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Minnesota Department of Health
Environmental Monitoring Report 2007-2008

Minnesota Department of Health Environmental Monitoring Tables

Minnesota Department of Health Environmental Monitoring Program

The Minnesota Department of Health (MDH) maintains an environmental monitoring program for radioactivity around the two nuclear generating power plants in the state. The program is designed to assess the impact of the nuclear generating plants to the environment and the public over a period of time. Data collected is used to determine compliance with appropriate standards and establish trends. Annual reports are generated and available for public review.

Monitoring for radioactivity began in Minnesota in 1953 in response to nuclear weapons testing. Over fifty years of monitoring radioactivity levels provides Minnesota Department of Health an excellent database. Long-term trends established for certain radionuclides continue to be confirmed by current environmental monitoring. Throughout the years the Minnesota Department of Health environmental monitoring program has transformed. Careful analysis of data generated and potential risks has lead Minnesota Department of Health to make alterations in its sampling program from time to time. Some collection points and types of samples have been discontinued while others added.

The major components of the Minnesota Department of Health environmental monitoring program are sample collection, data analysis, and interpretation. Around the Monticello Nuclear Generating Power Plant and the Prairie Island Nuclear Generating Power Plant samples that are collected include: air, surface water, and milk. Ambient gamma radiation doses are monitored through the use of thermoluminescent dosimeters. Well water samples are also collected only near the Prairie Island plant.

Besides those samplings, since 1995 Minnesota Department of Health has received data from two pressurized ion chambers (PIC) located near the Independent Spent Fuel Storage Installation (ISFSI). Data from the PICs is transmitted to a computer. Every fifteen minutes a modem relays that data, via phone line, to a Minnesota Department of Health computer. The system also conveys alarm messages to Minnesota Department of Health staff members if the radiation levels are significantly high or communication between the PIC and the computer is disrupted.

In the fall of 2008 Monticello began storing spent fuel in its own ISFSI on site. This ISFSI is monitored using a Data Radiation Monitor (DRM) to measure dose rates gamma radiation. Readings are taken approximately every four seconds and transmitted via radio waves to a base computer. Minnesota Department of Health connects to the base computer and receives dose rate readings. As with the Prairie Island monitoring system, alarm messages are sent if communication is disrupted or radiation levels are exceeded.

AIR MONITORING

Continuous air monitoring allows Minnesota Department of Health to determine the level of radioactive contamination that could expose the public through inhalation. Air sampler particulate filters and cartridges are collected every other week and analyzed for radioactive particulates in the air.

In 2007 and 2008 air samples were collected from three locations in Minnesota; one at each of the nuclear power generating plants and one in downtown St. Paul. The air samplers at the nuclear generating power plants are located downwind of the plant based on predominant wind directions.

The location of the Prairie Island air sampler is near Lock and Dam No. 3 downstream from the Prairie Island Nuclear Power Generating Plant. The air sampler at Monticello is located near the Monticello Xcel Training Center downstream from the Monticello Nuclear Power Generating Plant.

The St. Paul air sampler is located on the roof of the Freeman Building at 625 Robert Street North, St. Paul and is used as a standard for comparison. The results of the air samples in St. Paul indicate natural background readings and no reactor-produced isotopes were detected. Data collected from the Prairie Island and Monticello air samplers are compared to data from the St. Paul sampler, historical data, and Minnesota Department of Health Radioactive Material Rules, Chapter 4731.2750.

Air sampler locations are shown in Table 2A Monticello Sampling Sites and Table 2B Prairie Island Sampling Sites. Air sample results are shown in Table 4 Air Sampling Results for Monticello Nuclear Generating Plant, Table 5 Air Sampling Results for Prairie Island Nuclear Generating Plant, and Table 6 Air Sampling Results for St. Paul.

SURFACE WATER MONITORING

Since surface water is the drinking water source for many cities in the state, Minnesota Department of Health samples the river water downstream from both power plants. The results are compared to the drinking water standards for compliance. They are also measured against the historical data for changes that may have occurred due to releases from the power plant.

In 2007, river water was gathered both upstream and downstream from the Prairie Island power generating plant twice a month for the entire year. Water was gathered downstream from the Monticello plant twice a month all year but not in the winter upstream from the Monticello plant due to the river freezing over.

In 2008, river water collection was reduced to downstream at both locations.

Water sample locations are shown in Table 2A Monticello Sampling Sites and Table 2B Prairie Island Sampling Sites.
Water sample results are shown in Table 7 Surface Water Results for Monticello Nuclear Generating Plant, and Table 8 Surface Water Results for Prairie Island Nuclear Generating Plant.

MILK MONITORING

Milk samples are collected monthly from a farm located near each power plant. Radiation contamination that may have been deposited in the fields and consumed by cows would be concentrated and forwarded to the milk. Since there are no standards for milk, except for emergency situations, sample analysis is compared to drinking water standards.

Milk sampling locations are shown in Table 2A Monticello Sampling Sites and Table 2B Prairie Island Sampling Sites.
Milk sample results are shown in Table 9 Milk Analysis Results for Monticello Nuclear Generating Power Plant, and Table 10 Milk Analysis Results for Prairie Island Nuclear Generating Power Plant.

AMBIENT GAMMA RADIATION MONITORING

Ambient gamma radiation levels are measured around the power plants by using thermoluminescent dosimeters (TLDs). TLDs are located beyond the plant's boundaries to estimate the dose received by a member of the public if they were to be at that location continuously throughout the monitoring period. TLDs are changed quarterly and read by a nationally accredited laboratory and compared to control readings and historical data.

TLD locations are shown in Table 3A and Table 3B TLD Locations.
TLD results are shown in Table 11 TLD Results.

WELL WATER MONITORING

Well water is periodically reviewed since radioactivity may seep through the soil and enter the water table. These samples are collected quarterly and again compared to drinking water standards and historical data. The collection point was selected to be a private farm located close to the Prairie Island nuclear power plant.

Well water sample location is shown in Table 2A Monticello Sampling Sites and Table 2B Prairie Island Sampling Sites.
Well water sample results are show in Table 12 Well Water Analysis Results.

CROPS/VEGETATION MONITORING

Radiation levels in vegetation would indicate past radioactive contamination to the area. During the growing season of 2007 apples and grass were gathered from locations near the nuclear power generating plants for analysis. There were no indications of an effect from these nuclear power generating plants.

Cow feed was collected each time milk is sampled from the two dairy farms near the power plants. The change in sampling frequencies make comparisons of cow feed analysis difficult with the previous years.

Crops, vegetation, and cow feed collection was eliminated in 2008.

Crops and vegetation sample results are shown in Table 13 Vegetation Results for Monticello Nuclear Generating Plant, and Table 14 Vegetation Results for Prairie Island Nuclear Generating Plant.

PROGRAM SUMMARY

In 2007 and 2008, no sample results within the current environmental monitoring program areas were found to exceed any federal or state standards or guidelines.

PROGRAM MODIFICATIONS

In the fall of 2007, staff of the Radioactive Material Unit assumed responsibility for the collection of environmental samples; previously staff from the Public Health Laboratory performed the collection. Through this modification the RAM unit now collects environmental samples as well as interprets the data received from the Public Health Laboratory. Following a thorough review of the Minnesota Department of Health Environmental Monitoring Program performed in 2007, several modifications to the program were initiated.

TLD MONITORING

In 2006, Minnesota Department of Health transferred the dosimetry program from an internal evaluation to Global Dosimetry, a processor approved by the National Voluntary Laboratory Accreditation Program.

In addition to TLDs located in various locations around the two nuclear power generating plants, there have been two located inside the earthen berm surrounding the Prairie Island ISFSI and two located just outside the berm. Because the ISFSI and berm are controlled areas and unavailable to the public, the TLDs from around the Prairie Island ISFSI were removed in 2008. Xcel Energy continues to monitor direct exposure in these areas. Also new TLD locations were employed around the Monticello Nuclear Power Generating Plant. The new locations are designed to have TLD distribution 360 degrees around the power plant and better represent exposure levels.

SURFACE WATER SAMPLING

Upstream surface water sampling from both power plants was discontinued in 2008. These samples have been used as control levels and have varied little over time. Minnesota Department of Health has decades of historical data to indicate baseline levels from both upstream and downstream surface water.

VEGETATION

Vegetation sampling was discontinued in 2008. A better indicator of recent radioactive releases, compared to vegetation sampling, is through air sampling. Minnesota Department of Health has continuous air monitoring at both power plants. Because Minnesota Department of Health has continuous air monitoring and numerous years of various vegetation sampling to use as baseline data in the event of a release from either nuclear generating power plant, sampling has been discontinued.

Table 1

Minnesota Department of Health
Sample Summary for 2007 and 2008

Sample Type	Collection and Frequency	Number of Samples Collected	Analyses Performed
Air	C, W	194	GA, GB, GI, Sr, I
Surface Water	G, W*, Q	70	GA, GB, GI, Sr, H
Well Water	G, Q	7	GA, GB, GI, Sr, H
Milk	G, M	48	GI, Sr, I
Vegetation	G, BW^{+}	36	GI, Sr, I
TLD	C, Q	183	Direct exposure

Collection type: C = continuous; G = grab

Frequency: W = weekly; M = monthly; Q = quarterly; A = annually; BW = bi-weekly

Analyses performed: GA = gross alpha; GB = gross beta; GI = gamma isotopic; Sr = strontium; I = iodine; H = tritium

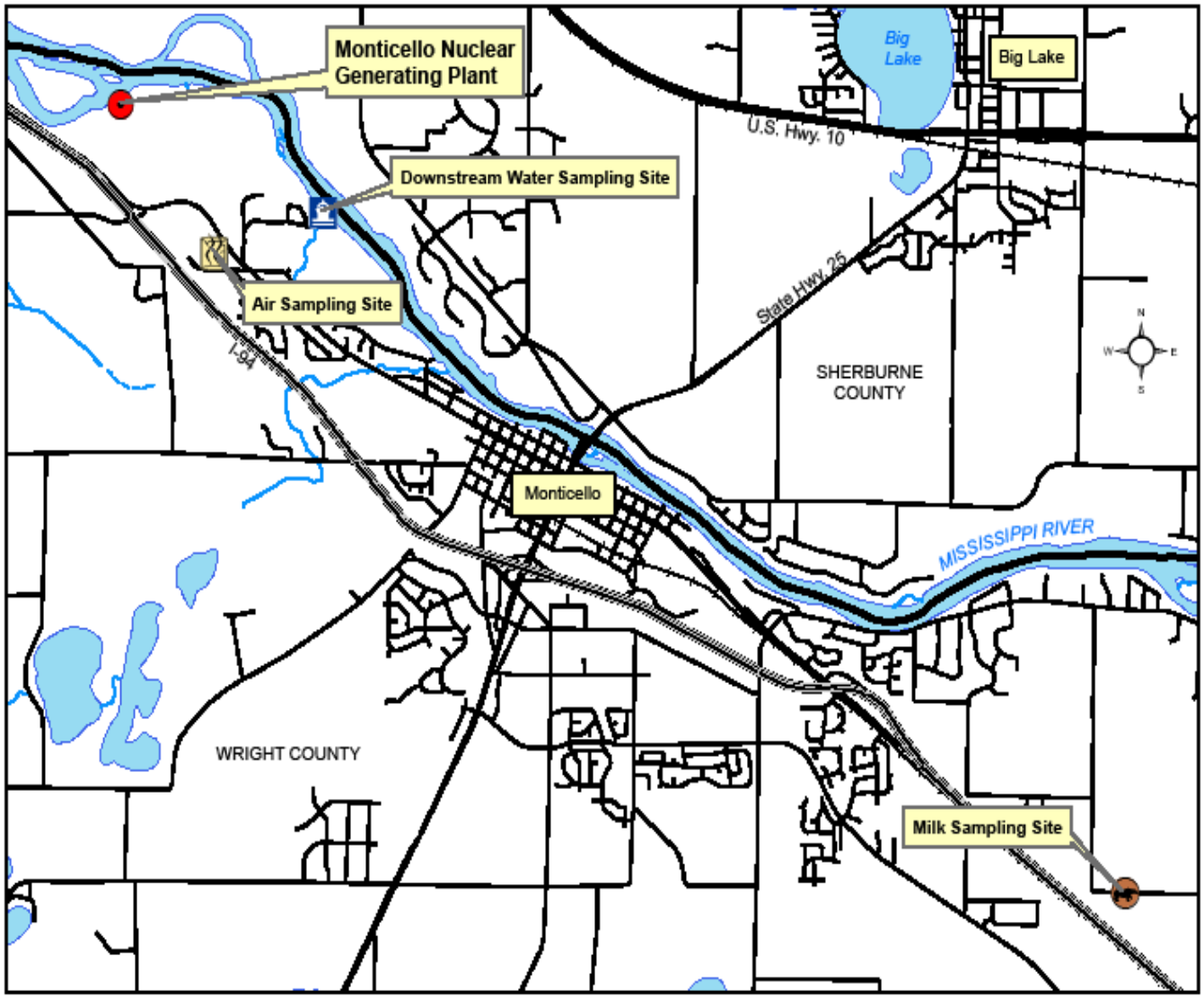
*Samples taken through June 2008

$^{+}$Samples taken during the growing season and through June 2008

Table 2A

Minnesota Department of Health
Monticello Environmental Sampling Sites

MONTICELLO NUCLEAR GENERATING PLANT AND SAMPLING SITE LOCATIONS



Source: MN Dep't. of Health, February 2009

0 0.25 0.5 1 1.5 2 Miles

Table 2B

Minnesota Department of Health
Prairie Island Environmental Sampling Sites

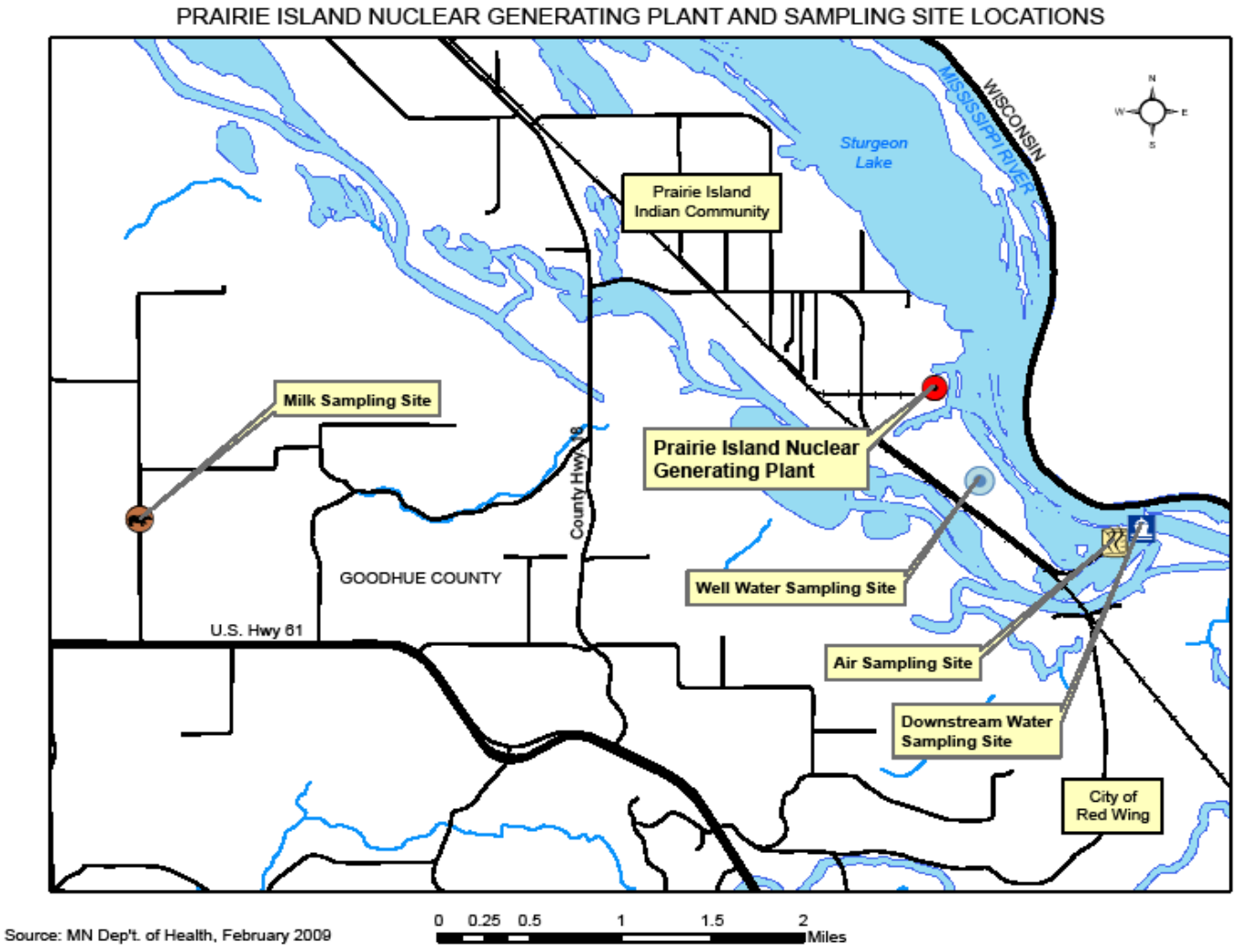


Table 3A

Minnesota Department of Health
Monticello Area TLD Locations, July 2008

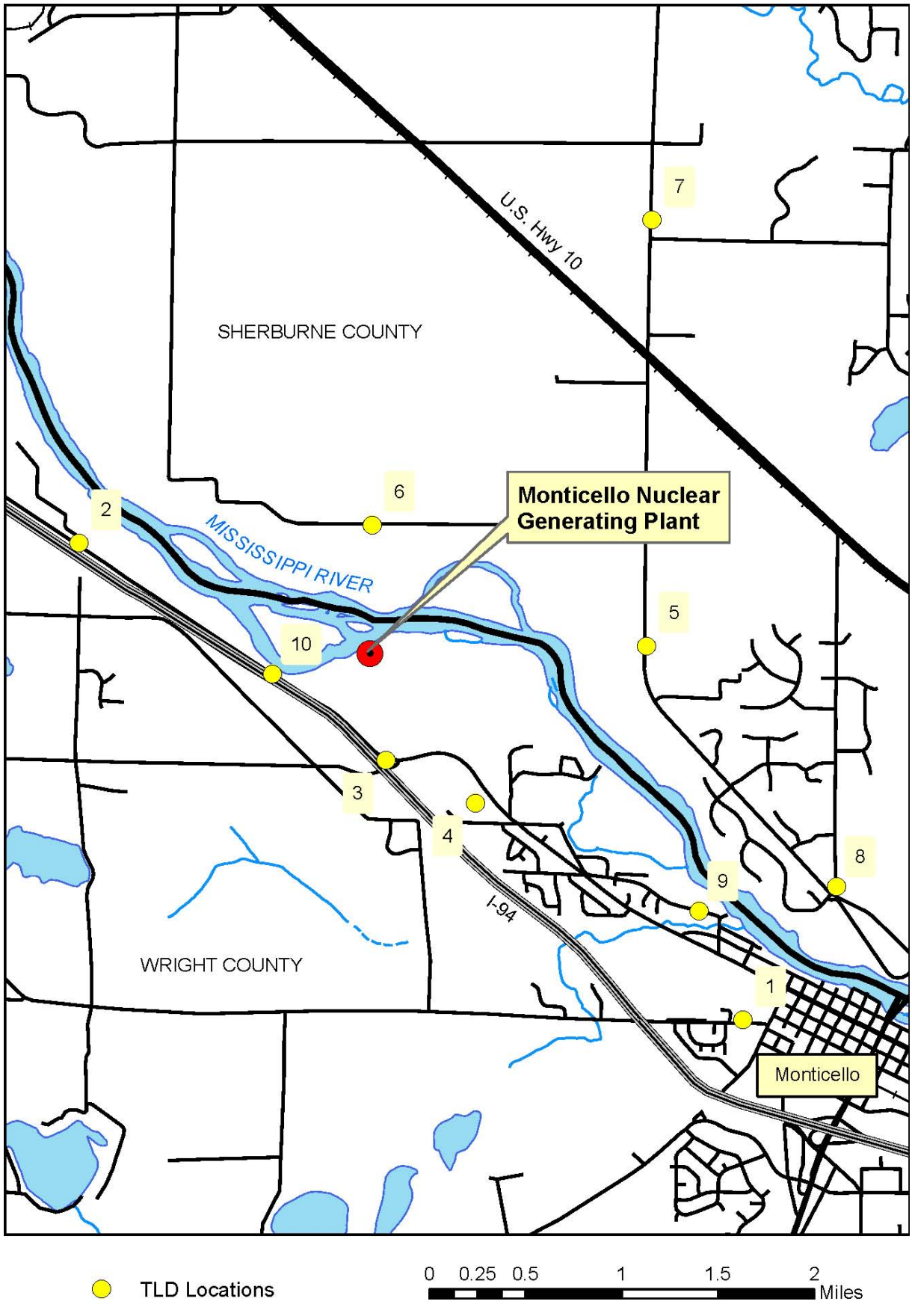


Table 3B

Prairie Island Area TLD Locations
Minnesota Department of Health, July 2008

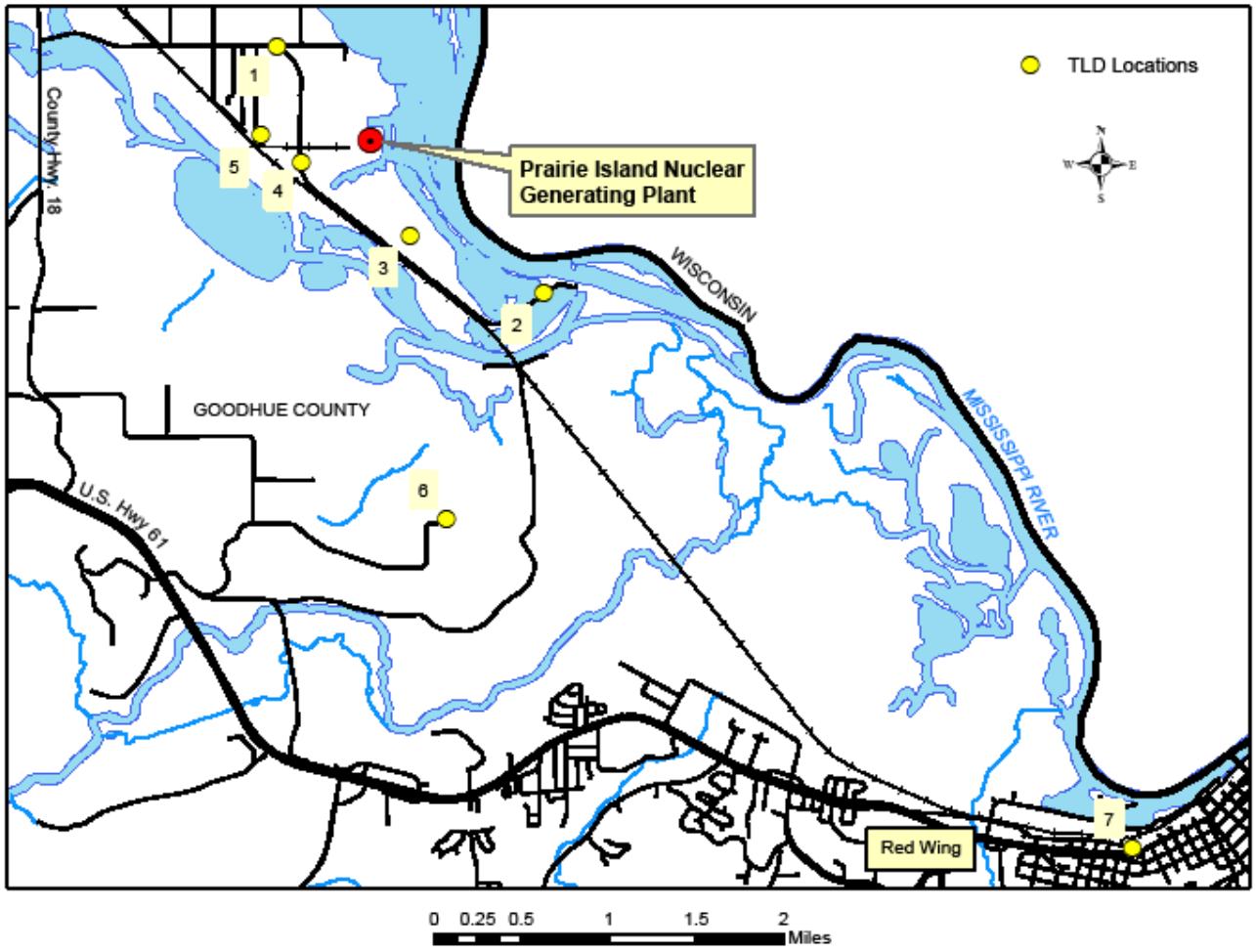


Table 4

Minnesota Department of Health
Air Sampling Results for Monticello Nuclear Generating Plant
Results and Detection Limits in pCi/m^3

2007

Date Collected	Gross Alpha	Gross Beta	Sr-91[1]	Co-60[1]	Ce-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
1/9	0.00500	0.01900	>12 1/2 lives	3.59E-03	2.75E-03	7.46E-02	8.42E-02	5.44E-02
1/23	0.00370	0.01700	>12 1/2 lives	3.18E-03	3.15E-03	6.20E-02	9.54E-02	5.13E-02
2/6	0.00600	0.02300	>12 1/2 lives	3.73E-03	3.19E-03	6.17E-02	1.01E-01	5.93E-02
2/21	0.00430	0.01500	>12 1/2 lives	3.47E-03	2.81E-03	1.50E-02	9.23E-02	5.13E-02
3/6	0.00260	0.01200	>12 1/2 lives	3.77E-03	3.30E-03	5.75E-02	1.10E-01	6.60E-02
3/20	0.00260	0.01700	>12 1/2 lives	3.24E-03	3.65E-03	1.30E-02	1.01E-01	6.30E-02
4/3	0.00160	0.01000	>12 1/2 lives	1.83E-03	2.20E-03	1.06E-02	9.65E-02	5.78E-02
4/17	0.00210	0.01300	2.68E-01	3.18E-03	3.55E-03	3.79E-03	9.76E-02	6.24E-02
5/1	0.00150	0.01200	4.57E-01	3.73E-03	4.35E-03	4.27E-03	1.26E-01	7.67E-02
5/15	0.00200	0.01100	>12 1/2 lives	3.63E-03	3.33E-02	1.63E-02	1.17E-01	6.72E-02
5/29	0.00270	0.01100	>12 1/2 lives	2.50E-03	3.19E-03	1.19E-02	9.12E-02	5.53E-02
6/13	0.00250	0.01000	>12 1/2 lives	3.63E-03	3.21E-03	1.96E-02	9.81E-02	6.21E-02
6/26	0.00088	0.00980	>12 1/2 lives	2.56E-03	3.71E-03	1.12E-02	1.05E-01	6.79E-02
7/11	0.00044	0.00097	7.13E-02	3.62E-03	3.54E-03	2.58E-03	1.07E-01	6.62E-02
7/24	0.00140	0.01200	4.43E-02	3.19E-03	3.59E-03	2.82E-03	1.01E-01	6.42E-02
8/8	0.00090	0.00950	>12 1/2 lives	5.14E-03	4.60E-03	4.83E-03	1.29E-01	7.19E-02
8/21	0.00320	0.01300	>12 1/2 lives	3.95E-03	5.03E-03	1.45E-02	1.31E-01	8.17E-02
9/6	0.00370	0.01500	>12 1/2 lives	4.81E-03	5.83E-03	8.48E-02	1.58E-01	9.05E-02
9/19	0.00260	0.01100	>12 1/2 lives	3.08E-03	3.73E-03	8.18E-02	1.04E-01	6.53E-02
10/2	0.00360	0.02000	>12 1/2 lives	2.07E-03	3.45E-03	2.93E-02	1.01E-02	6.03E-02
10/17	0.00340	0.00950	>12 1/2 lives	2.92E-03	3.38E-03	1.94E-01	9.82E-02	5.53E-02
10/30	0.00440	0.01500	>12 1/2 lives	4.69E-03	4.50E-03	8.29E-02	1.26E-01	7.85E-02
11/14	0.00570	0.01900	>12 1/2 lives	3.62E-03	4.15E-03	3.33E-01	1.14E-01	6.37E-02
11/27	0.00610	0.02200	>12 1/2 lives	4.96E-03	6.15E-03	1.57E-01	1.62E-01	9.27E-02
12/13	0.00730	0.03300	>12 1/2 lives	3.54E-03	3.86E-03	9.72E-02	1.12E-01	7.44E-02
12/27	0.01100	0.05600	>12 1/2 lives	3.71E-03	4.55E-03	5.73E-02	1.38E-01	8.21E-02

2008

Date Collected	Gross Alpha	Gross Beta	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
1/8	0.0038	0.019	>12 1/2 lives	7.32E-03	7.27E-03	1.11E-01	1.82E-01	1.17E-01
2/6	0.0056	0.033	>12 1/2 lives	8.59E-03	7.05E-03	2.89E-02	2.34E-01	1.45E-01
2/22	0.0095	0.041	>12 1/2 lives	6.10E-03	5.30E-03	4.42E-02	1.60E-01	8.74E-02
3/4	0.0059	0.033	>12 1/2 lives	8.42E-03	7.61E-03	6.60E-02	2.79E-01	1.69E-01
3/18	0.0041	0.024	>12 1/2 lives	8.25E-03	8.87E-03	4.04E-02	2.66E-01	1.53E-01
4/2	0.0029	0.011	>12 1/2 lives	7.22E-03	6.31E-03	1.61E-02	1.73E-01	1.10E-01
4/15	0.0032	0.014	>12 1/2 lives	1.84E-02	1.38E-02	2.87E-02	4.86E-01	2.95E-01
4/29	0.0032	0.014	>12 1/2 lives	2.55E-03	3.23E-03	1.27E-02	9.93E-02	6.05E-02
5/13	0.0043	0.014	>12 1/2 lives	3.78E-03	3.19E-03	2.95E+02	1.00E-01	6.12E-02
5/27	0.002	0.0077	>12 1/2 lives	3.72E-03	3.40E-03	1.71E-02	1.04E-01	5.48E-02
6/11	0.002	0.0094	1.24E-02	3.17E-03	2.75E-03	2.60E-03	8.25E-02	5.53E-02
6/24	0.0017	0.01	1.08E-02	3.71E-03	3.77E-03	3.11E-03	9.94E-02	6.45E-02
7/8	0.0017	0.013	2.05E-02	2.91E-03	4.53E-03	2.63E-03	1.09E-01	7.20E-02
7/23	1.1	9.3	9.01E+00	2.17E+00	1.72E+00	1.65E+00	6.34E+01	3.77E+01
7/30	0.0018	0.022	7.73E-03	1.26E-03	2.06E-03	1.65E-03	5.57E-02	3.65E-02
8/5	0.0015	0.018	1.90E-02	3.51E-03	3.48E-03	3.56E-03	1.15E-01	7.51E-02
8/19	0.0018	0.017	>12 1/2 lives	2.74E-03	2.54E-03	7.50E-03	8.23E-02	5.29E-02
9/2	0.0019	0.025	9.05E-02	3.72E-03	3.84E-03	3.74E-03	1.07E-01	6.75E-02
9/16	0.0007	0.011	>12 1/2 lives	1.49E-03	1.86E-03	2.28E-03	5.62E-02	3.44E-02

10/14	0.0015	0.016	>12 1/2 lives	1.19E-03	1.79E-03	2.67E-03	5.33E-02	3.26E-02
10/28	0.0012	0.017	3.95E-02	2.02E-03	1.88E-03	1.73E-03	5.02E-02	3.48E-02
11/12	0.0046	0.026	>12 1/2 lives	1.65E-03	1.85E-03	4.39E-03	5.55E-02	3.66E-02
11/25	0.0025	0.02	>12 1/2 lives	1.66E-03	1.81E-03	4.46E-03	5.40E-02	3.80E-02
12/9	0.0071	0.03	>12 1/2 lives	1.70E-03	2.24E-03	2.15E-02	6.62E-02	4.27E-02
12/23	0.063	0.33	>12 1/2 lives	1.62E-02	1.68E-02	9.15E-02	5.73E-01	3.35E-01

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

[2]Because Radium-226 is an alpha emitter, the total concentration of Radium-226 is a component of the Gross Alpha results (along with uranium and thorium). Therefore, the Radium-226 concentration would be less than or equal to the Gross Alpha values.

Table 5

Minnesota Department of Health
Air Sampling Result for Prairie Island Nuclear Generating Plant
Results and Detection Limits in pCi/m^3

2007

Date Collected	Gross Alpha	Gross Beta	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
1/16	0.00600	0.023	>12 1/2 lives	4.35E-03	4.75E-03	7.45E-03	1.20E-01	7.22E-02
1/30	0.00790	0.029	>12 1/2 lives	3.79E-03	2.18E-03	7.68E-02	8.86E-02	5.78E-02
2/13	0.00750	0.028	>12 1/2 lives	3.66E-03	3.77E-03	1.27E-01	1.13E-01	6.71E-02
2/27	0.00490	0.022	>12 1/2 lives	3.26E-03	3.69E-03	3.77E-02	1.16E-01	6.89E-02
3/13	0.00300	0.017	>12 1/2 lives	3.33E-03	4.11E-03	3.17E-02	1.17E-01	6.86E-02
3/27	0.00280	0.018	>12 1/2 lives	3.07E-03	3.71E-03	1.48E-02	9.00E-02	5.85E-02
4/11	0.00270	0.014	>12 1/2 lives	2.77E-03	3.97E-03	1.38E-02	1.01E-01	6.40E-02
4/24	0.00390	0.014	>12 1/2 lives	1.73E-03	3.42E-03	2.14E-02	1.11E-01	6.87E-02
5/9	0.00250	0.013	>12 1/2 lives	2.44E-03	2.69E-03	2.56E-02	9.15E-02	5.43E-02
5/22	0.00240	0.014	>12 1/2 lives	3.66E-03	4.35E-03	2.06E-02	1.31E-01	6.46E-02
*6/5	0.00540	0.012	>12 1/2 lives	3.71E-02	3.58E-02	9.60E-02	1.18E+00	6.47E-01
6/19	0.00029	0.00066	>12 1/2 lives	1.24E-03	1.77E-03	9.66E-03	6.28E-02	4.20E-02
7/3	0.00180	0.0072	>12 1/2 lives	1.27E-03	2.56E-03	3.49E-03	6.59E-02	4.00E-02
7/17	0.00055	0.0061	4.21E-02	2.64E-03	2.99E-03	2.52E-03	7.95E-02	4.76E-02
7/31	0.00210	0.019	1.81E-01	2.05E-03	2.91E-03	2.48E-03	7.71E-02	4.45E-02
8/15	0.00480	0.02200	>12 1/2 lives	2.62E-03	2.80E-03	1.30E-02	7.55E-02	4.56E-02
8/28	0.00280	0.01400	>12 1/2 lives	3.14E-03	3.26E-03	1.22E-02	9.17E-02	5.21E-02
9/12	0.00350	0.01800	>12 1/2 lives	2.28E-03	2.58E-03	1.90E-02	6.92E-02	3.86E-02
9/25	0.00200	0.02300	4.55E-02	2.06E-03	2.71E-03	1.91E-03	7.75E-02	5.05E-02
10/10	0.00140	0.01900	7.68E-03	2.06E-03	2.61E-03	1.93E-03	7.85E-02	4.50E-02
10/23	0.01100	0.03500	>12 1/2 lives	2.60E-03	2.60E-03	1.01E-01	8.38E-02	4.69E-02
11/6	0.00340	0.01600	>12 1/2 lives	2.85E-03	2.61E-03	5.04E-02	7.96E-02	5.13E-02
11/20	0.00570	0.02100	>12 1/2 lives	2.18E-03	2.56E-03	1.17E-01	7.18E-02	4.36E-02
12/19	0.03800	0.17000	>12 1/2 lives	5.12E-03	5.57E-03	3.87E-02	1.69E-01	9.87E-02

*= fuse blown on sampler

2008

Date Collected	Gross Alpha	Gross Beta	Sr-91[1]	Co-60[1]	Cs-37[1]	I-131[1]	K-40[1]	Ra-226[1,2]
1/7	0.012	0.054	>12 1/2 lives	2.53E-03	2.55E-03	4.83E-03	7.79E-02	5.00E-02
1/22	0.0074	0.035	>12 1/2 lives	2.33E-03	1.68E-03	2.06E-02	6.40E-02	3.79E-02
1/29	0.0072	0.043	>12 1/2 lives	6.52E-03	5.89E-03	5.79E-02	2.06E-01	1.25E-01
2/13	0.0049	0.034	>12 1/2 lives	2.85E-03	2.32E-03	7.31E-03	7.94E-02	4.68E-02
2/26	0.0057	0.029	3.60E-02	3.48E-03	2.67E-03	2.73E-03	8.88E-02	5.17E-02
3/11	0.0056	0.027	>12 1/2 lives	2.44E-03	2.78E-03	2.57E-02	7.96E-02	5.15E-02
3/25	0.0023	0.017	>12 1/2 lives	2.68E-03	2.68E-03	9.24E-03	8.60E-02	5.30E-02
4/8	0.0023	0.016	>12 1/2 lives	1.94E-03	2.46E-03	7.16E-03	7.49E-02	4.42E-02
4/25	0.02	0.11	>12 1/2 lives	1.38E-03	1.45E-03	2.96E-03	4.74E-02	2.98E-02
5/6	0.0021	0.013	4.97E+00	3.00E-03	2.77E-03	2.63E-03	8.00E-02	4.62E-02
5/20	0.019	0.081	>12 1/2 lives	2.17E-03	2.58E-03	8.37E-03	6.22E-02	4.11E-02
6/3	0.0096	0.062	3.79E-02	1.61E-03	1.71E-03	1.46E-03	4.99E-02	3.18E-02
6/18	0.0012	0.0064	7.76E-03	2.83E-03	2.74E-03	1.68E-03	7.52E-02	4.59E-02
7/1	0.0012	0.0088	1.49E-02	2.07E-03	2.65E-03	2.97E-03	9.27E-02	6.23E-02
7/15	0.0011	0.011	1.27E-02	3.12E-03	2.83E-03	1.89E-03	9.45E-02	5.98E-02
7/29	0.0018	0.015	9.32E-21	2.99E-03	2.27E-03	2.46E-04	9.48E-02	6.44E-02
8/12	0.0016	0.012	>12 1/2 lives	2.05E-03	3.15E-03	7.92E-03	8.01E-02	5.56E-02
8/26	0.0017	0.017	>12 1/2 lives	2.42E-03	2.77E-03	4.22E-03	8.17E-02	5.38E-02
9/9	0.002	0.016	>12 1/2 lives	2.76E-03	3.37E-03	4.96E-03	9.95E-02	6.36E-02
9/23	0.0011	0.019	5.27E-02	2.82E-03	3.75E-03	2.36E-03	1.04E-01	5.79E-02
10/7	0.001	0.02	2.19E-02	3.59E-03	4.48E-03	3.50E-03	1.26E-01	7.64E-02

10/21	0.00071	0.0011	9.70E-03	2.78E-03	2.69E-03	2.25E-03	7.51E-02	4.73E-02
11/4	0.0017	0.017	2.27E-01	2.24E-03	2.59E-03	1.85E-03	6.92E-02	4.44E-02
11/18	0.0013	0.0082	>12 1/2 lives	2.30E-03	2.11E-03	5.51E-03	6.75E-02	3.82E-02
12/2	0.0022	0.014	>12 1/2 lives	2.64E-03	2.27E-03	2.98E-03	7.86E-02	4.64E-02
12/16	0.0037	0.016	>12 1/2 lives	2.49E-03	3.06E-03	1.55E-02	8.66E-02	5.19E-02
12/30	0.0047	0.028	>12 1/2 lives	1.85E-03	2.36E-03	2.12E-02	6.82E-02	4.18E-02

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

[2]Because Radium-226 is an alpha emitter, the total concentration of Radium-226 is a component of the Gross Alpha results (along with uranium and thorium). Therefore, the Radium-226 concentration would be less than or equal to the Gross Alpha values.

Table 6

Minnesota Department of Health
Air Sampling Results for St. Paul
Results and Detection Limits in pCi/m^3

2007

Date Collected	Gross Alpha	Gross Beta	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
1/2	0.00570	0.0260	>12 1/2 lives	5.73E-03	5.17E-03	1.05E-01	1.83E-01	1.07E-01
1/16	0.00510	0.0200	>12 1/2 lives	9.58E-03	7.84E-03	1.07E-01	2.07E-01	1.32E-01
1/23	0.00770	0.0350	>12 1/2 lives	5.30E-03	6.62E-03	1.24E-01	1.96E-01	1.19E-01
1/30	0.00480	0.0270	>12 1/2 lives	8.00E-03	7.34E-03	8.04E-02	2.00E-01	1.22E-01
2/6	0.00190	0.0250	1.98E-01	5.56E-03	6.63E-03	5.79E-03	2.12E-01	1.19E-01
2/21	0.00290	0.0330	2.89E-02	7.30E-03	7.27E-03	6.01E-03	2.11E-01	1.25E-01
2/27	0.00120	0.0140	6.01E-03	8.41E-03	9.08E-03	6.00E-03	2.77E-01	1.70E-01
3/6	0.00400	0.0130	>12 1/2 lives	7.96E-03	7.82E-03	7.29E-02	2.12E-01	1.26E-01
3/13	0.00250	0.0230	2.74E-02	6.26E-03	6.59E-03	6.56E-03	2.05E-01	1.30E-01
3/20	0.00210	0.0110	>12 1/2 lives	8.25E-03	7.41E-03	2.94E-02	2.08E-01	1.25E-01
3/27	0.00260	0.0160	1.22E-01	8.02E-03	8.76E-03	7.13E-03	2.38E-01	1.41E-01
4/3	0.00100	0.0085	1.32E-01	5.77E-03	6.79E-03	5.75E-03	2.15E-01	1.24E-01
4/11	0.00250	0.0160	>12 1/2 lives	8.68E-03	7.19E-03	1.23E-02	2.05E-01	1.26E-01
4/17	0.00400	0.0190	3.09E-02	1.12E-02	1.03E-02	7.68E-03	2.77E-01	1.86E-01
4/24	0.00150	0.0074	5.95E-02	5.06E-03	6.16E-03	1.27E-02	2.02E-01	1.26E-01
5/1	0.00320	0.0110	>12 1/2 lives	7.55E-03	7.92E-03	4.01E-02	2.27E-01	1.40E-01
5/9	0.00230	0.0110	>12 1/2 lives	8.39E-03	7.68E-03	4.34E-02	2.21E-01	1.31E-01
5/15	0.00350	0.0170	1.41E+00	8.58E-03	1.00E-02	7.74E-03	3.06E-01	1.71E-01
5/22	0.00100	0.0044	2.35E-02	5.96E-03	6.40E-03	4.23E-03	2.04E-01	1.31E-01
5/29	0.00260	0.0150	1.91E-01	7.18E-03	9.00E-03	6.73E-03	2.58E-01	1.55E-01
6/5	0.00140	0.0130	2.02E-02	6.67E-03	7.09E-03	5.04E-03	2.34E-01	1.39E-01
6/13	0.00220	0.0190	>12 1/2 lives	7.62E-03	7.75E-03	1.72E-03	1.96E-01	1.24E-01
6/19	0.00210	0.0240	1.09E+00	5.58E-03	8.62E-03	7.27E-03	2.39E-01	1.57E-01
6/26	0.00260	0.0210	>12 1/2 lives	9.19E-03	8.74E-03	1.96E-02	2.56E-01	1.51E-01
7/3	0.00099	0.0130	3.67E-02	6.56E-03	6.58E-03	3.60E-03	2.03E-01	1.26E-01
7/11	0.00150	0.0210	3.45E-02	9.59E-03	6.35E-03	5.16E-03	2.12E-01	1.37E-01
7/17	0.00300	0.0250	3.88E-02	1.08E-02	8.76E-03	5.26E-03	3.16E-01	1.83E-01
7/24	0.00170	0.0160	3.31E-02	9.64E-03	8.13E-03	4.33E-03	2.43E-01	1.53E-01
7/31	0.00300	0.0260	3.19E-02	8.57E-03	9.86E-03	4.82E-03	2.89E-01	1.62E-01
8/8	0.00190	0.0260	1.78E-02	5.49E-03	4.97E-03	5.48E-03	1.69E-01	1.13E-01
8/15	0.00370	0.0450	3.07E-02	9.35E-03	9.50E-03	6.58E-03	2.42E-01	1.36E-01
8/21	0.00200	0.0070	>12 1/2 lives	7.69E-03	8.67E-03	2.76E-02	2.87E-01	1.82E-01
8/28	0.00400	0.0190	>12 1/2 lives	4.72E-03	7.17E-03	2.12E-02	2.40E-01	1.50E-01
9/6	0.00390	0.0260	>12 1/2 lives	6.65E-03	6.07E-03	2.31E-02	1.77E-01	1.08E-01
9/12	0.00140	0.0075	>12 1/2 lives	1.25E-02	1.20E-02	1.75E-02	3.21E-01	1.78E-01
9/19	0.00210	0.0190	1.60E-01	8.47E-03	9.15E-03	7.89E-03	2.45E-01	1.46E-01
9/25	0.00290	0.0280	4.39E-02	9.86E-03	1.00E-02	7.86E-03	2.93E-01	1.85E-01
10/2	0.00390	0.0240	>12 1/2 lives	7.01E-03	8.55E-03	6.78E-02	2.25E-01	1.38E-01
10/10	0.00084	0.0160	2.33E-02	6.45E-03	6.71E-03	5.51E-03	1.95E-01	1.22E-01
10/17	0.00330	0.0071	>12 1/2 lives	8.09E-03	7.47E-03	3.30E-01	2.06E-01	1.35E-01
10/23	0.00410	0.0130	>12 1/2 lives	6.54E-03	8.98E-03	5.10E-01	2.65E-01	1.67E-01
10/30	0.00200	0.0055	>12 1/2 lives	7.82E-03	8.09E-03	1.29E-01	2.30E-01	1.44E-01
11/6	0.00500	0.0180	>12 1/2 lives	6.17E-03	9.46E-03	1.58E-01	2.59E-01	1.60E-01
11/14	0.00490	0.0230	>12 1/2 lives	7.38E-03	6.09E-03	6.38E-02	2.11E-01	1.42E-01
11/20	0.00600	0.0190	>12 1/2 lives	8.75E-03	8.43E-03	5.05E-01	2.49E-01	1.54E-01
11/27	0.00810	0.0310	>12 1/2 lives	5.16E-03	9.71E-03	2.90E-01	2.62E-01	1.73E-01
12/6	0.00620	0.0240	>12 1/2 lives	4.49E-03	4.95E-03	1.22E-01	1.55E-01	9.73E-02
12/12	0.01400	0.0590	>12 1/2 lives	7.63E-03	8.90E-03	1.55E-01	2.67E-01	1.86E-01
12/20	0.0110	0.0640	>12 1/2 lives	6.65E-03	7.52E-03	9.02E-02	1.97E-01	1.09E-01
12/27	0.0130	0.0550	>12 1/2 lives	8.19E-03	8.58E-03	1.13E-01	2.29E-01	1.38E-01

2008

Date Collected	Gross Alpha	Gross Beta	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
1/2	0.00850	0.0410	>12 1/2 lives	1.10E-02	8.85E-03	7.23E-02	2.92E-01	1.64E-01
1/8	0.009	0.04	>12 1/2 lives	7.74E-03	9.22E-03	1.62E-01	2.61E-01	1.64E-01
1/15	0.0074	0.053	>12 1/2 lives	8.63E-03	8.84E-03	6.59E-03	2.50E-01	1.53E-01
1/24	0.00670	0.0340	>12 1/2 lives	6.32E-03	6.55E-03	5.10-02	1.71E-01	1.14E-01
1/29	0.00850	0.0620	>12 1/2 lives	1.24E-02	1.29E-02	7.83E-02	3.74E-01	2.35E-01
2/6	0.00320	0.0240	>12 1/2 lives	7.28E-03	7.84E-03	3.72E-02	1.93E-01	1.19E-01
2/13	0.01000	0.0490	>12 1/2 lives	8.64E-03	6.80E-03	6.63E-02	2.38E-01	1.37E-01
2/22	0.00700	0.0350	>12 1/2 lives	5.98E-03	7.02E-03	2.56E-02	1.96E-01	1.21E-01
2/26	0.00210	0.0310	>12 1/2 lives	1.06E-02	1.64E-02	9.53E-03	4.03E-01	2.37E-01
3/4	0.00810	0.0370	>12 1/2 lives	9.15E-03	1.10E-02	1.66E-01	3.06E-01	1.91E-01
3/11	0.00430	0.0310	2.39E-01	7.71E-03	9.10E-03	5.08E-03	2.48E-01	1.58E-01
3/18	0.00290	0.0170	>12 1/2 lives	5.24E-03	7.08E-03	3.52E-02	2.40E-01	1.45E-01
3/25	0.00140	0.0180	2.13E-01	1.03E-02	9.31E-03	8.64E-03	2.71E-01	1.57E-01
4/2	0.00130	0.0150	9.89E-02	5.77E-03	6.33E-03	4.80E-03	1.77E-01	1.16E-01
4/8	0.00180	0.0200	3.74E-02	8.76E-03	8.16E-03	6.65E-03	2.83E-01	1.70E-01
4/15	0.00100	0.0073	1.78E-01	8.72E-03	8.12E-03	6.76E-03	2.19E-01	1.37E-01
4/22	0.00210	0.0180	7.02E-01	7.09E-03	7.19E-03	7.00E-03	2.22E-01	1.30E-01
4/29	0.00270	0.0170	>12 1/2 lives	6.12E-03	7.13E-03	2.62E-02	2.05E-01	1.29E-01
5/6	0.00390	0.0190	>12 1/2 lives	6.03E-03	7.90E-03	2.35E-02	2.32E-01	1.44E-01
5/13	0.00190	0.0110	9.17E-01	8.04E-03	7.81E-03	6.43E-03	2.53E-01	1.44E-01
5/20	0.00051	0.0070	7.51E-02	4.24E-03	4.45E-03	3.64E-03	1.27E-01	7.13E-02
5/27	0.00052[1]	0.0014[1]	>12 1/2 lives	1.31E-02	1.08E-02	5.13E-02	4.21E-01	2.54E-01
8/26	0.00190	0.0200	9.41E-02	2.70E-03	3.96E-03	3.77E-03	1.17E-01	7.20E-02
9/2	0.00140	0.0250	2.79E-02	5.15E-03	4.88E-03	4.51E-03	1.40E-01	8.89E-02
9/9	0.00110	0.0100	4.86E-02	2.78E-03	3.09E-03	3.08E-03	1.06E-01	6.68E-02
9/16	0.00110	0.0140	7.64E-02	3.87E-03	5.12E-03	4.41E-03	1.42E-01	8.17E-02
9/23	0.00180	0.0270	2.47E-02	4.67E-03	5.43E-03	4.46E-03	1.34E-01	8.28E-02
9/30	0.00190	0.0220	7.30E-03	4.65E-03	4.06E-03	2.60E-03	1.09E-01	7.77E-02
10/7	0.00110	0.0180	1.99E-02	4.16E-03	4.84E-03	3.30E-03	1.18E-01	8.51E-02
10/14	0.00111	0.0150	>12 1/2 lives	3.45E-03	3.42E-03	5.88E-03	1.16E-03	6.48E-02
10/21	0.00066	0.0190	1.50E-02	4.20E-03	3.65E-03	3.44E-03	1.16E-01	7.05E-02
10/28	0.00100	0.0160	9.20E-02	3.32E-03	4.70E-03	3.34E-03	1.21E-01	7.88E-02
11/4	0.00340	0.0380	1.54E-02	3.40E-03	4.61E-03	3.74E-03	1.14E-01	7.90E-02
11/10	0.00099	0.0110	6.03E-01	3.96E-03	3.55E-03	4.32E-03	1.33E-01	7.77E-02
11/18	0.00220	0.0170	>12 1/2 lives	4.51E-03	3.46E-03	4.64E-03	1.16E-01	7.09E-02
11/25	0.00240	0.0220	>12 1/2 lives	2.35E-03	3.85E-03	5.54E-03	1.06-01	6.76E-02
12/2	0.00380	0.0260	6.28E-02	4.22E-03	3.90E-03	2.86E-03	1.21E-01	7.62E-02
12/9	0.00570	0.0220	>12 1/2 lives	4.17E-03	4.60E-03	4.52E-03	1.35E-01	7.90E-02
12/16	0.00620	0.0300	>12 1/2 lives	2.75E-03	3.54E-03	3.08E-02	1.16E-01	7.23E-02
12/23	0.00770	0.0450	>12 1/2 lives	3.64E-03	3.30E-03	2.19E-02	1.28E-01	7.84E-02
12/30	0.00870	0.0550	>12 1/2 lives	3.95E-03	5.14E-03	3.77E-02	1.39E-01	8.11E-02

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

[2]Because Radium-226 is an alpha emitter, the total concentration of Radium-226 is a component of the Gross Alpha results (along with uranium and thorium). Therefore, the Radium-226 concentration would be less than or equal to the Gross Alpha values.

Table 7

Minnesota Department of Health
Surface Water Results for Monticello Nuclear Generating Plant
Results and Detection Limits in pCi/L

2007

Date Collected Upstream	Gross Alpha[1]	Gross Beta	Tritium[1]	Sr-89[1]	Sr-90[1]	Sr-91[1]	Co-60[1]	Ce-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
4/3	1.0	5.7	200	2.0	2.0	2.55E+02	2.73E+00	2.40E+00	2.86E+00	6.55E+01	6.25E+01
5/1	1.0	4.4	200	2.0	2.0	>12 1/2 lives	2.59E+00	2.97E+00	7.04E+00	5.12E+01	6.49E+01
6/26	1.1	3.3	212	2.0	2.0	>12 1/2 lives	2.06E+00	2.80E+00	2.90E+00	6.67E+01	7.13E+01
7/24	1.0	4.1	212	2.0	2.0	3.49E+02	2.35E+00	2.58E+00	2.74E+00	5.15E+01	6.77E+01
8/21	1.0	2.6	201	2.0	2.0	>12 1/2 lives	2.60E+00	2.34E+00	4.92E+00	6.99E+01	6.94E+01
9/6	1.0	2.5	218	2.0	2.0	>12 1/2 lives	3.21E+00	2.36E+00	4.26E+00	7.01E+01	7.37E+01
10/30	1.0	2.3	200	2.0	2.0	>12 1/2 lives	1.88E+00	2.40E+00	1.45E+01	5.06E+01	5.96E+00
11/27	2.3	2.3	200	2.0	2.0	>12 1/2 lives	2.44E+00	2.70E+00	1.21E+01	5.16E+01	6.84E+01
Downstream											
1/9	1.0	3.5	217	2.0	2.0	>12 1/2 lives	2.66E+00	2.75E+00	2.65E+01	5.10E+01	6.66E+01
2/6	1.0	3.1	217	2.0	2.0	>12 1/2 lives	3.03E+00	3.18E+00	6.15E+00	7.03E+01	7.59E+01
3/6	1.1	3.2	217	2.0	2.0	>12 1/2 lives	2.67E+00	3.25E+00	7.34E+00	5.80E+01	6.36E+01
4/3	1.8	7.2	200	2.0	2.0	>12 1/2 lives	1.31E+00	2.61E+00	1.99E+01	5.07E+01	5.66E+01
5/1	1.0	3.9	200	2.0	2.0	>12 1/2 lives	2.59E+00	2.77E+00	7.03E+00	4.97E+01	6.13E+01
6/26	1.1	3	212	2.0	2.0	>12 1/2 lives	1.31E+00	1.91E+00	3.55E+00	4.77E+01	4.80E+01
7/24	1.0	4.1	212	2.0	2.0	3.70E+02	2.73E+00	2.91E+00	3.01E+00	7.84E+01	7.85E+01
8/21	1.0	3.2	201	2.0	2.0	>12 1/2 lives	2.85E+00	2.92E+00	1.44E+01	7.24E+01	8.91E+01
9/6	1.0	2.9	218	2.0	2.0	>12 1/2 lives	3.12E+00	2.47E+00	5.33E+00	5.30E+01	7.22E+01
10/30	1.0	2.8	200	2.0	2.0	>12 1/2 lives	2.56E+00	2.01E+00	1.60E+01	7.15E+01	7.32E+01
11/27	1.9	3.1	200	2.0	2.0	>12 1/2 lives	3.46E+00	3.08E+00	1.49E+01	7.59E+01	7.19E+01
12/13	1.6	2.5	200	2.0	2.0	>12 1/2 lives	2.22E+00	2.74E+00	1.17E+01	5.33E+01	6.85E+01
12/27	2.4	2	200	2.0	2.0	>12 1/2 lives	2.06E+00	2.75E+00	4.06E+00	7.12E+01	7.17E+01

2008

Date Collected Downstream	Gross Alpha[1]	Gross Beta	Tritium[1]	Sr-89[1]	Sr-90[1]	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
1/8	1.0	2.5	227	2.0	2.0	>12 1/2 lives	2.72E+00	2.84E+00	1.02E+01	5.35E+01	6.81E+01
1/24	1.0	3.1	227	2.0	2.0	>12 1/2 lives	2.23E+00	3.14E+00	2.01E+01	6.95E+01	6.87E+01
2/6	1.0	2.8	200	2.0	2.0	>12 1/2 lives	2.27E+00	2.91E+00	2.15E+01	5.50E+01	7.14E+01
2/22	1.0	3.1	200	2.0	2.0	>12 1/2 lives	1.68E+00	2.08E+00	5.16E+00	4.76E+01	5.97E+01

3/4	1.0	3.1	200	2.0	2.0	>12 1/2 lives	1.79E+00	2.51E+00	6.07E+00	4.74E+01	6.31E+01
3/18	1.0	3	200	2.0	2.0	>12 1/2 lives	2.70E+00	2.77E+00	8.72E+00	6.99E+01	7.23E+01
4/15	1.0	2.8	200	2.0	2.0	>12 1/2 lives	2.40E+00	2.84E+00	4.50E+00	5.43E+01	6.67E+01
7/23	1.0	1.6	226	2.0	2.0	>12 1/2 lives	2.70E+00	2.58E+00	3.95E+00	5.43E+01	6.94E+01
10/14	1.0	2	226	2.0	2.0	5.48E+01	1.28E+00	2.22E+00	2.56E+00	5.05E+01	6.44E+01

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

[2]Because Radium-226 is an alpha emitter, the total concentration of Radium-226 is a component of the Gross Alpha results (along with uranium and thorium). Therefore, the Radium-226 concentration would be less than or equal to the Gross Alpha values.

Table 8

Minnesota Department of Health
Surface Water Results for Prairie Island Nuclear Generating Plant
Results and Detection Limits in pCi/L

2007

Date Collected	Gross Alpha[1]	Gross Beta	Tritium[1]	Sr-89[1]	Sr-90[1]	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
Upstream											
4/24	7.5	10.7	200	2.0	2.0	>12 1/2 lives	1.24E+00	2.35E+00	5.55E+00	4.76E+01	5.02E+01
5/9	7.8	9.8	200	2.0	2.0	>12 1/2 lives	2.84E+00	2.91E+00	2.68E+00	7.69E+01	8.07E+01
6/5	3.8	7	200	2.0	2.0	3.27E+02	3.35E+00	2.49E+00	2.93E+00	7.72E+01	7.37E+01
7/31	5.4	7.6	212	2.0	2.0	5.02E+01	2.27E+00	2.60E+00	2.73E+00	6.97E+01	6.76E+01
8/15	3.3	6.7	201	2.0	2.0	>12 1/2 lives	2.76E+00	2.84E+00	1.47E+01	5.24E+01	6.83E+01
9/12	3.8	7	218	2.0	2.0	>12 1/2 lives	2.59E+00	2.66E+00	1.36E+01	5.64E+01	6.77E+00
10/23	5.2	7.9	218	2.0	2.0	>12 1/2 lives	2.45E+00	3.21E+00	1.40E+01	8.05E+01	7.93E+01
11/6	5.1	7.5	200	2.0	2.0	>12 1/2 lives	1.12E+00	1.58E+00	2.63E+00	3.09E+01	4.03E+01
12/6	2.8	5.5	200	2.0	2.0	>12 1/2 lives	2.76E+00	1.86E+00	7.41E+00	6.25E+01	7.96E+01
12/20	2.7	7.1	200	2.0	2.0	>12 1/2 lives	3.41E+00	3.08E+00	9.10E+00	7.62E+01	7.74E+01
Downstream											
1/16	1.1	4.7	217	2.0	2.0	>12 1/2 lives	2.93E+00	2.15E+00	1.70E+01	7.48E+01	7.37E+01
2/13	2.3	5.2	217	2.0	2.0	>12 1/2 lives	2.41E+00	2.48E+00	1.96E+01	8.00E+01	7.87E+01
3/13	1.0	4.9	200	2.0	2.0	>12 1/2 lives	2.74E+00	4.54E+00	1.89E+01	7.40E+01	8.41E+01
4/24	5.7	9.4	200	2.0	2.0	>12 1/2 lives	2.63E+00	2.61E+00	8.36E+00	6.41E+01	6.83E+01
5/9	3.9	7.4	200	2.0	2.0	>12 1/2 lives	2.61E+00	2.47E+00	2.48E+01	6.30E+01	6.13E+01
6/5	5.2	5.9	200	2.0	2.0	>12 1/2 lives	2.37E+00	2.50E+00	4.06E+00	4.91E+01	6.05E+01
7/31	4.7	4	201	2.0	2.0	5.03E+01	2.42E+00	2.92E+00	3.06E+00	7.97E+01	7.79E+01
8/15	3	5.6	201	2.0	2.0	>12 1/2 lives	2.92E+00	3.24E+00	7.12E+00	7.38E+01	8.03E+01
9/12	4.8	5.3	218	2.0	2.0	>12 1/2 lives	3.50E+00	3.61E+00	1.97E+01	8.27E+01	9.63E+01
10/23	4.7	6.3	218	2.0	2.0	>12 1/2 lives	2.84E+00	2.58E+00	2.94E+01	5.11E+01	6.64E+01
11/6	4.2	6.7	200	2.0	2.0	>12 1/2 lives	1.59E+00	1.58E+00	2.51E+00	4.45E+01	4.55E+00
12/6	1.8	5	200	2.0	2.0	>12 1/2 lives	2.85E+00	2.59E+00	7.68E+00	6.80E+01	6.55E+01
12/20	2.4	4	200	2.0	2.0	>12 1/2 lives	2.42E+00	2.58E+00	7.02E+00	4.63E+01	6.11E+01

2008

Date Collected	Gross Alpha[1]	Gross Beta	Tritium[1]	Sr-89[1]	Sr-90[1]	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]	Ra-226[1,2]
Upstream											
1/7	2	4.3	227	2.0	2.0	>12 1/2 lives	2.17E+00	3.49E+00	6.86E+00	8.39E+01	8.30E+01
1/22	2.8	5.7	227	2.0	2.0	>12 1/2 lives	2.69E+00	3.03E+00	8.12E+00	5.30E+01	6.93E+01

1/29	1.4	5.9	200	2.0	2.0	>12 1/2 lives	2.88E+00	3.06E+00	4.63E+01	5.32E+01	7.16E+01
2/13	1.7	6.2	200	2.0	2.0	>12 1/2 lives	3.33E+00	2.85E+00	5.74E+00	8.00E+01	7.75E+01
2/26	1.0	6.5	200	2.0	2.0	>12 1/2 lives	3.01E+00	2.31E+00	6.75E+00	7.29E+01	7.52E+01
3/11	1.0	5.7	200	2.0	2.0	>12 1/2 lives	2.66E+00	3.43E+00	4.75E+00	6.68E+01	6.62E+01
3/25	2.7	4.9	200	2.0	2.0	>12 1/2 lives	2.80E+00	1.93E+00	5.78E+00	7.92E+01	7.67E+01
Downstream											
1/7	3.4	5.9	227	2.0	2.0	>12 1/2 lives	2.29E+00	2.40E+00	1.78E+01	4.72E+01	6.17E+01
1/22	1.6	3.8	227	2.0	2.0	>12 1/2 lives	2.89E+00	3.14E+00	9.33E+00	7.17E+01	7.34E+01
1/29	3.3	4	227	2.0	2.0	>12 1/2 lives	3.76E+00	2.60E+00	3.21E+01	7.82E+01	7.49E+01
2/13	1.2	3.6	200	2.0	2.0	>12 1/2 lives	2.63E+00	2.79E+00	1.23E+01	7.97E+01	7.85E+01
2/26	1.4	3.5	200	2.0	2.0	>12 1/2 lives	1.77E+00	2.66E+00	8.40E+00	5.47E+01	6.23E+01
3/11	1.8	3.6	200	2.0	2.0	>12 1/2 lives	2.80E+00	2.58E+00	1.01E+01	5.62E+01	7.02E+01
3/25	1.0	5.1	200	2.0	2.0	>12 1/2 lives	1.95E+00	2.53E+00	4.48E+00	5.36E+01	6.81E+01
4/8	1.6	4.3	200	2.0	2.0	>12 1/2 lives	3.39E+00	2.27E+00	4.47E+00	7.84E+01	7.75E+01
7/15	4.5	3.5	200	2.0	2.0	>12 1/2 lives	2.26E+00	1.85E+00	4.13E+00	5.14E+01	6.28E+01
10/7	1.0	2.5	226	2.0	2.0	6.15E+01	2.84E+00	2.66E+00	3.67E+00	7.91E+01	7.82E+01

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

[2]Because Radium-226 is an alpha emitter, the total concentration of Radium-226 is a component of the Gross Alpha results (along with uranium and thorium). Therefore, the Radium-226 concentration would be less than or equal to the Gross Alpha values.

Table 9

Minnesota Department of Health
Milk Analysis Results for Monticello Nuclear Generating Plant
Results and Detection Limits in pCi/L

2007

Date Collected	Sr-89[1]	Sr-90[1]	Sr-91[1]	Co-60[1]	Ce-137[1]	I-131[1]	K-40[1]
2/6*	2.0	2.0	>12 1/2 lives	3.80E+00	3.97E+00	5.06E+00	1.29E+03
2/21	2.0	2.0	>12 1/2 lives	3.35E+00	3.46E+00	7.24E+00	1.24E+03
3/20	2.0	2.0	4.67E+01	3.24E+00	3.79E+00	1.87E+00	1.22E+03
4/17	2.0	2.0	>12 1/2 lives	2.69E+00	3.95E+00	3.27E+00	1.27E+03
5/15	2.0	2.0	>12 1/2 lives	2.70E+00	3.25E+00	5.58E+00	1.20E+03
6/13	2.0	2.0	>12 1/2 lives	4.29E+00	4.66E+00	4.59E+00	1.26E+03
7/11	2.0	2.1	>12 1/2 lives	2.24E+00	3.30E+00	3.51E+00	1.17E+03
8/8	2.0	2.0	1.64E+01	3.48E+00	4.16E+00	3.56E+00	1.23E+03
9/19	2.0	2.0	>12 1/2 lives	3.63E+00	3.47E+00	4.14E+00	1.27E+03
10/17	2.0	2.0	>12 1/2 lives	3.94E+00	3.31E+00	4.14E+00	1.25E+03
11/14	2.0	2.0	>12 1/2 lives	3.77E+00	3.75E+00	4.54E+00	1.26E+03
12/19	2.0	2.0	>12 1/2 lives	3.65E+00	2.69E+00	5.97E+00	1.29E+03

*=January Milk Sample

2008

Date Collected	Sr-89[1]	Sr-90[1]	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]
1/24	2.0	2.0	1.16E+04	2.50E+00	2.99E+00	2.29E+00	1.39E+03
2/22	2.0	2.0	>12 1/2 lives	2.32E+00	2.90E+00	7.04E+00	1.30E+03
3/18	2.0	2.0	>12 1/2 lives	2.91E+00	2.78E+00	3.87E+00	1.39E+03
4/14	2.0	2.0	5.65E+01	4.18E+00	4.03E+00	3.81E+00	1.36E+03
5/27	2.0	2.0	5.45E+01	2.45E+00	2.12E+00	2.08E+00	1.32E+03
6/24	2.0	2.0	1.36E+01	3.30E+00	3.27E+00	2.71E+00	1.27E+03
7/8	2.0	2.0	1.74E+01	3.53E+00	2.59E+00	1.64E+00	1.41E+03
8/21	2.0	2.0	6.03E+02	3.82E+00	3.51E+00	3.29E+00	1.34E+03
9/30	2.0	2.0	6.79E+01	2.00E+00	2.57E+00	2.45E+00	1.38E+03
10/14	2.0	2.0	9.76E+01	3.73E+00	4.20E+00	3.48E+00	1.30E+03
11/25	2.0	2.0	>12 1/2 lives	2.31E+00	3.52E+00	1.24E+01	1.33E+03
12/23	2.0	2.0	>12 1/2 lives	3.13E+00	2.99E+00	4.18E+00	1.34E+03

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

[2]Because Radium-226 is an alpha emitter, the total concentration of Radium-226 is a component of the Gross Alpha results (along with uranium and thorium). Therefore, the Radium-226 concentration would be less than or equal to the Gross Alpha values.

Table 10

Minnesota Department of Health
Milk Analysis Results for Prairie Island Nuclear Generating Plant
Results and Detection Limits in pCi/L

2007

Date Collected	Sr-89[1]	Sr-90[1]	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]
1/30	2.0	2.0	3.55E+02	3.84E+00	3.85E+00	3.19E+00	1.38E+03
2/27	2.0	2.0	>12 1/2 lives	3.11E+00	3.63E+00	5.28E+00	1.40E+03
3/27	2.0	2.0	>12 1/2 lives	3.51E+00	3.97E+00	4.21E+00	1.34E+03
4/24	2.0	2.0	3.79E+01	2.46E+00	1.91E+00	2.19E+00	1.33E+03
5/22	2.0	2.0	>12 1/2 lives	1.97E+00	2.71E+00	4.37E+00	1.26E+03
6/19	2.0	2.0	5.87E+01	3.84E+00	3.24E+00	2.87E+00	1.33E+03
7/17	2.0	2.0	2.80E+02	3.55E+00	3.98E+00	3.16E+00	1.37E+03
8/28	2.0	2.0	>12 1/2 lives	2.24E+00	3.09E+00	3.10E+00	1.41E+03
9/25	2.0	2.0	3.86E+01	3.13E+00	3.40E+00	2.01E+00	1.28E+03
10/23	2.0	2.0	1.03E+02	4.17E+00	3.78E+00	2.70E+00	1.24E+03
11/20	2.0	2.0	>12 1/2 lives	3.78E+00	3.28E+00	4.63E+00	1.31E+03
12/20	2.0	2.0	>12 1/2 lives	5.27E+00	3.70E+00	6.99E+00	1.36E+03

2008

Date Collected	Sr-89[1]	Sr-90[1]	SR-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]
1/29	2.0	2.0	8.76E+00	2.59E+00	3.07E+00	2.33E+00	1.41E+03
2/26	2.0	2.0	>12 1/2 lives	3.24E+00	3.11E+00	5.97E+00	1.28E+03
3/25	2.0	2.0	7.18E+01	2.44E+00	3.56E+00	2.92E+00	1.32E+03
4/24	2.0	2.0	7.52E+03	2.75E+00	2.64E+00	3.53E+00	1.30E+03
5/20	2.0	2.0	>12 1/2 lives	3.80E+00	3.55E+00	3.37E+00	1.30E+03
6/18	2.0	2.0	4.56E+01	3.01E+00	2.78E+00	3.15E+00	1.29E+03
7/29	2.0	2.0	1.75E+01	3.59E+00	3.06E+00	2.50E+00	1.28E+03
8/26	2.0	2.0	>12 1/2 lives	3.97E+00	3.01E+00	8.55E+00	1.23E+03
9/23	2.0	2.0	5.90E+01	3.35E+00	3.06E+00	2.99E+00	1.35E+03
10/21	2.0	2.0	2.01E+02	2.73E+00	3.12E+00	2.85E+00	1.31E+03
11/18	2.0	2.0	1.18E+02	3.41E+00	4.16E+00	3.89E+00	1.21E+03
12/30	2.0	2.0	1.09E+01	2.75E+00	2.31E+00	1.88E+00	1.27E+03

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

[2]Because Radium-226 is an alpha emitter, the total concentration of Radium-226 is a component of the Gross Alpha results (along with uranium and thorium). Therefore, the Radium-226 concentration would be less than or equal to the Gross Alpha values.

Table 11

Minnesota Department of Health TLD Results
Results in mrem

2007

Monticello

Location	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Average
Control	16	13	14	22	16.25
Control	14	14	13	22	15.75
City Office	22	21	21	26	22.50
CR75 Acacia	20	21	17	21	19.75
CR75 120 St Bridge	22	21	19	25	21.75
XCEL Training Center	24	23	22	26	23.75
East Pole 433	21	19	18	23	20.25
North Pole 485	21	20	22	24	21.75
Olson Farm	21	22	18	25	21.50
Orrock	20	20	21	22	20.75

Prairie Island

Location	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Average
Control	16	13	13	22	16.00
Control	15	12	14	23	16.00
Hastings	23	22	22	22	22.25
Sturgeon Lake Rd	20	17	19	21	19.25
Lock & Dam 3	24	17	17	22	20.00
Suter Farm	25	18	22	26	22.75
ISFSI Wakonade	22	19	20	23	21.00
ISFSI North	28	21	25	27	25.25
ISFSI South	29	25	27	31	28.00
ISFSI East	32	28	31	34	31.25
ISFSI West	106	80	98	100	96.00
Tower	22	20	22	22	21.50
Gustafson Farm	21	21	23	22	21.75
Red Wing	22	20	22	21	21.25

2008

Monticello

Location	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Average
Control	24	21	23	21	22.25
Control	23	19	25	22	22.25
City Office	27	21	24	25	24.25
CR75 Acacia	24	20	26	24	23.50
CR75 120 St Bridge	25	22	23	23	23.25
XCEL Training Center	26	25	28	24	25.75
East Pole 433	25	21	27	24	24.25
North Pole 485	26	23	25	23	24.25
Olson Farm	25	21	26	24	24.00
Orrock	24	*(2)*			24.00
*(3)*CR 50/CR11		23	27	24	24.67
*(3)*CR 75 - Monticello		19	29	26	24.67
*(3)*River Street		19	25	23	22.33

Prairie Island

Location	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Average

Control	24	19	26	22	22.75
Control	23	19	26	23	22.75
Hastings	26	*(1)*			26.00
Sturgeon Lake Rd	25	28	22	22	24.25
Lock & Dam 3	25	26	25	24	25.00
Suter Farm	27	27	27	24	26.25
ISFSI Wakonade	34	53	37	24	37.00
ISFSI North	43	*(2)*			43.00
ISFSI South	49	*(2)*			49.00
ISFSI East	50	*(1)*			50.00
ISFSI West	132	*(1)*			132.00
Tower	28	29	27	25	27.25
Gustafson Farm	27	30	26	25	27.00
Red Wing	26	32	26	25	27.25

(1) TLD discontinued
(2) TLD moved to another location
(3) New Locations

Table 12

Minnesota Department of Health
Well Water Analysis Results
Results and Detection Limits in pCi/L

2007

Date Collected	Gross Alpha[1]	Gross Beta	Tritium[1]	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]
2/13	1.0	4	217	2.28E+02	3.15E+00	2.75E+00	3.45E+00	6.93E+01
5/9	1.0	5.8	200	>12 1/2 lives	1.09E+00	1.49E+00	2.41E+00	3.04E+01
8/28	1.0	3.8	201	>12 1/2 lives	2.19E+00	2.92E+00	4.79E+00	5.29E+01
11/20	1.2	3	200	>12 1/2 lives	2.59E+00	2.58E+00	4.94E+00	5.04E+01

2008

Date Collected	Gross Alpha[1]	Gross Beta	Tritium[1]	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]
5/20	1.0	1.1	200	>12 1/2 lives	2.44E+00	2.07E+00	1.51E+01	4.82E+01
8/12	1.0	3.2	226	>12 1/2 lives	2.44E+00	2.91E+00	2.86E+00	5.36E+01
11/4	1.7	3.1	226	>12 1/2 lives	2.44E+00	1.66E+00	7.06E+00	5.99E+01

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

[2]Because Radium-226 is an alpha emitter, the total concentration of Radium-226 is a component of the Gross Alpha results (along with uranium and thorium). Therefore, the Radium-226 concentration would be less than or equal to the Gross Alpha values.

Table 13

Minnesota Department of Health
Vegetation Results for Monticello Nuclear Generating Plant
Results and Detection Limits in pCi/L

2007

Date Collected	Sample	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]
1/23	Cow feed	>12 1/2 lives	6.57E-03	8.00E-03	3.18E-01	5.51E+00
2/21	Cow feed	>12 1/2 lives	6.98E-03	7.46E-03	4.61E-02	5.19E+00
3/20	Cow feed	>12 1/2 lives	8.35E-03	7.23E-03	2.17E-01	5.50E+00
4/17	Cow feed	>12 1/2 lives	5.92E-03	5.94E-03	1.76E-01	5.28E+00
5/15	Cow feed	>12 1/2 lives	7.57E-03	8.70E-03	3.14E-02	5.90E+00
6/13	Cow feed	1.06E+01	2.67E-02	3.36E-02	3.05E-02	1.24E+01
7/11	Cow feed	>12 1/2 lives	4.01E-03	7.39 E-03	8.34E-03	5.81E+00
8/8	Cow feed	>12 1/2 lives	4.11E-03	5.96E-03	4.95E-03	6.15E+00
9/19	Cow feed	>12 1/2 lives	5.02E-03	7.65E-03	6.91E-03	6.15E+00
10/17	Cow feed	>12 1/2 lives	8.86E-03	9.34E-03	2.11E-01	4.16E+00
11/14	Cow feed	>12 1/2 lives	6.94E-03	6.67E-03	1.16E-01	7.78E+00
12/19	Cow feed	>12 1/2 lives	6.39E-03	6.43E-03	>12 1/2 lives	8.55E+00
5/15	Hay	>12 1/2 lives	1.50E-02	1.04E-02	1.76E-02	3.87E+00
6/13	Hay	>12 1/2 lives	6.00E-03	5.52E-03	9.74E-03	5.63E+00
7/24	Grass	>12 1/2 lives	1.18E-02	2.11E-02	2.11E-02	7.13E+00
8/21	Grass	>12 1/2 lives	1.27E-02	1.50E-02	1.37E-01	3.88E+00
9/19	Apples	>12 1/2 lives	5.53E-03	6.37E-03	4.77E-02	1.74E+00
9/19	Apples	>12 1/2 lives	6.50E-03	4.85E-03	3.21E-02	2.03E+00

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

Table 14

Minnesota Department of Health
Vegetation Results for Prairie Island Nuclear Generating Plant
Results and Detection Limits in pCi/L

2007

Date Collected	Sample	Sr-91[1]	Co-60[1]	Cs-137[1]	I-131[1]	K-40[1]
1/30	Cow feed	>12 1/2 lives	7.69E-03	6.02E-03	1.89E-02	2.91E+00
2/27	Cow feed	>12 1/2 lives	8.37E-03	5.78E-03	3.75E-02	3.89E+00
3/27	Cow feed	>12 1/2 lives	6.36E-03	5.84E-03	8.07E-03	3.01E+00
4/24	Cow feed	>12 1/2 lives	9.46E-03	7.78E-03	4.76E-02	4.71E+00
5/22	Cow feed	>12 1/2 lives	6.05E-03	4.17E-03	5.38E-02	3.56E+00
6/19	Cow feed	>12 1/2 lives	6.04E-03	7.59E-03	1.97E-02	3.41E+00
7/17	Cow feed	>12 1/2 lives	8.19E-03	6.25E-03	1.01E-02	3.32E+00
8/28	Cow feed	>12 1/2 lives	3.49E-03	5.73E-03	3.30E-02	3.35E+00
9/25	Cow feed	1.11E+00	7.90E-03	1.14E-02	5.98E-03	1.11E-+01
10/23	Cow feed	>12 1/2 lives	1.05E-02	9.96E-03	5.11E-02	6.59E+00
11/20	Cow feed	>12 1/2 lives	3.14E-02	2.66E-02	2.31E-01	7.43E+00
12/20	Cow feed	>12 1/2 lives	8.65E-03	1.31E-02	1.34E+00	8.24E+00
5/22	Hay	>12 1/2 lives	1.16E-02	6.85E-03	3.50E-02	5.06E+00
6/19	Hay	>12 1/2 lives	9.90E-03	6.31E-03	1.24E-02	5.56E+00
7/17	Hay	>12 1/2 lives	1.83E-02	1.18E-02	1.82E-02	5.75E+00
8/15	Hay	>12 1/2 lives	1.75E-02	1.78E-02	1.27E-01	5.06E+00
9/5	Apples	>12 1/2 lives	6.56E-03	7.98E-03	3.26E-02	1.16E+00
10/10	Apples	>12 1/2 lives	4.93E-03	7.96E-03	1.74E-02	1.46E+00

All underlined data represent measured values.

[1]All data (except those values underlined) represent the gamma counting system lowest detection concentrations. Samples measured had values below the detectable concentrations.

Revisions:

Revised September 2009 to update tables to show differentiate data from actual data

Revised December 2009 to include table of Prairie Island area TLD locations