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Minnesota Department of Health Environmental Monitoring Report 2013 Data

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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. A baseline for certain radionuclides has been established and current environmental monitoring continues to validate the natural background levels in Minnesota. Throughout the years the Minnesota Department of Health environmental monitoring program has transformed. Careful analysis of potential risks and data collected 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 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 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 2013, 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 2013 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 <u>Table 2A</u> Monticello Sampling Sites and <u>Table 2B</u> Prairie Island Sampling Sites.

Air sample results for gross alpha, gross beta, and naturally occurring Beryllium-7 and Potassium-40 are shown in <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, and <u>Table 6</u> 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 mrems 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 0.0267 pCi/m³ at all locations. Gross beta levels were below 0.0634 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 2013 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 <u>Table 2A</u> Monticello Sampling Sites and <u>Table 2B</u> Prairie Island Sampling Sites. Water sample results for gross alpha, gross beta, and select radionuclides of interest are shown in <u>Table 7</u> Surface Water Results for Monticello Nuclear Generating Plant, and <u>Table 8</u> 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 2013 were below 3.1 pCi/L at both locations. Tritium values were below 722 pCi/L at both locations.

The SWDA 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. 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 2013 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 <u>Table 2A</u> Monticello Sampling Sites and <u>Table 2B</u> Prairie Island Sampling Sites. Milk sample results for select radionuclides of interest are shown in <u>Table 9</u> Milk Analysis Results for Monticello Nuclear Generating Power Plant and <u>Table 10</u> 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 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. 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 2013 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. These results are compared to control readings, historical data, and MDH regulatory limits.

TLD locations are shown in <u>Table 3A</u> Monticello Area TLD Locations and <u>Table 3B</u> Prairie Island Area TLD Locations. TLD results are shown in <u>Table 11</u> 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 2013 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 <u>Table 2B</u> 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 show in <u>Table 12</u> Well Water Analysis Results. Community Water sample results are shown in <u>Table13</u> 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 2013 were below at or below 3.0 pCi/L. and Tritium values were below 215 pCi/L.

The SWDA 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 2013 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.

The EPA RADNET changed their procedures in October of 2013 to collect samples after every precipitation event. Because of this change MDH appears to be collecting more frequently to send to EPA RADNET. In doing so, often the sample is not large enough to collect for both EPA and MDH unless a measureable precipitation event occurs. Therefore, the number of precipitation samples collected may be fewer than in previous years. Data from the precipitation collected in St. Paul may also be review at the EPA RADNET website.

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 2013 were below 3.0 pCi/L. and Tritium values were below 324 pCi/L.

The SWDA 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 2013 were within the EPA and MDH standards and guidelines:

PROGRAM MODIFICATIONS

Program modifications were made to the precipitation collection process in 2013 in accordance with the changes made by EPA as part of the national RADNET monitoring program.

Minnesota Department of Health Sample Summary for 2013

Sample Type	Collection and Frequency	Number of Samples Collected	Analyses Performed
Air	C, W & BW	105	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	5	GA, GB, GI, Sr, H
Milk	G, M	24	GI, Sr, I
TLD	C, Q	72	Direct exposure
Precipitation	С	19	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



Minnesota Department of Health Prairie Island Environmental Sampling Sites



Minnesota Department of Health Monticello Area TLD Locations



Minnesota Department of Health Prairie Island Area TLD Locations



Minnesota Department of Health 2013 Air Sampling Results for Monticello Nuclear Generating Plant Results and Detection Limits in pCi/m³

Date	Gross	Gross		
Collected	Alpha	Beta	Be-7	K-40
01/02/13	0.01100	0.0405	<0.0148	<0.0440
01/16/13	0.00352	0.0230	0.0355	<0.0464
01/25/13	0.00568	0.0208	0.0478	<0.0804
02/12/13	0.00780	0.0373	0.0343	<0.0326
02/25/13	0.00496	0.0281	0.0433	<0.0485
03/12/13	0.00236	0.0140	0.0779	<0.0448
03/27/13	0.00249	0.0201	0.0575	<0.0440
04/09/13	0.00109	0.0174	0.1390	<0.0581
04/23/13	0.00051	0.0070	0.0750	<0.0515
05/08/13	0.00178	0.0132	0.0795	<0.0483
05/21/13	0.00112	0.0137	0.1280	<0.0565
06/04/13	0.00111	0.0088	0.0964	<0.0494
06/18/13*	*	*	*	*
07/02/13	0.00259	0.0094	0.0565	<0.0492
07/16/13	0.00436	0.0178	0.0797	<0.0468
07/29/13	0.00242	0.0104	0.0533	<0.0445
08/13/13	0.00305	0.0119	0.0357	<0.0426
08/26/13	0.00756	0.0243	0.0666	<0.0536
09/10/13	0.00955	0.0213	<0.0151	<0.0466
09/24/13	0.01300	0.0268	<0.0266	<0.0998
10/09/13	0.00918	0.0212	<0.0174	<0.0535
10/22/13	0.00666	0.0134	<0.0206	<0.0721
11/06/13	0.00563	0.0145	<0.0157	<0.0550
11/19/13	0.00807	0.0222	<0.0133	<0.0421
12/03/13	0.02670	0.0549	<0.0163	<0.0522
12/17/13	0.01030	0.0232	<0.0202	<0.0614
12/31/13	0.01000	0.0238	<0.0211	<0.0616

* Sample damage - no results reported.

Minnesota Department of Health 2013 Air Sampling Result for Prairie Island Nuclear Generating Plant Results and Detection Limits in pCi/m³

Date	Gross	Gross		
Collected	Alpha	Beta	Be-7	K-40
01/08/13	0.00861	0.0358	0.0322	<0.0523
01/22/13	0.00615	0.0262	0.0333	<0.0496
02/05/13	0.00745	0.0353	0.0266	<0.0441
02/19/13	0.00665	0.0370	0.0494	<0.0555
03/06/13	0.00151	0.0181	0.0614	<0.0450
03/19/13	0.00217	0.0182	0.0800	<0.0475
04/03/13	0.00119	0.0137	0.0601	<0.0369
04/16/13	0.00091	0.0110	0.1020	<0.0556
04/30/13	0.00145	0.0155	0.1390	<0.0601
05/14/13	0.00116	0.0106	0.0703	<0.0507
05/28/13	0.00065	0.0098	0.0939	<0.0549
06/12/13	0.00870	0.0109	0.0973	<0.0447
06/25/13	0.00147	0.0097	0.0714	<0.0458
07/10/13	0.00332	0.0130	0.0630	<0.0506
07/23/13	0.00323	0.0132	0.0647	<0.0489
08/06/13	0.00263	0.0100	0.0351	<0.0472
08/20/13	0.00475	0.0139	0.0462	<0.0385
09/03/13	0.00442	0.0155	0.0400	<0.0385
09/17/13	0.00789	0.0175	<0.0171	<0.0470
10/02/13	0.00536	0.0122	0.0149	<0.0470
10/15/13	0.00575	0.0142	<0.0161	<0.0565
10/29/13	0.00411	0.0095	<0.0145	<0.0581
11/13/13	0.00729	0.0177	<0.0152	<0.0506
11/26/13	0.01020	0.0235	<0.0158	<0.0548
12/10/13	0.01640	0.0404	<0.0158	<0.0460
12/24/13	0.01410	0.0322	0.0175	<0.0487

Minnesota Department of Health 2013 Air Sampling Results for St. Paul Results and Detection Limits in pCi/m³

Date	Gross	Gross		
Collected	Alpha	Beta	Be-7	K-40
01/02/13	0.01390	0.0540	0.0353	<0.0733
01/08/13	0.01590	0.0634	0.0410	<0.0717
01/16/13	0.00095	0.0182	0.0344	<0.0534
01/22/13	0.00750	0.0397	0.0564	<0.0663
01/30/13	0.00499	0.0271	0.0391	<0.0523
02/05/13	0.01430	0.0595	0.0490	<0.0705
02/12/13	0.00243	0.0189	0.0299	<0.0613
02/19/13	0.00363	0.0206	0.0711	<0.0564
02/25/13	0.00151	0.0095	0.0513	<0.0714
03/06/13	0.00143	0.0203	0.1070	<0.0403
03/12/13	0.00180	0.0153	0.0997	<0.0765
03/19/13	0.00534	0.0229	0.1090	<0.0650
03/27/13	0.00151	0.0170	0.0361	<0.0538
04/02/13	0.00096	0.0159	0.0997	<0.0716
04/09/13	0.00086	0.0144	0.1340	<0.0607
04/16/13	0.00078	0.0083	0.0949	<0.0693
04/23/13	0.00063	0.0098	0.0976	<0.0587
04/30/13	0.00181	0.0204	0.1920	<0.0704
05/08/13	0.00076	0.0082	0.0487	<0.0652
05/14/13	0.00122	0.0148	0.1530	<0.0938
05/21/13	0.00085	0.0120	0.1210	<0.0735
05/28/13	0.00049	0.0087	0.1180	<0.0696
06/04/13	0.00103	0.0083	0.1070	<0.0611
06/12/13	0.00091	0.0124	0.1030	<0.0612
06/18/13	0.00142	0.0107	0.1120	<0.0653
06/25/13	0.00137	0.0108	0.1020	< 0.0633
07/02/13	0.00235	0.0115	0.1020	<0.0598
07/10/13	0.00310	0.0157	0.0841	<0.0495
07/16/13	0.00486	0.0164	0.0978	<0.0779
07/23/13	0.00062	0.0141	0.1200	< 0.0592
07/29/13	0.00130	0.0055	0.0378	<0.0686
08/06/13	0.00294	0.0134	0.0644	<0.0518
08/13/13	0.00307	0.0104	0.0494	
00/20/13	0.00635	0.0206	0.0040	<0.0500
00/02/13	0.00162	0.0273	0.1040	<0.0010
09/03/13	0.00509	0.0137		<0.0400
09/10/13	0.00978	0.0204	<0.0222	<0.0035
09/17/13	0.00303	0.0108	<0.0195	<0.0030
10/02/13	0.00711	0.0100	0.0175	<0.0040
10/02/13	0.00646	0.0200	<0.0133	<0.0074
10/15/13	0.00627	0.0135	<0.0220	<0.0000
10/22/13	0.00566	0.0113	<0.0222	<0.0700
10/29/13	0.00416	0.0095	<0.0200	<0.0600
11/06/13	0.00752	0.0192	<0.0188	<0.0664
11/13/13	0.01290	0.0316	< 0.0353	<0.1170
11/19/13	0.02070	0.0464	0.0445	<0.0127
11/26/13	0.01380	0.0343	< 0.0361	<0.1150
12/03/13	0.01700	0.0390	<0.0388	<0.0110
12/10/13	0.02270	0.0523	< 0.0353	<0.1200
12/17/13	0.01870	0.0479	<0.0357	<0.0100
12/24/13	0.02310	0.0492	<0.0436	<0.1370
12/31/13	0.01010	0.0284	<0.0424	<0.1260

Minnesota Department of Health 2013 Surface Water Results for Monticello Nuclear Generating Plant Results and Detection Limits in pCi/L

Date Collected	Gross Alpha	Gross Beta	Tritium	Sr-89	Sr-90	K-40
01/02/13	<3.0	<4.0	<200	<2.0	<2.0	<53.5
04/09/13	<3.0	<4.0	<200	<2.0	<2.0	<51.0
07/02/13	<3.0	<4.0	<297	<2.0	<2.0	<47.9
10/09/13	<3.0	<4.0	<200	<2.0	<2.0	<72.0

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

Minnesota Department of Health 2013 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	Sr-90	K-40
01/08/13	<3.0	<4.0	<200	<2.0	<2.0	<44.0
04/03/13	<3.0	4.4	<200	<2.0	<2.0	<59.5
07/10/13	3.1	5.9	<200	<2.0	<2.0	<56.3
10/02/13	<3.0	5.0	722	<2.0	<2.0	<57.5

 $^1\mbox{Sr-89}$ and Sr-90 were below the required detection limit of 2 pCi/L (§ 141.2).

Minnesota Department of Health 2013 Milk Analysis Results for Monticello Nuclear Generating Plant Results and Detection Limits in pCi/L

Date Collected	Sr-89	Sr-90	K-40
01/25/13	<2.0	<2.0	1350
02/25/13	<2.0	<2.0	1320
03/27/13	<2.0	<2.0	1300
04/23/13	<2.0	<2.0	1350
05/21/13	<2.0	<2.0	1360
06/18/13	<2.0	<2.0	1320
07/29/13	<2.0	<2.0	1280
08/26/13	<2.0	<2.0	1360
09/24/13	<2.0	<2.0	1330
10/22/13	<2.0	<2.0	1300
11/19/13	<2.0	<2.0	1330
12/17/13	<2.0	<2.0	1360

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

Minnesota Department of Health 2013 Milk Analysis Results for Prairie Island Nuclear Generating Plant Results and Detection Limits in pCi/L

Date Collected	Sr-89	Sr-90	K-40
01/22/13	<2.0	<2.0	1360
02/19/13	<2.0	<2.0	1380
03/19/13	<2.0	<2.0	1350
04/30/13	<2.0	<2.0	1350
05/28/13	<2.0	<2.0	1280
06/25/13	<2.0	<2.0	1320
07/23/13	<2.0	<2.0	1320
08/20/13	<2.0	<2.0	1340
09/17/13	<2.0	<2.0	1330
10/29/13	<2.0	<2.0	1320
11/26/13	<2.0	<2.0	1320
12/24/13	<2.0	<2.0	1340

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

2013 Minnesota Department of Health TLD Results Results in mrem

Monticello

	Number on					
Location	Table 3	<u>1st Qtr</u>	<u>2nd Qtr</u>	<u>3rd Qtr</u>	<u>4th Qtr</u>	<u>Average</u>
Control		21	18	21	*	
Control		22	17	19	*	
City Office	1	24	20	22	37	
CR75 Acacia	2	23	21	25	25	
CR75 120 St Bridge	3	24	20	24	26	
XCEL Training Center	4	23	20	22	29	
East Pole 433	5	23	20	23	37	
North Pole 485	6	22	21	24	29	
Olson Farm	7	23	20	21	25	
CR 50/CR11	8	21	19	20	34	
CR 75 - Monticello	10	23	22	25	29	
River Street	9	22	20	22	37	

Prairie Island <u>4th Q</u>tr Location 1st Qtr 2nd Qtr 3rd Qtr Average * Control 19 24 18 * Control 21 19 20 1 Sturgeon Lake Rd 19 19 19 23 2 Lock & Dam 3 21 21 17 21 3 Suter Farm 20 22 21 25 4 **ISFSI** Wakonade *22 *20 59 * 5 Tower 22 22 20 29 Gustafson Farm 6 22 37 24 23 7 Red Wing 23 21 22 27 8 **Training Center** *20 25 33 *

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

Minnesota Department of Health 2013 Well Water Analysis Results—City of Redwing Results and Detection Limits in pCi/L

Date Collected	Gross Alpha	Gross Beta	Tritium	K-40
02/05/13	<3.0	<4.0	<215	<58.70
05/14/13	<3.0	<4.0	<211	<59.97
08/06/13	<3.0	<4.0	<211	<56.49
11/13/13	<3.0	9.2	<211	<69.34

Minnesota Department of Health 2013 Community Water Analysis Results—City of Redwing Results and Detection Limits in pCi/L

Date Collected	Gross Alpha	Gross Beta	Tritium	K-40
01/08/13	<3.0	4.8	<215	<48.79
04/03/13	<3.0	<4.0	<215	<59.24
07/10/13	<3.0	4.8	<211	<57.09
10/02/13	<3.0	<4.0	<211	<54.02
11/13/13	<3.0	9.2	<211	<69.34

Date Collected	Gross Alpha	Gross Beta	Be-7	K-40	Sr-89	Sr-90	Tritium
03/12/13	<3.0	<4.0	<19.5	<45.9	<2.0	<2.0	<200
04/09/13	<3.0	4.2	<25.6	<50.4	<2.0	<2.0	<200
04/16/13	<3.0	4.8	<26.2	<65.2	<2.0	<2.0	<200
04/23/13	<3.0	4.0	<26.9	<68.6	<2.0	<2.0	<200
05/08/13	<3.0	<4.0	<22.1	<51.8	<2.0	<2.0	<200
05/21/13	<3.0	<4.0	<21.3	<65.7	<2.0	<2.0	<200
06/04/13	<3.0	<4.0	<18.1	<47.8	<2.0	<2.0	<297
06/12/13	<3.0	<4.0	<21.1	<50.0	<2.0	<2.0	<297
06/18/13	<3.0	<4.0	<20.4	<53.3	<2.0	<2.0	<297
06/25/13	<3.0	<4.0	<24.1	<51.2	<2.0	<2.0	<297
07/02/13	<3.0	<4.0	<19.6	<48.7	<2.0	<2.0	<297
07/10/13	<3.0	<4.0	<26.2	<51.1	<2.0	<2.0	<297
07/16/13	<3.0	<4.0	<18.3	<39.4	<2.0	<2.0	<200
09/03/13	<3.0	<4.0	<24.2	<56.0	<2.0	<2.0	<200
09/17/13	<3.0	<4.0	<25.9	<68.7	<2.0	<2.0	<200
09/24/13	<3.0	<4.0	<25.8	<77.9	<2.0	<2.0	<200
10/09/13	<3.0	<4.0	<17.8	<54.4	<2.0	<2.0	<200
10/15/13	<3.0	<4.0	<19.1	<59.5	<2.0	<2.0	<324
10/22/13	<3.0	<4.0	<21.4	<52.3	<2.0	<2.0	<324

Minnesota Department of Health 2013 Precipitation Water Results for St. Paul Results and Detection Limits in pCi/L

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