.004
06-13-12	496	0.022 ± 0.002	12-19-12	349	0.061 ± 0.004
06-20-12	477	0.021 ± 0.002	12-27-12	370	0.056 ± 0.004
06-27-12	498	0.020 ± 0.002	01-02-13	279	0.087 ± 0.006
07-03-12	454	0.027 ± 0.003			
2nd Quarter Mean ± s.d.		0.020 ± 0.004	4th Quarter Mean ± s.d.		0.049 ± 0.021
Cumulative Average					0.032
Previous Annual Average					0.027

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

<sup>b</sup> ND = No Data; see Table 2.0, Listing of Missed Samples.

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Table 7. Airborne particulate data, gross beta analyses, monthly averages, minima and maxima.

<b>January</b>			
Location	Average	Minima	Maxima
Control	0.036	0.028	0.044
M-1	0.036	0.028	0.044
Indicators	0.036	0.026	0.050
M-2	0.034	0.026	0.044
M-3	0.036	0.028	0.046
M-4	0.038	0.026	0.049
M-5	0.035	0.026	0.050

<b>April</b>			
Location	Average	Minima	Maxima
Control	0.019	0.015	0.022
M-1	0.019	0.015	0.022
Indicators	0.019	0.013	0.024
M-2	0.019	0.013	0.024
M-3	0.017	0.014	0.021
M-4	0.019	0.014	0.024
M-5	0.020	0.013	0.024

<b>February</b>			
Location	Average	Minima	Maxima
Control	0.032	0.025	0.036
M-1	0.032	0.025	0.036
Indicators	0.034	0.027	0.041
M-2	0.031	0.029	0.033
M-3	0.034	0.027	0.038
M-4	0.035	0.029	0.041
M-5	0.034	0.030	0.038

<b>May</b>			
Location	Average	Minima	Maxima
Control	0.017	0.011	0.026
M-1	0.017	0.011	0.026
Indicators	0.019	0.011	0.031
M-2	0.017	0.013	0.024
M-3	0.018	0.011	0.023
M-4	0.022	0.016	0.031
M-5	0.018	0.014	0.026

<b>March</b>			
Location	Average	Minima	Maxima
Control	0.026	0.016	0.033
M-1	0.026	0.016	0.033
Indicators	0.027	0.015	0.038
M-2	0.026	0.018	0.034
M-3	0.026	0.015	0.038
M-4	0.027	0.017	0.036
M-5	0.027	0.018	0.036

<b>June</b>			
Location	Average	Minima	Maxima
Control	0.020	0.018	0.022
M-1	0.020	0.018	0.022
Indicators	0.021	0.014	0.029
M-2	0.021	0.018	0.028
M-3	0.022	0.014	0.029
M-4	0.020	0.018	0.026
M-5	0.022	0.020	0.027

Note: unless otherwise specified, samples collected on the first, second or third day of the month are grouped with data of the previous month.

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Table 7. Airborne particulate data, gross beta analyses, monthly averages, minima and maxima.

<b>July</b>			
Location	Average	Minima	Maxima
Control	0.026	0.020	0.036
M-1	0.026	0.020	0.036
Indicators	0.027	0.019	0.044
M-2	0.027	0.023	0.034
M-3	0.024	0.019	0.030
M-4	0.028	0.021	0.044
M-5	0.029	0.022	0.032

<b>October</b>			
Location	Average	Minima	Maxima
Control	0.027	0.016	0.036
M-1	0.027	0.016	0.036
Indicators	0.030	0.016	0.046
M-2	0.030	0.020	0.042
M-3	0.029	0.023	0.040
M-4	0.030	0.016	0.040
M-5	0.030	0.017	0.046

<b>August</b>			
Location	Average	Minima	Maxima
Control			
M-1	0.025	0.018	0.038
Indicators	0.023	0.014	0.039
M-2	0.025	0.015	0.039
M-3	0.020	0.014	0.028
M-4	0.024	0.016	0.036
M-5	0.025	0.017	0.038

<b>November</b>			
Location	Average	Minima	Maxima
Control	0.047	0.031	0.084
M-1	0.047	0.031	0.084
Indicators	0.048	0.030	0.083
M-2	0.051	0.030	0.083
M-3	0.046	0.031	0.075
M-4	0.048	0.031	0.082
M-5	0.047	0.031	0.077

<b>September</b>			
Location	Average	Minima	Maxima
Control			
M-1	0.027	0.016	0.037
Indicators	0.027	0.013	0.046
M-2	0.027	0.016	0.036
M-3	0.028	0.017	0.046
M-4	0.028	0.013	0.040
M-5	0.027	0.017	0.037

<b>December</b>			
Location	Average	Minima	Maxima
Control	0.068	0.050	0.097
M-1	0.068	0.050	0.097
Indicators	0.064	0.045	0.087
M-2	0.058	0.045	0.084
M-3	0.066	0.049	0.082
M-4	0.067	0.051	0.087
M-5	0.065	0.051	0.087

Note: unless otherwise specified, samples collected on the first, second or third day of the month are grouped with data of the previous month.

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Table 8. Airborne particulates, quarterly composites from each location, analysis for gamma-emitting isotopes.

Activity (pCi/m <sup>3</sup> )						
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Cumulative Average	Previous Average
M-1 (C)						
Lab Code	MAP- 2044	MAP- 4364	MAP- 6452	MAP- 8453		
Volume(m <sup>3</sup> )	4258	4944	4968	4550		
Be-7	0.064 ± 0.014	0.094 ± 0.012	0.086 ± 0.012	0.041 ± 0.012	0.064	0.065
Mn-54	< 0.0006	< 0.0007	< 0.0003	< 0.0003	< 0.0007	< 0.0009
Co-58	< 0.0003	< 0.0007	< 0.0004	< 0.0004	< 0.0007	< 0.0009
Co-60	< 0.0004	< 0.0003	< 0.0009	< 0.0007	< 0.0009	< 0.0008
Zn-65	< 0.0005	< 0.0009	< 0.0005	< 0.0006	< 0.0009	< 0.0010
Zr-Nb-95	< 0.0006	< 0.0011	< 0.0007	< 0.0005	< 0.0011	< 0.0014
Ru-103	< 0.0007	< 0.0010	< 0.0007	< 0.0008	< 0.0010	< 0.0011
Ru-106	< 0.0056	< 0.0048	< 0.0028	< 0.0043	< 0.0056	< 0.0079
Cs-134	< 0.0005	< 0.0006	< 0.0004	< 0.0008	< 0.0006	< 0.0008
Cs-137	< 0.0004	< 0.0008	< 0.0004	< 0.0005	< 0.0008	< 0.0009
Ba-La-140	< 0.0011	< 0.0010	< 0.0010	< 0.0015	< 0.0011	< 0.0034
Ce-141	< 0.0008	< 0.0009	< 0.0014	< 0.0009	< 0.0014	< 0.0017
Ce-144	< 0.0026	< 0.0037	< 0.0032	< 0.0032	< 0.0037	< 0.0050
M-2						
Lab Code	MAP- 2045	MAP- 4365	MAP- 6453	MAP- 8454		
Volume(m <sup>3</sup> )	4275	5050	4573	4567		
Be-7	0.060 ± 0.009	0.076 ± 0.012	0.080 ± 0.010	0.053 ± 0.010	0.064	0.063
Mn-54	< 0.0004	< 0.0004	< 0.0006	< 0.0003	< 0.0006	< 0.0009
Co-58	< 0.0006	< 0.0003	< 0.0004	< 0.0007	< 0.0006	< 0.0009
Co-60	< 0.0003	< 0.0003	< 0.0005	< 0.0006	< 0.0005	< 0.0008
Zn-65	< 0.0008	< 0.0005	< 0.0007	< 0.0008	< 0.0008	< 0.0010
Zr-Nb-95	< 0.0005	< 0.0004	< 0.0007	< 0.0007	< 0.0007	< 0.0014
Ru-103	< 0.0009	< 0.0005	< 0.0007	< 0.0007	< 0.0009	< 0.0011
Ru-106	< 0.0056	< 0.0050	< 0.0029	< 0.0070	< 0.0056	< 0.0079
Cs-134	< 0.0004	< 0.0005	< 0.0007	< 0.0004	< 0.0007	< 0.0008
Cs-137	< 0.0006	< 0.0005	< 0.0005	< 0.0004	< 0.0006	< 0.0009
Ba-La-140	< 0.0009	< 0.0012	< 0.0007	< 0.0015	< 0.0012	< 0.0034
Ce-141	< 0.0012	< 0.0011	< 0.0011	< 0.0013	< 0.0012	< 0.0017
Ce-144	< 0.0019	< 0.0037	< 0.0040	< 0.0031	< 0.0040	< 0.0050

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Table 8. Airborne particulates, quarterly composites from each location, analysis for gamma-emitting isotopes.

Activity (pCi/m <sup>3</sup> )						
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Cumulative Average	Previous Average
M-3						
Lab Code	MAP- 2046	MAP- 4366	MAP- 6454	MAP- 8456		
Volume(m <sup>3</sup> )	4094	4617	4240	4451		
Be-7	0.064 ± 0.012	0.076 ± 0.013	0.089 ± 0.011	0.042 ± 0.010	0.065	0.070
Mn-54	< 0.0005	< 0.0007	< 0.0004	< 0.0004	< 0.0007	< 0.0009
Co-58	< 0.0004	< 0.0005	< 0.0006	< 0.0003	< 0.0006	< 0.0009
Co-60	< 0.0003	< 0.0007	< 0.0002	< 0.0005	< 0.0007	< 0.0008
Zn-65	< 0.0006	< 0.0010	< 0.0004	< 0.0006	< 0.0010	< 0.0010
Zr-Nb-95	< 0.0008	< 0.0006	< 0.0004	< 0.0008	< 0.0008	< 0.0014
Ru-103	< 0.0006	< 0.0009	< 0.0006	< 0.0011	< 0.0009	< 0.0011
Ru-106	< 0.0057	< 0.0057	< 0.0037	< 0.0030	< 0.0057	< 0.0079
Cs-134	< 0.0005	< 0.0008	< 0.0004	< 0.0006	< 0.0008	< 0.0008
Cs-137	< 0.0006	< 0.0006	< 0.0006	< 0.0007	< 0.0006	< 0.0009
Ba-La-140	< 0.0009	< 0.0018	< 0.0008	< 0.0017	< 0.0018	< 0.0034
Ce-141	< 0.0010	< 0.0013	< 0.0008	< 0.0010	< 0.0013	< 0.0017
Ce-144	< 0.0036	< 0.0034	< 0.0031	< 0.0044	< 0.0036	< 0.0050
M-4						
Lab Code	MAP- 2047	MAP- 4367	MAP- 6455	MAP- 8457		
Volume(m <sup>3</sup> )	3958	4580	4600	4496		
Be-7	0.068 ± 0.012	0.091 ± 0.013	0.090 ± 0.013	0.046 ± 0.009	0.068	0.069
Mn-54	< 0.0006	< 0.0007	< 0.0005	< 0.0005	< 0.0007	< 0.0009
Co-58	< 0.0005	< 0.0005	< 0.0005	< 0.0004	< 0.0005	< 0.0009
Co-60	< 0.0004	< 0.0004	< 0.0006	< 0.0003	< 0.0006	< 0.0008
Zn-65	< 0.0008	< 0.0010	< 0.0006	< 0.0005	< 0.0010	< 0.0010
Zr-Nb-95	< 0.0008	< 0.0010	< 0.0006	< 0.0006	< 0.0010	< 0.0014
Ru-103	< 0.0006	< 0.0011	< 0.0006	< 0.0007	< 0.0011	< 0.0011
Ru-106	< 0.0047	< 0.0067	< 0.0038	< 0.0037	< 0.0067	< 0.0079
Cs-134	< 0.0008	< 0.0006	< 0.0005	< 0.0004	< 0.0008	< 0.0008
Cs-137	< 0.0008	< 0.0006	< 0.0007	< 0.0007	< 0.0008	< 0.0009
Ba-La-140	< 0.0016	< 0.0022	< 0.0010	< 0.0012	< 0.0022	< 0.0034
Ce-141	< 0.0009	< 0.0012	< 0.0009	< 0.0011	< 0.0012	< 0.0017
Ce-144	< 0.0022	< 0.0039	< 0.0045	< 0.0039	< 0.0045	< 0.0050

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Table 8. Airborne particulates, quarterly composites from each location, analysis for gamma-emitting isotopes.

Activity (pCi/m <sup>3</sup> )						
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Cumulative Average	Previous Average
M-5						
Lab Code	MAP- 2048	MAP- 4368	MAP- 6456	MAP- 8458		
Volume(m <sup>3</sup> )	4060	5836	4309	4427		
Be-7	0.068 ± 0.012	0.100 ± 0.014	0.093 ± 0.012	0.042 ± 0.012	0.068	0.064
Mn-54	< 0.0007	< 0.0007	< 0.0009	< 0.0008	< 0.0009	< 0.0009
Co-58	< 0.0007	< 0.0005	< 0.0006	< 0.0006	< 0.0007	< 0.0009
Co-60	< 0.0007	< 0.0004	< 0.0007	< 0.0005	< 0.0007	< 0.0008
Zn-65	< 0.0013	< 0.0007	< 0.0015	< 0.0023	< 0.0015	< 0.0010
Zr-Nb-95	< 0.0013	< 0.0008	< 0.0011	< 0.0020	< 0.0013	< 0.0014
Ru-103	< 0.0009	< 0.0007	< 0.0008	< 0.0012	< 0.0009	< 0.0011
Ru-106	< 0.0068	< 0.0043	< 0.0058	< 0.0077	< 0.0068	< 0.0079
Cs-134	< 0.0005	< 0.0004	< 0.0007	< 0.0008	< 0.0007	< 0.0008
Cs-137	< 0.0006	< 0.0006	< 0.0007	< 0.0006	< 0.0007	< 0.0009
Ba-La-140	< 0.0013	< 0.0013	< 0.0012	< 0.0016	< 0.0013	< 0.0034
Ce-141	< 0.0012	< 0.0013	< 0.0013	< 0.0014	< 0.0013	< 0.0017
Ce-144	< 0.0030	< 0.0025	< 0.0038	< 0.0041	< 0.0038	< 0.0050



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Table 9. Milk, analysis for iodine-131 and gamma-emitting isotopes.

Collection: Monthly - November through April.

Biweekly - May through October.

Location	Date Collected	Lab Code	Concentration (pCi/L)				
			I-131	K-40	Cs-134	Cs-137	Ba-La-140
Kitzman M-16	01-31-12			NS <sup>a</sup>			
	04-11-12	MMI -2011	< 0.5	1436 ± 110	< 5	< 5	< 5
	05-09-12	MMI -2723	< 0.5	1579 ± 127	< 5	< 5	< 5
	05-22-12	MMI -3088	< 0.5	1898 ± 114	< 5	< 5	< 5
	06-06-12	MMI -3481	< 0.5	1899 ± 115	< 5	< 5	< 5
	06-20-12	MMI -3727	< 0.5	1982 ± 127	< 5	< 5	< 5
	07-03-12	MMI -3960	< 0.5	1963 ± 82	< 5	< 5	< 5
	07-16-12	MMI -4266	< 0.5	1881 ± 138	< 5	< 5	< 5
	08-01-12	MMI -4785	< 0.5	1854 ± 106	< 5	< 5	< 5
	08-15-12	MMI -5094	< 0.5	1818 ± 127	< 5	< 5	< 5
	08-29-12	MMI -5428	< 0.5	1798 ± 123	< 5	< 5	< 5
	09-12-12	MMI -5724	< 0.5	1874 ± 110	< 5	< 5	< 5
	09-27-12	MMI -6051	< 0.5	1944 ± 118	< 5	< 5	< 5
	10-10-12	MMI -6329	< 0.5	1854 ± 97	< 5	< 5	< 5
	10-24-12	MMI -6908	< 0.5	1765 ± 127	< 5	< 5	< 5
11-07-12	MMI -7168	< 0.5	1697 ± 100	< 5	< 5	< 5	
12-31-12				NS <sup>a</sup>			
Cumulative Average			< 0.5	1816	< 5	< 5	< 5
Previous Annual Average			< 0.5	1818	< 5	< 5	< 5
Greniger (C) M-17C	01-31-12			NS <sup>a</sup>			
	04-11-12	MMI -2012	< 0.5	1929 ± 127	< 5	< 5	< 5
	05-09-12	MMI -2724	< 0.5	2082 ± 136	< 5	< 5	< 5
	05-23-12	MMI -3089	< 0.5	1768 ± 110	< 5	< 5	< 5
	06-06-12	MMI -3482	< 0.5	1945 ± 145	< 5	< 5	< 5
	06-20-12	MMI -3728	< 0.5	1736 ± 92	< 5	< 5	< 5
	07-03-12	MMI -3961	< 0.5	1553 ± 113	< 5	< 5	< 5
	07-16-12	MMI -4267	< 0.5	1692 ± 77	< 5	< 5	< 5
	08-02-12	MMI -4836	< 0.5	1687 ± 121	< 5	< 5	< 5
	08-14-12	MMI -5057	< 0.5	1619 ± 128	< 5	< 5	< 5
	08-29-12	MMI -5429	< 0.5	1909 ± 112	< 5	< 5	< 5
	09-12-12	MMI -5725	< 0.5	1866 ± 106	< 5	< 5	< 5
	09-27-12	MMI -6052	< 0.5	1820 ± 116	< 5	< 5	< 5
	10-10-12	MMI -6330	< 0.5	1750 ± 122	< 5	< 5	< 5
	10-24-12	MMI -6909	< 0.5	1512 ± 88	< 5	< 5	< 5
11-07-12	MMI -7169	< 0.5	1704 ± 99	< 5	< 5	< 5	
12-31-12				NS <sup>a</sup>			
Cumulative Average			< 0.5	1771	< 5	< 5	< 5
Previous Annual Average			1.5	1821	< 5	< 5	< 5

<sup>a</sup> NS = No Sample; see Table 2.0, Listing of Missed Samples.

Table 9A. Pasture grass, vegetation, analysis for gamma-emitting isotopes.  
Collection: 3x per year

Sample Description and Concentration (pCi/g wet)				Annual Average	Previous Annual Average
Location: M-41 (Training Center)					
Date Collected	07-16-12	08-14-12	09-19-12		
Lab Code	MVE- 4268	MVE- 5091	MVE- 5925		
Mn-54	< 0.005	< 0.009	< 0.005	< 0.009	< 0.015
Fe-59	< 0.027	< 0.016	< 0.018	< 0.027	< 0.040
Co-58	< 0.006	< 0.008	< 0.006	< 0.008	< 0.013
Co-60	< 0.010	< 0.009	< 0.011	< 0.011	< 0.013
Zn-65	< 0.021	< 0.020	< 0.025	< 0.025	< 0.036
Nb-95	< 0.014	< 0.012	< 0.010	< 0.014	< 0.018
I-131	< 0.025	< 0.023	< 0.044	< 0.044	< 0.018
Cs-134	< 0.010	< 0.008	< 0.009	< 0.010	< 0.014
Cs-137	< 0.007	< 0.010	< 0.009	< 0.010	< 0.017
Location: M-42 (Biology Station Road)					
Date Collected	07-16-12	08-14-12	09-19-12		
Lab Code	MVE- 4269	MVE- 5092	MVE- 5926		
Mn-54	< 0.009	< 0.011	< 0.011	< 0.011	< 0.017
Fe-59	< 0.022	< 0.023	< 0.022	< 0.023	< 0.038
Co-58	< 0.009	< 0.010	< 0.007	< 0.010	< 0.015
Co-60	< 0.010	< 0.008	< 0.005	< 0.010	< 0.019
Zn-65	< 0.022	< 0.013	< 0.018	< 0.022	< 0.026
Nb-95	< 0.010	< 0.011	< 0.009	< 0.011	< 0.015
I-131	< 0.025	< 0.021	< 0.034	< 0.034	< 0.022
Cs-134	< 0.008	< 0.008	< 0.009	< 0.009	< 0.014
Cs-137	< 0.012	< 0.007	< 0.014	< 0.014	< 0.020
Location: M-43 (Imholte Farm, Control)					
Date Collected	07-16-12	08-14-12	09-19-12		
Lab Code	MVE- 4270	MVE- 5093	MVE- 5927		
Mn-54	< 0.007	< 0.010	< 0.009	< 0.010	< 0.016
Fe-59	< 0.031	< 0.012	< 0.016	< 0.031	< 0.038
Co-58	< 0.007	< 0.008	< 0.008	< 0.008	< 0.012
Co-60	< 0.011	< 0.004	< 0.012	< 0.012	< 0.011
Zn-65	< 0.030	< 0.018	< 0.015	< 0.030	< 0.020
Nb-95	< 0.011	< 0.011	< 0.011	< 0.011	< 0.017
I-131	< 0.021	< 0.017	< 0.031	< 0.031	< 0.027
Cs-134	< 0.009	< 0.008	< 0.006	< 0.009	< 0.013
Cs-137	< 0.010	< 0.009	< 0.013	< 0.013	< 0.013

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Table 10. River water, analysis of monthly composites for gamma-emitting isotopes.

Location: M-8 (C)

Collection: Weekly

Sample Description and Concentration (pCi/L)					
Period Collected	January <sup>a</sup>	February <sup>b</sup>	March	April	May
Lab Code	MSW-716	MSW-1444	MSW-1950	MSW-2708	MSW-3535
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 10	< 15	< 13	< 11	< 19
Period Collected	June	July	August	September	October
Lab Code	MSW-4387	MSW-4884	MSW-5868	MSW-6737	MSW-7479
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 10	< 18	< 16	< 21	< 23
Period Collected	November	December <sup>c</sup>	Cumulative	Previous	Annual
Lab Code	MSW-8012	MSW-8368	Average	Average	Average
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 24	< 13	< 24	< 24	< 26

<sup>a</sup> Composite of three samples for month; see Table 2.0, Listing of Missed Samples.

<sup>b</sup> Composite of two samples for month; see Table 2.0, Listing of Missed Samples.

<sup>c</sup> Only one sample for December collected 12-05-12; water frozen remainder of month.

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Table 10. River water, analysis of monthly composites for gamma-emitting isotopes.

Location: M-9  
Collection: Weekly

Sample Description and Concentration (pCi/L)					
Period Collected	January	February	March	April	May
Lab Code	MSW-717	MSW-1445	MSW-1951	MSW-2709	MSW-3536
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 20	< 14	< 17	< 15	< 21
Period Collected	June	July	August	September	October
Lab Code	MSW-4388	MSW-4885	MSW-5869	MSW-6738	MSW-7480
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 12	< 9	< 30	< 31	< 25
Period Collected	November	December	Cumulative		Previous
Lab Code	MSW-8014	MSW-8369	Average		Annual
					Average
Mn-54	< 10	< 10	< 10		< 10
Fe-59	< 30	< 30	< 30		< 30
Co-58	< 10	< 10	< 10		< 10
Co-60	< 10	< 10	< 10		< 10
Zn-65	< 30	< 30	< 30		< 30
Zr-Nb-95	< 15	< 15	< 15		< 15
Cs-134	< 10	< 10	< 10		< 10
Cs-137	< 10	< 10	< 10		< 10
Ba-La-140	< 15	< 15	< 15		< 15
Ce-144	< 25	< 16	< 31		< 43

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Table 11. Drinking water, City of Minneapolis, M-14, analysis of monthly composites for gross beta, iodine-131, and gamma-emitting isotopes.  
Collection: Weekly

Sample Description and Concentration (pCi/L)					
Period Collected	January	February	March	April	May
Lab Code	MDW-616	MDW-1134	MDW-1664	MDW-2639	MDW-3444
Gross beta	3.1 ± 0.7	2.2 ± 0.7	2.0 ± 0.6	2.2 ± 1.0	2.7 ± 0.8
I-131	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 17	< 22	< 26	< 18	< 22
Period Collected	June	July	August	September	October
Lab Code	MDW-4120	MDW-5038	MDW-5661	MDW-6130	MDW-7229
Gross beta	2.0 ± 0.8	2.5 ± 1.0	3.1 ± 1.8	2.1 ± 1.0	< 0.9
I-131	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Mn-54	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10
Ba-La-140	< 15	< 15	< 15	< 15	< 15
Ce-144	< 15	< 26	< 21	< 36	< 22
Period Collected	November	December		Cumulative	Previous
Lab Code	MDW-7897	MDW-8367		Average	Average
Gross beta	2.8 ± 1.0	2.2 ± 0.8		2.4	2.2
I-131	< 1.0	< 1.0		< 1.0	< 1.0
Mn-54	< 10	< 10		< 10	< 10
Fe-59	< 30	< 30		< 30	< 30
Co-58	< 10	< 10		< 10	< 10
Co-60	< 10	< 10		< 10	< 10
Zn-65	< 30	< 30		< 30	< 30
Zr-Nb-95	< 15	< 15		< 15	< 15
Cs-134	< 10	< 10		< 10	< 10
Cs-137	< 10	< 10		< 10	< 10
Ba-La-140	< 15	< 15		< 15	< 15
Ce-144	< 22	< 18		< 36	< 27

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Table 12. River water and drinking water, analysis of quarterly composites for tritium.  
Collection: Quarterly composites of weekly collections.

Sample Type, Location and Collection Period	Lab Code	<u>Concentration (pCi/L)</u> H-3	
<u>River Water Upstream, M-8 (C)</u>			
1st Quarter	MSW - 1952	< 500	< 143
2nd Quarter	MSW - 4381	< 500	< 152
3rd Quarter	MSW - 6732	< 500	< 152
4th Quarter	MSW - 8375	< 500	< 141
Cumulative Average		< 500	< 147
Previous Annual Average		< 500	< 145
<u>River Water Downstream, M-9</u>			
1st Quarter	MSW - 1953	< 500	< 143
2nd Quarter	MSW - 4382	< 500	< 152
3rd Quarter	MSW - 6734	< 500	< 152
4th Quarter	MSW - 8376	< 500	< 141
Cumulative Average		< 500	< 147
Previous Annual Average		< 500	< 145
<u>Drinking Water Minneapolis, M-14</u>			
1st Quarter	MDW - 1954	< 500	< 143
2nd Quarter	MDW - 4379	< 500	< 152
3rd Quarter	MDW - 6729	< 500	< 152
4th Quarter	MDW - 8366	< 500	< 140
Cumulative Average		< 500	< 147
Previous Annual Average		< 500	< 146

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Table 13. Well water, analysis for tritium and gamma-emitting isotopes.

Sample Description and Concentration (pCi/L)												
Date Collected	Lab Code	H-3 ( $< 500$ pCi/L)	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-Nb-95	Cs-134	Cs-137	Ba-La-140	Ce-144
<u>Monticello (M-11)</u>												
1/18/2012	MWW-290	$< 145$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 21$
4/19/2012	MWW-2243	$< 150$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 35$
7/25/2012	MWW-4601	$< 164$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 29$
10/17/2012	MWW-6816	$< 177$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 46$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 46$
<u>Plant Well No. 1 (M-12)</u>												
1/18/2012	MWW-291	$< 145$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 28$
4/18/2012	MWW-2244	$< 150$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 15$
7/25/2012	MWW-4603	$< 164$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 45$
10/17/2012	MWW-6818	$< 177$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 17$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 45$
<u>Wise (M-27)</u>												
1/18/2012												
4/18/2012	MWW-2245	$< 150$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 26$
7/25/2012	MWW-4604	$< 164$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 40$
10/17/2012	MWW-6819	$< 177$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 40$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 40$
<u>Imholte (M-43) Control</u>												
1/18/2012	MWW-292	$< 145$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 33$
4/18/2012	MWW-2246	$< 150$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 29$
7/25/2012	MWW-4605	$< 164$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 39$
10/17/2012	MWW-6820	$< 177$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 41$
Cumulative Averages		$< 500$	$< 10$	$< 30$	$< 10$	$< 10$	$< 30$	$< 15$	$< 10$	$< 10$	$< 15$	$< 41$

<sup>a</sup> NS = No Sample, see Table 2.0, Listing of Missed Samples.

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Table 14. Fish, analysis of edible portions for gamma-emitting isotopes.  
Collection: Semiannually

Sample Description and Concentration (pCi/g wet)				Cumulative Average	Previous Average
<u>Upstream 1000' M-8 (C)</u>					
Date Collected	05-31-12	05-31-12	10-25-12		
Lab Code	MF- 3258	MF- 3259	MF- 7009		
Sample Type	Smallmouth Bass	Silver Redhorse	Mixed composite		
K-40	3.51 ± 0.47	3.33 ± 0.39	3.24 ± 0.47	3.36	2.98
Mn-54	< 0.018	< 0.009	< 0.011	< 0.018	< 0.014
Fe-59	< 0.055	< 0.031	< 0.045	< 0.055	< 0.021
Co-58	< 0.023	< 0.016	< 0.023	< 0.023	< 0.010
Co-60	< 0.008	< 0.013	< 0.022	< 0.022	< 0.013
Zn-65	< 0.037	< 0.016	< 0.035	< 0.037	< 0.012
Nb-95	< 0.023	< 0.027	< 0.019	< 0.027	< 0.013
Zr-95	< 0.028	< 0.027	< 0.035	< 0.035	< 0.019
Cs-134	< 0.018	< 0.012	< 0.017	< 0.018	< 0.011
Cs-137	< 0.015	< 0.014	< 0.020	< 0.020	< 0.014
Ba-La-140	< 0.034	< 0.020	< 0.067	< 0.067	< 0.018
Ce-144	< 0.107	< 0.065	< 0.107	< 0.107	< 0.092
<u>Downstream 1000' M-9</u>					
Date Collected	05-31-12	05-31-12	10-25-12		
Lab Code	MF- 3260	MF- 3261	MF- 7010		
Sample Type	Smallmouth Bass	Silver Redhorse	Mixed composite		
K-40	3.58 ± 0.41	3.43 ± 0.41	3.02 ± 0.34	3.34	3.06
Mn-54	< 0.017	< 0.012	< 0.015	< 0.017	< 0.017
Fe-59	< 0.037	< 0.034	< 0.052	< 0.052	< 0.033
Co-58	< 0.017	< 0.009	< 0.023	< 0.023	< 0.011
Co-60	< 0.010	< 0.005	< 0.013	< 0.013	< 0.010
Zn-65	< 0.020	< 0.019	< 0.030	< 0.030	< 0.023
Nb-95	< 0.021	< 0.021	< 0.021	< 0.021	< 0.009
Zr-95	< 0.022	< 0.039	< 0.034	< 0.039	< 0.026
Cs-134	< 0.014	< 0.012	< 0.013	< 0.014	< 0.013
Cs-137	< 0.014	< 0.011	< 0.017	< 0.017	< 0.024
Ba-La-140	< 0.043	< 0.025	< 0.032	< 0.043	< 0.021
Ce-144	< 0.081	< 0.084	< 0.100	< 0.100	< 0.082



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Table 15. Algae or aquatic insects, analysis for gamma-emitting isotopes.  
Collection: Semiannually

Sample Description and Concentration (pCi/g wet)		Cumulative Average	Previous Average
<u>Upstream 1000' M-8 (C)</u>			
Date Collected	09-05-12		
Lab Code	MBO- 5551		
Be-7	< 0.58	< 0.58	< 0.64
K-40	< 1.08	< 1.08	< 1.35
Mn-54	< 0.048	< 0.048	< 0.069
Fe-59	< 0.12	< 0.12	< 0.089
Co-58	< 0.068	< 0.068	< 0.056
Co-60	< 0.052	< 0.052	< 0.034
Zn-65	< 0.097	< 0.097	< 0.13
Zr-Nb-95	< 0.12	< 0.12	< 0.076
Ru-103	< 0.091	< 0.091	< 0.065
Ru-106	< 0.34	< 0.34	< 0.45
Cs-134	< 0.045	< 0.045	< 0.050
Cs-137	< 0.042	< 0.042	< 0.053
Ba-La-140	< 0.39	< 0.39	< 0.17
Ce-144	< 0.30	< 0.30	< 0.24
<u>Downstream 1000' M-9</u>			
Date Collected	09-05-12		
Lab Code	MBO- 5552		
Be-7	< 0.48	< 0.48	< 0.33
K-40	< 0.97	< 0.97	< 0.65
Mn-54	< 0.051	< 0.051	< 0.024
Fe-59	< 0.17	< 0.17	< 0.075
Co-58	< 0.072	< 0.072	< 0.036
Co-60	< 0.022	< 0.022	< 0.024
Zn-65	< 0.094	< 0.094	< 0.057
Zr-Nb-95	< 0.086	< 0.086	< 0.044
Ru-103	< 0.053	< 0.053	< 0.051
Ru-106	< 0.39	< 0.39	< 0.31
Cs-134	< 0.046	< 0.046	< 0.036
Cs-137	< 0.055	< 0.055	< 0.040
Ba-La-140	< 0.25	< 0.25	< 0.072
Ce-144	< 0.25	< 0.25	< 0.12

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Table 16. Edible cultivated (irrigated) crops, analysis for iodine-131 and gamma-emitting isotopes.  
Collection: Annually

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Sample Description and Concentration (pCi/g wet)	
Location:	Control (Cabbage)
Date Collected	
Lab Code	ND <sup>a</sup>
Mn-54	-
Fe-59	-
Co-58	-
Co-60	-
Zn-65	-
Nb-95	-
I-131	-
Cs-134	-
Cs-137	-

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Location:	M-27 (Cabbage)
Date Collected	
Lab Code	ND <sup>a</sup>
Mn-54	-
Fe-59	-
Co-58	-
Co-60	-
Zn-65	-
Nb-95	-
I-131	-
Cs-134	-
Cs-137	-

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<sup>a</sup> ND = No data; sample not collected.

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Table 17. Shoreline (SS) sediments, analysis for gamma-emitting isotopes.  
Collection: Semiannually

Sample Description and Concentration (pCi/g dry)		Cumulative Average	Previous Average
<u>Upstream 1000' M-8 (C)</u>			
Date Collected	09-05-12		
Lab Code	MSS- 5553		
Be-7	< 0.18	< 0.18	< 0.20
K-40	10.02 ± 0.52	10.02	10.50
Mn-54	< 0.013	< 0.013	< 0.014
Fe-59	< 0.031	< 0.031	< 0.040
Co-58	< 0.016	< 0.016	< 0.018
Co-60	< 0.015	< 0.015	< 0.011
Zn-65	< 0.025	< 0.025	< 0.034
Nb-95	< 0.028	< 0.028	< 0.026
Zr-95	< 0.023	< 0.023	< 0.038
Ru-103	< 0.013	< 0.013	< 0.022
Ru-106	< 0.056	< 0.056	< 0.16
Cs-134	< 0.010	< 0.010	< 0.013
Cs-137	< 0.014	< 0.014	< 0.014
Ba-La-140	< 0.044	< 0.044	< 0.064
Ce-144	< 0.10	< 0.10	< 0.11
<u>Downstream 1000' M-9</u>			
Date Collected	09-05-12		
Lab Code	MSS- 5554		
Be-7	0.33 ± 0.19	0.33	< 0.27
K-40	8.85 ± 0.49	8.85	10.75
Mn-54	< 0.017	< 0.017	< 0.022
Fe-59	< 0.042	< 0.042	< 0.068
Co-58	< 0.019	< 0.019	< 0.021
Co-60	< 0.013	< 0.013	< 0.018
Zn-65	< 0.030	< 0.030	< 0.040
Nb-95	< 0.032	< 0.032	< 0.034
Zr-95	< 0.014	< 0.014	< 0.048
Ru-103	< 0.017	< 0.017	< 0.027
Ru-106	< 0.062	< 0.062	< 0.16
Cs-134	< 0.011	< 0.011	< 0.016
Cs-137	< 0.013	< 0.013	0.065
Ba-La-140	< 0.043	< 0.043	< 0.055
Ce-144	< 0.081	< 0.081	< 0.14

MONTICELLO

Table 17. Shoreline (SS) sediments, analysis for gamma-emitting isotopes  
(continued).

Sample Description and Concentration (pCi/g dry)		Cumulative Average	Previous Average
<u>Montissippi Park M-15</u>			
Date Collected	09-05-12		
Lab Code	MSS- 5555		
Be-7	1.09 ± 0.33	1.09	< 0.18
K-40	10.82 ± 0.63	10.82	9.85
Mn-54	< 0.020	< 0.020	< 0.015
Fe-59	< 0.030	< 0.030	< 0.046
Co-58	< 0.026	< 0.026	< 0.015
Co-60	< 0.016	< 0.016	< 0.013
Zn-65	< 0.035	< 0.035	< 0.042
Nb-95	< 0.026	< 0.026	< 0.038
Zr-95	< 0.020	< 0.020	< 0.039
Ru-103	< 0.027	< 0.027	< 0.018
Ru-106	< 0.14	< 0.14	< 0.117
Cs-134	< 0.014	< 0.014	< 0.013
Cs-137	0.081 ± 0.022	0.081	0.028
Ba-La-140	< 0.059	< 0.059	< 0.039
Ce-144	< 0.12	< 0.124	< 0.092

**ENCLOSURE 3**

**CORRECTIONS TO THE 2013 AREOR**

Broadleaf vegetation samples were not collected since 2011 due to unavailability; these samples were not included as missed samples, because they were considered to be above and beyond required samples. Since they were included in the Offsite Dose Calculation Manual (ODCM) ODCM-07.01 Table 1, they were required samples for Monticello Nuclear Generating Plant and should have been included as missed samples. The affected pages have been included in their entirety and should replace existing pages (5 and 17 of the main report, and V of the Completed Data Tables), ML14139A025.

**ENCLOSURE 3**

**ATTACHMENT 1**

**REPLACEMENT PAGES FOR THE 2013 AREOR**

3 Pages to Follow

### 3.3 Program Execution

The Program was executed as described in the preceding section with the following exceptions:

(1) Air Particulates / Air Iodine:

M-01, No air particulate / air iodine sample was available from for the week ending January 16, 2013, the sampler failed down due to a faulty toggle switch.

M-01, A partial air particulate / air iodine sample (54 m3) was collected for the week ending May 1, 2013, due to sampler failure. No air particulate / air iodine sample was available for the week ending May 8, 2013, due to sampler failure. The vacuum pump was replaced.

M-02, No air particulate sample was collected for the week ending November 27, 2013, the filter was misaligned in the holder.

(2) Surface Water:

Surface water was not collected at location M-08 for the months of January, February, March and December, 2013, due to unsafe ice conditions.

(3) Well Water:

Well water was not collected at location MW-27 in January, 2013. No water was available from the outside tap.

(4) Drinking Water (M-14):

No sample was available for the January 13, 2013 collection. The sample was damaged in shipment. The drinking water sample for May 17, 2013 was lost during shipping.

No drinking water sample was available November 27, 2013. The sample was missed.

(5) Milk

There was no goat milk available from locations M-16 and M-17 in 2013. Goats are no longer milked at location M-16, the herd has been sold.

(6) Broad Leaf Vegetables

Broad Leaf Vegetables were not collected in 2013 due to unavailability. The previous Critical Garden ceased to be used and attempts to obtain a sample from the new Critical Garden were unsuccessful.

Deviations from the program are summarized in Table 5.3.

### 3.4 Program Modifications

Milk sampling was dropped from the REMP in 2013. The indicator location M-16, discontinued dairy operations.

Modifications to the Groundwater monitoring program are detailed in Appendix E.



Table 5.3. MISSED COLLECTIONS AND ANALYSES

All required samples were collected and analyzed as scheduled with the following exceptions:					
Sample Type	Analysis	Location	Collection Date or Period	Reason for not conducting REMP as required	Plans for Preventing Recurrence
WW	Gamma, H-3	M-014	1/13/2013	Sample damaged in shipment.	None required.
AP/AI	Beta, I-131	M-01	1/16/2013	Pump found off.	Sampler restarted.
SW	Gamma	M-008	Jan. 2013	Water frozen entire month; no composite.	None required.
WW	Gamma, H-3	M-027	1/23/2013	Residence vacant, water turned off.	None required.
SW	Gamma	M-008	Feb. 2013	Water frozen entire month; no composite.	None required.
SW	Gamma	M-008	Mar. 2013	Water frozen entire month; no composite.	None required.
SW	H-3	M-008	1st Qtr '13	Water frozen entire quarter; no composite.	None required.
AP/AI	Beta, I-131	M-01	5/1/2013	Pump found off.	Sampler pump replaced.
WW	Gamma, H-3	M-014	5/7/2013	Sample damaged in shipment.	None required.
AP/AI	Beta, I-131	M-01	5/8/2013	Pump failure.	Sampler pump replaced.
AP/AI	Beta, I-131	M-02	11/27/2013	Filter misaligned in holder; light particulate collected.	Technician coached on verification practices.
WW	Gamma, H-3	M-014	11/27/2013	No sample taken.	Technician coached on proper turnover.
SW	Gamma	M-008	Dec. 2013	Water frozen entire month; no composite.	None required.
VE	I-131	Highest D/Q Garden and Control	At Harvest	Samples became unavailable when previous Critical Garden ceased to be used.	Attempted to obtain a sample from new Critical Garden

2.0. LISTING of MISSED SAMPLES

All required samples were collected and analyzed as scheduled with the following exceptions:					
Sample Type	Analysis	Location	Collection Date or Period	Reason for not conducting REMP as required	Plans for Preventing Recurrence
WW	Gamma, H-3	M-014	1/13/2013	Sample damaged in shipment.	None required.
AP/AI	Beta, I-131	M-01	1/16/2013	Pump found off.	Sampler restarted.
SW	Gamma	M-008	Jan. 2013	Water frozen entire month; no composite.	None required.
WW	Gamma, H-3	M-027	1/23/2013	Residence vacant, water turned off.	None required.
SW	Gamma	M-008	Feb. 2013	Water frozen entire month; no composite.	None required.
SW	Gamma	M-008	Mar. 2013	Water frozen entire month; no composite.	None required.
SW	H-3	M-008	1st Qtr '13	Water frozen entire quarter; no composite.	None required.
AP/AI	Beta, I-131	M-01	5/1/2013	Pump found off.	Sampler pump replaced.
WW	Gamma, H-3	M-014	5/7/2013	Sample damaged in shipment.	None required.
AP/AI	Beta, I-131	M-01	5/8/2013	Pump failure.	Sampler pump replaced.
AP/AI	Beta, I-131	M-02	11/27/2013	Filter misaligned in holder; light particulate collected.	Technician coached on verification practices.
WW	Gamma, H-3	M-014	11/27/2013	No sample taken.	Technician coached on proper turnover.
SW	Gamma	M-008	Dec. 2013	Water frozen entire month; no composite.	None required.
VE	I-131	Highest D/Q Garden and Control	At Harvest	Samples became unavailable when previous Critical Garden ceased to be used.	Attempted to obtain a sample from new Critical Garden

**ENCLOSURE 4**

**CORRECTIONS TO THE 2014 AREOR**

L-MT-16-035  
Enclosure 4  
Page 1 of 1

Inaccuracies were discovered in the 2014 Annual Radiological Environmental Operating Report, Groundwater Monitoring section (Appendix E). The inaccuracies are being corrected in the attached pages. The affected pages have been included in their entirety and should replace the existing pages, ML15132A628.

**ENCLOSURE 4**

**ATTACHMENT 1**

**REPLACEMENT PAGES FOR THE 2014 AREOR**

6 Pages to Follow

## 1.0 INTRODUCTION

This appendix to the Radiological Environmental Monitoring Program Annual Report to the United States Nuclear Regulatory Commission summarizes and interprets results of the Ground Water Monitoring Program samples taken at the Monticello Nuclear Plant, Monticello, Minnesota, during the period January – December 2014. This sampling program was established in October of 2006 following the industry initiative on ground water monitoring.

## 2.0 SUMMARY

The Ground Water Sampling Program was established following industry events where tritium was discovered in ground water surrounding commercial nuclear facilities. This program is described and the results for 2014 are summarized and discussed.

Program findings for 2014 detected low levels of tritium in monitoring wells located on the plant property. With the exception of monitoring wells MW-9A and MW-13A, tritium measured at or near expected natural background levels. Tritium was detected at a concentration greater than 500 pCi/l in one of four storm water runoff samples collected from storm water outfall sample point SD-006. Tritium was not detected in either of two samples collected from the sewer lift station. The 2014 sample results (excluding MW-9A and MW-13A and one storm water runoff sample) all measured below the required limit of 500 pCi/L. Measurements for 2014 were below the Environmental Protection Agency's drinking water standard of 20,000 pCi/L and present no harm to members of the public.

None of the samples monitored for gamma-emitting isotopes showed activity greater than the LLD. A summary of the analytical data for ground water monitoring wells and storm water runoff samples is provided in Table E-3. Complete data tables for each period and location are provided in Table E-4.

### **3.0 Ground Water Sampling Program**

#### **3.1 Program Design and Data Interpretation**

The purpose of this sampling program is to assess the impact of any tritium leaching into the environment (ground water system) from MNGP. For this purpose, water samples are collected and analyzed for tritium content.

#### **3.2 Program Description**

The sampling and analysis schedule for the Ground Water Monitoring Program is summarized in Table E-1 and briefly reviewed below. Table E-2 defines the additional sample locations and codes for the Ground Water Sampling Program.

Sampling from the groundwater monitoring wells was conducted monthly for seven locations, quarterly for eight locations, and annually for four locations.

#### **3.3 Program Execution**

The Program was executed as described with the following exceptions:

Two monitoring well samples for MW-14 were missed in 2014:

- In June 2014, river water levels (912.3 ft) were above the height of the monitoring well riser (911.3 ft).
- In November 2014, the sample was unobtainable due to the well casing being encased in ice.

Additional analyses for gamma emitting isotopes were performed on samples from each of the nineteen monitoring wells. The results are summarized in Table E-3. Results of individual analyses are reported in Table E-4.

#### **3.4 Program Modifications**

There were no additional on-site monitoring wells added to the ground water program in 2014.



### 3.5 Results and Discussions

Sampling points in North America have shown tritium concentrations in precipitation may range from 5 pCi/L to 157 pCi/L (Environmental Isotope Data No. 10; World Survey of Isotope Concentration in Precipitation (1988-1991). Results obtained show tritium in ground water samples at or near expected natural background levels, with the exception of monitoring wells, MW-9A and MW-13A.

Excluding the data from wells MW-9A and MW-13A and SD-006, 2014 sample results all measured below an LLD level of 500 pCi/L, and were similar to averages measured in 2013.

The average for 2014 at location MW-9A was 3296 pCi/L which is a decline from the 2013 average of 5457 pCi/L. The highest level that was observed in 2014 was 5911 pCi/L for the November 2014 sample. Three of the monthly samples were below the LLD of 500 pCi/L.

The tritium levels observed at location MW-13A for 2014 ranged from a high of 935 pCi/L in January, fell to 715 pCi/L in February, then stayed below 600 pCi/L for the remainder of the first half of the year and then below the LLD of 500 pCi/L for the remainder of the year.

None of the groundwater samples analyzed for gamma-emitting isotopes showed activity greater than LLD.

**Table E-1. Sample Collection and Analysis Program, Ground Water.**

Medium	Number	Sample Codes	Collection type	Analysis Type
Ground Water Quarterly	32	MW-1, MW-2, MW-3, MW-4, MW-9B, MW-11, MW-12A, MW-12B,	Grab	H-3
Ground Water Monthly	82	MW-9A, MW-10, MW-13A, MW-13B, MW-14, MW-15A MW-15B,	Grab	H-3
Ground Water Annual	4	MW-5, MW-6, MW-7, MW-8	Grab	H-3

**Table E-2. Sampling locations for Ground Water Monitoring Wells.**

Sample Type	Vendor Code	Well Number	Distance from Stack (miles)	Compass Heading from Stack	Sector
Ground Water	M-33	MW-1	0.11	299	WNW
Ground Water	M-34	MW-2	0.14	301	WNW
Ground Water	M-35	MW-3	0.15	305	NW
Ground Water	M-36	MW-4	0.1	25	NNE
Ground Water	M-37	MW-5	0.1	253	WSW
Ground Water	M-38	MW-6	229 Feet	228	SW
Ground Water	M-39	MW-7	0.2	66	ENE
Ground Water	M-40	MW-8	0.3	150	SSE
Ground Water	M-44	MW-9A	0.1	310	NW
Ground Water	M-51	MW-9B	0.1	310	NW
Ground Water	M-45	MW-10	0.1	292	WNW
Ground Water	M-46	MW-11	0.1	283	WNW
Ground Water	M-47	MW-12A	0.1	330	NW
Ground Water	M-48	MW-12B	0.1	326	NW
Ground Water	M-49	MW-13A	0.12	316	NW
Ground Water	M-50	MW-13B	0.12	316	NW
Ground Water	M-52	MW-14	0.17	306	NW
Ground Water	M-53	MW-15A	0.14	14	NNE
Ground Water	M-54	MW-15B	0.14	14	NNE