2023 Annual Radioactive Effluent Release Report

For Monticello Nuclear Generating Plant

For the period covering January 1, 2023 through December 31, 2023

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EXECUTIVE SUMMARY

Monticello Nuclear Generating Plant (MNGP) is a Boiling Water Reactor (BWR) located in central Minnesota. The plant releases small quantities of radioactive materials in gaseous form and does not make routine releases of radioactive liquids. Radioactive material in the environment due to plant operations remains below detectible levels, as discussed in the Annual Radiological Environmental Operating Report (AREOR) for MNGP. Technical Specifications limit the quantities of radioactive material that may be released, based on calculated radiation doses or dose rates. Dose to Members of the Public due to radioactive materials released from the plant is limited by Appendix I of 10 CFR 50 and by 40 CFR 190. Operational doses to the public during 2023 were calculated to be very small compared to the limits required by regulation and compared to other sources of radiation dose and pose no health hazard. Below is a brief summary of the significant sections of the report.

DOSE ASSESSMENT FOR OPERATION OF MNGP IN 2023

The Critical Receptor for MNGP has changed since the last report; the new critical receptor is located at 1.10 miles SE. The Critical Receptor was a Child with dose due to Ground Plane, Inhalation and Vegetable Ingestion pathways. The maximum Annual Organ Dose calculated for this receptor was 0.0328 mrem to the Thyroid. This annual dose is a small fraction of the 10 CFR 50, Appendix I guideline of 15 mrem to the Maximum Organ.

Maximum Gaseous Site Boundary Air Doses were calculated to be 0.00186 mrad gamma and 0.000646 mrad beta. These doses are also small compared to the 10 CFR 50, Appendix I guidelines for air dose of 10 mrad gamma and 20 mrad beta.

Effluent-related dose to individuals due to their activities inside the site boundary was found to be highest for a hypothetical worker in the subyard or Site Admin Building working 40 hours/week. The maximum organ dose due to gaseous effluents was found to be 0.0202 mrem Thyroid, after taking into account occupancy time.

The leak from the penetration between the Turbine and Reactor Buildings reported in the 2022 ARERR was fixed in March 2023. The total release was quantified at 829,000 ± 68,100 gallons containing a total activity of 14.0 ± 1.2 Ci. As a result of migration of the Tritium plume from the penetration leak, MNGP detected Tritium in Monitoring Wells that had the potential to interface with the river. Tritium was first detected in Monitoring Wells 33-A & 37-A on 7/27/23. There are two methods of determining river Tritium loading. The first method is river sampling, performed both upstream, and downstream. Analysis, performed by both in-house labs and third-party vendors with very low detection capability, has shown no detectable Tritium in the Mississippi River above naturally occurring background levels. The second is an analytical method. Using the most widely used and accepted groundwater modeling software and a set of conservative groundwater flow volume assumptions, an abnormal discharge of 0.167 Curies ^{3}H to the Mississippi River between the period of 7/27/23-12/31/23 period was estimated. This is far less than would be present in the river from naturally occurring sources over that period. This highest dose from this release was determined to be 0.0504 mRem to any Child organ at the nearest drinking water source. Out of an abundance of caution, MNGP has also installed a sheet pile wall on the river perimeter as part of the mitigation strategy to minimize any further migration of the source offsite.

The Likely Most-Exposed Individual due to all Uranium Fuel Cycle Operations for demonstration of compliance with 40 CFR 190 was determined to be the same as the Critical Receptor identified above. The doses received were calculated to be 0.0112 mrem Whole Body, 0.0337 mrem Thyroid, and 0.0290 mrem Bone (Max Organ other than Thyroid) using Ground Plane, Plume (noble gas), Inhalation and Vegetable Ingestion pathways. The assessment looked at Radiological Environmental Monitoring Program (REMP) Thermoluminescent Dosimeters (TLDs) and found that no Facility Related Dose was detected at any REMP TLD locations for MNGP in 2023.

ENVIRONMENTAL MONITORING

REMP results for 2023 did not detect radioactive material due to plant operation in offsite samples. This confirms that impact on the environment and the public due to plant effluents remains very low, consistent with the small dose values reported in the Dose Assessment section.

Two areas of particular interest with regard to environmental monitoring for the present report are TLD and groundwater monitoring. TLD results were analyzed using methodology based on ANSI/HPS N13.37-2014 and found to indicate no Facility Related Dose at, or beyond, the site boundary. This result indicates that direct radiation due to operating the plant or the Independent Spent Fuel Storage Installation (ISFSI) is not contributing measurable dose to people living near the site.

A 2023 4th quarter REMP TLD was positive, but it is not believed to be due to facility dose. It is believed to be the result of the heavy construction in the area. A Monticello RP Technician did a follow-up survey and found a background dose rate of 5 μrem/hr; there was nothing above background observed at the TLD location and surrounding areas. This condition was captured in MNGP CAP 501000082357; the background of this TLD and the others nearby will need to be reevaluated if this condition persists.

Groundwater monitoring of onsite wells found that seventeen monitoring well locations indicated tritium concentrations above those observed in rainwater captured onsite. The leak to groundwater that started in 2022 and the ensuing migration of the plume has resulted in significant changes in the groundwater. Tritium has been detected in the following wells: MW-4, MW-9, MW-9B, MW-10, MW-12A, MW-12B, MW-13A, MW-15A, MW-16A, MW-16B, MW-23A, MW-29A, MW-30A, MW-31B, MW-33A, and MW-37A. The highest concentration seen on site during the 2023 reporting period was at Monitoring Well 9B, 2,970,000 ± 7,980 pCi/l. This activity is above the REMP reporting threshold of 30,000 pCi/l per the MNGP ODCM. In total, 10 wells were above the REMP reporting threshold. Tritium was detected in newly developed MW-33A and MW-37A which resulted in MNGP reporting an abnormal discharge to the Mississippi River. There were three Ba-140 Groundwater samples that returned positive results, (MW-12A, MW-30A, MW-37A), and one MW-4 sample Cs-134 result that was positive.

INTRODUCTION

While many readers of this report will be very familiar with the scientific, design, and operational principles of nuclear power generation, the sections below provide a brief introduction for the reader that may not have a background in the nuclear industry.

ABOUT NUCLEAR POWER

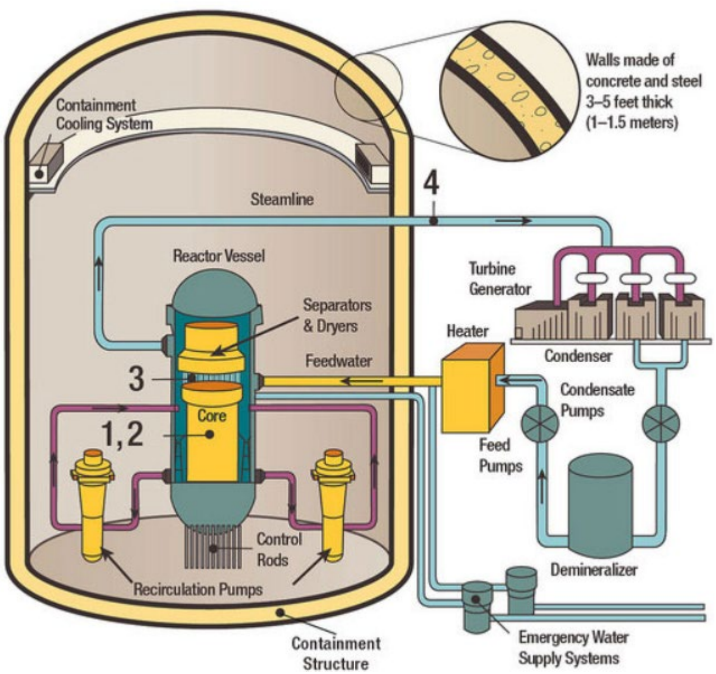

FIGURE 1: TYPICAL BOILING WATER REACTOR (BWR) DESIGN. (US NRC, REF. [11])

Commercial nuclear power plants are generally classified as either Boiling Water Reactors (BWRs) or Pressurized Water Reactors (PWRs), based on their design. Monticello Nuclear Generating Plant is classified as a BWR and the discussion below will focus on that technology.

Electricity is generated by a BWR similarly to the way that electricity is generated at other conventional types of power plants, such as those driven by coal or natural gas. Water is boiled to generate steam, the steam turns a turbine that is attached to a generator and the steam is condensed back into water to be returned to the boiler. Figure 1 shows a schematic representation for a typical BWR. What makes nuclear power different from these other types of power plants is that the heat is generated by fission and decay reactions occurring within and around the core containing fissionable uranium (U-235).

Nuclear fission occurs when certain nuclides (primarily U-233, U-235, or Pu-239) absorb a neutron and break into several smaller nuclides (called fission products) as well as some additional neutrons. Among the fission products are noble gases, Krypton (Kr) and Xenon (Xe), which must be removed along with other non-condensable gases (due to air leaks) from the condenser in order to maintain a working vacuum to pull steam across the turbine. Figure 2 shows an example of a fission reaction of U-235; of note in the diagram are two fission products (Ba-139 and Kr-95), two additional neutrons produced, and 200 MeV of energy released.

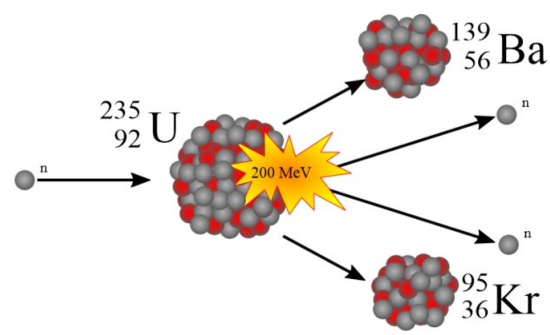

FIGURE 2: EXAMPLE OF A FISSION REACTION. (WIKIMEDIA COMMONS, REF. [12])

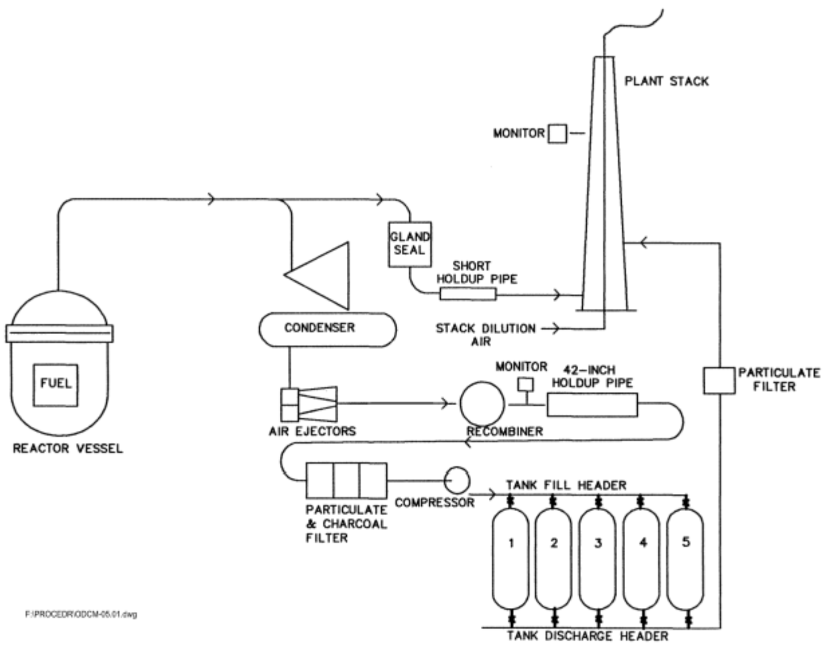

FIGURE 3: GASEOUS RADWASTE TREATMENT SYSTEM AT MNGP.

At MNGP, the non-condensable gases are treated with the Gaseous Radwaste Treatment System; this system reduces the amount of radioactive material released to the environment by holding gases from the main condenser in compressed gas tanks for a minimum of 50 hours to allow for decay of shorter-lived isotopes. The treated gases are released through the 100-meter Plant Stack. The Plant Stack provides additional dilution time for activity in the plume to dissipate prior to reaching the ground level where people could be exposed to the radioactive material that it contains. The Gaseous Radwaste Treatment System includes filtration to reduce particulate and iodine activity that is released; however, because filters are not perfectly efficient, small quantities of particulate, iodine and tritium activity are also released through the Plant Stack. Figure 3 provides a schematic representation of the Gaseous Radwaste Treatment System at MNGP.

ABOUT RADIATION DOSE

Ionizing radiation, including alpha, beta, and gamma radiation from radioactive decay, has sufficient energy to break chemical bonds in tissues and result in damage to tissue or genetic material. The amount of ionization that will be generated by a given exposure to ionizing radiation is quantified as dose. The units for dose are generally given in millirem (mrem) in the US.

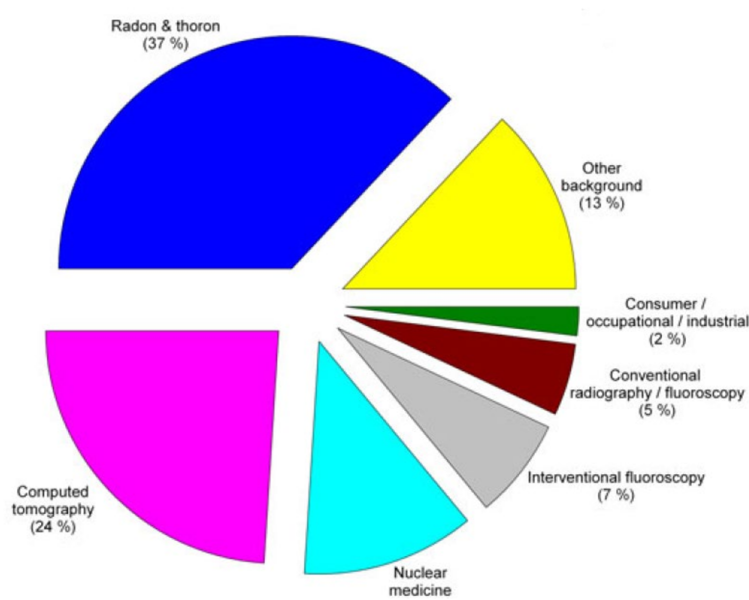

FIGURE 4: US POPULATION DOSE DISTRIBUTION FOR MAJOR SOURCES OF EXPOSURE. (NCRP REPORT 160, REF. [1])

The National Council on Radiation Protection (NCRP) has evaluated the population dose for the US and determined that the average individual is exposed to approximately 620 mrem per year (Ref. [1]). There are many sources of radiation dose, ranging from natural background sources to medical procedures, air travel, and industrial processes. Approximately half (310 mrem) of the average exposure is due to natural sources of radiation including exposure to Radon, cosmic radiation, and internal radiation and terrestrial due to naturally occurring radionuclides. The remaining 310 mrem of exposure is due to man-made sources of exposure, with the most significant contributors being medical (48%) due to radiation used in various types of medical scans and treatments. Of the remaining 2% of dose, most is due to consumer activities such as air travel, smoking cigarettes, and building materials. A small fraction of this 2% is due to industrial activities including generation of nuclear power.

Readers who are curious about common sources and effects of radiation dose that they may encounter can find excellent sources of information from the Health Physics Society, including the Radiation Fact Sheets (http://hps.org/hpspublications/radiationfactsheets.html), and from the US Nuclear Regulatory Commission website (http://www.nrc.gov/about-nrc/radiation.html). The Personal Annual Radiation Dose Calculator on the NRC website can be particularly interesting to look at (http://www.nrc.gov/about-nrc/radiation/around-us/calculator.html). When the facts are examined, it becomes apparent that the dose to the public due to routine nuclear plant operations is very small when compared to common background and medical sources of radiation exposure.

ABOUT DOSE CALCULATION

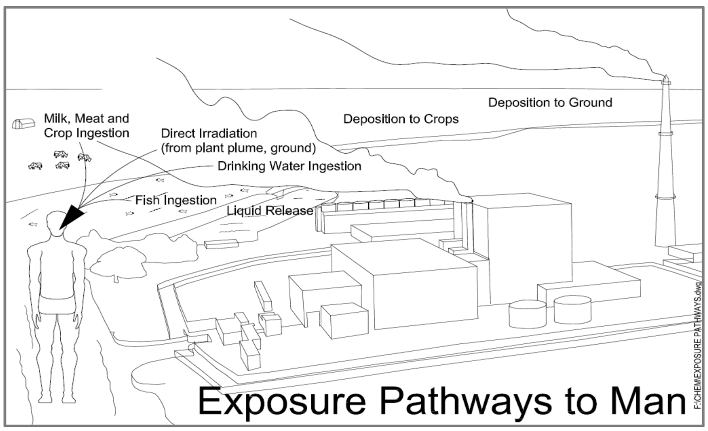

FIGURE 5: POTENTIAL EXPOSURE PATHWAYS TO MEMBERS OF THE PUBLIC DUE TO OPERATION OF MNGP.

Concentrations of radioactive material in the environment resulting from the operation of MNGP are very small and it is not possible to determine doses directly using measured activities of environmental samples. To overcome this, Dose Calculations based on measured activities of effluent streams are used to model the dose impact for Members of the Public due to plant operation and effluents. There are several mechanisms that can result in dose to Members of the Public, including: Ingestion of radionuclides in food or water; Inhalation of radionuclides in air; Immersion in a plume of noble gases; and Direct Radiation from the ground, the plant or from an elevated plume (See Figure 5).

The MNGP Offsite Dose Calculation Manual (ODCM) specifies the methodology used to obtain the doses in the Dose Assessment section of this report. The methodology in the ODCM is based on NRC Regulatory Guide 1.109 (Ref. [2]) and NUREG-0133 (Ref. [3]). Doses are calculated by determining what the nuclide concentration will be in air, on the ground or in food products based on plant effluent releases. Release points are continuously monitored to quantify what concentrations of nuclides are being released, then meteorological data is used to determine how much of the released activity will be present at a given location outside of the plant either deposited onto the ground or in gaseous form. Intake patterns and nuclide bio-concentration factors are used to determine how much activity will be transferred into animal milk or meat. Finally, human ingestion factors and dose factors are used to determine how much activity will be consumed and how much dose the consumer will receive. Inhalation dose is calculated by determining the concentration of nuclides and how much air is breathed by the individual.

Each year MNGP performs a Land Use Census to determine what potential dose pathways currently exist within a five-mile radius around the plant, the area most affected by plant operations. The Annual Land Use Census identifies the locations of vegetable gardens, nearest residences, milk animals and meat animals. The data from the census is used to determine who is likely to receive the highest radiation dose as a result of plant operation.

There is uncertainty in dose calculation results due to modeling atmospheric dispersion of material released and bioaccumulation factors, as well as assumptions associated with consumption and land-use patterns. Even with these sources of uncertainty, the calculations do provide a reasonable estimate of the order of magnitude of the exposure. Conservative assumptions are made in the calculation inputs, including the amounts of various foods and water consumed and the amount of air inhaled, such that the actual dose received is likely lower than the calculated dose. Even with the built in conservatism, doses calculated for the highest hypothetical exposed individual due to plant operation (on the order of less than 1 mrem) are a very small fraction of the annual dose that is received due to other sources that are not related to plant operation (about 620 mrem). The calculated doses due to plant effluents, along with REMP results indicating no identified radioactive material due to plant operations, serve to provide assurance that MNGP is not having a negative impact on the environment or people living near the plant.

DOSE ASSESSMENT FOR OPERATION OF MNGP DURING THE 2023 CALENDAR YEAR

Below is an assessment of radiation dose due to operation of MNGP during the period of January 1, 2023 through December 31, 2023. The doses calculated represent a small fraction of the dose limits contained in 40 CFR 190 and Appendix I of 10 CFR 50.

CRITICAL RECEPTOR

The Land Use Census for MNGP identifies real exposure pathways for radioactive effluents based on Ingestion (including Gardens, Milk Animals, and Meat Animals), Inhalation and Direct Radiation Exposure (Residence Locations). Inhalation and Direct Radiation Exposure are assumed to exist at all locations, while Ingestion Pathways are assumed only where vegetable gardens, milk animals, or meat animals are actively used for consumption. For any given location and pathway, all age groups are assumed to be present and consume conservative quantities of food products, water, and inhaled air (based on Table E-5 of Regulatory Guide 1.109, Ref. [2]). The person that is identified as having the largest potential exposure is called the Critical Receptor.

For 2023, the Critical Receptor identified by the MNGP Land Use Census has changed since the last Land Use Census. The Critical Receptor was identified as a Child at a Garden in the SE Sector 1.1 miles away from the plant and the max organ being Thyroid. A factor in the Critical Receptor changing was the update of ODCM-APP-A which provided updated dispersion and deposition values calculated using 2016-2020 data. This Critical Receptor is used for determination of compliance with the dose limits of 10 CFR 50, Appendix I. The Critical Receptor from the 2023 Land Use Census is included as Table 1.

TABLE 1: CRITICAL RECEPTOR 2023.

SECTOR	**SE**
DISTANCE	**1.1 miles**
PATHWAYS	**Ground Plane, Inhalation, and Vegetable**
Age Group	**Child**
Organ	**Thyroid**

OFFSITE DOSE DUE TO GASEOUS RELEASES

Critical Receptor dose results below were calculated using the 2023 effluent source term from Table 11 and Table 12. The Critical Receptor doses include dose from C-14 released between May 1 and September 30, in accordance with the methodology in the MNGP ODCM; this is because only C-14 released during the growing season will be incorporated into food products that contribute to the calculated dose for the Ingestion pathways. Dose due to noble gases released from the Plant Stack and Reactor Building Vent (RBV) release points have been determined for the SSE site boundary location.

The calculated quarterly and annual doses remain a small percentage of the Guidelines provided in Appendix I to 10 CFR 50.

TABLE 2: CRITICAL RECEPTOR ORGAN DOSE

Max Organ	Period	Dose*	10 CFR 50, Appendix I Design Objective	% of Guideline
Thyroid	Q1	0.0137 mrem	7.5 mrem/quarter	0.18%
Thyroid	Q2	0.00967 mrem		0.13%
Bone	Q3	0.0173 mrem		0.23%
Thyroid	Q4	0.00451 mrem		0.06%
Thyroid	**Annual**	**0.0328 mrem**	**15 mrem/year**	**0.22%**

**Includes dose from Iodines, Particulates, Tritium, and Carbon-14.*

TABLE 3: AIR DOSE DUE TO NOBLE GASES AT THE MAXIMUM SITE BOUNDARY LOCATION

Exposure Type	Period	Exposure*	10 CFR 50, Appendix I Design Objective	% of Guideline
Gamma Air Dose	Q1	0.000612 mrad	5 mrad/quarter	0.01%
	Q2	0.000260 mrad		0.01%
	Q3	0.000585 mrad		0.01%
	Q4	0.000403 mrad		0.01%
	Annual	**0.00186 mrad**	**10 mrad/year**	**0.02%**
Beta Air Dose	Q1	0.000154 mrad	10 mrad/quarter	0.0015%
	Q2	0.0000624 mrad		0.0006%
	Q3	0.000215 mrad		0.002%
	Q4	0.000215 mrad		0.002%
	Annual	**0.000646 mrad**	**20 mrad/year**	**0.006%**

**Includes dose due to Noble Gases only.*

OFFSITE DOSE DUE TO LIQUID RELEASES

As a result of the continued migration of the Tritium Plume following the abnormal release to the site environs in 2022, MNGP concluded that Tritium had the potential to reach the river. This determination was made after H-3 was detected in Monitoring Wells 33A & 37A on July 27, 2023. Tritium was subsequently detected in Monitoring Well 48-A, on 8/18/23, via a sample analyzed by MNGP's in-house laboratory. A follow up sample taken 8/23/23 was sent to MNGP's certified vendor laboratory and was below the minimum detectable concentration (MDC). The below analysis used the MW-48A in-house sample as an active interface for the period between the positive sample and the following less than detectable sample.

Our groundwater vendor used their modeling software (MODFLOW) to estimate the amount of activity released to the river. The software modeled the interface between monitoring wells positive for Tritium near the river and the river. This was done to estimate the groundwater exchange rate with the river at those interfaces. Tritium concentration between sample dates was linearly interpolated. A more in-depth explanation is provided in the Abnormal Releases/Discharges section.

A total abnormal discharge for 2023 period was quantified to be 0.167 Ci of Tritium. The max dose was determined to be at the nearest drinking water uptake, the St. Paul Water Intake, 34.2 mi downstream of the plant. The max dose was 0.0504 mrem to any Child Organ.

TABLE 4: LIQUID EFFLUENT DOSE

Organ	Dose	10 CFR 50, Appendix I Design Objective	% of Guideline
Whole Body	0.0504 mrem	3 mrem	1.68%
Max Organ	0.0504 mrem	10 mrem	0.50%

DOSE TO INDIVIDUALS DUE TO THEIR ACTIVITIES INSIDE THE SITE BOUNDARY

This section evaluates dose to non-occupationally exposed workers that may be onsite for various reasons. Groups of concern include cleaning contractors at the Receiving Warehouse and Site Administrative Building, and Xcel Energy Company Transmission and Distribution (T&D) crews working in the subyard. These workers are considered not to be occupationally exposed because the work activities are only remotely related to plant-operational activities. Use of a very conservative assumption of 40 hours/week spent inside the site boundary by these groups conservatively represents the most-exposed individual.

The annual whole body, skin and organ dose was computed using the 2023 source term using the noble gas dose calculation methodology provided in the ODCM. Elevated finite plume dose factors for the site boundary were used for Plant Stack noble gas total body doses; these dose factors provide a good approximation of the elevated finite plume dose factors that would be determined at the location of interest. The highest calculated organ dose to non-occupationally exposed workers within the site boundary due to plant effluent releases was determined to be 0.0202 mrem Thyroid for workers in the subyard or Site Administration Building. This computed dose includes a reduction by the factor of 40/168 to account for limited occupancy factor for these individuals. The calculated doses due to gaseous effluents for Whole Body, Thyroid and Skin for non-rad workers onsite are presented in Table 5.

TABLE 5: MAXIMUM EFFLUENT DOSE TO INDIVIDUALS DUE TO THEIR ACTIVITIES INSIDE SITE BOUNDARY

Organ	Dose*
Whole Body	0.0142 mrem
Thyroid	0.0202 mrem
Max Other Organ (Lung)	0.0146 mrem

**Includes doses due to Gaseous Effluent Releases of Noble Gases, Iodines, Particulates, and Tritium. Pathways calculated were Inhalation and Direct Radiation due to Elevated Plume and Ground-Plane Deposition.*

DOSE TO THE LIKELY MOST-EXPOSED MEMBER OF THE PUBLIC (40 CFR 190)

Compliance with 40 CFR 190, Environmental Radiation Protection Standards for Nuclear Power Operations, requires controlling dose to any member of the public due to all radiation sources from the uranium fuel cycle below 25 mrem to the whole body, 75 mrem to the thyroid and 25 mrem to any other organ. These limits apply to dose in the general environment outside of the site boundary due to effluents in addition to other sources of dose from the uranium fuel cycle that impact members of the public. In the case of Monticello Nuclear Generating Plant, no other nearby uranium fuel cycle sources are present and only doses due to effluents, direct radiation from the reactor and steam turbines and direct radiation due to the ISFSI are included in the assessment.

In order to determine the maximum exposed individual, it is necessary to determine whether direct radiation dose due to plant operations has been detected outside of the site boundary. MNGP has analyzed the 2023 REMP TLD data using methodology based on ANSI/HPS N13.37-2014 (Ref. [4]) and has determined that facility related radiation dose was not detected for any REMP TLD during 2023. Attachment B summarizes the REMP TLD data for 2023. See Direct Radiation Dose below on pg. 16 for more information on REMP TLDs.

Therefore, the Likely Most-Exposed Member of the Public would be the Critical Receptor identified in the 2023 Land Use Census. Doses due to Iodines, Tritium, Carbon-14, Particulates with > 8-day half-life, and Noble Gases were summed to determine total dose due to gaseous effluents, and the results are reported in Table 6.

TABLE 6: TOTAL DOSE DUE TO ALL URANIUM FUEL CYCLE SOURCES (40 CFR 190)

Dose Type	Organ	Dose	40 CFR 190 Limits	% of Limit
Direct Radiation Dose*	All	Not detected	-	0.00%
Noble Gases	Whole Body Skin	0.00093 mrem 0.00194 mrem	- -	0.01% 0.02%
Particulates, Iodines, Tritium and Carbon-14	Whole Body Thyroid Max Other Organ (Bone)	0.0103 mrem 0.0328 mrem 0.0281 mrem	- - -	0.04% 0.06% 0.12%
Total Dose **	**Whole Body** **Thyroid** **Max Other Organ (Bone)**	**0.0112 mrem** **0.0337 mrem** **0.0290 mrem**	**25 mrem** **75 mrem** **25 mrem**	**0.05%** **0.07%** **0.13%**

** Based on REMP TLD Results, as discussed in the Environmental Monitoring Section below.*
*** For the Critical Receptor identified in* Table 1*, above. Because Direct (TLD) dose is 0.0, then this represents the likely most-exposed individual. Doses in* ***bold*** *include contributions due to Iodines, Particulates, Tritium, Carbon-14, and Noble Gases.*

SUPPLEMENTAL INFORMATION

ABNORMAL RELEASES/DISCHARGES

Monticello Nuclear Generating Plant had an abnormal release to the site environs due to the leak from a penetration between the Turbine and Reactor Buildings. The leak was fixed in March 2023. Over the period of leakage between November 2022 - March 2023 the total release was quantified to be a volume of 829,000 ± 68,100 gallons containing a total activity of 14.0 ± 1.2 Ci. The activity from the nuclides in the release were calculated and provided in Table 7. Due to the uncertainty in the Tritium calculation and the small magnitude of the respective gamma species, the resulting sum appears the same as the Tritium result.

TABLE 7: ABNORMAL RELEASE TO THE SITE ENVIRONS

Nuclide	Activity Released (Ci)
H-3	14.0 ± 1.2
I-131	0.00090 ± 0.00026
I-133	0.010 ± 0.0015
I-135	0.023 ± 0.0076
Xe-133	0.0027 ± 0.00058
Xe-135	0.042 ± 0.0049
Total Activity	**14.0 ± 1.2**

As a result of the abnormal release above and the resulting migration of that plume, there was a potential for MNGP to have had an abnormal discharge to the Mississippi River. Monticello collected additional weekly upstream and downstream river samples to send to a specialized laboratory able to detect Tritium with a LLD of 19.3 pCi/l. These results are plotted in Figure 6 below, for results that were less than 19.3 pCi/l, 0 is the plotted value. The black line on 7/27/23 represents the first day of detection in monitoring wells that were near the Mississippi River. Per these results, no plant impact can be seen on the concentration of Tritium (i.e., above natural background level) in the Mississippi River.

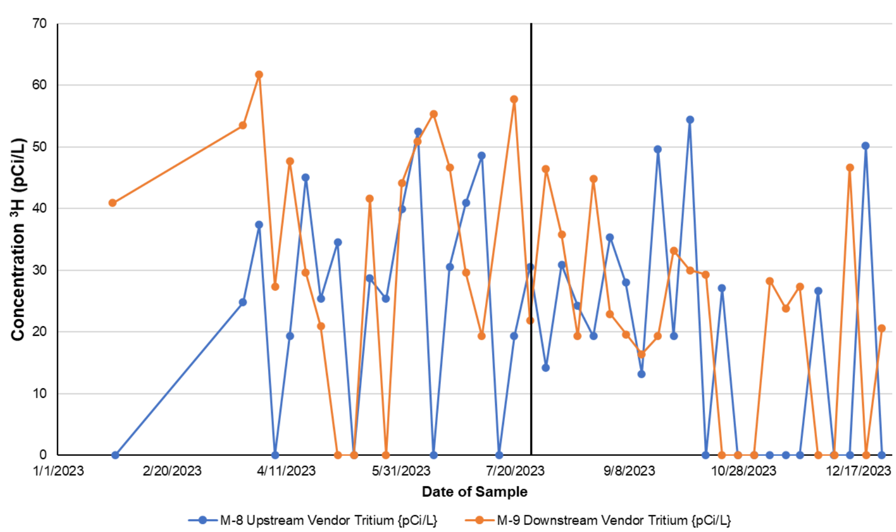

FIGURE 6: RIVER WATER TRITIUM SAMPLE RESULTS FROM SPECIALIZED LABORATORY

While Monticello did not detect any Tritium resulting from plant activities in the river, on July 27, 2023 Tritium was detected in newly developed Monitoring Wells 33-A & 37-A. It was subsequently detected in Monitoring Well 48-A on 8/18/23, all following samples of MW-48A were less than detectable. This positive result was from MNGP's in-house laboratory; the sample sent to our certified vendor laboratory on 8/23/23 was less than detectable. MW-48A was considered positive and an active interface between the date of the positive sample (8/18/23) and the subsequent vendor laboratory sample (8/23/23) being less than detectable. It is assumed groundwater continuously flows to the river, so our groundwater vendor modeled the flow between the tritium positive monitoring wells near the river and the river such the site could determine if a discharge had occurred.

The groundwater vendor used MODFLOW to determine flux to the river from each respective monitoring well interface. The model assumed each interface extended half the distance to the adjacent monitoring wells in either direction. The flux was calculated daily using the developed model. Tritium concentrations at each well interface were determined daily by linearly interpolating between samples. The wells containing Tritium were considered part of the interface until a sample was taken that was below the minimum detectable concentration. The site installed a Vertically Engineered Barrier (VEB) between the plume and the river from August 2023 - November 2023, this changed the flux calculations accordingly. The results of the analysis for the modeled abnormal discharge to the Mississippi River are given below in Table 8. The gamma species were only ever detected in MW-9 before decaying away; thus, no abnormal discharge of gamma species is reported. The total activity released was determined to be 0.167 Ci Tritium which resulted in a dose to 0.0504 mrem to any Child organ at the nearest receptor.

TABLE 8: MODELED ABNORMAL DISCHARGE FROM MNGP TO MISSISSIPPI RIVER

Month	^{3}H Activity Discharged (Ci)
July 2023*	0.00401
August 2023	0.0525
September 2023	0.0997
October 2023	0.00865
November 2023	0.00105
December 2023	0.00109
Total 2023	**0.167**

**July 2023 is the first date of detection, 7/27/23, through the end of the month.*

Remediation activities remain in progress to mitigate further abnormal discharges via this pathway. Also, the site continues to work with the vendor to determine any further abnormal discharges and will ensure they are included in the 2024 ARERR.

WATER STORAGE POND AND EVAPORATION

MNGP has established a new gaseous release point within this reporting period. The site in-serviced the Water Storage Pond system in August 2023. The Water Storage Pond is designed to hold the pumped groundwater as part of the ongoing Tritium remediation efforts. Over time some of the Tritiated Water within the Storage Pond has naturally evaporated. The site identified this as a new gaseous release point.

Before the Water Storage Pond was placed in service, the site used temporary above ground storage tanks to contain the remediated Tritiated water. The evaporation from these tanks was accounted for as well.

A total of 0.388 Ci of Tritium released via natural evaporation from the temporary tanks and the Water Storage Pond is accounted for during this reporting period.

ENVIRONMENTAL MONITORING

The REMP at MNGP provides additional assurance that there are no significant dose or environmental impacts due to operation of the plant. The MNGP ODCM specifies REMP requirements, including TLD samples for direct radiation exposure, Water Samples (Surface, Ground, and Drinking Water sources), Air sampling for Particulate and Iodine radionuclides, Vegetation and Milk sampling, and sampling of Shoreline Sediments, and Fish. REMP sampling continues to indicate that radionuclides in the environment due to operation of MNGP remain below detectable levels.

A 2023 4th quarter REMP TLD was positive, M01A, but it is not believed to be due to facility dose. The vendor was contacted and verified the result was accurate. It is believed to be the result of the heavy construction in the area. A Monticello RP Technician did a follow-up survey and found a background dose rate of 5 µrem/hr. There was no indication of anything above background at the TLD location. This condition was captured in MNGP QIM 501000082357; the background of this TLD and the others nearby will need revaluated if this condition persists.

Complete results and analyses for MNGP REMP Sampling in 2023 are available in the 2023 AREOR for MNGP (Ref. [5]).

CHANGES IN LAND USE AND NON-OBTAINABLE MILK OR VEGETABLE SAMPLES

A single milk cow was located at 3.25 miles in the NNE sector during the 2023 Land Use Census. This location included milk, meat, and garden ingestion pathways. Discussion with the animal's owner indicated that the cow provides enough milk for their use, but not enough extra to reliably obtain the 1-2 gallons per sample period required for analysis. Due to the relatively low deposition parameter, the calculated dose at this location remains lower than the dose at the critical receptor. ODCM-07.01 (based on NUREG-1302 (Ref. [6])) states that milk samples are required for three locations within 1 mile or three locations where calculated doses are greater than 1 mrem/year. As stated above the location is greater than 1 mile away and the low dispersion parameter has total calculated dose to infant thyroid by all pathways at 0.0146 mrem, thus a milk sample is not required.

Milk samples were not available during 2023 due to the limited milk supply of the animal, as discussed above. The site missed the compensatory June Vegetation sampling; the sample was collected but it was not shipped to the vendor laboratory within the required 3 days (see MNGP QIM 501000075372.) Compensatory samples were collected and analyzed (per ODCM-07.01, Table 1) for July, August, and September.

Corn and Potato sampling was not required because no routine liquid discharges were made during the growing season. Additionally, the Land Use Census found that there are no water use permits for irrigation using water from the Mississippi River within 5 miles downstream of the plant.

DIRECT RADIATION DOSE MONITORING

TLDs are stationed around MNGP to measure the ambient gamma radiation field. Monitoring stations are placed near the site boundary and approximately five (5) miles from the reactor, in locations representing sixteen (16) compass sectors. Other locations are chosen to measure the radiation field at places of special interest such as nearby residences, meeting places and population centers. Control sites are located farther than ten (10) miles from the site, in areas that will not be affected by plant operations.

In order to reliably determine whether direct radiation dose due to plant operation has been detected at or beyond the site boundary, Monticello has analyzed REMP TLD's using methodology based on ANSI/HPS N13.37-2014 (Reference [4]), starting with the 2015 ARERR. This methodology uses the historical average background TLD dose for each location and the Minimum Differential Dose (MDD) based on the performance of the TLD system to determine if a statistically significant dose due to plant operation has been detected. A table summarizing the 2023 TLD analysis is presented in Attachment B (pg. 32). Complete results for the REMP TLDs are also reported in the AREOR.

Historically, the site used guidance from NUREG-0543, METHODS FOR DEMONSTRATING LWR COMPLIANCE WITH THE EPA URANIUM FUEL CYCLE STANDARD (40 CFR PART 190), which states in Section IV, "As long as a nuclear plant site operates at a level below the Appendix I reporting requirements, no extra analysis is required to demonstrate compliance with 40 CFR Part 190". This statement remains true, assuming that there are no potentially significant sources of direct radiation dose. With the inclusion of spent fuel storage onsite (ISFSI), it is necessary to verify that direct radiation does not reach a level that would cause the total dose to exceed the 40 CFR 190 limits. Hence, the more reliable ANSI/HPS methodology was implemented in order to determine direct radiation dose moving forward.

The ISFSI at Monticello Nuclear Generating Plant was constructed west of the plant in 2007. The initial loading campaign was completed in 2008 with 10 Horizontal Storage Modules (HSM's) loaded with spent fuel. In 2013 an additional five HSM's were loaded with spent fuel. In 2016 one additional HSM was loaded. In 2018 an ISFSI campaign loaded an additional 14 HSM's, bringing the total number of stored modules to 30.

GROUNDWATER PROTECTION PROGRAM (GWPP)

Onsite groundwater is monitored at MNGP in accordance with the guidance presented in NEI 07-07 (Reference [7]). This initiative was developed by NEI and nuclear industry stakeholders to address a gap in industry guidance and practices for monitoring groundwater and responding to inadvertent releases of radioactive material with the potential to contaminate groundwater. The initiative sets forth voluntary requirements for evaluating and monitoring Systems, Structures and Components (SSCs) with a high risk of contaminating groundwater. Additionally, the guidance specifies reporting requirements for onsite groundwater sample results that exceed REMP reporting thresholds and that all onsite groundwater results are reported in either the ARERR (Effluent) or AREOR (REMP) reports.

The current groundwater monitoring program includes 60 monitoring wells and 8 pumping wells at 40 different locations. 20 of the locations include a “nested” configuration, where one sample is taken at the level of the water table (GWPP locations ending with an A) while a second sample can be taken from deeper water (GWPP locations ending with a B). A map of groundwater sample locations is provided in Attachment C (pg. 33).

Since the previous report, 41 additional monitoring wells have been developed. As a part of the investigation into the Tritium plume migration, several wells were developed, sampled, and analyzed in Monticello’s in-house laboratory. If Tritium was not detected in the newly developed well, it was noted for the site vendor’s groundwater modeling purposes. These wells were periodically sampled and analyzed in-house for Tritium to verify the plume had not undergone an unforeseen migration. Only the wells sent to our certified vendor laboratory are included in the full 2023 groundwater data in Attachment D (pg. 37). The plume has migrated throughout the site environs resulting in several additional monitoring wells being positive for Tritium that were not previously above detectable concentration.

As a part of the Water Storage Pond installation, Monitoring Wells 101, 102, and 103 have been developed around the pond. This, along with the Water Storage Pond Leak Detection System, ensures that the pond is not leaking into the surrounding groundwater. They are only tested for Tritium currently, for there is no pathway for gamma isotopes to these wells. The contents of water transferred to the pond are verified free of gamma nuclides before addition.

The site has also developed pumping wells. Some of these have replaced existing monitoring wells and some are new developments. Monitoring Well 10 and Monitoring Well 13A were over-drilled and converted to Pumping Well 10A (PW-10A) and Pumping Well 13A (PW-13A) respectively. These wells are still sampled as before; they are labeled as both in Attachment D. The purpose of the pumping wells is remediation. Additionally, Pumping Wells 4A, 9A, 16A, and 30A are located near the monitoring well of the same number. There are also Pumping Wells 1 and 22A. The pumping wells are included on the map in Attachment C. The site is pumping the Tritium containing groundwater to the Water Storage Pond where it is then stored (evaporation is accounted for).

The wells are sampled at different frequencies depending on how likely they are to include non-natural activity; Table 9 summarizes the current sampling frequencies for groundwater monitoring wells at MNGP. Wells that have historically read only at background levels and are unlikely to become contaminated are monitored once annually for tritium and gamma-emitting nuclides. Wells that have historically indicated tritium near background levels but are more likely to include activity from leaks or spills are monitored quarterly for tritium and gamma-emitting nuclides. The remaining wells are monitored more frequently to ensure that high-risk SSCs are adequately monitored and that existing activity is characterized with sufficient resolution; these wells are monitored monthly for tritium and quarterly for gamma-emitting nuclides. Several wells are considered sentinel wells that would indicate if radioactive material were migrating offsite into the Mississippi River; these wells are indicated in **bold** in Table 9, below. As a result of the ongoing response to the abnormal release to the groundwater and resulting migration of the plume, several new monitoring wells were installed downstream (i.e., between the site and the river) of former sentinel wells.

TABLE 9: GROUNDWATER MONITORING WELL SAMPLING FREQUENCIES.

Tritium Sampling Frequency	Number of Monitoring Wells	Groundwater Monitoring Well Identities*
Quarterly	9	MW-1, **MW-2**, **MW-3**, **MW-4B**, MW-11, MW-13B, **MW-14**, **MW-15B**, **MW-23A**, **MW-37A**
Monthly	12	MW-4, MW-9, MW-9B, MW-10, MW-12A, MW-12B, MW-13A, **MW-15A**, MW-16A, MW-29A, MW-30A, **MW-33A**
Annual	16	MW-1B, MW-4B, MW-5, MW-6, MW-7, MW-8, MW-10B, MW-16B, MW-26A, MW-26B, MW-31B, MW-48A, MW-101[1], MW-102[1], MW-103[1]
Developed, Not Currently Sampled	24	MW-17A, MW-17B, MW-19A, MW-19B, MW-20A, MW-21A, MW-23B, MW-24, MW-27A, MW-27B, MW-28A, MW-28B, MW-29B, MW-30B, MW-31B, MW-33B, MW-37B, MW-48B, MW-50A, MW-58A, MW-66A, MW-67A, MW-67B, MW-68A

** Locations in **BOLD** typeface are considered sentinel wells.*
[1] MW-101, MW-102, MW-103 are tested for Tritium only

Water depths are determined at 33 currently sampled monitoring wells on a monthly basis and the data is used to determine static water levels. The Pumping Wells PW-10A and PW-13A do not have their levels currently determined. Monitoring Wells 101, 102, and 103 currently have their water depth measured on a semi-annual basis. It has been noted that groundwater generally flows toward the river, but there are fluctuations in the gradient and periods of flow reversal have been observed when river level is particularly high.

Additional sampling performed under the guidance of the GWPP includes sampling water from storm drains. These samples periodically indicate elevated tritium activities due to recapture of tritium from gaseous effluents. Zero samples of the storm drain were above the minimum detectable concentration in 2023. Rain and snow samples taken onsite indicate that tritium is commonly detected in rainwater at concentrations historically ranging from approximately 200 pCi/l to nearly 1,000 pCi/l. The highest detected concentrations of tritium in rain and snow samples around MNGP have approached 2,000 pCi/l. The site has also established new rain collection sites around the Water Storage Pond to assess the amount of recapture from the pond as it evaporates. In 2023, the concentration of tritium in rain and snow samples ranged between <193 to 968 pCi/l, with an average of 413 pCi/l.

Results for 2023 indicate that monitoring well MW-9A contained tritium activities ranging from 174,000 ± 1,890 pCi/l to 2,700,000 ± 7,610 pCi/l, with an average of 800,250 pCi/l. A comparison of peak, average, and the range of tritium concentrations by year in MW-9A is presented in Table 10 and Figure 6, below. The annual averages below include MDA values for cases where activity was <MDA.

TABLE 10: ANNUAL TRITIUM ACTIVITY TRENDS MW-9A FROM 2009-2023.

Year	Peak H-3 Activity MW-9A (pCi/l)	Average H-3 Activity MW-9A (pCi/l)
2009	21,727	9,117
2010	21,127	4,549
2011	2,317	549
2012	770	306
2013	15,124	4,147
2014	5,911	2,522
2015	6,493	1,679
2016	6,559	2,423
2017	5,306	1,553
2018	4,400	1,252
2019	5,850	1,805
2020	1,660	713
2021	8,220	2,185
2022	4,220,000	851,329
2023	2,700,000	800,250

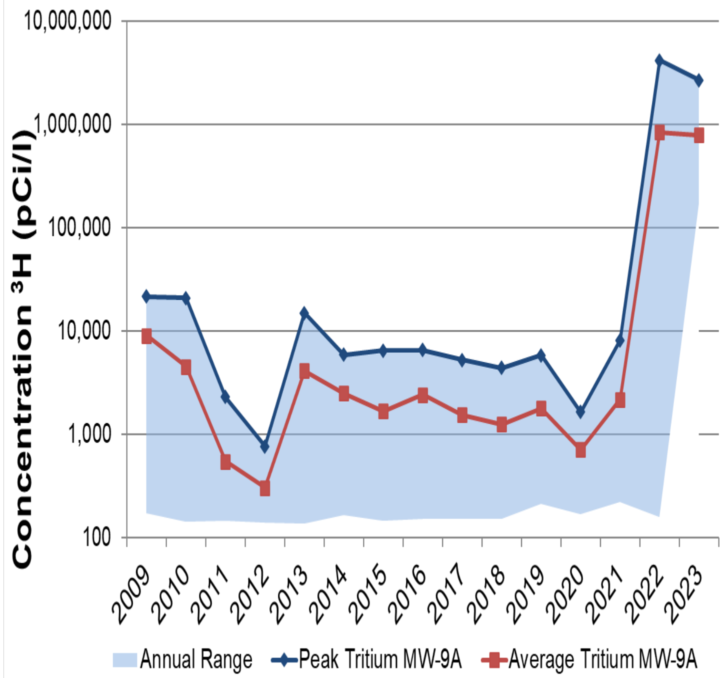

FIGURE 7: ANNUAL TRITIUM ACTIVITY TRENDS MW-9A FROM 2009-2023.

Tritium has been detected in the following wells: MW-4, MW-9, MW-9B, MW-10, MW-12A, MW-12B, MW-13A, MW-15A, MW-16A, MW-16B, MW-23A, MW-29A, MW-30A, MW-31B, MW-33A, and MW-37A. All other monitoring wells indicated activities that were less than 300 pCi/l.

The site had 4 samples in 2023 return positive gamma results. In the 3/21/23 MW-12A sample, Ba-140 was detected at a concentration of 16.6 ± 14.7 pCi/l. The 8/23/23 MW-30A sample detected Ba-140 at a concentration of 16.6 ± 18.7 pCi/l. The 08/28/23 sample of MW-37A detected Ba-140 at a concentration of 15.8 ± 12.1 pCi/l. The MW-4 sample taken 3/21/23 detected Cs-134 at a concentration of 3.03 ± 2.82 pCi/l. Due to the high uncertainty in each of these results and following samples returning to below MDC, it is the conclusion of the site that no gamma-emitting nuclides were detected related to site operation in 2023. All tritium results were obtained as required. The full 2023 onsite groundwater well monitoring results are presented in Attachment D (pg. 37).

The LLD for groundwater monitoring of tritium at MNGP during 2023 was less than 300 pCi/l, in accordance with station processes and procedures; this LLD is far below the required REMP LLD (2,000 pCi/l) and very far below the REMP reporting threshold for water samples (20,000 pCi/l). The site has chosen to use this low LLD in order to quickly identify and characterize any potential contamination sources. The LLD as reported represents the activity at which there is a 95% chance that a sample containing that level of activity would be characterized as detected with only a 5% chance that the sample would be characterized as a blank.

The Xcel Energy Groundwater Monitoring Program (Ref. [8]) has established a Baseline Threshold Level for tritium, defined as the 95% Confidence Level determined using Student's t test and a statistical mean of ten or more sample results; at this level a sample would be considered to be statistically different from background, based on analytical results. For wells that consistently indicate near or below LLD, the Baseline Threshold Level is 400 pCi/l. The program also provides an Action Level of 3-times the Baseline Threshold Level, or 1200 pCi/l for these wells; at this level, additional action is taken to evaluate the cause of the change in activity and work through the Corrective Action process to address the concern. Tritium was detected in Sentinel Wells which resulted in the abnormal discharge of Tritium being reported as discussed in the Abnormal Releases/Discharges section of this report.

RADIOACTIVE SOLID WASTE DISPOSAL

During 2023, a total of 76.4 Ci of Solid, Low-Level Radioactive waste was shipped offsite for disposal, which contained purely Class A waste. A total of 17 shipments were made to two locations. Tables summarizing types and quantities of waste shipped are included in Attachment A, Table 16.

EFFLUENT RADIATION MONITORS OUT OF SERVICE FOR GREATER THAN 30 DAYS

The Water Storage Pond Transfer System Radiation Monitor was out of service beyond 30 days. The site has not installed the Water Storage Pond Transfer System Radiation Monitor yet. However, the monitor and its associated compensatory actions were added to the ODCM so there was governance on how to operate the system until the radiation monitor is installed. The required compensatory samples were collected for operation of the system in batch mode. The current expectation of the site is to have the radiation monitor installed and in-serviced by the end of June 2024.

CHANGES TO THE ODCM

ODCM-01.01, Introduction, was revised to align the definition of an abnormal discharge and abnormal release to that of Reg Guide 1.21 Rev 3 which is the most current industry standard. The site previously used the terms interchangeably, which is how they are presented in Reg Guide 1.21 Rev 1.

ODCM-02.01, Liquid Effluents & ODCM-03.01, Gaseous Effluents, were both updated to include the Water Storage Pond as a new gaseous release point as well as associated equipment and systems. The initial change included equipment that was not installed on site

ODCM-05.01, Gaseous Effluents Calculations, was updated to include how evaporation from the pond will be determined. Tables 26 and 27 for the RBV WRGMs and the Stack WRGMs respectively, were also updated to correspond with the new X/Q and D/Q values for the site. A follow-up change corrected errors within the text of Table 27; the numbers within the table did not change.

ODCM-07.01, Radiological Environmental Monitoring Program, was updated to include a new Figure 1 which showed the location of the new Critical Receptor. REMP TLD M-15B, previously named Red Oak Wild Bird Farm, had its name changed to Barton Ave NW. The TLD location did not change; the bird farm is no longer present at this location.

ODCM-APP-A was updated with new dispersion and deposition (X/Q and D/Q respectively) values using MET data from 2016-2020. The update to ODCM-APP-A also included the parameters for the new gaseous release point, the Water Storage Pond. A follow-up update was performed after an error was found in the X/Q & D/Q report from the vendor. It was discovered ODCM-APP-A contained zeros for the dispersion parameters for the N, NNE, NE, ENE, E, ESE, SE, and SSE sectors for 2.7 miles short-term Offgas Stack releases. This issue was captured in MNGP QIM 501000077554. The vendor was contacted who confirmed the error and provided an updated report with the missing values. The ODCM was updated to include these values.

CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

In 2023, Monticello upgraded the resin drying system from the existing equipment (RDS-1000) to a Self-Engaging Resin Dewatering System (SERDS). As part of this project, the Process Control Program (PCP) was revised to update the affected portions to reflect the new equipment. This change did not affect any processes or commitments within the PCP.

CORRECTIONS TO PREVIOUS ARERRS

There is a correction to the 2022 ARERR included with this report. The 2022 ARERR Groundwater Data was corrected to include the detection of gamma isotopes by our vendor laboratory. The samples were previously identified as being below required LLD but above the site's certified vendor laboratory's MDC. This correction fixes the data in Attachment D and the related text in the report.

REFERENCES

[1] "NCRP Report No. 160: Ionizing Radiation Exposure of the Population of the United States," National Council on Radiation Protection and Measurements, Bethesda, MD, 2009.

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[3] W. C. Burke and F. J. Congel, "NUREG-0133: Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," US Nuclear Regulatory Comission, Washington D.C., 1978.

[4] "ANSI/HPS N13.37-2014: Environmental Dosimetry - Criteria for System Design and Implementation," Health Physics Society, McLean, VA, 2014.

[5] Arcadis, "2023 Annual Radiological Environmental Operating Report for Monticello Nuclear Generating Plant," Xcel Energy, Monticello, MN, 2023.

[6] W. W. Meinke and T. H. Essig, "NUREG-1302: Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors," U.S. Nuclear Regulatory Commission, Washington, D.C., 1991.

[7] "NEI 07-07: Industry Ground Water Protection Initiative - Final Guidance Document, Rev. 1," Nuclear Energy Institute, Washington, DC, 2019.

[8] "FP-CY-GWPP-01, "Fleet Groundwater Protection Program"," Xcel Energy (internal procedure), Minneapolis, MN, 2024.

[9] J. de Lambert and W. A. Carlson, Carlson McCain, Inc., Lino Lakes, MN, 2024.

[10] "Offsite Dose Calculation Manual for Monticello Nuclear Generating Plant," Xcel Energy, Monticello, MN.

[11] "Boiling Water Reactors (BWRs)," 15 January 2015. [Online]. Available: http://www.nrc.gov/reactors/bwrs.html. [Accessed 11 April 2016].

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ATTACHMENT A: 2023 ARERR RELEASE SUMMARY TABLES

Covering the Operating Period of Jan – Dec 2023

Facility: Monticello Nuclear Generating Plant

Licensee: Xcel Energy

License Number: DPR-22

1. Regulatory Limits

a. Fission and activation gases:
   1. **Quarterly** dose at or beyond the site boundary
      5 mrad gamma radiation
      10 mrad beta radiation
   2. **Annual** dose at or beyond the site boundary
      10 mrad gamma radiation
      20 mrad beta radiation

b. Iodine-131, Iodine-133, Tritium and Particulates, half-lives >8 days:
   1. **Quarterly**
      7.5 mrem to any organ
   2. **Annual**
      15 mrem to any organ

c. Liquid Effluents:
   1. **Quarterly:**
      1.5 mrem total body
      5 mrem to any organ
   2. **Annual:**
      3 mrem total body
      10 mrem to any organ

2. Maximum Permissible Concentrations

a. Fission and Activation Gases:
   10 CFR 20, Appendix B, Table 2, Column 1

b. Iodine-131, Iodine-133, Tritium and Particulates, half-lives >8 days:
   10 CFR 20, Appendix B, Table 2, Column 1

c. Liquid effluents:
   10 times 10 CFR 20, Appendix B, Table 2, Column 2
   2.0E-4 µCi/ml for dissolved and entrained gases

3. Average Energy

(Not Applicable)

4. Measurements and Approximations of Total Radioactivity

a. **Noble Gases:**

Gross noble gas activity released from Reactor Building Vent and Plant Stack exhaust streams is continuously monitored for variation in release rate. Weekly gamma isotopic analysis is performed on grab samples from exhaust streams. Releases from the Plant Stack are modeled to account for varying noble gas concentrations due to decay tank releases; this methodology was implemented at the site in January 2018 in order to improve the accuracy of noble gas release and dose estimates. The uncertainty estimate for noble gas releases was increased to ±50% in 2019; this accounts for the estimated uncertainty in the noble gas release model along with other uncertainties associated with sampling and counting. 75% of the noble gases released in 2019 consist of Xe-137, Xe-133, and Xe-135; these gases are affected by increased uncertainty due to low concentration (Xe-137), wide variation in concentration (Xe-133) and periodic increases in activity (Xe-135).

b. **Iodines in Gaseous Effluent:**

Continuous sampling using charcoal cartridges with isokinetic sample flow drawn from Reactor Building Vent and Plant Stack exhaust streams. Weekly gamma isotopic analysis.

c. **Particulates in Gaseous Effluent:**

Continuous sampling using particulate filters with isokinetic sample flow drawn from Reactor Building Vent and Plant Stack exhaust streams. Weekly analysis for gamma isotopic and gross alpha. Gross alpha samples are decayed for approximately 9 days prior to analysis to allow for decay of natural activity. Quarterly composites are analyzed for Sr-89 and Sr-90.

d. **Tritium in Gaseous Effluent:**

Monthly grab samples from Reactor Building Vent and Plant Stack exhaust streams followed by liquid scintillation counting.

e. **Liquid Effluents**

Tank sample analyzed prior to each planned release and continuous monitoring of gross activity during planned release.

5. Batch Releases

a. **Liquid**

1.	Number of batch Releases	0	
2.	Total time period for batch releases	0	min
3.	Maximum time period for a batch release	0	min
4.	Average time period for a batch release	0	min
5.	Minimum time period for a batch release	0	min
6.	Average river flow during release	N/A	cfm

b. **Gaseous**

1.	Number of batch Releases	5	
2.	Total time period for batch releases	4030.0	min
3.	Maximum time period for a batch release	1617.0	min
4.	Average time period for a batch release	806.5	min
5.	Minimum time period for a batch release	59.0	min

6. Abnormal Releases

a. **Liquid**

1.	Number of releases:	6	
2.	Total activity released:	1.67E-01	Ci

b. **Gaseous**

1.	Number of releases:	0	
2.	Total activity released:	0	Ci

Table 11: Gaseous Effluents – Summation of All Releases (RG-1.21 Table 1A)

Type of Effluent	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est. Total Error, %
A. Fission & Activation Gases						
1. Total Release	Curies	2.65E+01	1.29E+01	1.67E+01	1.57E+01	5.00E+01
2. Average Release Rate for Period	µCi/sec	3.40E+00	1.64E+00	2.10E+00	1.97E+00	
3. Percent of Applicable Limit	%	1.19E-02	5.15E-03	1.12E-02	7.84E-03	
B. Iodines						
1. Total Iodine-131	Curies	1.10E-03	3.98E-04	5.50E-04	4.04E-04	3.20E+01
2. Average Release Rate for Period	µCi/sec	1.41E-04	5.06E-05	6.92E-05	5.08E-05	
3. Percent of Applicable Limit	%	1.10E-01	3.98E-02	5.50E-02	4.04E-02	
C. Particulates						
1. Total Particulates (Half-lives > 8 days)	Curies	1.45E-04	2.93E-04	2.07E-04	2.22E-04	4.00E+01
2. Average Release Rate for Period	µCi/sec	1.87E-05	3.72E-05	2.60E-05	2.79E-05	
3. Percent of Applicable Limit	%	4.95E-03	1.06E-02	5.89E-03	8.34E-03	
4. Gross Alpha Activity	Curies	3.64E-07	5.53E-07	6.23E-07	3.83E-07	5.00E+01
D. Tritium						
1. Total Release	Curies	4.91E+00	3.78E+00	4.20E+00	4.37E+00	3.30E+01
2. Average Release Rate for Period	µCi/sec	6.31E-01	4.80E-01	5.28E-01	5.50E-01	
3. Percent of Applicable Limit	%	9.72E-03	7.32E-03	1.15E-02	1.65E-02	
E. Carbon-14						
1. Total Release	Curies	2.01E+00	1.21E+00	1.81E+00	1.73E+00	N/A

Table 12: Gaseous Effluents - Elevated Releases (RG-1.21 Table 1B)

		Continuous Mode				Batch Mode			
Nuclides Released	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
1. Fission and Activation Gases									
Ar-41	Curies	2.42E-02	1.24E-02	8.94E-02	2.50E-02	9.49E-03	1.13E-02	0.00E+00	0.00E+00
Kr-85M	Curies	1.84E-01	2.00E-01	2.39E-01	1.15E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-87	Curies	3.08E-01	2.46E-01	2.35E-01	1.62E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-88	Curies	4.41E-01	5.05E-01	5.46E-01	3.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	Curies	9.54E+00	4.22E+00	5.26E+00	5.47E+00	5.02E-03	0.00E+00	0.00E+00	0.00E+00
Xe-133m	Curies	2.76E-01	4.24E-02	5.85E-02	9.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135	Curies	2.45E+00	1.70E+00	2.81E+00	1.56E+00	9.22E-04	1.49E-03	0.00E+00	0.00E+00
Xe-135m	Curies	2.68E+00	1.23E+00	1.70E+00	1.82E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-137	Curies	4.68E+00	1.86E+00	1.57E+00	1.87E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-138	Curies	4.98E+00	2.67E+00	2.85E+00	3.38E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Curies	2.56E+01	1.27E+01	1.53E+01	1.48E+01	1.54E-02	1.28E-02	0.00E+00	0.00E+00
2. Iodines									
I-131	Curies	3.81E-04	2.59E-04	4.55E-04	3.36E-04	0.00E+00	2.61E-08	0.00E+00	0.00E+00
I-132	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.42E-08	0.00E+00	0.00E+00
I-133	Curies	2.68E-03	1.93E-03	3.17E-03	2.52E-03	5.52E-08	8.00E-08	0.00E+00	0.00E+00
I-135	Curies	4.19E-03	3.00E-03	5.04E-03	4.06E-03	0.00E+00	1.21E-07	0.00E+00	0.00E+00
Total for Period	Curies	7.25E-03	5.19E-03	8.67E-03	6.92E-03	5.52E-08	3.01E-07	0.00E+00	0.00E+00
3. Particulates									
Ag-110m	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-08	0.00E+00	0.00E+00	0.00E+00
Ba-140	Curies	2.44E-05	2.04E-05	2.64E-05	2.22E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	Curies	1.99E-07	8.16E-07	6.74E-08	1.61E-08	0.00E+00	6.72E-09	0.00E+00	0.00E+00
Co-60	Curies	1.63E-06	5.30E-06	2.29E-06	1.08E-06	0.00E+00	3.34E-08	0.00E+00	0.00E+00
Cr-51	Curies	9.10E-07	4.48E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	Curies	4.89E-08	1.01E-06	2.55E-07	2.09E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	Curies	0.00E+00	2.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mn-54	Curies	1.84E-07	8.75E-07	2.08E-07	1.64E-07	1.61E-08	0.00E+00	0.00E+00	0.00E+00
Os-191	Curies	7.94E-07	4.08E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-89	Curies	8.03E-06	3.31E-05	8.53E-06	7.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	Curies	0.00E+00	4.54E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Curies	3.62E-05	6.71E-05	3.78E-05	3.12E-05	2.64E-08	4.02E-08	0.00E+00	0.00E+00
4. Tritium									
H-3	Curies	4.71E-01	7.03E-01	9.45E-01	1.10E+00	0.00E+00	4.33E-03	0.00E+00	0.00E+00
5. Carbon-14									
C-14	Curies	2.01E+00	1.21E+00	1.81E+00	1.73E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 13: Gaseous Effluents – Reactor Building Vent & Water Storage Pond Releases (RG-1.21 Table 1C)

		Continuous Mode				Batch Mode			
Nuclides Released	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
1. Fission and Activation Gases									
Xe-133	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-04
Xe-135	Curies	3.18E-01	1.83E-01	6.69E-01	8.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135m	Curies	5.73E-01	0.00E+00	6.98E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Curies	8.91E-01	1.83E-01	1.37E+00	8.73E-01	0.00E+00	0.00E+00	0.00E+00	2.31E-04
2. Iodines									
I-131	Curies	7.16E-04	1.39E-04	9.56E-05	6.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-133	Curies	6.36E-03	5.65E-04	7.94E-04	4.93E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-135	Curies	1.66E-02	0.00E+00	0.00E+00	5.04E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Curies	2.36E-02	7.04E-04	8.90E-04	1.07E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Particulates									
Ag-110m	Curies	0.00E+00	0.00E+00	9.42E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba-140	Curies	5.36E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	Curies	1.43E-06	2.34E-05	2.10E-05	3.97E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	Curies	1.63E-05	1.21E-04	4.42E-05	6.89E-05	0.00E+00	0.00E+00	0.00E+00	2.68E-07
Cr-51	Curies	0.00E+00	2.61E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	Curies	3.15E-05	4.80E-06	3.89E-06	2.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mn-54	Curies	2.83E-06	1.75E-05	1.86E-06	2.09E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Os-191	Curies	0.00E+00	3.02E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-124	Curies	0.00E+00	1.09E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-89	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	Curies	3.35E-06	1.92E-05	3.95E-06	3.22E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Curies	1.09E-04	2.26E-04	1.69E-04	1.90E-04	0.00E+00	0.00E+00	0.00E+00	2.68E-07
4. Tritium									
H-3	Curies	4.43E+00	3.07E+00	3.25E+00	3.27E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-04
5. Carbon-14									
C-14	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 14: Liquid Effluents - Summation of All Releases (RG-1.21 Table 2A)

Type of Effluent		Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est. Total Error, %
A. Fission & Activation Products							
1.	Total Release (not including Tritium, Gases, and Alpha)	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E+01
2.	Average Diluted Concentration During Period	µCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3.	Percent of Applicable Limit	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
B. Tritium							
1.	Total Release	Curies	0.00E+00	0.00E+00	1.56E-01	1.08E-02	2.50E+01
2.	Average Diluted Concentration During Period	µCi/ml	0.00E+00	0.00E+00	1.29E-05	3.36E-06	
3.	Percent of Applicable Limit	%	0.00E+00	0.00E+00	1.29E+00	3.36E-01	
C. Dissolved and Entrained Gases							
1.	Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E+01
2.	Average Diluted Concentration During Period	µCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3.	Percent of Applicable Limit	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
D. Gross Alpha Radioactivity							
1.	Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E+01
E. Waste Volume Released (Pre-Dilution)		Liters	0.00E+00	0.00E+00	1.21E+07	3.21E+06	2.50E+01
F. Volume of Dilution Water Used		Liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E+01

Table 15: Liquid Effluents (RG-1.21 Table 2B)

		Continuous Mode				Batch Mode			
Nuclides Released	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
H-3	Curies	0.00E+00	0.00E+00	1.56E-01	1.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Curies	0.00E+00	0.00E+00	1.56E-01	1.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 16: Solid Waste and Irradiated Fuel Shipments (RG-1.21 Table 3)

A. Solid Waste Shipped Offsite for Burial or Disposal

1. Type of waste	**Waste Class**	**Unit**	**1/1/2023 – 12/31/2023**	**Est. Total Error, %**	**Major Nuclides for this waste type:**
a. Spent Resins, Filters, and Evaporator Bottoms	A	ft^3 m^3 Ci	1.25E+03 3.55E+01 7.62E+01	2.50E+01	H-3, C-14, Mn-54, Fe-55, Co-58, Co-60, Ni-63, Zn-65, Sr-90, Nb-95, Tc-99, Ag-110m, I-129, Cs-137, Pu-238, Pu-239, Pu-240, Pu-241, Am-241, Cm-242, Cm-243
b. Dry Active Waste (DAW)	A	ft^3 m^3 Ci	1.50E+04 4.23E+02 2.33E-01	2.50E+01	H-3, C-14, Cr-51, Mn-54, Fe-55, Co-58, Co-60, Ni-63, Zn-65, Sr-90, Zr-95, Nb-95, Tc-99, Ag-110m, I-129, Cs-137, Ce-141, Pu-238, Pu-239, Pu-240, Pu-241, Am-241, Cm-242, Cm-243
c. Irradiated Components	A	ft^3 m^3 Ci	0.00E+00 0.00E+00 0.00E+00	2.50E+01	
	C	ft^3 m^3 Ci	0.00E+00 0.00E+00 0.00E+00	2.50E+01	
c. Other Wastes	A	ft^3 m^3 Ci	0.00E+00 0.00E+00 0.00E+00	2.50E+01	
Sum of All Low-Level Waste Shipped from the Site	**All**	**ft^3** **m^3** **Ci**	**1.62E+04** **4.59E+02** **7.64E+01**	**2.50E+01**	**H-3, C-14, Cr-51, Mn-54, Fe-55, Co-58, Co-60, Ni-63, Zn-65, Sr-90, Nb-95, Tc-99, Ag-110m, I-129, Cs-137, Ce-141, Pu-238, Pu-239, Pu-240, Pu-241, Am-241, Cm-242, Cm-243**

2. Estimate of major nuclide composition (by type of waste)

Type of waste	**Nuclide Name**	**Abundance, %** **(1.0% cutoff)**	**Activity (Ci)**
a. Spent Resins, Filters, and Evaporator Bottoms	Mn-54	5.95%	4.53E+00
	Fe-55	30.1%	2.29E+01
	Co-58	2.35%	1.79E+00
	Co-60	52%	3.96E+01
	Ni-63	1.38	1.05E+00
	Zn-65	4.33%	3.30E+00
	Cs-137	2.26%	1.72E+00
b. Dry Active Waste (DAW)	Mn-54	6.36%	1.48E-02
	Fe-55	13.74%	3.21E-02
	Co-58	1.96%	4.56E-03
	Co-60	71.81%	1.68E-01
	Zn-65	3.21%	7.48E-03

Table 16: Solid Waste and Irradiated Fuel Shipments (RG-1.21 Table 3) (Continued)

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
3	Interstate Ventures, Inc.	Waste Control Specialists LLC Compact Waste Facility Andrews, TX
14	Xcel Energy Trucking	UniTech Services Group Oak Ridge Service Center Oak Ridge, TN

B. Irradiated Fuel Shipments (Disposition)

There were no shipments of irradiated fuel from MNGP in 2023.

ATTACHMENT B: 2023 REMP TLD DOSE INFORMATION

TABLE 17: 2023 REMP TLD DOSE RESULTS.

Dose Determination for Monticello Nuclear Generating Plant Operations in 2023.

		Quarterly Baseline, B_Q (mrem)		Normalized Quarterly Monitoring Data, M_Q (mrem per standard quarter)				QuarterlyFacility Dose, $F_Q = M_Q - B_Q$ (mrem)				Annual Baseline, B_A (mrem)	Annual Monitoring Data, M_A (mrem)	Annual Facility Dose, $F_A = M_A - B_A$ (mrem)
		Q1	Q2-Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
Inner Ring	M01A	13.2	15.1	12.8	14.8	17.9	25.3	ND	ND	ND	10.2^	58.5	70.8	12.3^
	M02A	14.2	16.1	12.4	14.6	16.7	15.1	ND	ND	ND	ND	62.6	58.8	ND
	M03A	13.9	15.7	11.1	14.5	15.6	14.7	ND	ND	ND	ND	61.0	55.9	ND
	M04A	13.1	15.6	10.8	13.2	15.3	12.7	ND	ND	ND	ND	59.8	52.0	ND
	M05A	13.2	15.9	10.1	13.5	15.7	13.5	ND	ND	ND	ND	60.8	52.8	ND
	M06A	14.1	16.1	10.5	14.7	16.7	14.5	ND	ND	ND	ND	62.4	56.4	ND
	M07A	13.9	15.9	10.4	13.4	15.2	14.2	ND	ND	ND	ND	61.4	53.2	ND
	M08A	13.9	15.8	10.9	13.9	15.5	14.2	ND	ND	ND	ND	61.5	54.5	ND
	M09A	14.3	15.8	10.6	14.5	15.7	15.1	ND	ND	ND	ND	61.5	55.9	ND
	M10A	14.3	16.4	10.6	14.3	15.7	14.6	ND	ND	ND	ND	63.4	55.2	ND
	M11A	15.4	16.9	*	13.9	17.5	14.8	*	ND	ND	ND	66.0	61.5	ND
	M12A	15.5	17.1	12.0	14.2	15.3	15.2	ND	ND	ND	ND	66.5	56.6	ND
	M13A	13.6	14.6	*	11.3	12.7	11.8	*	ND	ND	ND	57.3	47.7	ND
	M14A	14.3	16.3	12.5	15.2	17.2	16.0	ND	ND	ND	ND	63.4	60.9	ND
Outer Ring	M01B	14.3	15.4	10.2	13.3	17.3	13.9	ND	ND	ND	ND	60.7	54.7	ND
	M02B	14.6	15.4	11.1	13.3	17.7	14.4	ND	ND	ND	ND	60.8	56.5	ND
	M03B	12.2	12.9	10.1	10.9	16.1	12.1	ND	ND	ND	ND	50.9	49.1	ND
	M04B	12.9	14.4	10.2	12.5	17.1	13.2	ND	ND	ND	ND	56.1	53.0	ND
	M05B	14.6	16.0	11.5	13.0	19.2	14.1	ND	ND	ND	ND	62.5	57.9	ND
	M06B	12.8	15.4	*	13.7	19.0	14.6	*	ND	ND	ND	58.8	62.9	ND
	M07B	15.3	16.1	11.7	13.7	17.8	14.2	ND	ND	ND	ND	63.5	57.3	ND
	M08B	13.6	14.8	11.7	13.6	15.1	12.9	ND	ND	ND	ND	58.0	53.3	ND
	M09B	14.2	16.7	10.8	15.0	17.6	14.3	ND	ND	ND	ND	64.3	57.6	ND
	M10B	14.5	16.0	9.9	13.8	16.0	14.0	ND	ND	ND	ND	62.5	53.6	ND
	M11B	13.9	16.0	10.1	14.7	16.3	14.7	ND	ND	ND	ND	61.8	55.7	ND
	M12B	13.5	15.6	10.1	14.4	15.8	14.4	ND	ND	ND	ND	60.3	54.7	ND
	M13B	13.5	14.4	12.0	13.7	16.3	14.3	ND	ND	ND	ND	56.6	56.2	ND
	M14B	13.4	15.5	11.6	14.4	16.5	14.5	ND	ND	ND	ND	59.9	57.0	ND
	M15B	13.5	15.0	10.2	13.7	15.0	13.1	ND	ND	ND	ND	58.4	52.0	ND
	M16B	13.0	13.5	10.4	13.1	15.1	13.6	ND	ND	ND	ND	53.4	52.3	ND
Spec. Interest	M01S	12.1	13.3	10.1	10.7	16.3	12.5	ND	ND	ND	ND	51.7	49.6	ND
	M02S	11.5	12.7	10.0	11.4	14.4	11.8	ND	ND	ND	ND	49.7	47.6	ND
	M03S	13.6	15.3	11.4	13.9	15.8	14.9	ND	ND	ND	ND	59.4	56.0	ND
	M04S	14.3	15.8	11.5	14.3	16.8	13.9	ND	ND	ND	ND	61.7	56.5	ND
	M05S	14.1	15.3	11.6	13.6	15.4	13.7	ND	ND	ND	ND	60.1	54.3	ND
	M06S	15.9	16.9	12.9	14.1	15.8	15.6	ND	ND	ND	ND	66.6	58.4	ND
Control	M01C	14.0	14.8	9.9	12.5	14.4	13.5	ND	ND	ND	ND	58.4	50.3	ND
	M02C	14.0	15.6	10.2	11.9	13.9	12.2	ND	ND	ND	ND	60.9	48.1	ND
	M03C	15.3	16.3	11.2	13.4	15.3	13.4	ND	ND	ND	ND	64.3	53.3	ND
	M04C	14.1	14.8	9.9	12.3	13.8	12.9	ND	ND	ND	ND	58.7	48.8	ND

MDD_Q	4.7
MDD_A	11.2

ND = Not Detected, where $M_Q \leq (B_Q + MDD_Q)$ or $M_A \leq (B_A + MDD_A)$ for quarterly and annual data, respectively.
* = TLD missing in the field.
^ = TLD was positive, not believed to be due to facility dose, see MNGP QIM 501000082357
MDD_Q and MDD_A were determined using ten years of REMP TLD Data from 2001 through 2010. (See ANSI/HPS N13.37-2014 (Ref. [4]) for details on the methodology for determining facility related dose using REMP TLDs.)

ATTACHMENT C: GROUNDWATER MONITORING WELL LOCATIONS

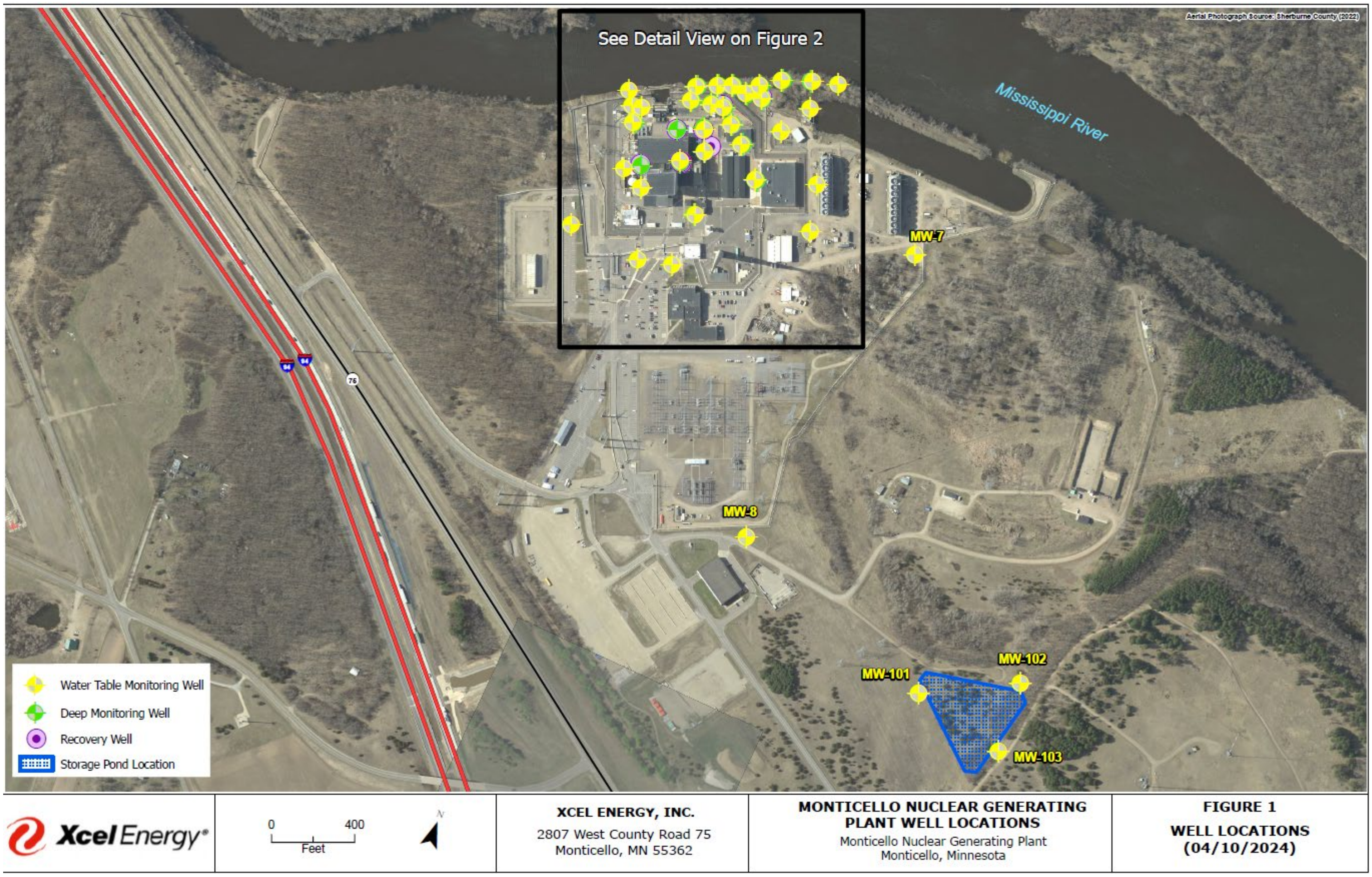

FIGURE 8: MNGP GROUNDWATER MONITORING WELL LOCATIONS – OVERALL VIEW (REF. [9]).

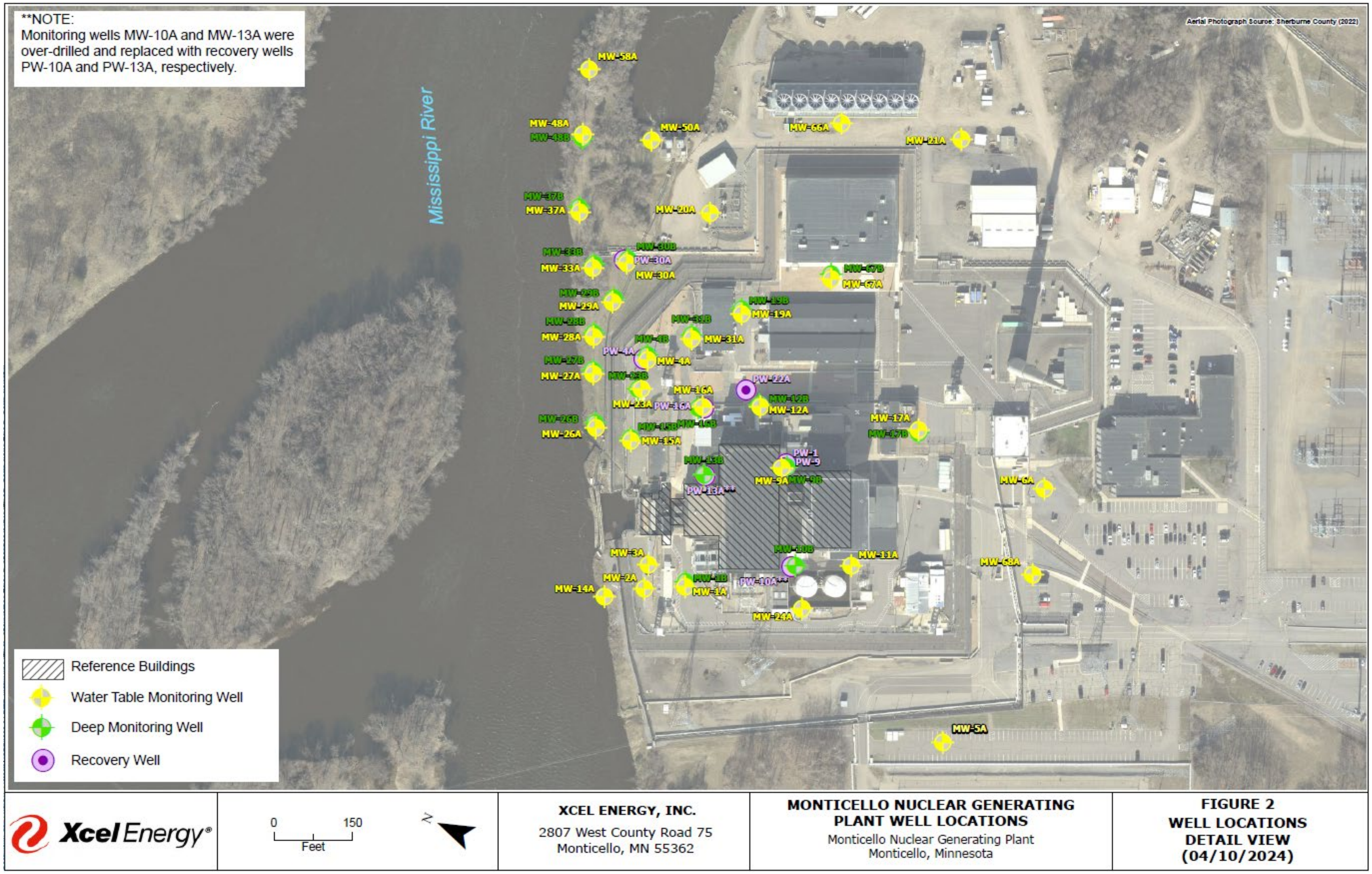

FIGURE 9: MNGP GROUNDWATER MONITORING WELL LOCATIONS – SITE VIEW (REF. [9]).

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TABLE 18: MNGP MONITORING WELL LOCATIONS FROM FP-CY-GWPP-01. (REF. [8])

Well ID	Date Installed	Unique Number	Plant Data (ft)		UTM Zone 15, (m)		Surface Elevation (ft)	Top of Riser Elevation (ft)	Bottom of Well Elevation (ft)	Screen Interval Elev – Elev	Depth to Top of Screen (ft)	Depth to Bottom of Screen (ft)
			Easting	Northing	Easting	Northing						
MW-1	8/10/1994	547747	4847.19	10248.69	433407.38	5020424.14	930.4	930.19	902.4	902.4 - 912.4	18	28
MW-1B	1/26/2023	870184	4857.61	10247.41	433410.44	5020425.10	930.2	929.96	873.2	973.2 - 878.2	52	57
PW-1	2/21/2023	870167	5081.98	10055.39	433496.59	5020399.96	927.9	930.41	898.7	898.7 - 903.7	24	29
MW-2	8/10/1994	547748	4843.43	10326.78	433396.55	5020445.36	921.8	923.82	897.5	897.5 - 907.5	14	24
MW-3	8/10/1994	547749	4889.37	10319.18	433410.26	5020449.01	919.9	921.91	901.2	901.2 - 911.2	9	19
MW-4	10/8/2007	747055	5281.42	10320.84	433518.94	5020498.60	925.4	927.86	898.7	898.7 - 908.7	17	27
MW-4B	1/24/2023	870185	5289.29	10321.02	433521.10	5020499.64	925.8	928.26	877.8	877.8 - 882.8	43	48
MW-5	9/6/2007	747056	4549.88	9757.05	433386.42	5020250.34	943.0	942.75	901.7	901.7 - 911.7	31	41
MW-6	9/7/2007	747057	5035.29	9563.03	433545.55	5020257.29	930.7	933.24	899.9	899.9 - 909.9	21	31
MW-7	9/5/2007	747058	6205.26	9609.17	433864.70	5020416.73	920.0	922.49	898.1	898.1- 908.1	12	22
MW-8	9/5/2007	747059	5393.93	8251.55	433809.51	5019938.00	931.5	934.00	900.1	900.1 - 910.1	21	31
MW-9	9/4/2009	725274	5074.19	10064.31	433493.53	5020401.38	927.9	927.58	901.2	901.2 - 911.2	17	27
MW-9B	11/17/2009	772326	5075.65	10054.35	433495.19	5020398.80	927.9	927.75	883.5	883.5 - 888.5	39	44
PW-9	2/6/2023	870166	5074.80	10059.10	433494.36	5020400.01	927.9	928.08	892.4	892.4 - 897.4	31	36
PW-10A**	5/30/2023	725272	4885.31	10045.19	433443.47	5020372.40	934.9	936.36	895.9	895.9-910.9	24	39
MW-10B	12/29/2022	870161	4887.86	10037.95	433445.13	5020370.70	934.9	934.41	875.9	875.9 - 880.9	54	59
MW-11	9/2/2009	725273	4886.97	9931.96	433458.12	5020341.16	934.9	934.51	899.7	899.7 - 909.7	25	35
MW-12A	10/29/2009	772328	5191.46	10105.31	433520.96	5020427.47	932.4	932.14	898.7	898.7 - 908.7	24	34
MW-12B	11/2/2009	772329	5195.51	10106.27	433521.97	5020428.24	932.4	932.13	884.4	884.4 - 889.4	43	48
PW-13A**	5/31/2023	772330	5059.49	10210.49	433471.13	5020440.14	931.3	932.95	891.3	891.3-906.3	25	40
MW-13B	11/1/2009	772331	5062.00	10212.53	433471.57	5020441.02	931.2	933.71	873.4	873.4 - 878.4	56	61
MW-14	9/13/2010	778176	4829.02	10402.98	433383.00	5020464.72	908.7	912.42	902.1	902.1 - 905.1	4	7
MW-15A	6/25/2012	789990	5126.35	10352.88	433471.86	5020488.07	919.0	918.67	903.0	903.0 - 913.0	6	16
MW-15B	6/26/2012	789991	5131.93	10352.93	433473.40	5020488.78	919.1	918.79	869.5	869.5 - 874.5	45	50
MW-16A	12/28/2022	870162	5191.47	10214.97	433507.22	5020457.91	930.6	930.07	899.6	899.6 - 909.6	21	31
MW-16B	12/28/2022	870163	5188.29	10223.72	433505.24	5020459.96	930.7	930.34	877.7	877.7 - 882.7	48	53
PW-16A	2/20/2023	870218	5188.48	10213.12	433506.63	5020457.04	930.5	932.85	892.5	892.5 - 902.5	28	38
MW-17A	12/21/2022	870164	5146.25	9802.99	433546.33	5020337.79	933.6	935.37	900.6	900.6 - 910.6	23	33
MW-17B	12/20/2022	870165	5141.41	9803.31	433544.90	5020337.36	933.5	934.90	858.5	858.5 - 863.5	70	75
MW-19A	1/11/2023	870186	5368.46	10141.08	433565.64	5020459.58	930.5	930.31	900.5	900.5 - 910.5	20	30
MW-19B	1/11/2023	870187	5378.46	10141.03	433568.42	5020460.82	930.5	930.24	880.5	880.5 - 885.5	45	50
MW-20A	1/27/2023	870188	5561.85	10201.21	433611.82	5020500.52	921.7	923.36	897.7	897.7 - 907.7	14	24
MW-21A	1/27/2023	870189	5701.37	9721.49	433710.68	5020384.77	923.6	926.28	897.6	897.6 - 907.6	16	26
PW-22A	1/25/2023	870190	5223.69	10132.39	433526.52	5020439.03	931.6	933.47	892.6	892.6 - 902.6	29	39
MW-23A	3/17/2023	870250	5225.01	10332.11	433501.86	5020494.66	921.6	923.25	898.6	898.6 - 908.6	13	23
MW-23B	3/17/2023	870251	5225.56	10338.94	433501.16	5020496.63	921.3	923.86	876.3	876.3 - 881.3	40	45
MW-24A	6/8/2023	872351	4804.67	10025.59	433423.53	5020356.85	934.8	936.54	901.8	901.8 - 911.8	23	33
MW-26A	6/15/2023	872374	5150.93	10419.40	433470.35	5020509.62	917.5	919.27	899.5	899.5-909.5	8	18
MW-26B	6/15/2023	872375	5160.96	10420.68	433472.97	5020511.23	917.4	919.56	869.4	869.4-874.4	43	48
MW-27A	6/15/2023	872372	5253.84	10424.64	433498.27	5020523.97	917.5	919.78	899.5	899.5-909.5	8	18
MW-27B	6/15/2023	872373	5262.43	10424.86	433500.63	5020525.11	917.6	919.91	871.6	871.6-876.6	41	46
MW-28A	7/5/2023	872321	5324.84	10423.67	433518.11	5020532.60	918.4	920.51	898.4	898.4-908.4	10	20
MW-28B	7/5/2023	872322	5332.78	10423.44	433520.34	5020533.53	918.8	920.64	878.8	878.8-883.8	35	40
MW-29A	6/30/2023	872323	5391.03	10387.72	433541.00	5020530.91	920.6	922.79	898.6	898.6-908.6	13	23
MW-29B	6/29/2023	872324	5398.64	10384.23	433543.55	5020530.90	920.6	922.73	877.6	877.6-882.6	38	43
MW-30A	7/6/2023	872325	5465.99	10360.20	433565.27	5020532.66	920.0	921.33	899.0	899.0-909.0	11	21
MW-30B	7/6/2023	872326	5473.21	10357.95	433567.55	5020532.94	919.9	921.78	880.9	880.9-885.9	34	39
MW-31A	7/6/2023	872328	5320.18	10236.12	433540.32	5020479.93	929.0	930.86	894.0	894.0-909.0	20	35
MW-31B	7/6/2023	872327	5328.12	10236.47	433542.48	5020481.02	928.8	930.63	878.8	878.8-883.8	45	50
MW-33A	7/19/2023	872414	5456.44	10424.99	433554.49	5020549.46	919.0	920.87	897.0	897.0-907.0	12	22
MW-33B	7/18/2023	872415	5464.23	10422.71	433556.94	5020549.80	919.1	920.39	879.1	879.1-884.1	35	40
MW-37A	7/21/2023	872416	5562.59	10450.69	433580.75	5020569.90	913.0	914.96	896.0	896.0-906.0	7	17
MW-37B	7/21/2023	872417	5571.69	10450.91	433583.26	5020571.10	913.9	916.20	875.9	875.9-880.9	33	38

**Monitoring Wells MW-10 and MW-13A have been over-drilled and converted into Pumping Wells PW-10A and PW-13A Respectively.

TABLE 18: MNGP MONITORING WELL LOCATIONS FROM FP-CY-GWPP-01. (REF. [8]) (CONT.)

Well ID	Date Installed	Unique Number	Plant Data (ft)		UTM Zone 15, (m)		Surface Elevation (ft)	Top of Riser Elevation (ft)	Bottom of Well Elevation (ft)	Screen Interval Elev – Elev	Depth to Top of Screen (ft)	Depth to Bottom of Screen (ft)
			Easting	Northing	Easting	Northing						
MW-48A	7/26/2023	872437	5711.40	10444.22	433622.90	5020586.75	919.6	921.62	897.6	897.6-907.6	12	22
MW-48B	7/26/2023	872438	5703.61	10444.65	433620.68	5020585.90	920.8	922.59	868.8	868.8-873.8	47	52
MW-50A	7/24/2023	872439	5700.59	10313.03	433636.33	5020548.96	919.4	921.70	897.4	897.4-907.4	12	22
MW-58A	7/25/2023	872440	5836.28	10432.11	433659.10	5020599.04	920.1	922.87	899.1	899.1-909.1	11	21
MW-66A	10/11/2023	880250	5732.81	9949.96	433690.78	5020452.16	919.5	920.89	891.5	891.5-901.5	18	28
MW-67A	10/12/2023	880251	5435.28	9970.07	433605.63	5020420.47	930.6	932.47	895.6	895.6-905.6	25	35
MW-67B	10/12/2023	880252	5443.78	9969.50	433608.06	5020421.37	930.6	932.83	875.6	875.6-880.6	50	55
MW-68A	10/11/2023	880253	4870.85	9585.16	433497.11	5020242.83	936.8	936.80	902.8	902.8-912.8	24	34
MW-101A	7/27/2023	872427	6222.89	7498.06	434134.17	5019832.62	928.2	929.85	901.2	901.2-911.2	17	27
MW-102A	7/28/2023	872428	6713.15	7546.16	434264.30	5019907.42	926.4	928.59	989.4	989.4-999.4	18	28
MW-103A	7/28/2023	872429	6606.53	7219.23	434275.66	5019803.26	935.2	937.55	903.3	903.3-913.3	22	32

ATTACHMENT D: 2023 GROUNDWATER PROTECTION PROGRAM WELL DATA

TABLE 19: 2023 GROUNDWATER MONITORING DATA FOR MNGP.

		Concentration (pCi/L)										
Lab ID	**Collect Date**	**^{3}H**	**^{54}Mn**	**^{58}Co**	**^{59}Fe**	**^{60}Co**	**^{65}Zn**	**^{95}Zr**	**^{95}Nb**	**^{134}Cs**	**^{137}Cs**	**^{140}Ba-^{140}La**
Monitoring Well 1 (MW-1)												
615805001	3/22/2023	< 255	< 1.58	< 1.73	< 3.69	< 1.88	< 3.28	< 2.99	< 1.97	< 1.69	< 2.84	< 11.5
624481001	5/24/2023	< 223	< 1.54	< 1.63	< 3.84	< 1.53	< 3.38	< 3.26	< 1.89	< 1.74	< 1.54	< 15.6
635348001	8/23/2023	< 235	< 1.79	< 1.74	< 3.52	< 1.50	< 2.70	< 3.17	< 2.07	< 1.68	< 1.52	< 17.4
643202001	10/24/2023	< 125	< 2.01	< 2.14	< 4.19	< 2.27	< 3.91	< 3.42	< 2.15	< 2.10	< 2.12	< 12.8
Monitoring Well 1B (MW-1B)												
643202002	10/24/2023	< 125	< 1.81	< 1.49	< 3.79	< 1.83	< 3.03	< 3.39	< 1.78	< 1.53	< 1.88	< 9.85
Monitoring Well 2 (MW-2)												
615805002	3/22/2023	< 240	< 1.21	< 1.26	< 2.74	< 1.39	< 2.66	< 2.46	< 1.49	< 1.48	< 1.40	< 8.64
624481002	5/24/2023	< 223	< 1.48	< 1.54	< 1.42	< 3.25	< 3.34	< 2.96	< 1.68	< 1.69	< 1.58	< 14.5
635348002	8/23/2023	< 246	< 1.27	< 1.46	< 3.30	< 1.18	< 2.56	< 2.61	< 1.68	< 1.45	< 1.33	< 13.9
643202003	10/24/2023	< 153	< 1.50	< 1.60	< 3.29	< 1.52	< 3.35	< 2.65	< 1.77	< 1.73	< 1.72	< 9.86
Monitoring Well 3 (MW-3)												
615805003	3/22/2023	< 255	< 1.52	< 1.46	< 2.89	< 1.42	< 2.64	< 2.63	< 1.62	< 1.58	< 1.50	< 9.31
624481003	5/24/2023	< 222	< 1.44	< 1.73	< 3.92	< 1.72	< 3.26	< 3.15	< 1.74	< 1.80	< 1.67	< 16.1
635348003	8/23/2023	< 248	< 1.29	< 1.52	< 3.62	< 1.37	< 2.84	< 2.75	< 1.73	< 1.56	< 1.32	< 14.5
643202004	10/24/2023	< 132	< 1.43	< 1.56	< 3.58	< 1.75	< 3.53	< 3.09	< 1.67	< 1.89	< 2.14	< 10.8
Monitoring Well 4 (MW-4)												
615805004	3/21/2023	< 248	< 1.28	< 1.45	< 3.20	< 1.50	< 3.01	< 2.83	< 1.52	3.03 ± 2.82	< 1.45	< 9.96
624481004	5/24/2023	< 224	< 1.52	< 1.62	< 3.72	< 1.54	< 2.76	< 3.00	< 1.52	< 1.69	< 1.55	< 14.8
627525001	6/16/2023	691 ± 222										
627525002	6/17/2023	815 ± 223										
628045001	6/21/2023	878 ± 235										
631021001	7/18/2023	5980 ± 352										
636604001	8/24/2023	606 ± 229	< 1.21	<1.64	< 3.78	< 1.53	< 2.80	< 2.88	< 1.54	<1.43	<1.30	< 26.0
639233001	9/19/2023	2310 ± 248										
643949001	10/24/2023	2030 ± 264	< 1.51	< 1.56	< 3.47	< 1.45	< 3.31	< 3.01	< 1.73	<1.60	< 1.51	< 12.5
650022001	11/28/2023	1300 ± 292										
650357001	12/18/2023	2350 ± 269										
Monitoring Well 4B (MW-4B)												
643202005	10/25/2023	< 129	< 1.28	< 1.21	< 2.53	< 1.55	< 2.46	< 2.45	< 1.18	< 1.33	< 1.26	< 6.43
Monitoring Well 5 (MW-5)												
634806001	8/22/2023	< 245	< 1.38	< 1.51	< 3.24	< 1.60	< 2.77	< 2.58	< 1.61	< 1.64	< 1.50	< 11.5

TABLE 19: 2023 GROUNDWATER MONITORING DATA FOR MNGP**.** (CONTINUED).

Lab ID	Collect Date	^{3}H	^{54}Mn	^{58}Co	^{59}Fe	^{60}Co	^{65}Zn	^{95}Zr	^{95}Nb	^{134}Cs	^{137}Cs	^{140}Ba-^{140}La
Monitoring Well 6 (MW-6)												
634806002	8/22/2023	< 244	< 1.61	< 1.50	< 3.54	< 1.50	< 2.93	< 2.72	< 2.01	< 1.57	< 1.64	< 13.0
Monitoring Well 7 (MW-7)												
634806003	8/22/2023	< 252	< 1.93	< 2.05	< 4.14	< 1.92	< 4.01	< 3.54	< 2.17	< 2.12	< 1.83	< 14.9
Monitoring Well 8 (MW-8)												
634806004	8/22/2023	< 244	< 1.15	< 1.36	< 3.03	< 1.19	< 2.53	< 2.41	< 1.55	< 1.41	< 1.31	< 10.2
Monitoring Well 9 (MW-9)												
608231006	1/17/2023	2680000 ± 7550	< 1.62	< 1.61	< 3.18	< 1.93	< 3.21	< 2.6	< 1.64	< 1.84	< 1.78	< 8.12
608231006	1/17/2023	2700000 ± 7610 *										
613684001	2/27/2023	1500000 ± 29300										
616606001	3/21/2023	1800000 ± 35100	< 1.33	< 1.43	< 4.3	< 1.43	< 2.76	< 3.13	< 1.88	< 1.44	< 1.29	< 29.7
619903001	4/20/2023	1120000 ± 6710										
624656001	5/24/2023	776000 ± 6410	< 1.1	< 1.28	< 2.83	< 1.1	< 2.3	< 2.37	< 1.34	< 1.18	< 1.11	< 14.1
628045002	6/21/2023	253000 ± 3200										
631021002	7/18/2023	214000 ± 1990										
636604002	8/22/2023	266000 ± 3770	< 1.98	< 1.98	< 4.16	< 1.57	< 3.03	< 3.53	< 1.98	< 1.56	< 1.51	< 32.4
639233002	9/19/2023	174000 ± 1890										
643949002	10/18/2023	248000 ± 2400	< 1.37	< 1.80	< 4.21	< 1.62	< 3.07	< 3.01	< 1.89	< 1.56	< 1.67	< 20.4
650022002	11/27/2023	364000 ± 4550										
650357002	12/18/2023	208000 ± 2010										
Monitoring Well 9B (MW-9B)												
608231002	1/17/2023	2970000 ± 7980	< 1.53	< 1.69	< 2.83	< 1.8	< 3.05	< 2.97	< 1.77	< 1.77	< 1.78	< 8.61
613684002	2/27/2023	1480000 ± 29000										
616606002	3/21/2023	146000 ± 2880	< 1.20	< 1.69	< 3.81	< 1.28	< 2.95	< 3.03	< 1.77	< 1.4	< 1.84	< 28.3
619903002	4/20/2023	26100 ± 999										
624656002	5/24/2023	9250 ± 717	< 1.38	< 1.57	< 3.73	< 1.45	< 3.41	< 2.68	< 1.59	< 1.55	< 1.4	< 13.3
628045003	6/21/2023	19900 ± 942										
631021003	7/18/2023	23300 ± 658										
636604003	8/22/2023	20700 ± 1090	< 1.46	< 1.77	< 4.32	< 1.37	< 2.99	< 3.28	< 2.02	< 1.49	< 1.46	< 33.5
639233003	9/19/2023	19000 ± 636										
643949003	10/18/2023	6250 ± 407	< 1.27	< 1.5	< 3.13	< 1.26	< 2.54	< 2.43	< 1.57	< 1.35	< 1.27	< 15.9
650022003	11/27/2023	8550 ± 704										
650357003	12/18/2023	71300 ± 1190										

***Duplicate sample; not used in calculating average.**

TABLE 19: 2023 GROUNDWATER MONITORING DATA FOR MNGP. (CONTINUED)

Lab ID	Collect Date	^{3}H	^{54}Mn	^{58}Co	^{59}Fe	^{60}Co	^{65}Zn	^{95}Zr	^{95}Nb	^{134}Cs	^{137}Cs	^{140}Ba-^{140}La
Monitoring Well 10 (MW-10) / Pumping Well 10A (PW-10A)												
607960003	1/17/2023	< 212										
613105001	2/27/2023	< 257	< 1.54	< 1.33	< 3.36	< 1.46	< 2.83	< 2.63	< 1.64	< 1.59	< 1.56	< 9.43
615805005	3/22/2023	< 258										
619903006	4/20/2023	47000 ± 1320										
624656003	5/26/2023	604000 ± 5700	< 1.81	< 1.66	< 4.10	< 1.95	< 3.38	< 3.59	< 2.14	< 1.77	< 1.97	< 14.0
628045004	6/21/2023	475000 ± 4490										
631021004	7/18/2023	169000 ± 1760										
636604004	8/24/2023	93300 ± 2280	< 1.42	< 1.65	< 3.58	< 1.05	< 2.36	< 3.04	< 1.82	< 1.46	< 1.43	< 26.7
639233004	9/19/2023	4410 ± 940										
643949004	10/20/2023	48200 ± 1040	< 1.04	< 1.19	< 3.01	< 1.10	< 2.14	< 2.28	< 1.30	< 1.15	< 1.11	< 13.9
650022004	11/28/2023	5980 ± 580										
650357004	12/18/2023	4550 ± 337										
Monitoring Well 10B (MW-10B)												
615805006	3/22/2023	< 250	< 2.24	< 2.06	< 4.52	< 2.42	< 5.66	< 4.97	< 2.44	< 2.58	< 2.26	< 14.0
624481005	5/26/2023	< 223	< 1.37	< 1.30	< 3.08	< 1.27	< 2.62	< 2.38	< 1.41	< 1.50	< 1.39	< 11.6
643202006	10/24/2023	< 125	< 1.78	< 1.86	< 3.06	< 2.05	< 3.74	< 3.55	< 1.76	< 1.99	< 1.83	< 11.1
Monitoring Well 11 (MW-11)												
615805007	3/22/2023	< 254	< 1.86	< 2.00	< 4.16	< 2.02	< 3.78	< 3.62	< 2.26	< 2.09	< 2.16	< 11.6
624481006	5/26/2023	< 223	< 1.42	< 1.53	< 3.63	< 1.45	< 2.93	< 2.73	< 1.65	< 1.53	< 1.46	< 13.4
635348004	8/23/2023	< 247	< 1.53	< 1.69	< 3.69	< 1.68	< 3.53	< 2.97	< 1.78	< 1.61	< 1.40	< 16.2
643200006	10/24/2023	< 135	< 1.92	< 2.03	< 3.81	< 2.04	< 3.98	< 3.93	< 2.36	< 2.10	< 2.42	< 12.2
Monitoring Well 12A (MW-12A)												
608231003	1/17/2023	845000 ± 4240	< 1.72	< 1.73	< 3.41	< 1.54	< 3.31	< 2.94	< 1.78	< 1.93	< 1.69	< 9.34
613684003	2/27/2023	19600 ± 520										
616606003	3/21/2023	307000 ± 6030	< 1.14	< 1.34	< 3.60	< 1.24	< 2.49	< 1.57	< 2.67	< 1.18	< 1.20	16.6 ± 14.8
619903003	4/20/2023	184000 ± 2590										
624656004	5/26/2023	61400 ± 1840	< 1.30	< 1.46	< 3.42	< 1.61	< 2.74	< 2.83	< 1.70	< 1.45	< 1.56	< 10.7
628045005	6/21/2023	9140 ± 634										
631021005	7/18/2023	2370 ± 244										
636604005	8/23/2023	397 ± 196	< 1.12	< 1.42	< 3.26	< 1.21	< 2.39	< 2.57	< 1.51	< 1.16	< 1.25	< 24.1
639233005	9/19/2023	310 ± 145										
643949005	10/20/2023	296 ± 170	< 1.41	< 1.56	< 4.07	< 1.71	< 3.23	< 3.15	< 1.70	< 1.70	< 1.53	< 19.6
650022005	11/27/2023	766 ± 230										
650357005	12/18/2023	892 ± 209										
Monitoring Well 12B (MW-12B)												
615805008	3/21/2023	< 250	< 1.37	< 1.62	< 2.71	< 1.24	< 2.20	< 2.40	< 1.44	< 1.54	< 1.45	< 9.82
624481007	5/26/2023	< 222	< 1.40	< 1.57	< 2.86	< 1.43	< 2.53	< 2.43	< 1.55	< 1.53	< 1.47	< 11.9
636604006	8/23/2023	19300 ± 1050	< 1.30	< 1.77	< 4.38	< 1.63	< 2.94	< 3.12	< 1.83	< 1.48	< 1.42	< 30.4
643949006	10/20/2023	87200 ± 1410	< 1.15	< 1.29	< 2.83	< 1.24	< 2.53	< 2.34	< 1.36	< 1.15	< 1.17	< 15.5
650022006	11/27/2023	36100 ± 1440										
650357006	12/18/2023	29500 ± 782										

TABLE 19: 2023 GROUNDWATER MONITORING DATA FOR MNGP. (CONTINUED).

Lab ID	Collect Date	^{3}H	^{54}Mn	^{58}Co	^{59}Fe	^{60}Co	^{65}Zn	^{95}Zr	^{95}Nb	^{134}Cs	^{137}Cs	^{140}Ba-^{140}La
Monitoring Well 13A (MW-13A) / Pumping Well 13A (PW-13A)												
607960001	1/17/2023	< 217										
613105002	2/27/2023	333 ± 156										
616606005	3/21/2023	2340 ± 240	< 1.27	< 1.53	< 4.08	< 1.22	< 2.69	< 2.95	< 1.82	< 1.36	< 1.21	< 28.9
619903004	4/20/2023	489000 ± 4370										
624656005	5/26/2023	485000 ± 5100	< 1.63	< 1.88	< 1.69	< 4.14	< 3.38	< 2.92	< 1.93	< 1.72	< 1.69	< 14.1
628045006	6/21/2023	1110000 ± 6770										
631021006	7/18/2023	588000 ± 3280										
636604007	8/24/2023	219000 ± 3520	< 1.55	< 2.26	< 5.17	< 1.53	< 3.40	< 4.23	< 2.33	< 1.86	< 1.68	< 31.0
639233006	9/19/2023	96000 ± 1380										
643949007	10/20/2023	103000 ± 1550	< 1.26	< 1.48	< 3.35	< 1.30	< 2.68	< 2.57	< 1.70	< 1.39	< 1.30	< 16.1
Monitoring Well 13B (MW-13B)												
607960002	1/17/2023	< 216										
613105003	2/27/2023	< 259										
615805009	3/21/2023	< 255	< 1.58	< 1.71	< 3.87	< 1.64	< 3.51	< 2.99	< 1.81	< 1.66	< 1.90	< 10.8
619479001	4/20/2023	< 179										
624481008	5/26/2023	< 223	< 1.24	< 1.24	< 2.91	< 1.31	< 2.70	< 2.50	< 1.37	< 1.42	< 1.24	< 11.6
636604008	8/24/2023	< 217	< 1.62	< 1.93	< 5.05	< 1.57	< 3.24	< 3.39	< 1.87	< 1.59	< 1.57	< 15.5
643949008	10/24/2023	< 251	< 1.36	< 1.59	< 3.35	< 1.5	< 2.91	< 3.02	< 1.66	< 1.59	< 1.53	< 14.2
Monitoring Well 14 (MW-14)												
624481009	5/24/2023	< 222	< 1.56	< 1.71	< 3.77	< 1.47	< 3.07	< 2.72	< 1.96	< 1.63	< 1.53	< 14.3
634806005	8/21/2023	< 237	< 1.52	< 1.70	< 3.90	< 1.61	< 3.28	< 3.10	< 1.92	< 1.64	< 1.69	< 17.3
643200001	10/18/2023	< 121	< 2.20	< 1.92	< 5.20	< 2.33	< 4.96	< 3.86	< 2.45	< 2.00	< 2.47	< 16.8
Monitoring Well 15A (MW-15A)												
615805010	3/21/2023	< 244	< 1.33	< 1.30	< 2.84	< 1.33	< 2.66	< 2.32	< 1.37	< 1.31	< 1.20	< 7.92
624481010	5/24/2023	< 223	< 1.38	< 1.61	< 3.61	< 1.62	< 2.91	< 2.90	< 1.63	< 1.47	< 1.42	< 13.0
627349001	6/16/2023	< 298										
635348005	8/23/2023	844 ± 192	< 1.85	< 2.16	< 4.69	< 2.14	< 4.12	< 3.66	< 2.02	< 1.90	< 1.87	< 18.4
639233007	9/19/2023	9670 ± 462										
643949009	10/24/2023	58500 ± 1180	< 1.58	< 1.58	< 4.03	< 1.62	< 3.37	< 3.38	< 1.68	< 1.65	< 1.54	< 16.4
650022007	11/27/2023	27400 ± 1250										
650357007	12/18/2023	33400 ± 813										
Monitoring Well 15B (MW-15B)												
615805011	3/21/2023	< 253	< 1.81	< 1.76	< 4.16	< 2.14	< 4.26	< 3.39	< 2.31	< 2.09	< 2.17	< 14
624481011	5/24/2023	< 222	< 1.43	< 1.66	< 3.76	< 1.59	< 3.22	< 2.88	< 1.92	< 1.59	< 1.64	< 15.4
635348006	8/23/2023	< 251	< 1.47	< 1.49	< 3.25	< 1.45	< 2.54	< 2.52	< 1.57	< 1.48	< 1.34	< 12.9
643200002	10/25/2023	< 127	< 1.63	< 1.60	< 2.72	< 1.67	< 3.37	< 2.72	< 1.60	< 1.72	< 1.65	< 7.55

TABLE 19: 2023 GROUNDWATER MONITORING DATA FOR MNGP. (CONTINUED).

Lab ID	Collect Date	^{3}H	^{54}Mn	^{58}Co	^{59}Fe	^{60}Co	^{65}Zn	^{95}Zr	^{95}Nb	^{134}Cs	^{137}Cs	^{140}Ba-^{140}La
Monitoring Well 16A (MW-16A)												
608231004	1/17/2023	12700 ± 548	< 1.76	< 1.67	< 4.10	< 1.97	< 3.34	< 3.33	< 1.93	< 1.82	< 1.94	< 10.6
613684004	2/27/2023	11100 ± 398										
616606004	3/22/2023	86100 ± 1710	< 1.07	< 1.22	< 3.15	< 1.15	< 2.48	< 2.37	< 1.48	< 1.20	< 1.14	< 23.9
619903005	4/20/2023	135000 ± 2290										
624656006	5/26/2023	1640 ± 318	< 1.73	< 1.76	< 3.21	< 1.52	< 3.02	< 3.21	< 1.87	< 1.76	< 1.66	< 14.5
628045007	6/21/2023	143000 ± 2450										
631021007	7/18/2023	23700 ± 666										
636604009	8/23/2023	24300 ± 1190	< 1.26	< 1.54	< 3.78	< 1.25	< 2.74	< 2.74	< 1.59	< 1.33	< 1.24	< 28.0
639233008	9/19/2023	18400 ± 623										
643949010	10/24/2023	7870 ± 451										
650022008	11/27/2023	147000 ± 2870	< 1.39	< 1.51	< 2.99	< 1.24	< 2.49	< 2.84	< 1.62	< 1.41	< 1.45	< 13.9
650357008	12/18/2023	65700 ± 1130										
Monitoring Well 16B (MW-16B)												
615805012	3/22/2023	< 256	< 1.41	< 1.41	< 3.14	< 1.51	< 2.89	< 2.84	< 1.61	< 1.57	< 1.39	< 9.91
636604010	8/23/2023	11500 ± 812	< 1.51	< 1.67	< 4.40	< 1.42	< 3.31	< 3.25	< 1.93	< 1.59	< 1.54	< 32.2
643949011	10/24/2023	6820 ± 424	< 1.35	< 1.57	< 3.37	< 1.56	< 2.94	< 3.22	< 1.98	< 1.61	< 1.46	< 15.8
Monitoring Well 23A (MW-23A)												
636604011	8/28/2023	29600 ± 1260	< 1.19	< 1.43	< 2.97	< 1.12	< 2.44	< 2.80	< 1.50	< 1.28	< 1.54	< 20.9
643949012	10/24/2023	17300 ± 664	< 1.47	< 1.57	< 3.80	< 1.40	< 3.12	< 3.17	1.63	< 1.71	< 1.41	< 17.7
Monitoring Well 26A (MW-26A)												
627349002	6/16/2023	< 297										
Monitoring Well 26B (MW-26B)												
627349003	6/16/2023	< 291										
Monitoring Well 27A (MW-27A)												
627349004	6/16/2023	< 284										
Monitoring Well 27B (MW-27B)												
627349005	6/16/2023	< 297										
Monitoring Well 29A (MW-29A)												
629562001	7/12/2023	1660 ± 193										
636604012	8/23/2023	60900 ± 1830	< 1.30	< 1.72	< 3.89	< 1.39	< 2.74	< 2.88	< 1.79	< 1.41	< 1.28	< 30.0
643949013	10/20/2023	613 ± 192	< 1.15	< 1.26	< 2.80	< 1.23	< 2.56	< 2.55	< 1.36	< 1.26	< 1.29	< 16.1
650023001	11/28/2023	1270 ± 269										
650357009	12/18/2023	269 ± 170										
Monitoring Well 30A (MW-30A)												
629562002	7/12/2023	45900 ± 987										
636604013	8/23/2023	363 ± 163	< 1.45	< 1.67	< 4.53	< 1.53	< 3.14	< 3.19	< 1.74	< 1.49	< 1.36	16.6 ± 18.7
643949014	10/20/2023	2460 ± 276	< 1.07	< 1.32	< 2.98	< 1.18	< 2.38	< 2.22	< 1.29	< 1.19	< 1.06	< 14.4
650023002	11/28/2023	581 ± 203										
650357010	12/18/2023	719 ± 196										
Monitoring Well 31B (MW-31B)												
636604014	8/23/2023	2040 ± 345	< 1.42	< 1.86	< 4.42	< 1.38	< 3.4	< 3.38	< 1.86	< 1.57	< 1.51	< 33.2

TABLE 19: 2023 GROUNDWATER MONITORING DATA FOR MNGP. (CONTINUED).

Lab ID	Collect Date	^{3}H	^{54}Mn	^{58}Co	^{59}Fe	^{60}Co	^{65}Zn	^{95}Zr	^{95}Nb	^{134}Cs	^{137}Cs	^{140}Ba-^{140}La
Monitoring Well 33A (MW-33A)												
636604015	8/23/2023	716 ± 209	< 1.57	< 1.87	< 4.49	< 1.53	< 3.08	< 3.58	< 2.12	< 1.56	< 1.53	< 34.2
643949015	10/23/2023	2540 ± 281	< 1.24	< 1.26	< 2.93	< 1.18	< 2.57	< 2.33	< 1.44	< 1.27	< 1.22	< 12.3
650023003	11/28/2023	5260 ± 536										
650357011	12/18/2023	3730 ± 310										
Monitoring Well 37A (MW-37A)												
636604016	8/28/2023	8890 ± 677	< 1.24	< 1.20	< 3.11	< 1.20	< 2.50	< 2.59	< 1.49	< 1.18	< 1.12	15.8 ± 12.1
643949016	10/23/2023	< 250	< 1.45	< 1.59	< 3.44	< 1.46	< 3.53	< 3.19	< 1.83	< 1.47	< 1.50	17.1
Monitoring Well 48A (MW-48A)												
635816001	8/23/2023	< 202	< 1.24	< 1.47	< 3.28	< 1.46	< 2.95	< 2.71	< 1.47	< 1.54	< 1.53	< 15.3
Monitoring Well 101 (MW-101)												
643200003	10/25/2023	<135	< 3.07	< 3.08	< 5.59	< 2.83	< 6.22	< 5.45	< 3.31	< 2.90	< 3.01	< 15.0
Monitoring Well 102 (MW-102)												
643200004	10/25/2023	< 130	< 1.53	< 1.51	< 3.92	< 1.48	< 2.97	< 2.82	< 1.80	< 1.76	< 1.81	< 10.0
Monitoring Well 103 (MW-103)												
643200005	10/25/2023	< 131	< 2.14	< 1.97	< 4.61	< 2.15	< 4.32	< 3.81	< 2.39	< 2.34	< 2.08	< 13.5
Storm Drain SD006												
611414001	2/8/2023	< 254	< 1.39	< 1.60	< 3.11	< 1.22	< 2.63	< 2.78	< 1.65	< 1.42	< 1.44	< 13.1
611414002	2/8/2023	< 251*	< 1.23	< 1.40	< 2.93	< 1.10	< 2.60	< 2.50	< 1.50	< 1.30	< 1.21	< 11.8
619349001	4/10/2023	< 178	< 1.46	< 1.53	< 2.75	< 1.37	< 2.76	< 2.76	< 1.59	< 1.63	< 1.53	< 10.6
634097001	8/14/2023	< 235	< 1.48	< 1.70	< 3.60	< 1.81	< 3.52	< 3.04	< 1.75	< 1.90	< 1.71	< 10.7
643207001	10/25/2023	< 211	< 1.54	< 1.61	< 3.37	< 2.03	< 3.71	< 3.17	< 1.83	< 2.05	< 1.67	< 8.78

***Duplicate sample; not used in calculating average.**