



Minnesota Department of Health
Environmental Monitoring Report
2012 Data

Minnesota Department of Health Environmental Monitoring Tables

<u>Table 1</u>	Sample Summary
<u>Table 2A</u>	Monticello Environmental Sampling Sites
<u>Table 2B</u>	Prairie Island Environmental Sampling Sites
<u>Table 3A</u>	Monticello Area TLD Locations
<u>Table 3B</u>	Prairie Island Area TLD Locations
<u>Table 4</u>	Air Sampling Results for Monticello Nuclear Generating Plant
<u>Table 5</u>	Air Sampling Results for Prairie Island Nuclear Generating Plant
<u>Table 6</u>	Air Sampling Results for St Paul
<u>Table 7</u>	Surface Water Results for Monticello Nuclear Generating Plant
<u>Table 8</u>	Surface Water Results for Prairie Island Nuclear Generating Plant
<u>Table 9</u>	Milk Analysis Results for Monticello Nuclear Generating Power Plant
<u>Table 10</u>	Milk Analysis Results for Prairie Island Nuclear Generating Power Plant
<u>Table 11</u>	TLD Results
<u>Table 12</u>	Well Water Analysis Results
<u>Table 13</u>	Community Water Analysis Results
<u>Table 14</u>	Precipitation Water Analysis Results

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 provide an independent evaluation of the impact of the nuclear generating power plants to the environment and the public over a period of time. Data collected is used to verify compliance with appropriate standards, provide the public with reliable data regarding the environmental impact of the nuclear generating power plants, and establish trends. Annual reports are generated and available for public review. Sample data not included in the annual reports is available through the MDH Public Health Lab.

Monitoring for radioactivity began in Minnesota in 1953 in response to nuclear weapons testing. Over fifty years of monitoring radioactivity levels provides MDH with 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 MDH to make alterations in its sampling program from time to time. Some collection points and sample mediums 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 (MNGPP) and the Prairie Island Nuclear Generating Power Plant (PINGPP) 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 MDH has received data from two pressurized ion chambers (PIC) located at the Prairie Island Nuclear Generating Power Plant 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 an MDH computer. The system also conveys alarm messages to MDH 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 an automatic switching, two Geiger-Mueller-tube based dose rate monitor called the Data Radiation Monitor (DRM). The DRM continuously measures gamma radiation dose rates. Readings are taken approximately every four seconds and transmitted via radio waves to a base computer. MDH 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.

PROGRAM SUMMARY

In 2012, no sample results within the current environmental monitoring program areas were found to exceed any federal or state standards or guidelines.

AIR MONITORING

Continuous air monitoring allows the 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 weekly or every other week and analyzed for radioactive particulates in the air.

In 2012 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 in St. Paul and is used as a standard for comparison.

Air sampler locations are shown in [Table 2A](#) Monticello Sampling Sites and [Table 2B](#) Prairie Island Sampling Sites. Air sample results for gross alpha, gross beta, and naturally occurring Beryllium-7 and Potassium-40 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.

Data Analysis: Data collected from the Prairie Island and Monticello air samplers are compared to data from the St. Paul sampler, historical data, EPA standards, and MDH Radioactive Material Rules, Chapter 4731.2750. Specific isotopes of interest are examined using the limits indicated in MDH Chapter 4731 designating concentrations such that a dose limit of 50 mrem per year is not exceeded for each isotope.

The majority of data for these radioisotopes are below MDH Public Health Lab's (PHL) detection levels. In instances where the detection levels exceeded the Chapter 4731 concentrations or established standards, review of the gross alpha and gross beta values were considered. It is understood that the gross alpha or gross beta values represent the maximum value any individual alpha or beta emitter could indicate. Gross alpha levels were below 0.0163 pCi/m³ at all locations. Gross beta levels were below 0.0606 pCi/m³ at all locations.

Whenever applicable, naturally occurring Potassium-40 and Beryllium-7 are tracked as a means of quality control for accuracy of lab data. It is expected that these levels will remain somewhat constant throughout time.

All air sample results for 2012 were within the EPA and MDH standards and guidelines.

SURFACE WATER MONITORING

Since surface water is the drinking water source for many cities in the state, MDH samples the river water downstream from both power plants. The results are compared to the EPA Safe Drinking Water Standards and MDH Chapter 4731.2750 for compliance. They are also measured against the historical data for changes that may have occurred due to releases from the power plant.

Water sample locations are shown in [Table 2A](#) Monticello Sampling Sites and [Table 2B](#) Prairie Island Sampling Sites. Water sample results for gross alpha, gross beta, and select radionuclides of interest 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.

Data Analysis: The EPA Safe Drinking Water Act (SDWA) is often the most restrictive limit for these samples. The radiological component of the SDWA limits gross alpha particles to 15 pCi/L (including combined Radium 226 and Radium 228 at 5 pCi/L), tritium to 20,000 pCi/L, and beta/photon emitters to doses equivalent to 4 mrem per year. Gross alpha values for 2012 were below 3.3 pCi/L at both locations. Tritium values were below 200 pCi/L at both locations.

The SDWA limits the total body or critical organ dose from a single beta/photon emitter to 4 mrem. Concentrations for 168 beta/photon emitters that will deliver a total body or critical organ dose of 4 mrem are compared to the isotopic analysis in the MDH samples. The majority of data for these radioisotopes falls below MDH Public Health Lab's (PHL) detection levels. In instances where the detection levels exceed the SDWA levels, review of the gross beta values were considered, since the gross beta value represents the maximum value any individual beta emitter could be.

All surface water sample results for 2012 were within the EPA and MDH standards and guidelines.

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 the EPA Safe Drinking Water Standards and MDH Chapter 4731.2750. Samples are also compared to historical data and reviewed for trends.

Milk sampling locations are shown in [Table 2A](#) Monticello Sampling Sites and [Table 2B](#) Prairie Island Sampling Sites. Milk sample results for select radionuclides of interest 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.

Data Analysis: MDH recognizes that the EPA Safe Drinking Water Act (SDWA) is often a more restrictive limit for these samples because there are no specific standards for milk samples. However, by meeting these standards MDH continues to ensure that public health and safety is maintained. Due to the physical properties of milk, analyzing for gross alpha and gross beta values is difficult and highly unreliable; therefore these results are not available.

The SWDA limits the total body or critical organ dose from a single beta/photon emitter to 4 mrem. Concentrations for 168 beta/photon emitters that will deliver a total body or critical organ dose of 4 mrem are compared to the isotopic analysis in the MDH samples. Again, the majority of data for these radioisotopes are below MDH Public Health Lab's (PHL) detection levels. In instances where the detection levels exceed the SDWA levels, review of past air sample results were considered. It should be noted that if a release were to occur, before it would be observed in milk samples it would most likely be detected in air samples.

All milk sample results for 2012 were within the EPA and MDH standards and guidelines.

AMBIENT GAMMA RADIATION MONITORING

Ambient gamma radiation levels are measured around the power plants by using thermoluminescent dosimeters (TLDs). MDH has placed TLDs 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 and analyzed quarterly. In 2006, MDH transferred the analysis of the dosimeters from an internal evaluation to Mirion Technologies (formerly Global Dosimetry), a processor approved by the National Voluntary Laboratory Accreditation Program. Mirion Technologies reports TLD results to MDH and MDH compares these results to control readings, historical data, and MDH regulatory limits.

TLD locations are shown in [Table 3A](#) Monticello Area TLD Locations and [Table 3B](#) Prairie Island Area TLD Locations. TLD results are shown in [Table 11](#) TLD Results.

Over the past 4 years MDH identified intermittent slightly elevated readings for the Prairie Island TLDs located at ISFSI Wakonade and Training Center. In order to determine the cause for the higher TLD readings MDH performed several investigations; including discussions with PINGPP personnel, comparison to PINGPP TLDs in close proximity, and surveys around the TLDs. It was discovered through discussion with dosimetry personnel at Mirion Technologies, the TLD company, that the type of TLD used and the process for analysis was the reason for the elevated readings.

According to Mirion Technologies the Type 17 Environmental (Lithium Fluoride (LiF) based) dosimeter is meant for ambient gamma radiation measurements. The lithium contained in this TLD although it is naturally occurring contains a percentage of both Li-7 and Li-6 isotopes. Because Li-6 responds to neutrons and the neutron component was not taken into account in the analysis, the reported ambient gamma readings appear elevated.

Mirion Technologies has recalculated the values for the TLDs at the ISFSI Wakonade and Training Center for 2012. The data in Table 11 reflects the recalculated numbers to remove the response to Li-6. In October of 2013 MDH replaced the Type 17 Environmental dosimeter with the Type 36 badge. With the Type 36 dosimeter Mirion Technologies has algorithms to calculate the neutron and gamma exposure contributions accurately.

Data Analysis: Mirion Technologies results from the field TLDs are compared to the control readings. Control badges are kept in St. Paul for the monitoring period so that control readings indicate background radiation levels.

All TLD results for 2012 were within MDH regulatory limits to members of the public.

WELL WATER AND COMMUNITY WATER MONITORING

Well water is periodically reviewed since radioactivity may seep through the soil and enter the water table. The collection point was selected to be a private farm located close to the Prairie Island nuclear power plant. Community Water samples are collected at Prairie Island as part of the EPA RADNET system. MDH also collects a sample to represent the community water supply at Prairie Island. These samples are collected quarterly and again compared to the EPA Safe Drinking Water Standards, MDH Chapter 4731.2750, and historical data.

Well water sample location is shown in [Table 2B](#) Prairie Island Sampling Sites. Community water samples are collected from the Dakota Station at Prairie Island. Well water sample results for gross alpha, gross beta, and select radionuclides of interest are shown in [Table 12](#) Well Water Analysis Results. Community Water sample results are shown in [Table 13](#) Community Water Analysis Results.

Data Analysis: Well water and community water data is analyzed similar to surface water. The EPA Safe Drinking Water Act (SDWA) is often the most restrictive limit for these samples. The radiological component of the SDWA limits gross alpha particles to 15 pCi/L (including combined Radium 226 and Radium 228 at 5 pCi/L), tritium to 20,000 pCi/L, and beta/photon emitters to doses equivalent to 4 mrem per year. Gross alpha values for 2012 were at or below 5.5 pCi/L. and Tritium values were below 200 pCi/L.

The SDWA limits the total body or critical organ dose from a single beta/photon emitter to 4 mrems. Concentrations for 168 beta/photon emitters that will deliver a total body or critical organ dose of 4 mrems are compared to the isotopic analysis in the MDH samples. In instances where the detection levels exceed the SDWA levels, review of the gross beta values were considered, since the gross beta value represents the maximum value any individual beta emitter could be.

All well water and community water sample results for 2012 were within the EPA and MDH standards and guidelines.

PRECIPITATION MONITORING

As part of the EPA RADNET program, MDH also collects precipitation samples at the air sampling location in St. Paul. These samples are collected when enough precipitation is in the collection bucket to fill an analysis container. Samples are split, one going to EPA RADNET and one to MDH PHL. Data collected is compared to the EPA Safe Drinking Water Standards, MDH Chapter 4731.2750 and historical data.

Data Analysis: Precipitation data is analyzed similar to surface water. The EPA Safe Drinking Water Act (SDWA) is often the most restrictive limit for these samples. The radiological component of the SDWA limits gross alpha particles to 15 pCi/L (including combined Radium 226 and Radium 228 at 5 pCi/L), tritium to 20,000 pCi/L, and beta/photon emitters to doses equivalent to 4 mrem per year. Gross alpha values for 2012 were below 3.0 pCi/L. and Tritium values were below 200 pCi/L.

The SDWA limits the total body or critical organ dose from a single beta/photon emitter to 4 mrems. Concentrations for 168 beta/photon emitters that will deliver a total body or critical organ dose of 4 mrems are compared to the isotopic analysis in the MDH samples. In instances where the detection levels exceed the SDWA levels, review of the gross beta values were considered, since the gross beta value represents the maximum value any individual beta emitter could be.

All precipitation sample results for 2012 were within the EPA and MDH standards and guidelines:

PROGRAM MODIFICATIONS

No program modifications were made in 2012.

Table 1

Minnesota Department of Health Sample Summary for 2012

Sample Type	Collection and Frequency	Number of Samples Collected	Analyses Performed
Air	C, W & BW	104	GA, GB, GI, Sr, I
Surface Water	G, Q	8	GA, GB, GI, Sr, H
Well Water	G, Q	4	GA, GB, GI, Sr, H
Community Water	G, Q	4	GA, GB, GI, Sr, H
Milk	G, M	24	GI, Sr, I
TLD	C, Q	72	Direct exposure
Precipitation	C	15	GA, GB, GI, Sr, H

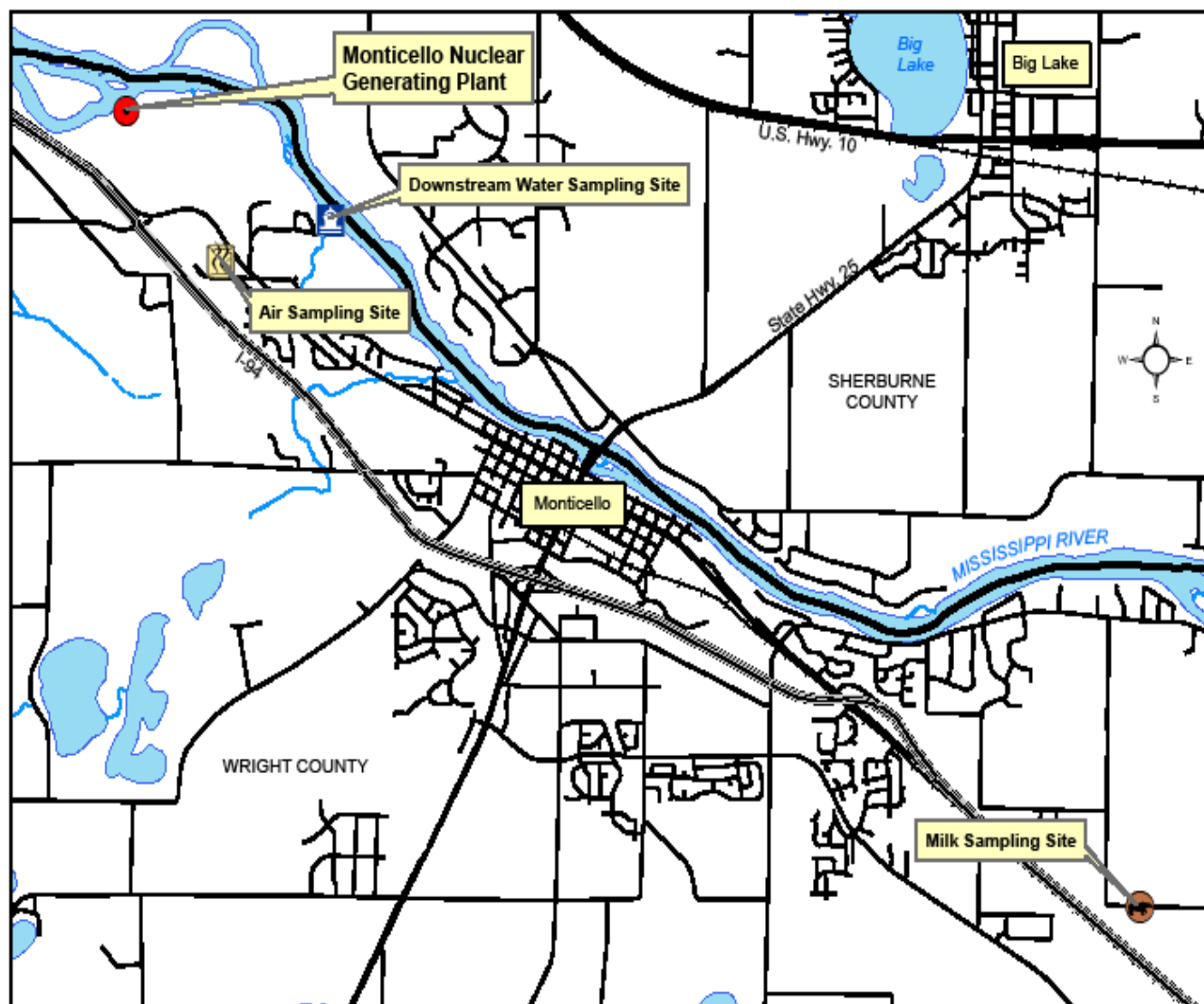
Collection type: C = continuous; G = grab

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

Minnesota Department of Health
Monticello Environmental Sampling Sites

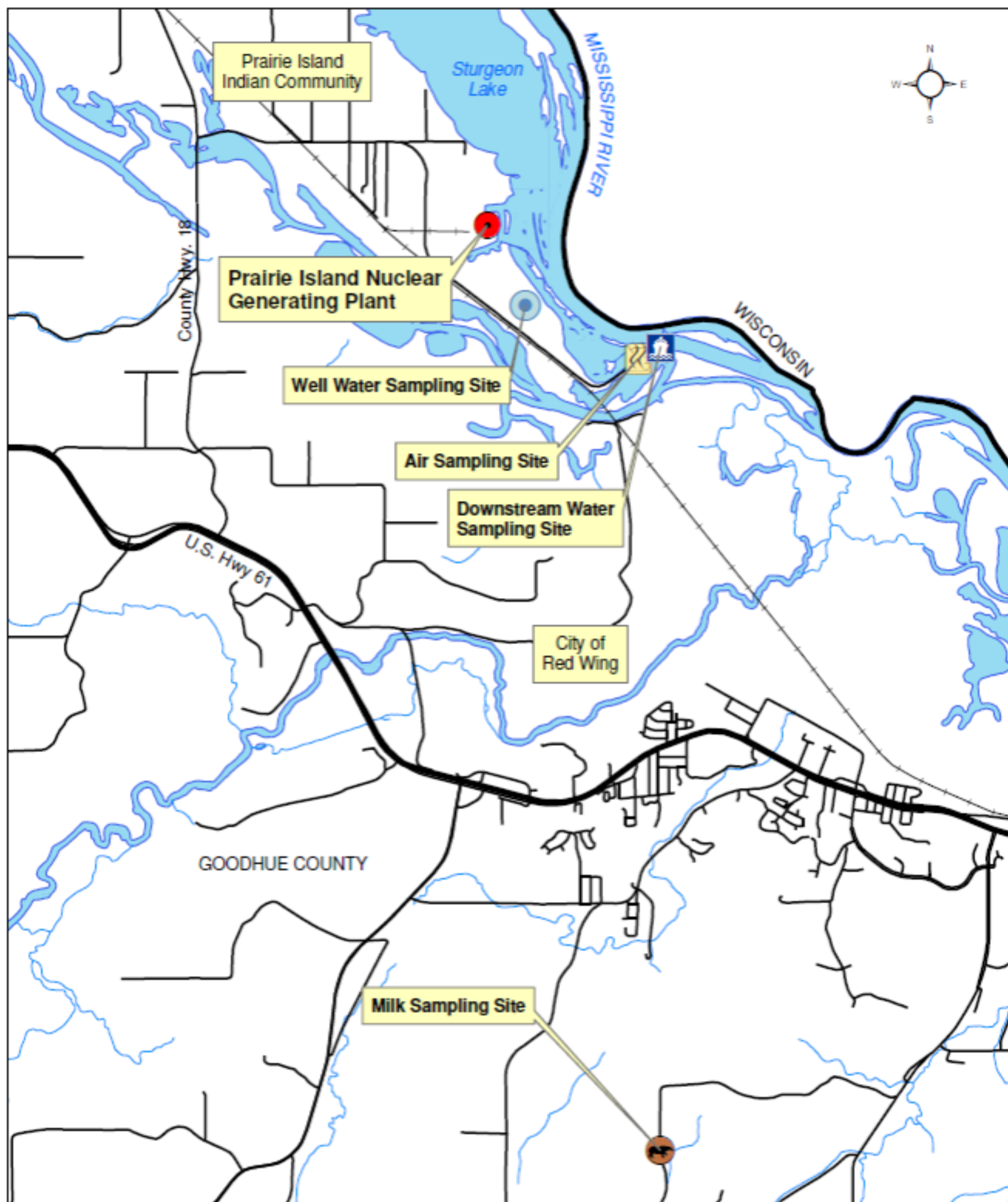
MONTICELLO NUCLEAR GENERATING PLANT AND SAMPLING SITE LOCATIONS



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

0 0.25 0.5 1 1.5 2 Miles

Minnesota Department of Health
Prairie Island Environmental Sampling Sites



Minnesota Department of Health
Monticello Area TLD Locations

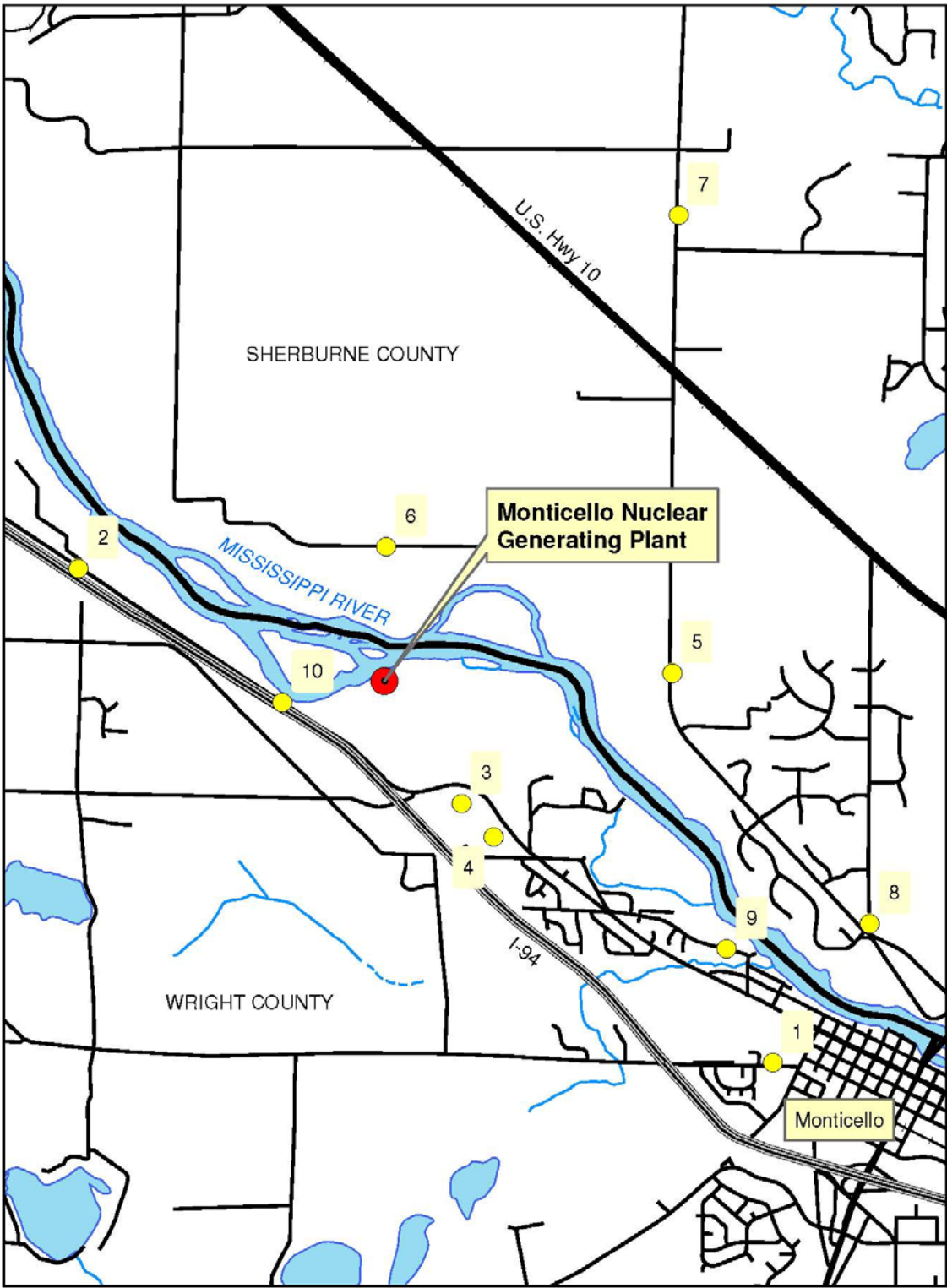


Table 3B

Minnesota Department of Health
Prairie Island Area TLD Locations

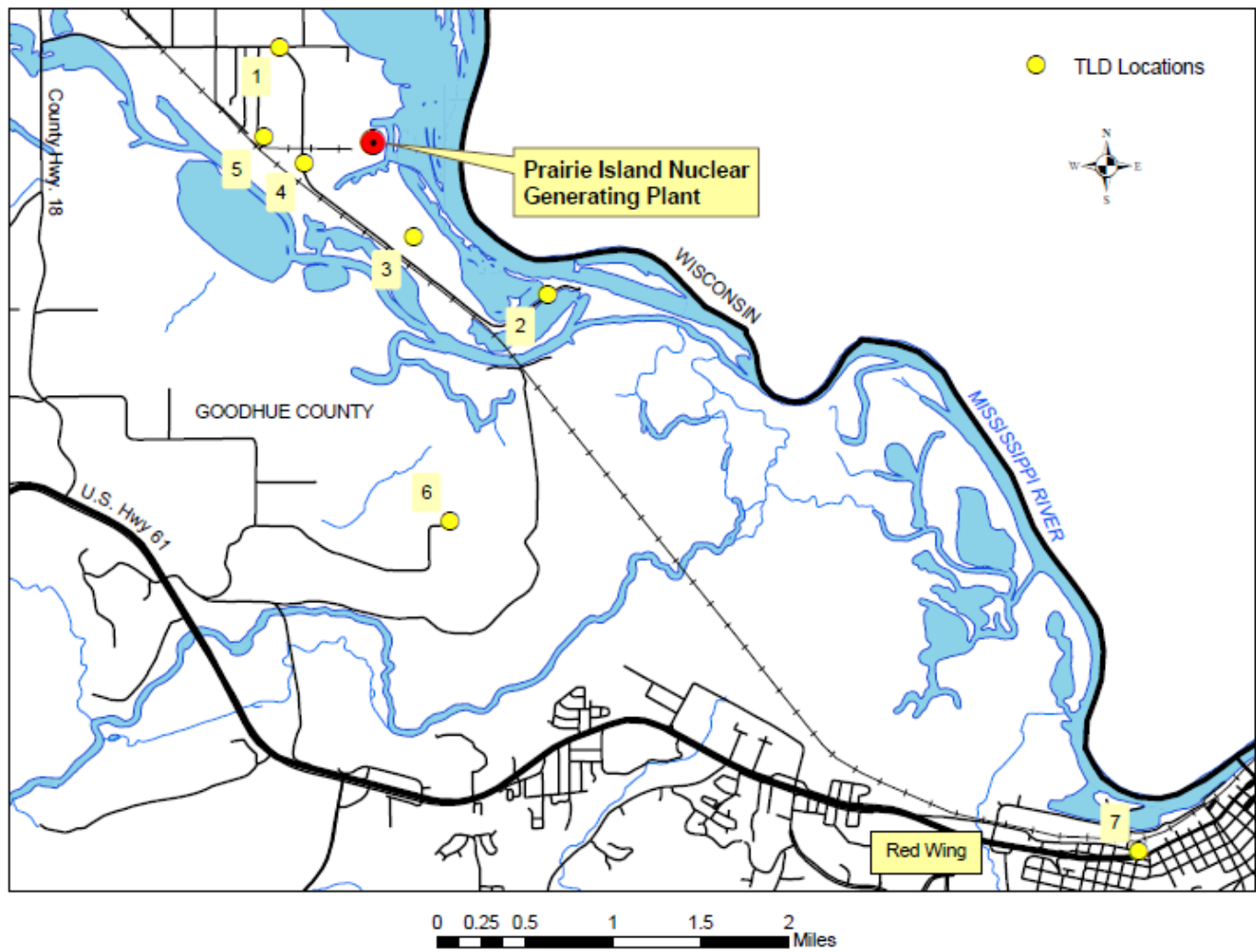


Table 4

Minnesota Department of Health
 2012 Air Sampling Results for Monticello Nuclear Generating Plant
 Results and Detection Limits in pCi/m³

Date Collected	Gross Alpha	Gross Beta	Be-7	K-40
1/03	.00735	.0192	.0386	< 0.0770
1/17	.00635	.0191	.0374	< 0.0674
1/31	.00843	.0292	.0335	< 0.0839
2/14	.00594	.0186	.0312	< 0.0822
2/28	.00786	.0242	.0331	< 0.0751
3/13	.00720	.0217	.0306	< 0.0739
3/27	.00456	.0124	.0429	< 0.0759
4/10	.00395	.00889	< 0.0269	< 0.0741
4/24	.00455	.0117	< 0.0259	< 0.0726
5/09	.00435	.0107	.0383	< 0.0636
5/23	.00498	.0127	< 0.0344	< 0.0869
6/05	.00378	.00910	.0350	< 0.0880
6/20	.00370	.0114	.0372	< 0.0591
7/03	.00388	.00928	< 0.0328	< 0.0883
7/17	.00581	.0175	.08	< 0.0764
7/31	.00611	.0170	.0557	< 0.0848
8/14	.00404	.0131	.0474	< 0.0911
8/28	.00562	.0160	.0468	< 0.0741
9/11	.00530	.0185	.0604	< 0.0397
9/25	.00287	.0103	.0369	< 0.0449
10/09	.00308	.0169	.0549	< 0.0437
10/23	.00330	.0131	< 0.0164	< 0.0426
11/06	.00679	.0194	< 0.0173	< 0.0476
11/20	.0131	.0362	.0222	< 0.0445
12/04	.0163	.0478	.0254	< 0.0465
12/18	.0114	.0359	< 0.0115	< 0.0454

Table 5

Minnesota Department of Health
 2012 Air Sampling Result for Prairie Island Nuclear Generating Plant
 Results and Detection Limits in pCi/m³

Date Collected	Gross Alpha	Gross Beta	Be-7	K-40
1/10	.00519	.0182	< 0.0222	< 0.0595
1/24	.00586	.0236	.0514	< 0.0608
2/07	.00807	.0227	.0214	< 0.0485
2/21	.00645	.0216	.0422	< 0.0462
3/06	.00538	.0199	.0287	< 0.0503
3/21	.00489	.0164	.0409	< 0.0424
4/03	.00316	.00855	< 0.0212	< 0.0668
4/17	.00371	.0116	.0379	< 0.0513
5/01	.00479	.0134	.0679	< 0.0471
5/15	.00396	.00847	.0259	< 0.0462
5/29	.00319	.0117	.0384	< 0.0487
6/13	.00863	.0243	.0339	< 0.0453
6/26	.00343	.00972	.0381	< 0.0513
7/11	.00436	.0148	.0606	< 0.044
7/25	.00524	.0173	.0710	< 0.0504
8/07	.00340	.0104	.0404	< 0.0507
8/21	.00341	.0111	.0368	< 0.0514
9/04	.00540	.0182	.0398	< 0.0463
9/17	.00398	.0157	.0605	< 0.0540
10/02	.00335	.0143	.0575	< 0.0415
10/16	.00345	.0159	.0303	< 0.0486
10/30	.00609	.0198	< 0.0133	< 0.0440
11/13	.00729	.0205	.0188	< 0.0413
11/28	.0115	.0404	.0399	< 0.0468
12/11	.0111	.0378	.0182	< 0.0533
12/26	.00913	.0347	.0241	< 0.0423

Table 6

Minnesota Department of Health
2012 Air Sampling Results for St. Paul
Results and Detection Limits in pCi/m³

Date Collected	Gross Alpha	Gross Beta	Be-7	K-40
1/03	.00731	.0198	< 0.0344	< 0.105
1/10	.00695	.0193	< 0.0407	< 0.112
1/17	.00627	.0199	< 0.0345	< 0.0943
1/24	.00884	.0277	.0450	< 0.110
1/31	.00660	.0259	< 0.0438	< 0.125
2/07	.00644	.0205	< 0.0312	< 0.102
2/14	.00577	.0168	.0461	< 0.123
2/21	.00809	.0263	.0459	< 0.106
2/28	.00748	.0225	< 0.0382	< 0.110
3/06	.00348	.0185	.0518	< 0.107
3/13	.00353	.0209	.147	< 0.103
3/21	.00386	.0142	.0700	< 0.0840
3/27	.00369	.00824	< 0.0343	< 0.105
4/03	.00356	.00840	< 0.0287	< 0.0850
4/10	.00083	.0116	.136	< 0.0970
4/17	.00485	.0123	< 0.0330	< 0.102
4/24	.00520	.0114	< 0.0406	< 0.118
5/01	.00170	.0159	.229	< 0.102
5/09	.00276	.00808	< 0.0342	< 0.0960
5/15	.00522	.0111	.0429	< 0.101
5/23	.00324	.0128	< 0.0344	< 0.0924
5/29	.00085	.0116	.138	< 0.128
6/05	.00103	.0109	.129	< 0.108
6/13	.00240	.0145	.126	< 0.0988
6/19	.00190	.00488	.0474	< 0.115
6/26	.00146	.0120	.129	< 0.112
7/03	.00539	.0172	.0671	< 0.0978
7/11	.00379	.0117	.0595	< 0.0927
7/17	.00178	.0240	.239	< 0.132
7/24	.00153	.0162	.113	< 0.103
7/31	.00541	.0154	< 0.0467	< 0.114
8/07	.00457	.0134	.0736	< 0.103
8/15	.00321	.0102	< 0.0349	< 0.1
8/21	.00077	.00982	.113	< 0.0989
8/28	.00597	.0246	.0923	< 0.104
9/04	.00672	.0237	< 0.0389	< 0.0944
9/11	.00443	.0155	< 0.0344	< 0.0959
9/18	.00361	.0143	.0574	< 0.0912
9/25	.00233	.0105	< 0.0340	< 0.0939
10/02	.00451	.0176	.0718	< 0.0920
10/09	.00153	.0164	.0942	< 0.0992
10/16	.00431	.0165	< 0.0357	< 0.102
10/23	.00663	.0215	< 0.0295	< 0.0989
10/30	.00665	.0210	< 0.0265	< 0.0900
11/06	.00800	.0189	.0201	< 0.0831
11/13	.00839	.0225	< 0.0219	< 0.0956
11/20	.0145	.0474	.0428	< 0.0924
11/28	.0108	.0350	.0249	< 0.0868
12/04	.0150	.0606	< 0.0197	< 0.0987
12/11	.0076	.0229	< 0.0203	< 0.0608
12/18	.0100	.0396	.0187	< 0.0543
12/26	.00699	.0287	.0176	< 0.0468

Table 7

Minnesota Department of Health
2012 Surface Water Results for Monticello Nuclear Generating Plant
Results and Detection Limits in pCi/L

Date Collected	Gross Alpha	Gross Beta	Tritium	Sr-89 ¹	Sr-90 ¹	K-40
1/03	< 3.3	< 4.0	< 200	< 2.0	< 2.0	< 47.5
4/10	< 3.0	< 4.0	< 200	< 2.0	< 2.0	< 69.8
7/03	< 3.0	< 4.0	< 200	< 2.0	< 2.0	< 54.3
10/09	< 3.0	< 4.0	< 200	< 2.0	< 2.0	< 66.3

¹Sr-89 and Sr-90 were below the required detection limit of 2 pCi/L (§ 141.25).

Table 8

Minnesota Department of Health
2012 Surface Water Results for Prairie Island Nuclear Generating Plant
Results and Detection Limits in pCi/L

Date Collected	Gross Alpha	Gross Beta	Tritium	Sr-89 ¹	Sr-90 ¹	K-40
1/10	< 3.0	< 4.0	< 200	< 2.0	< 2.0	< 77.4
4/03	< 3.0	< 4.0	< 200	< 2.0	< 2.0	< 46.1
7/11	< 3.0	< 4.0	< 200	< 2.0	< 2.0	< 77.1
10/02	< 3.0	4.9	< 200	< 2.0	< 2.0	< 63.8

¹Sr-89 and Sr-90 were below the required detection limit of 2 pCi/L (§ 141.25).

Table 9

Minnesota Department of Health
 2012 Milk Analysis Results for Monticello Nuclear Generating Plant
 Results and Detection Limits in pCi/L

Date Collected	Sr-89¹	Sr-90¹	K-40
1/03	< 2.0	< 2.0	1290
2/28	< 2.0	< 2.0	1330
3/27	< 2.0	< 2.0	1350
4/24	< 2.0	< 2.0	1300
5/23	< 2.0	< 2.0	1330
6/20	< 2.0	< 2.0	1300
7/31	< 2.0	< 2.0	1330
8/28	< 2.0	< 2.0	1320
9/25	< 2.0	< 2.0	1270
10/23	< 2.0	< 2.0	1370
11/20	< 2.0	< 2.0	1370
12/18	< 2.0	< 2.0	1340

¹Sr-89 and Sr-90 were below the required detection limit of 2 pCi/L (§ 141.25).

Table 10

Minnesota Department of Health
 2012 Milk Analysis Results for Prairie Island Nuclear Generating Plant
 Results and Detection Limits in pCi/L

Date Collected	Sr-89 ¹	Sr-90 ¹	K-40
1/24	< 2.0	< 2.0	1390
3/06	< 2.0	< 2.0	1340
3/21	< 2.0	< 2.0	1290
4/17	< 2.0	< 2.0	1290
5/29	< 2.0	< 2.0	1300
6/26	< 2.0	< 2.0	1330
7/25	< 2.0	< 2.0	1380
8/21	< 2.0	< 2.0	1260
9/17	< 2.0	< 2.0	1320
10/30	< 2.0	< 2.0	1340
11/28	< 2.0	< 2.0	1410
12/26	< 2.0	< 2.0	1350

¹Sr-89 and Sr-90 were below the required detection limit of 2 pCi/L (§ 141.25).

Table 11

2012 Minnesota Department of Health TLD Results Results in mrem

Monticello

<u>Location</u>	<u>Number on Table 3</u>	<u>1st Qtr</u>	<u>2nd Qtr</u>	<u>3rd Qtr</u>	<u>4th Qtr</u>	<u>Average</u>
Control		19	24	20	19	20.50
Control		19	24	20	19	20.50
City Office	1	22	27	24	22	23.75
CR75 Acacia	2	22	26	22	23	23.25
CR75 120 St Bridge	3	23	25	22	26	24.00
XCEL Training Center	4	23	27	24	24	24.50
East Pole 433	5	28	25	23	22	24.50
North Pole 485	6	23	29	24	22	24.50
Olson Farm	7	24	31	24	22	25.25
CR 50/CR11	8	22	25	23	25	23.75
CR 75 - Monticello	10	23	28	25	23	24.75
River Street	9	23	25	23	23	23.50

Prairie Island

<u>Location</u>		<u>1st Qtr</u>	<u>2nd Qtr</u>	<u>3rd Qtr</u>	<u>4th Qtr</u>	<u>Average</u>
Control		20	20	18	22	20.00
Control		21	21	18	20	20.00
Sturgeon Lake Rd	1	24	22	19	21	21.50
Lock & Dam 3	2	26	23	18	21	22.00
Suter Farm	3	30	24	21	24	24.75
ISFSI Wakonade	4	*30	*25	*22	*27	26.00
Tower	5	30	23	20	24	24.25
Gustafson Farm	6	30	24	21	24	24.75
Red Wing	7	31	25	22	25	25.75
Training Center	8	*28	*24	*20	*24	24.00

* TLDs recalculated by Mirion Technologies. For details, see explanation on page 5 under **AMBIENT GAMMA RADIATION MONITORING**.

Table 12

Minnesota Department of Health
2012 Well Water Analysis Results—City of Redwing
Results and Detection Limits in pCi/L

Date Collected	Gross Alpha	Gross Beta	Tritium	K-40
2/7	< 3.0	< 4.0	< 200	< 73.83
5/01	< 3.0	< 4.0	< 200	< 49.82
8/7	< 3.0	< 4.0	< 200	< 53.92
11/13	< 3.0	4.4	< 200	< 49.81

Table 13

Minnesota Department of Health
2012 Community Water Analysis Results—City of Redwing
Results and Detection Limits in pCi/L

Date Collected	Gross Alpha	Gross Beta	Tritium	K-40
1/10	5.5	< 4.0	< 200	< 70.26
4/03	< 3.0	< 4.0	< 200	< 74.09
7/11	< 3.0	4.4	< 200	< 53.22
10/02	3.7	4.1	< 200	< 54.28

Table 14

Minnesota Department of Health
2012 Precipitation Water Results for St. Paul
Results and Detection Limits in pCi/L

Date Collected	Gross Alpha	Gross Beta	K-40	Sr-89 ¹	Sr-90 ¹	Tritium
03/06	< 3.0	< 4.0	< 43.3	< 2.0	< 2.0	< 200
03/21	< 3.0	< 4.0	< 65.5	< 2.0	< 2.0	< 200
04/17	< 3.0	< 4.0	< 51.2	< 2.0	< 2.0	< 200
04/24	< 3.0	< 4.0	< 48.1	< 2.0	< 2.0	< 200
05/09	< 3.0	< 4.0	< 68.2	< 2.0	< 2.0	< 200
05/23	< 3.0	6.0	< 47.2	< 2.0	< 2.0	< 209
05/29	< 3.0	< 4.0	< 77.4	< 2.0	< 2.0	< 209
06/13	< 3.0	< 4.0	< 80.5	< 2.0	< 2.0	< 209
06/19	< 3.0	< 4.0	< 46.0	< 2.0	< 2.0	< 209
07/11	< 3.0	< 4.0	< 46.7	< 2.0	< 2.0	< 200
07/17	< 3.0	< 4.0	< 56.5	< 2.0	< 2.0	< 200
07/24	< 3.0	< 4.0	< 68.5	< 2.0	< 2.0	< 200
07/30	< 3.0	< 4.0	< 77.8	< 2.0	< 2.0	< 200
10/30	< 3.0	4.7	< 52.2	< 2.0	< 2.0	< 200
12/11	< 3.0	< 4.0	< 53.0	< 2.0	< 2.0	< 200

¹Sr-89 and Sr-90 were below the required detection limit of 2 pCi/L (§ 141.25).