Stantec

PRELIMINARY DESIGN REPORT
Inver Grove Heights Water Treatment Plant
Rehabilitation Improvements

CITY OF
INVER GROVE
HEIGHTS

August 14, 2023

Prepared for:
City of Inver Grove Heights, Minnesota

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Executive Summary

The City of Inver Grove Heights has been monitored by the Minnesota Department of Health for combined radium tests at the water treatment facility since 2021. Individual tests were between 4.4 and 6.6 pCi/L. The maximum contaminant level (MCL) of 5.4 pCi/L was exceeded in October of 2022, and the City was notified in January of 2023. Because of the exceedance of the radium testing values, the City is advancing previously planned improvements to their water treatment plant with the goal of reducing radium levels in the drinking water to below 2.5 pCi/L. The City's treatment process has overall worked well for the past 26 years, but improvements to several components are needed to meet the ongoing treatment demands.

In addition to the media replacement project, other key upgrades to the water plant are being considered. This report summarizes the current situation, outlines the pilot study that was completed for different media types, discusses the existing conditions at the facility, and makes recommendations for upgrades at the plant, all with the goal of radium compliance and continued efficient operation of the plant for years to come.

1 CHAPTER 1 – INTRODUCTION

1.1 PURPOSE

The City of Inver Grove Heights (City), Minnesota operates a gravity water treatment plant (WTP, plant, facility) that receives raw groundwater from seven wells within proximity to the plant. The WTP was designed to remove iron and manganese (Fe/Mn) from the City's drinking water. Eight gravity filters with silica sand media are used as the primary treatment method. Chlorine, potassium permanganate, and manganese sulfate are added prior to the filters. These chemicals assist in removing Fe/Mn from the water. In addition to Fe/Mn removal, this treatment method is effective at removing radium.

The City has exceeded the radium limits assigned by Minnesota Department of Health (MDH). Considering it is a health concern, the City issued a statement to the public warning of the excess of the contaminant in the distribution system. The City is working on resolving the issue as soon as possible.

The majority of the WTP is 26 years old and in need of improvements, many of which were in the planning stages prior to the exceedance of the radium limits. The purpose of this study is to evaluate these improvements to address City concerns and issues and allow the City to plan and budget for the future. Each investigated improvement includes a description, analysis, and opinion of probable construction cost.

1.2 SCOPE

The scope of improvements considered in this study are presented in subsequent chapters of the report. Improvements address both the water treatment process, as well as mechanical, architectural, electrical, and structural issues.

2 CHAPTER 2 – DESIGN CRITERIA

This section establishes design criteria to be used for water treatment components. The design criteria is based on the results from the pilot study, MDH standards, and City's desired quality improvements. A 20-year planning period is typical for water treatment plant evaluations.

2.1 MINNESOTA DEPARTMENT OF HEALTH STANDARDS

Radioactive materials, also called radionuclides, are both naturally occurring, and human made. Radionuclides from naturally occurring sources can be adsorbed into groundwater and surface waters in Minnesota. When radionuclides break down (decay), they create radiation. Radionuclides are a natural part of our environment, and small amounts of radiation are common in the air, water, and soil around us. Coming in contact with too much radiation can cause health problems.

The U.S. Environmental Protection Agency's (EPA) Radionuclides Rule has four federal standards for radionuclides in drinking water. The EPA Radionuclides Rule and MDH requirements defines safe drinking water as containing up to or less than: 15 picocuries of alpha particles per liter of water (pCi/L), 5 pCi/L of combined radium 226/228, 20 pCi/L of uranium, or 4 millirem of beta/photon emitters per year (mrem/yr). MDH regulates public water systems by approving treatment plans. The department enforces the Safe Drinking Water Act and tests public water supplies on a regular basis. The City's water is currently tested for radium compliance on a quarterly basis.

2.2 WORK PRIOR TO THE REPORT

The City began working with Kurita (Tonka Water) after being notified of the elevated radium levels in the drinking water. Tonka reviewed the City's system and suggested dosing changes to the potassium permanganate and manganese sulfate in an effort to better capture radium in the current Fe/Mn treatment process. By increasing the chemical dosing, the existing sand filter was better able to remove radium from the water. These changes are an interim solution that will allow for compliant drinking water while a more permanent and comprehensive solution is developed.

2.3 PILOT STUDY

Multiple methods and media types exist for effective radium removal. Some are proprietary materials and systems. These systems come with differing costs than non-proprietary systems but can offer advantages from an operational perspective. Stantec recommended that pilot testing be completed. Working with City staff, two types of media were compared, Kurita (Tonka Water) IMAR and GreensandPlus with anthracite coal. Currently, the plant has a mono-media consisting of silica sand with no anthracite. Both IMAR and GreensandPlus with anthracite coal are considered dual media. A proprietary chemical called TonkaZorb hydrous manganese oxide (HMO) was proposed by Kurita to be used in the pilot. The pilot ran for two weeks starting on May 30, 2023. Samples were taken for testing of radium, Fe, Mn and other constituents. Kurita prepared a pilot testing report that is attached as Appendix B.

The pilot system consisted of skid mounted pressure vessels. One had 30” of IMAR dual media one had 18” of GreensandPlus and 12” of anthracite. The conclusions from the report summarized below for reference.

1. *Both filters, dosed with chlorine, and at a loading rate of 3.0 gpm/ft2 effectively lowered manganese to below its respective SMCL (Mn<0.05 mg/L) to an average of ≥0.002 for both run 1 and 2 for both the IMAR™ and GreensandPlus™ media beds.*

2. *Both filters, dosed with Kurita Water’s proprietary blend of TonkaZorb™ Hydrous Manganese Oxide (HMO), and at a loading rate of 3.0 gpm/ft2 effectively lowered manganese to below its respective SMCL (Mn<0.05 mg/L) to an average of ≥0.002 for both run 1 and 2 for both the IMAR™ and GreensandPlus™ media beds.*

3. *Both filters were dosed with chlorine bleach (sodium hypochlorite) and TonkaZorb™ at the same dosages. The chlorine dosage was approximately 2.0-2.2mg/L to achieve a free chlorine residual of ~ 0.8mg/L. Breakpoint chlorination was achieved during this pilot. The HMO dosage was 1ppm as Mn, this in addition to the raw manganese created a Mn concentration above the filter bed >1ppm to aid the removal of Radium and Gross Alpha. Both filters were able to effectively remove Mn, Fe and NH3 with these dosages.*

4. *At a loading rate of 3.0 gpm/ft2, the 30” of Tonka Water IMAR™ dual media performed such that all effluent lab samples were below their respective SMCL or MCL for Fe, Mn and Combined Radium. Per the stretch goal of <2.5pCi/L of the City of Inver Grove Heights, by the end of the pilot the IMAR™ filter was able to achieve this after a pseudo steady state of HMO feed was established to coat the media. Given the high concentration of oxidized manganese added to the filter, this allowed the additional filtration of Mn without the addition of permanganate and only needed the addition of chlorine to complete the oxidation of Mn and Fe in the source water. If given more time, eventually it is expected that the IMAR™ filter will perform relatively evenly in its ability to remove combined radium to that of a GreensandPlus™ bedded filter. Run 1 average effluent of radium was 2.67pCi/L (71.4% removal) and run 2 average radium was 1.50pCi/L (86.3% removal).*

5. *At a loading rate of 3.0 gpm/ft2, the 18” of GreensandPlus™ /12” of anthracite dual media performed such that all effluent lab samples were below their respective SMCL or MCL for Fe, Mn and Combined Radium. The media was able to remove the radium to a lower concentration than the IMAR™ filter, however as the pilot progressed, the performance gap between the two was closing. It is possible that given more time eventually will perform similarly to the IMAR™. Run 1 average effluent of radium was 0.24pCi/L (97.5% removal) and run 2 average radium was 0.39pCi/L (96.4% removal).*

6. *No head loss was observed during this pilot as the pilot did not generate any. Runtime cannot be determined by this.*

7. *The run lengths will need to be field determined on the full-scale system based on well combinations. Due to time constraints and needing to backwash the filter to show performance of backwashing and repeatability of the experiment, the 1st run had to be terminated after 1 week (or ~ 76 hours of runtime) and the second run was terminated at ~90 hours of runtime. At the end of each run, neither filters were showing signs of breakthrough so at the very least with the well combinations tested, the filters can reliably run for >72 hours. This should be studied further by IGH operators via ladder study with well combinations to determine Mn breakthrough to determine run lengths. The Tonka Water's Simul-Wash™ backwash system was simulated during the pilot. This method successfully cleaned the filter media between runs.*

Discussions about each media type and their benefits are contained in Section 6.1.

The pilot also demonstrated that modifications to the plant's chemical feed to incorporate a single HMO chemical will be needed for successful radium removal.

3 CHAPTER 3 – EXISTING CONDITIONS AND CONDITION ASSESSMENTS

3.1 FACILITY HISTORY

The WTP has undergone several improvement projects since it was first constructed.

- 1997: Construction of the original plant next to the ground storage reservoir. 6.02 MGD capacity. Designed to be expanded when City demand increased.
- 2006: Expansion of the 1997 plant. Added four additional filter cells. 12.04 MGD capacity.
- 2016: Added additional media to make up for media loss over 20 years of run-time.
- Minor upgrades and maintenance to the plant have taken place, but no other major rehabilitations have been completed.

4 CHAPTER 4 – CONDITION ASSESSMENTS

Stantec staff toured the WTP to review the existing conditions of plant components and provide recommendations for rehabilitation. The following are descriptions of the condition assessments that were completed in conjunction with City staff. Specific, phased recommendations are discussed in Chapter 5.

4.1 PROCESS

4.1.1 Filter Media

The ultimate driver for the project is compliance with radium standards, and media replacement is the key to meeting this goal. The current media is silica sand. The media effectively removes Fe and Mn from the City's water and has been supplemented with additional chemical feed to reduce radium in the drinking water. A media replacement is needed as the material has reached the end of its useful life. There has been some media loss over the life of the plant, the media was topped off with new sand in 2016. Further discussion regarding the pilot study and replacement media are found in Section 5.1.1 and Section 6.1.

4.1.2 Distributor Box and Column

The distributor box evenly distributes raw water to the individual filter cells. There are two distributor boxes, each serving four filter cells. The original construction phase of the WTP included a coated carbon steel distributor box. Over time paint coatings begin to fail and corrosion begins to form. Replacement of paint coatings and rehabilitation are currently due on the original distributor. The second construction phase of the WTP (expansion) included a stainless steel distributor box. While stainless steel material greatly reduces required maintenance, the potential for corrosion at the welds remains. The second phase stainless steel components are generally in good condition and don't warrant replacement or rehabilitation at this time.

Three options exist for rehabilitation. First, the steel components can be repainted. This is cost effective but does not address the ongoing maintenance of coated carbon steel. The fact that the second phase is already a less maintenance intensive material makes leaving the carbon steel components a less than desirable choice.

Second, the steel components can be replaced with stainless steel. This option would match the second phase of the WTP and would provide consistency across the plant. Off-site vs. on-site fabrication of components would need to be considered, as well as building access for completed components. The greater the extent of off-site fabrication, the better the overall quality will be, but field welding can be performed. The lifespan of the stainless distributor box is anticipated to be in the 50 year range.

Third, the distributor box and column could be replaced with concrete components. With this option both the column and box would be constructed of concrete. The existing steel column could be used as part of the formwork for the column upgrades, and the box would be replaced with reinforced concrete. This

replacement would require significant formwork, however it would require minimal building disturbance to install the materials in place. The longevity of concrete would exceed that of stainless steel, but the overall cost is significantly higher. In addition, further modifications to the existing filter configuration would be needed to accommodate concrete components.

The column in both phases of the plant are stainless steel and both appear to be in good condition. At this time, no revisions to the column are proposed unless concrete were the chosen rehabilitation method for the box.

4.1.3 General Process Components

4.1.3.1 Lower Level

General: General cleaning and touch-up painting should be considered after equipment replacements. Maintenance of tank seals and gaskets should be considered. Paint on tank walls is peeling in areas and repairs have previously been made.

Raw water and Asher Zone finished water pipe: The existing flow metering on the raw water pipe (30”) and Asher Zone finished water (24”) are not reliable and outdated. An original propeller meter on the raw water is not in service. A later installed probe type meter has reached the end of its useful life. It is recommended that new magnetic (inline) or ultrasonic flow (clamp-on) metering be installed to improve accuracy and reliability. Clamp-on meters are less expensive and easier to install if the accuracy for the meter is acceptable. Straight pipe runs up and downstream of the meter are needed, as ultrasonic meters are more susceptible to turbulence compared to magnetic meters. Magnetic meters are more expensive but provide greater flow accuracy. Installation would require removal and replacement of the existing propeller meter body with a new magnetic meter. Custom length meters can be provided to eliminate the need for a spool piece, as typical magnetic meters are shorter than older propeller meters.

Spraywash: Replacement of air actuated valves with electric actuated valves could be considered (see Section 5.1.1 Paragraph 4 for a discussion regarding valve replacement).

Filter drains and pipe penetrations: Leaking gaskets are causing some stains on the wall and floor. Repairs are recommended to the tank seals.

4.1.3.2 Ground Level

General: General paint touch-up is recommended for walls and piping. Replacement of pneumatic valves with electric could be considered. The City has been repairing sludge pumps as part of their five year CIP.

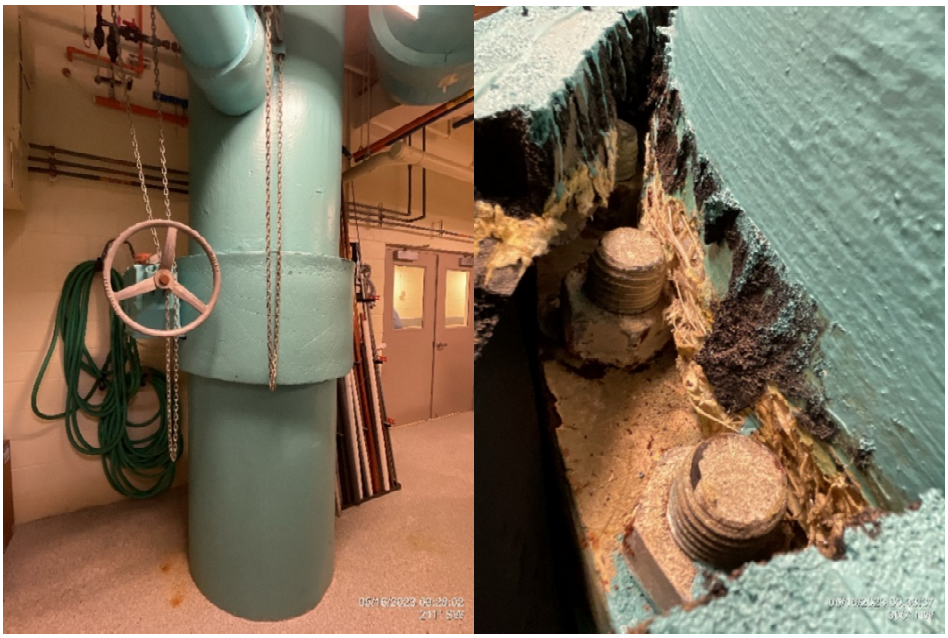
Dehumidifier Room:

The current dehumidification system is composed of a central desiccant dehumidification unit (Bry-Air brand). This unit has served the facility well but has become outdated and the unit has experienced increased maintenance costs and downtime. City staff have documented the desire to replace the dehumidification system with a new central unit. Portable dehumidifiers should be purchased for distant parts of the facility and for during replacement/maintenance of the centralized unit. New actuators and copper pipes near the unit should be installed.

If pneumatic operated valves in the plant are replaced with electric, the air compressor and air dryer could be removed. City staff noted that battery operated tools have replaced air tools in the facility. Air valves are currently failing near the blower.

It is recommended that the air wash blower be inspected by a manufacturer's representative and preventative maintenance, or replacement be completed as recommended. Internal components could be candidates for replacement if the remainder of the unit is in good condition.

Pipe Room: The 30” valve on the raw water pipe is showing signs of corrosion under the insulation. It is recommended that the pipe insulation be permanently removed in this room, the corrosion removed, and the valve/piping repainted. This should be done on all piping within the room. To combat moisture, it is recommended that a portable dehumidifier be permanently placed in this room.



Fluoride Room: The chemical dosing pumps for fluoride are aging and replacement with peristaltic pumps is recommended. The adjoining electrical components that are showing signs of degradation should also be replaced.

Potassium Permanganate and Manganese Sulfate Rooms: Considerations for revised chemical feed are discussed in Section 5.1.1 Paragraph 5. The current equipment is functioning, but upgrades could be considered if the rooms were to continue operating in their current capacity.

Chlorinator Room: Currently there are no chlorine gas detectors in the plant outside of the chlorinator/ChlorTainer rooms. The City has requested detectors be placed in rooms that have chlorine piping in them, even if just passing through. Consideration can also be given to placing the chlorine gas eductors (device that mixes the chlorine gas with water) in the chlorinator room. This means that chlorine gas will only be present in these two rooms, versus within lines in several rooms in the plant. Moving the eductors to the chlorinator room will allow mixed chlorine gas and water solution be routed to the feed points. This change would improve safety as it would reduce the amount of tubing where chlorine gas is present. This modification requires a water supply to be plumbed from the supply line at the ceiling and floor drainage to be extended from the adjacent garage or vestibule.

The vacuum switchover equipment for the ChlorTainers should be evaluated for replacement. New rotameters should be installed in the chlorinator room.

4.1.3.3 Upper Level

Pump room: One high service pump was under repair during the site visit. The City has rehabilitation of the high service pumps included as part of their five year CIP.

Filter room:

- The column and distributor box are discussed in greater detail in Section 4.2.1.
- Backwash supply valve(s) are suspected to be allowing water into the line which negatively impacts backwash sequencing. Valve replacement is suggested for these valves. Replacement of the air wash and influent valves should also be considered.
- All filter piping should be inspected when the filters are taken offline. It should be cleaned of any corrosion and repainted or replaced if necessary.
- Concrete filter walls should be evaluated for delaminated of paint coatings once the media has been removed.
- Media retaining nozzles should be replaced as these are critical components and require media to be removed to facilitate installation.
- Air wash piping should be evaluated when the filter is taken out of service and repairs made if necessary.
- Replacement of pneumatic actuators or replacement of pneumatic actuators with electric actuation of filter valves is discussed in Section 5.1.1 Paragraph 4.
- It is recommended that radar level sensing be incorporated into future plant work, as this can help improve the monitoring and operation of the plant.
- Stainless steel components (column, distributor box for cells 5-8, etc.) should be evaluated for degradation and repaired as necessary. Passivation of welds through application of a pickling paste may be considered to minimize corrosion.

Flow Splitter Room: The concrete tank coating in the flow splitter room is degrading and peeling from the walls. City staff have requested that the coating be blasted off and the walls left uncoated to minimize future maintenance. Products to extend the life of the concrete should be considered after paint coatings are removed.

4.2 ARCHITECTURAL

The condition of the building roof was assessed by Stantec staff. City staff indicated there are currently several roof leaks, mainly located at the original building skylights and roof access hatch. The following items are recommended to be addressed in future building maintenance.

Interior water staining at all of the original building skylights.

Roofing membrane shrinkage along the north parapet.

Roof access hatch pistons are leaking (indicating gasket failure) and the stop arm for the hatch is broken.

All but one of the roof scuppers is missing a gravel stop to retain the rock ballast.

The EPDM membrane installed at the original building is not UV resistant and the exposed membrane is drying out and shrinking, resulting in membrane failure.

4.3 BUILDING MECHANICAL

The condition of the building mechanical systems equipment was conducted by Stantec staff and is based on visual inspection and discussion with the operator during the site visit. Equipment was not disassembled, and destructive testing means were not employed. Typical equipment life is based on the research and guidelines of ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) and BOCA (Building Owners and Managers Association International).

4.3.1 Fire Sprinkler System

The facility is protected by a wet pipe fire sprinkler system. An annual inspection is required, and the last documented inspection occurred January 2, 2022, making the system overdue. City staff has already scheduled to include this inspection in the coming months.

4.3.2 Plumbing

4.3.2.1 Lower Level

- Backflow preventers require annual inspection and service. The last documented inspection occurred June 24, 2022. City staff are coordinating the annual inspection to occur in the next few months. Typical of two locations.
- The isolation valve adjacent to the backflow preventer is missing its handwheel and inoperative. Recommend replacing handwheel.
- The emergency eyewash has been disconnected. If sampling will continue to be performed at this location, it is recommended that the eyewash be replaced.
- It is recommended that the house and non-potable water meters be replaced so they match those currently used by the City. This will reduce the number of spare parts required to be stocked.
- The sump pumps are original to the facility. They have lasted well beyond the typical 15 year life. It is recommended that they be replaced in-kind.

- The sanitary piping double containment under the garage has stains from past leaks. Monitor for leaks and repair as necessary.

4.3.2.2 Ground Level

- Water heater is 26 years old and beyond the typical 12-15 year life. Recommend replacement.
- Potable water is used for cooling dehumidifier supply air and wasted down the drain. Consider less resource intensive cooling options when the dehumidifier is replaced.
- Copper elbows at dehumidifier cooling coil have corroded/eroded and have been replaced. When unit is replaced, confirm that the flow velocity in the system is appropriate for copper.

4.3.2.3 Upper Level

- Drinking fountain does not provide water. It is recommended to restore water supply and troubleshoot to determine if fixture was shut off due to leakage or another malfunction.

4.3.3 HVAC

4.3.3.1 Ground Level

- Dehumidifier is 26 years old and at end of useful life. Staff reports that replacement parts are now expensive and difficult to find. Consider replacing unit.
- Indoor makeup air unit burner has been replaced; however, the date of replacement is unknown. The unit is 26 years old and approaching end of useful life. Consider replacement at the same time as other mechanical components.
- Furnace is 26 years old and beyond the typical lifespan of 18 years. Consider replacement with a high efficiency condensing model.
- Fire/smoke dampers, various locations. Staff reports that dampers have been propped open throughout the facility. Consider stroking each damper individually to confirm operation and service/repair as required.
- Filter/grille missing on return/exhaust grille in the following rooms: polyphosphate room and potassium permanganate room. Consider replacing missing filter/grille.
- Staff raised concern about lack of gas detection and automatic ventilation in the Chlorine Room. Consider reviewing size of existing ventilation and provide for automatic operation on chlorine gas detection in addition for manual operation when space is occupied.

4.3.3.2 Upper Level

- Unit heaters are beyond their typical life space of 15 years. Corrosion and leaks noted on several unit heater flues including the high service pump room and filter room. Consider replacing associated flue and combustion air duct when replacing unit heater as part of normal building maintenance. Heaters should be evaluated on a case-by-case basis.
- Unit heater thermostat is broken in the filter room. Recommend replacement.

4.3.3.3 Roof Level

- AAON makeup air unit is six years old. Staff reports that it has been plagued with maintenance and operational problems.
- Carrier roof top unit was manufactured in 1997 (26 years old) and is past the anticipated operational life of 15 years. Consider replacement.

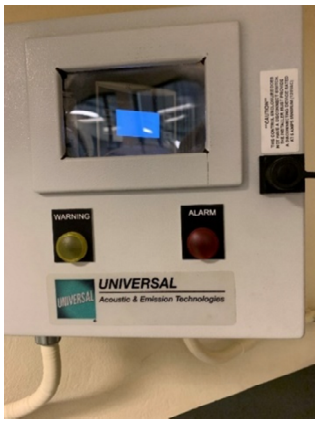
- Bryant roof top unit was manufactured in 2000 (23 years old) and is past the typical operational life of 15 years. Consider replacement.
- Bryant roof top unit was manufactured in 2006 (17 years old) and at end of the typical operational life of 15 years. Consider replacement.

4.4 BUILDING ELECTRICAL

The condition of the building electrical systems equipment was conducted by Stantec staff and is based on visual inspection and discussion with the operator during the site visit. The facility's electrical equipment and related conduit, wire, receptacles, etc. are generally in good condition. The following is a list of electrical items to consider for future projects.

- Consider replacing all the existing interior and exterior fixtures with LED lights to improve overall building efficiency. This is an ongoing facility CIP implementation item.

- Consider having infrared testing and inspection completed on all electrical equipment and motors. Equipment to be tested should include all service entrance equipment, motor control center, panelboards, transformers, generator control panel/main circuit breaker, disconnects, and motors. Infrared testing uses and infrared camera to identify components that are creating excessive heat. It can identify failing components or those in need of maintenance before actual issues present themselves.



- Consider replacing the existing high service pump variable frequency drives (VFDs). They are of an age that replacement parts are becoming difficult to obtain. Consider adding VFDs to the remaining high service pumps that don't have them. Consider adding a VFD to the backwash supply pump.

- Consider repairing or replacing the generator emissions monitoring panel. The operator interface screen is not functioning, and the panel components show signs of corrosion. The conduits from the generator to the panel are not sealed. Once the panel is replaced or repaired the conduits should be sealed.

4.5 CONTROLS AND SCADA

The SCADA system (Wonderware software and plant PLCs) has been upgraded in the past two years except the one remaining filter control console (SCP-5) and Well No. 9 SCP-6 which is part of the Babcock Booster Station. Automatic Systems has the parts on order for these final two upgrades and will complete when parts become available.

The SCADA system's original radios have been upgraded from MDS 9810s to MDS TransNET. The TransNET radio is being replaced by the TransNETX and per the manufacturer the newer units are backwards compatible, therefore no radio upgrades are needed at this time, other than considering replacing the SCADA master radio antenna (see Future Phase replacement recommendations).

Wireless access points (WAPs) could be added to the facility to allow wireless access in all areas. Automatic Systems could be contracted to test wireless signal strength a provide a quotation for adding

WAPs. It is anticipated that at a minimum WAPs will need to be added to the high service pump room, filter room, main level hallway, and lower level hallway.

4.6 CIVIL

The site around the building is generally in good shape. It is recommended that fill be added behind retaining walls to replace missing material and that walls repaired as necessary. Several locations of clearwell railing have frost heaved, lifting the railing. Repair of these posts is recommended, especially near the concrete retaining wall. The northeast corner of the clearwell cover has developed a crack from the adjacent retaining wall that should be investigated and repaired. Consider replacing the section of wall causing the damage.

5 CHAPTER 5 – WATER TREATMENT PLANT IMPROVEMENTS

This section of the report includes a description and an estimated construction cost for the WTP improvements. They are broken down into Phase 1 and Future Phase categories.

5.1 PHASE 1 IMPROVEMENTS

Phase 1 improvements include those items outlined in the City's RFP as well as other items identified through the course of site inspections and report preparation. A summary of the work and estimated costs is included in Section 5.1.3.

5.1.1 Phase 1 Improvements Identified in the RFP

1. Replace Sand Filter Media (8 treatment cells)

   The pilot testing efforts resulted in similar performance results between the two tested media types. Both media types being considered, IMAR and GreensandPlus with anthracite coal, are dual type medias. Dual media means that an anthracite coal is part of the mixture. The anthracite provides additional surface area for Fe, Mn, and conversely radium to be held on the media. This increases the length of time between backwashes. Increasing the time between backwashes reduces energy and water demands on the plant. It also prolongs media life, as there is less scouring and erosion of the media. Refer to Section 6.1 for more information regarding the two media types.

   Switching from a mono-media to a dual media will require upgrading the wash troughs to a new elevation and to ones that include media retention. Stantec and the City met with WesTech (original trough supplier) onsite to discuss options for replacement or revision to the existing components. Using the original manufacturer will mean a similar number of troughs and a similar configuration can be used. Tonka makes a competing product; however, it would require greater structural modifications to the filters, which is not as desirable. Detailed design will determine the exact configuration, elevation, and manufacturer of the new troughs. Changes to the gullet and modifications to the weir wall plate elevations adjacent to the filter cells are likely needed. The backwash pump capacity will also need to be evaluated as part of a media replacement due to increased backwash rates. If the weir wall can be sufficiently raised, additional backwash flow can likely be generated without upsizing the backwash pump. Filter capacity will be a limiting factor when raising the weir walls, as increasing the elevation will reduce freeboard in the filter cells. Weir wall elevations can be raised through addition of weir plates. The channels to insert the plates was part of the original design, and space is available for more plates. The existing plates should be evaluated for corrosion or damage at the time of media replacement and rehabilitated as needed.

   As part of the media replacement, the existing media should be tested for residual radium and a disposal plan should be developed.

2. Review and upgrade drain piping on the filters

   New plastic nozzles should be installed on the underdrain. Even though the existing ones may be functioning well, a media replacement presents the opportunity to replace this highly critical component at a time when it is easy to do so. Replacement of a broken nozzle after media is placed requires removal of all the media and taking the filter offline.

Piping that is not normally accessible should be inspected for damage and repair as needed when the filters are offline. Corrosion should be removed from steel components and pipe should be repainted.

The airwash piping header and supports underneath the underdrain should be reviewed to determine if repair is needed.

3. Replace existing Filter 1-4 carbon steel distribution box with stainless steel

   The paint coating on the Filter 1-4 distributor box is failing. The box itself is carbon steel and a rehabilitation is needed. Based on the options discussed in Section 4.1.2, it is recommended that the carbon steel box be replaced with stainless steel components. This would mean that Filters 1-4 would match Filters 5-8 that were installed in 2006. Although stainless steel isn't 100% immune to corrosion, especially at the weld seams, it will provide a generally maintenance free component. The project plans will need to address the installation of the fabricated components and any building modifications needed to place them. Options also exist for field welding portions of the box to minimize existing building impact. Overall, this option provides adequate longevity, is low maintenance, is mid-range for cost, and provides consistency to Filters 5-8.

   An inspection of the welds on the existing stainless steel center column on both Filters 1-4 and Filters 5-8 by a certified welding inspector should be considered.

4. Replace all filter valves and air compressor valves

   Currently all valve actuators in the plant are pneumatic. The system has worked well, but for continued reliability, valve actuators should be replaced. Since the original plant design, advancements in electric valve actuation technology have improved and costs have come down significantly, as they have become the industry standard for new facilities.

   There are two options for valve actuator replacement. The first option is to replace the existing pneumatic valve actuators with new pneumatic valve actuators. This will allow for continued reliable operation of the facility with minimal impact to plant infrastructure. The air compressor and air dryer system need to continue to be maintained. A future phase improvement to consider is replacement of the air compressor and dryer.

   The second option is to replace the existing pneumatic valve actuators with new electric actuators. Wiring and control panel upgrades will be needed in addition to the actuators themselves. Electric actuators are reliable and eliminate the need for the air compressor and dryer. This saves on long term maintenance and provide more reliability to the plant operators.

   Based on the improved reliability and reduced maintenance of electric actuators, City Staff and Stantec agree that replacement of the pneumatic operators with electric should be done as part of the project. The additional cost for the electric actuators is negated by the cost of a new air compressor and the increase in reliability.

   Complete replacement should be considered for the airwash supply (8"), influent (12"), and backwash waste (18") valves at each filter cell. This is a total of 24 valves, including any geared actuators and moving parts.

5. Consider new chemical feed HMO (i.e., TonkaZorb).

   Radium, Fe, and Mn removal at the plant is currently using a combination of chlorine, manganese sulfate, and potassium permanganate. A combined HMO (TonkaZorb) is proposed to be fed into the raw water upstream of the filters. This combined chemical will replace the manganese sulfate and potassium permanganate. Either the existing manganese sulfate or potassium permanganate rooms could be used for the new combined chemical.

After discussion with City staff, it is preferrable to use the manganese sulfate room since it is on west side of the building and has direct access to the parking lot for delivery vehicles. Adding a large tank to the room will be difficult without removing a wall, however linking two separate smaller tanks (with molded spigots for durability), would provide the same storage volume. The chemical containment knee wall can be extended if needed. Using the potassium permanganate room and installing one larger tank in the sunken containment area was also reviewed, however this option is less preferable as it is more expensive and further away from the outside of the building for deliveries.

The chemical feed point for the new HMO chemical will need to be evaluated. It could use an existing feed point, or a new one could be added near the head of the plant.

In the future, custom mixing of a non-proprietary HMO using two separate chemicals could be performed onsite to mimic TonkaZorb. The existing chemical rooms could be reconfigured to meet this need at a future date.

6. Replace fluoride pumps

   The dosing pumps in the fluoride rooms should be replaced with Watson Marlow peristaltic pumps to match other dosing pumps in the facility. The electrical box near the pumps should be replaced as well due to corrosion.

7. Replace chlorine feed systems (rotameters, vacuum switchovers)

   Replacement of the chlorine feed system rotameters and vacuum switchovers should be completed with the project. In addition, it is suggested that the eductors be moved to the chlorinator room. This will require a water supply and drain line to be extended to the room. Moving the eductors will reduce the chance of a chlorine gas leak elsewhere in the plant, since it will already be mixed with water. Audio/visual alarms and automatic ventilation of the chlorinator room should be provided for any potential gas leaks.

5.1.2 Additional Suggested Phase 1 Improvements

1. Blower

   The blower should be reviewed for immediate maintenance needs. Immediate needs should be addressed, and consideration given to full replacement of the blower in a future phase, based on current condition. If full replacement is needed, it should be coordinated with the dehumidifier replacement.

2. Electrical Infrared Testing

   Infrared testing on the electrical components and motors in the plant can identify problem areas such as loose connections and failing components before they take the plant offline. Testing can be completed in one day and a report will be provided that identifies problem areas. Many of the problems are quick fixes for an electrician. These services would be performed by a third party. Stantec can help facilitate this work.

3. Smoke Dampers:

   Test and troubleshoot all fire/smoke dampers.

4. Portable Dehumidifiers:

   Consider purchasing portable dehumidifiers for use if the central dehumidification unit is being serviced and for the eventual replacement of the central unit. This purchase can provide redundancy for the plant.

5. Exterior clearwell cover cracking:

   Investigate the cracking on the northeast corner of the clearwell cover slab. Make structural repairs to the cover as necessary and replace the failing section of retaining wall.

6. Flow splitter room:

   Remove the tank coating as it is failing. City staff does not want a new coating.

7. Replace all flow meters

   This task was moved to Phase 1 based on preliminary cost estimates and efficiencies of completing this work with the rest of Phase 1. These items could be bid as an add alternate to allow for easily removal from the project if overall costs come in over budget.

   Large pipes: A clamp on ultrasonic meter has already been installed on the 24” finished water pipe to the ground storage reservoir. City staff has noted success with this meter. It is suggested to install a new clamp-on ultrasonic flow meter on both the Asher Zone finished water pipe (24”) and raw water pipe (30”). This option will be more economical than installing mag meters at these locations. Consideration for replacing the existing propeller meter body with a spool pipe should be made to improve the ultrasonic meter accuracy, however this would not have to happen if the new ultrasonic meter accuracy can be determined to be acceptable.

   Smaller ductile iron pipes that currently have a propeller type meter should be provided with a magnetic meter. Custom length meters that match the existing body length of the propeller meter are suggested, as they provide the easiest and most cost effective replacement option since they eliminate a spool pipe.

5.1.3 Estimated Construction Cost – Phase 1

The following is a cost estimate summary for the Phase 1 Improvements. Appendix A contains a full breakdown of the cost estimate. A larger than typical contingency of 35% has been included as these costs are preliminary in nature and the full project scope will not be determined until final design. In addition, this contingency was increased in an effort to hedge against continued inflation and the estimate is subject to change based on actual market and economic conditions.

Phase 1 Improvements Identified in the RFP	$3,595,000
Additional Suggested Phase 1 Improvements	$261,000
Contingency (35%)	$1,350,000
Total Phase 1 Improvements	**$5,206,000**

5.2 FUTURE PHASE IMPROVEMENTS

Future Phase improvements include those items outlined in the City's RFP as well as other items identified through the course of site inspections and report preparation. A summary of the work and estimated costs is included in Section 5.2.4.

5.2.1 Future Phase Improvements identified in the RFP

1. Review condition of paint for all filter room walls and piping

   City staff has done a good job of keeping up on wall and pipe painting in accessible areas of the plant, however, weeping from tanks creates maintenance for many of these painted surfaces. Loose paint and delamination areas should be cleaned, and pipe should be inspected for corrosion. Painting of all walls, floors, and pipes should be scheduled to provide protection for those surfaces for years to come.

2. Upgrade security cameras

   The fire alarm, security systems, and cameras are of an age that they should be considered for replacement. At that time a review of the systems should be performed to determine if there are any changes to the systems that are needed, versus simply upgrading components. Also, a consideration should be given to providing equipment that matches systems in other City facilities.

3. Replace air compressor and air dryer

   Replacement of the air compressor will depend on the chosen valve actuator rehabilitation/replacement discussed above. If pneumatic valves are replaced in kind, the air compressor and dryer should be replaced in the near future to provide continued reliability. If the valves are changed to electric, the air compressor and dryer should be removed. If the compressor is removed, existing air lines should be capped.

   Based on current recommendations to install electric valve actuators, this item cost is not included in the Future Improvements budget.

4. Replace roof top heating and cooling units

   The rooftop heating and cooling units have reached the end of their useful life or are causing maintenance issues. It is recommended that they be considered for replacement. The work should be coordinated with the proposed roof replacement. This work should be included in future facilities CIP documents as well.

5. Upgrade main SCADA antenna

   The work should be tied to other SCADA upgrades in the City to minimize costs.

6. Install new variable flow drives (VFDs) for all high service pumps

   Current VFDs are becoming hard to find parts for and should be upgraded for continued reliable operation. VFDs can be added to the remainder of the high service pumps that currently do not have them and to supplemental backwash pump.

7. Roof rehabilitation/replacement The roof membrane is pulling away from the building and leaking around several penetrations. The roof generally needs to be scheduled for replacement as it has reached the end of its serviceable life for both the 1997 and 2006 portions of the building. This work should be coordinated with the rooftop HVAC unit replacements.

8. Replace dehumidifier (in progress or programed in facility maintenance budgets)

   The dehumidifier has reached the end of its useful life and is causing maintenance issues. The unit should be considered for replacement. Coordinate this work with any potential work on the air blower as they are in the same room and occupy similar spaces. This work should be included in future facilities CIP documents.

9. Consider radon gas mitigation systems for filter bays

   Mitigation for radon gas in the filter room could be considered.

10. Replace make-up air unit

    The unit has reached the end of its useful life and could be replaced. This work should be included in future facilities CIP documents.

11. Replace exhaust unit

    The unit has reached the end of its useful life and could be replaced. This work should be included in future facilities CIP documents.

12. Update fire alarm panel (in progress or programed in facility maintenance budgets)

    See No. 2 above. This work should be included in future facilities CIP documents as well.

5.2.2 Additional suggested Future Phase Improvements

13. Repair exterior railings: Reset the railing posts that are being pushed upward by frost action.

14. Backfill retaining walls: Provide preventive maintenance on the existing block retaining walls, both on the top and bottom sides.

15. Level Transducers: Replace the existing submersible level transducers with radar level transducers.

16. Plumbing and HVAC miscellaneous recommendations:
    - Replace missing handwheel on shut-off valve adjacent to backflow preventer in basement.
    - Replace emergency eyewash that has been disconnected from water supply in basement. If sampling is no longer conducted at this location, eyewash is not needed.
    - Replace water meters on house water and NPW (non-potable water) systems to match meters currently used by the utility. This allows simpler operations and a reduction in spare parts inventory.
    - Replace sump pumps in basement.
    - Replace existing gas fired water heater.
    - Restore water service to drinking fountain. Troubleshoot and repair/replace if water was turned off due to malfunction or leaks.
    - Replace gas-fired furnace, consider high efficiency condensing model.
    - Replace missing filter/grille on duct outlets to polyphosphate room and potassium permanganate room.
    - Replace unit heater thermostat in filter room.
17. Add wireless access points
18. Replace all the existing interior and exterior lights with LED lights (in progress or programed in facility maintenance budgets)
19. Repair or replace the generator emissions monitoring panel

5.2.3 Contaminants of Emerging Concern

Of the list of contaminants of emerging concern, the key contaminants present in the City's water supply are in a class of chemicals referred to as per- and polyfluoroalkyl substances (PFAS). The City's drinking water is in compliance with current drinking water standards. The regulatory requirements for PFAS in drinking water are currently being evaluated and are moving from draft to final rulemaking, which are anticipated to be more stringent than current standards.

City Staff and Stantec design professionals are actively following the status of the rulemaking changes. Currently available solutions exist to treat PFAS in the City if needed, however, until regulators and funding agencies finalize the rulemaking process, it is not warranted to design and implement treatment for the City at this time. Substantial modifications would be required to supplement the current treatment process to include treatment for PFAS. The specific feasibility of PFAS treatment for the City is not part of the scope of this report but can be studied at a future date if it becomes necessary.

5.2.4 Estimated Construction Cost – Future Phases

The following is a cost estimate summary for the Future Phase Improvements. Appendix A contains a full breakdown of the cost estimate. A larger than typical contingency of 35% has been included as these costs are preliminary in nature and the full project scope will not be determined until final design. In addition, this contingency was increased in an effort to hedge against continued inflation and the estimate is subject to change based on actual market and economic conditions.

Future Phase Improvements Identified in the RFP	$933,000
Additional Recommended Future Phase Improvements	$105,000
Contingency (35%)	$364,000
Total Phase 1 Improvements	**$1,402,000**
Improvements in Progress or Programed in Facility Maintenance Budgets	$428,000

6 CHAPTER 6 – CONCLUSIONS AND RECOMMENDATIONS

The need to reduce the radium levels in Inver Grove Height's drinking water is the paramount reason for the upcoming work on the plant. This work also provides a good opportunity for other improvements and preventive maintenance at the facility.

6.1 COMPONENT RECOMMENDATIONS

The key piece to reducing the radium levels in the drinking water is replacement of the existing filter media and modifications to the chemical feed systems. The pilot testing demonstrated that a dual media with HMO chemical addition can achieve the City's goal of less than 2.5 pCi/L of combined radium (Ra^{226}+RA^{228}). It also effectively reduces Mn below the SMCL of 0.05 mg/L and Fe below the SMCL of 0.3 mg/L. The combined HMO chemical feed (TonkaZorb) that was tested in the pilot showed good results.

This means that both media types would be a good choice for the City to use. Several other factors need to be considered when making the final decision on the media type.

1. Cost
    a. IMAR is estimated to cost approximately $36 per cubic foot.
    b. GreensandPlus (and anthracite) are estimated to cost approximately $42 per cubic foot.

2. Longevity: Both IMAR and GreensandPlus are expected to have a similar lifespan of approximately 15 years.

3. Radium removal
    a. IMAR did not remove as much radium as GreensandPlus in the pilot, but removal numbers were improving, even over the short run of the test. Kurita noted this is what they would expect based on other pilots and real-world data. It had already shown removal below 2.5 pCi/L.
    b. GreensandPlus provided greater radium removal than IMAR. This is likely attributed to the adsorption of radium into the media.

4. Residual radium
    a. IMAR does not retain radium over the long term. Future disposal does not need to consider adsorbed radium.
    b. GreensandPlus will adsorb radium over time. This also potentially contributes to the better initial removal figures noted above. Future disposal may need to consider that the media contains radium and requires specialized handling.

At this time, the City and Stantec are still reviewing the pilot test report and obtaining more detailed cost information from vendors. The specific media type selected will not have a major impact on the design efforts moving forward. At this time, it is recommended to complete the design allowing for either media type and the project should include an alternate bid item for each type. Since both are a proprietary product, bidding them head to head will increase competition and ensure the most cost effective solution is implemented.

The use of IMAR or GreensandPlus both will require a new HMO chemical feed system. It is recommended that the TonkaZorb pre-formulated chemical be used. Future improvements could be made to provide mixture of a non-proprietary chemicals.

Replacement of the wash troughs with ones that have media retaining features (because of the anthracite in both medias) will be needed. Both WesTech and Kurita manufacture wash troughs that will be suitable. The existing troughs were manufactured by WesTech. Consideration for the filter weir wall heights will be needed, as the backwash rates for both media types will increase compared to the existing silica sand.

Ensuring that the plant continues to operate reliably is a key part of the project. The valves for the filters are used on a daily basis and all need to function properly to ensure the plant continues to stay online. The current pneumatic valve actuation system has performed well, but newer and more reliable technology exists with electric valve actuation. The cost to retrofit electric actuators is more expensive than replacing the current pneumatic operators and air compressor, but the increased reliability and reduction in ongoing maintenance outweigh these costs. With pneumatic actuation, one single component or air leak can bring down the plant. With electric, any actuator failures could be isolated, and the remainder of the plant would continue to operate. For these reasons, electric valve actuation is recommended.

Other plant upgrade and maintenance improvements are discussed above. Overall, the initial and future phase work will allow the plant to continue supplying compliant drinking water to City residents for years to come.

6.2 TIMELINE

Project design is anticipated to start in early-September, with project bidding taking place in the spring of 2024. This timeline allows for agency reviews and also lines up with potential PFA loan/grant funding. The original schedule for the project included a winter 2023/2024 construction timeframe to avoid high water usage months. Because of delays in starting the pilot, additional due diligence, and long lead times on specialty components, especially electrical items, it is recommended that a winter of 2024/2025 construction take place. By bidding in spring of 2024, long lead time items can be sourced so they are ready the following winter. Many components are seeing over 26 week lead times. Because of the nature of the rehab work, it is important that all components be available at the time construction starts. The following is the proposed project schedule for the Phase 1 improvements.

- August 2023: Report Approval
- September 2023: Begin Phase 1 Design
- September/October 2023: MDH/PFA DWRF Loan Program Notice
- December 2023: Phase 1 Design Complete, Submit for MDH Review
- Spring 2024: Bidding & Contract Award
- Summer 2024: Contractor Material Procurement
- September 2024: Begin Phase 1 Construction
- April 2025: Phase 1 Construction Complete

The current modifications to chemical dosing have brought the City's radium concentration below the MCL. It is expected that these modifications will continue to keep the City below the MCL in anticipation of the rehabilitation project.

6.3 FUNDING

Funding of any improvement project is the final piece to keep critical infrastructure in good condition. The City is pursuing a number of different funding avenues. Historical evaluations, environmental assessments, and related tasks are required to be eligible for state PFA loan/grant funds. It is recommended that these items be reviewed immediately following the acceptance of this report. Public comment periods will require additional time to complete these tasks. By starting now, these steps will be complete ahead of bidding in the spring of 2024. Contract requirements such as prevailing wage and domestic iron and steel requirements should be considered in cost estimates.

6.4 PROJECT COSTS

In providing opinions of probable cost, it is recognized that neither the City nor Stantec has control over the costs of labor, equipment, or materials, or over the Contractor's methods of determining prices. The opinions of probable cost are based on Stantec's reasonable professional judgment and experience and do not constitute a warranty, express or implied, that the Contractors' bids, or the negotiated price of the Work or schedule will not vary from the City's budget or schedule or from any opinion of probable cost or project schedule prepared by Stantec. Exact costs and times will be determined only when bids have

been received for the project and when the construction work has been performed and payments finalized.

Material supply schedules have continued to increase, and material costs have been highly variable in the past year. Stantec will put forth a reasonable effort to mitigate material impacts during the design process but ultimately has no control over Contractor supplied materials and services. Contingencies have been included in the provided cost estimates.

7 APPENDIX A – DETAILED COST ESTIMATES

City of Inver Grove Heights
Water Treatment Plant Rehabilitation
Phase 1 and Future Phase Cost Estimates

		Estimated Cost	Item Used	Cumulative Total
PHASE 1 IMPROVEMENTS FROM RFP				
REPLACE SAND FILTER MEDIA				
1a-1	Tonka IMAR media.	$330,000	X	$330,000
1a-2	GreensandPlus and anthracite media.	$420,000		$330,000
1b	Labor to remove and install media.	$700,000	X	$1,030,000
1c-1	Install new WesTech wash troughs with media retention. Revise trough elevation. 3 per cell.	$770,000	X	$1,800,000
1c-2	Install new Kurita wash troughs with media retention. Revise trough elevation. 2 per cell.	$890,000		$1,800,000
1d	Add weir wall plates and rehab existing plates.	$50,000	X	$1,850,000
REVIEW AND UPGRADE DRAIN PIPING ON THE FILTERS				
2a	Replace underdrain nozzles.	$160,000	X	$2,010,000
2b	Inspect underdrain and air piping. Repairs as necessary.	$5,000	X	$2,015,000
REVIEW CONDITION OF PAINT IN FILTER 1-4 DISTRIBUTION BOX				
3a	Filter 1-4 distributor box replacement with stainless steel.	$535,000	X	$2,550,000
3b	Weld inspection of center columns.	$10,000	X	$2,560,000
REPLACE ALL FILTER VALVES AND AIR COMPRESSOR VALVES				
4a-1	Filter valve actuation - pneumatic actuator replacement	$270,000		$2,560,000
4a-2	Filter valve actuation - electric actuator conversion	$385,000	X	$2,945,000
4b	Valve replacement: airwash supply (8"), influent on distributor box (12"), & backwash waste in column (18") on each cell	$250,000	X	$3,195,000
4c	Repaint all pipe and valves in the filters.	$100,000	X	$3,295,000
CONSIDER NEW CHEMICAL FEED HMO				
5	New TonkaZorb HMO chemical feed equipment. Rehab manganese sulfate room for TonkaZorb, mothball non-used equipment.	$120,000	X	$3,415,000
REPLACE FLUORIDE PUMPS				
6	New peristaltic dosing pumps. Repair electrical panel.	$30,000	X	$3,445,000
REPLACE CHLORINE FEED SYSTEMS				
7a	New rotameters and vacuum switchovers. Move eductors.	$70,000	X	$3,515,000
7b	Chlorinator room plumbing modifications.	$30,000	X	$3,545,000
7c	New chlorine alarms and automatic ventilation.	$50,000	X	$3,595,000
ADDITIONAL SUGGESTED PHASE 1 IMPROVEMENTS				
8	Blower: Inspection of components. Address immediate needs.	$50,000	X	$3,645,000
9	Electrical Infrared Testing: One day of third party testing and report.	$3,000	X	$3,648,000
10	Smoke Dampers: Test and troubleshoot stuck dampers.	$3,000	X	$3,651,000
11	Portable Dehumidifiers: Purchase 4 additional.	$20,000	X	$3,671,000
12	Exterior Clearwell Cover Cracking: Repair clearwell lid and replace failing retaining wall.	$50,000	X	$3,721,000
13	Flow splitter room: Removal of tank coating.	$10,000	X	$3,731,000
FLOW METERS				
14a	Replace large flow meters with clamp on ultrasonic meters. Spool pipe in old propeller meter location.	$60,000	X	$3,791,000
14b-1	Replace small flow meters with custom length mag meters.	$65,000	X	$3,856,000
14b-2	Replace small flow meters with standard length mag meters and spool pipe.	$100,200		$3,856,000
TOTAL PHASE 1 IMPROVEMENTS		$3,856,000		
	Contingency (35%)	$1,350,000		
	Total with Contingency	**$5,206,000**		

City of Inver Grove Heights
Water Treatment Plant Rehabilitation
Phase 1 and Future Phase Cost Estimates

		Estimated Cost	Item Used	Cumulative Total
FUTURE PHASE IMPROVEMENTS FROM RFP				
MISCELLANEOUS ITEMS				
101	Review condition of paint for all filter room walls and piping	$100,000	X	$100,000
102	Upgrade security cameras	$25,000	X	$125,000
103	Replace air compressor and air dryer	$80,000		$125,000
104	Install new VFDs on high service pumps	$200,000	X	$325,000
105	Radon gas mitigation system for filter bays	$20,000	X	$345,000
ROOF ITEMS				
106a	Roof rehabilitation/replacement	$425,000	X	$770,000
106b	Replace rooftop heating and cooling units	$75,000	X	$845,000
106c	Upgrade main SCADA antenna	$3,000	X	$848,000
106d	Replace make-up air unit	$60,000	X	$908,000
106e	Replace exhaust unit	$25,000	X	$933,000
ADDITIONAL SUGGESTED FUTURE PHASE IMPROVEMENTS				
107	Repair exterior railings	$25,000	X	$958,000
108	Backfill retaining walls	$10,000	X	$968,000
109	Replace filter level transducers with radar	$30,000	X	$998,000
110	Miscellaneous plumbing and HVAC items	$25,000	X	$1,023,000
111	Add wireless access points	$10,000	X	$1,033,000
112	Repair/replace generator emissions monitoring panel	$5,000	X	$1,038,000
TOTAL FUTURE PHASE IMPROVEMENTS		$1,038,000		
	Contingency (35%)	$364,000		
	Total with Contingency	**$1,402,000**		
IMPROVEMENTS IN PROGRESS OR PROGRAMED IN FACILITY MAINTENANCE BUDGETS				
201	Replace dehumidifier	$300,000	X	$300,000
202	Update fire alarm panel	$8,000	X	$308,000
203	Replace all exterior and interior lights with LED	$120,000	X	$428,000
TOTAL IMPROVEMENTS IN PROGRESS OR PROGRAMED		**$428,000**		

8 APPENDIX B – KURITA PILOT REPORT

PILOT INVESTIGATIONS FOR:
City of Inver Grove Heights, MN

APPENDIX B

PILOT INVESTIGATIONS FOR:
City of Inver Grove Heights, MN

CONDUCTED: May 30, 2023 through June 9, 2023

AUGUST 1, 2023

Project: Inver Grove Heights, MN

Pilot #: J0030752

Manganese and radium removal by chemical oxidation with sodium hypochlorite and hydrous manganese oxide, followed by filtration with IMAR™ or GreensandPlus™ and Anthracite media at a loading rate of 3.0 gpm/ft^2.

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EXECUTIVE SUMMARY

From the period May 30, 2023 through June 9, 2023 Tonka Water, a Kurita America brand, Great Northern Environmental, and Stantec conducted a pilot study for the city of Inver Grove Heights to treat groundwater. The pilot test was performed to determine an effective and efficient treatment process to consistently remove manganese and combined radium (226+228) from the existing groundwater supply.

The study consisted of two filter trains in parallel. Filter 1 was bedded with 30" of IMAR™ media and Filter 2 was bedded with 18" of GreensandPlus™ and 12" of anthracite. Both filters consisted of the same hypochlorite and HMO addition. The results of the study demonstrated that hypochlorite addition followed by pressure filtration at a loading rate of 3.0 gpm/ft^2 effectively and consistently removed manganese in both filters to below the secondary EPA limit of 0.05 mg/L. Both filters showed that HMO addition followed by pressure filtration successfully removed radium at a filter loading rate of 3.0 gpm/ft^2 effectively and consistently to below the primary EPA limit of 5.0 pCi/L.

A hypochlorite feed of 2.0 mg/L and an HMO addition of 1 mg/L (as Mn) was necessary to fully oxidize the raw manganese and to achieve an average combined radium (226+228) removal of 79% for Filter 1 and 96% for Filter 2 through filtration.

Kurita America recommends that the full-scale system include filters loaded with 30" of IMAR™. Also, a TonkaBlend™ HMO feed system be included to deliver the TonkaZorb™ (HMO) effectively to the raw water source prior to filtration. Additionally, Tonka Water Simulwash™ backwash troughs should be installed to potentially improve media retention and water usage during backwash.

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1 INTRODUCTION

Tonka Water, a Kurita Brand, and Great Northern Environmental, set-up and conducted a pilot study under the oversight of the engineer, Stantec, to treat the groundwater at the Inver Grove Heights Water Treatment Plant during the period from May 30, 2023 through June 9, 2023.

The primary purpose of this pilot was to verify the effectiveness and efficiency of removing manganese to below the USEPA secondary maximum contaminant level (SMCL) of 0.050mg/L via chemical oxidation and media filtration at the intended filter design parameters. The pilot also assessed the feasibility of hydrous manganese oxide (HMO) for removal of radium to below the USEPA maximum contaminant level (MCL) for combined radium (Ra^{226}+Ra^{228}) of <5.0pCi/L.

This pilot utilized two filters run in parallel. Filter 1 was bedded with 30" of IMAR™ media. Filter 2 was bedded with 18" of Greensand Plus™ and 12" of anthracite media. Both filters assessed the ability to remove manganese using hypochlorite (chlorine) to oxidize manganese and HMO addition for radium adsorption followed by media filtration.

1.1 Iron and Manganese

Iron and manganese are commonly found in groundwater sources. These contaminants can add color to the water, produce staining of household fixtures and clothing, and cause plugging problems in distribution systems. Iron and manganese were not originally considered health hazards; consequently the U. S. Environmental Protection Agency established secondary maximum contaminant levels (SMCL) for iron and manganese at 0.3 mg/L and 0.05 mg/L, respectively.

Although manganese is an essential nutrient obtained from food, studies[1][2] have shown that consumption of excessive levels of manganese (a neurotoxin) in drinking water is associated with intellectual impairment of children. Some states have adopted health-based limits for manganese in drinking water; however, these limits typically have higher manganese concentrations than the SMCL.

Iron and manganese are frequently removed by oxidation to their insoluble forms, followed by media filtration. Iron is typically oxidized first with aeration and/or chlorine addition; manganese is typically oxidized with potassium or sodium permanganate. Detention often follows oxidant addition to allow time for chemical reactions to occur. The presence of organic matter, hydrogen

[1] Bouchard MF, S. Sauvé, B. Barbeau, M. Legrand, M .Brodeur, T. Bouffard, et al. 2011. Intellectual Impairment in School-age Children Exposed to Manganese from Drinking Water. Environ Health Perspect 119:138–143.

[2] Oulhote Y, D. Mergler , B. Barbeau, D.C. Bellinger, T. Bouffard, M.-È. Brodeur, D. Saint-Amour, M. Legrand, S. Sauvé and M.F. Bouchard, (Dec 2014) "Neurobehavioral Function in School-Age Children Exposed to Manganese in Drinking Water", Environmental Health Perspectives, 122 (12)

sulfide, or ammonia potentially interferes with the removal process; sometimes a polymer solution must be fed as a filter aid. Media utilizing manganese dioxide are often used in conjunction with an oxidant to provide contact oxidation and removal of manganese[3][4]. During contact oxidation, the soluble manganese adsorbs onto the manganese dioxide coating and is oxidized by the adsorbed oxidant (sodium hypochlorite) to form loosely bound solids of hydrous manganese oxides. These manganese solids are filtered by the media and may be later removed as solids during the backwash. Removal of manganese may also occur with contact oxidation, following the chemical addition of hydrous manganese oxide (HMO) solids, when the manganese concentrations are not high.

In this pilot, the well water had manganese concentrations that exceeded the SMCL. The addition of HMO for radium removal provided significantly higher concentrations of manganese in the filter influent. Measurements of manganese were conducted at several process locations, including the 'Top-of-Filter' (within the filter(s) from approximately one foot above the media) as well as the effluents from each filter.

1.2 Radium and Gross Alpha

Radionuclide contamination of groundwater is generally attributed to sources naturally occurring in the rock formations from which drinking water is obtained. Radionuclides have most commonly been found in the water supply in the Midwest and along the east coast. Radionuclides by their very nature are unstable and are continually emitting energy. The three radionuclides that have been identified to be of primary concern are uranium, radium and radon, and the potential carcinogenic impact of these substances is well known. Approximately 80 - 85% of the radium accumulating in the body, deposits in bones; consequently, the predominant, although not the only, health hazard with radium is bone cancer.

The USEPA has promulgated rules that established maximum contaminant levels (MCL) for radioactivity from gross alpha, beta & photon emitters, Ra-226 and 228, and uranium. The MCL for combined radium 226 and 228 was set at 5 pico-curies per liter (5 pCi/L), while the MCL for gross alpha was set at 15 pico-curies per liter. The MCL for beta particles and photon emitters were set at the equivalent of an annual dose to the total body or any internal organ of 4 millirems/year; while the MCL for uranium was set at 30 ug/L.

1.2.1 Radium Removal

Since radium is a divalent cation (Ra^{+2}) and is an alkaline earth metal (as are calcium and magnesium), it behaves very much as calcium and magnesium do in water. Therefore, it follows that the BATs (Best Available Technologies) identified by the USEPA for removal of radium are all

[3] Knocke, W.R., J.R. Hamon, and C.P. Thompson (1988) "Soluble Manganese Removal on Oxide-Coated Filter Media", Journal AWWA, 80(12), 65-70,

[4] Knocke, W.R., S.C. Occiano, and R. Hungate (1991) "Removal of Soluble Manganese by Oxide-Coated Filter Media:Sorption Rate and Removal Mechanism Issues", Journal AWWA, 861(1),117-127

softening techniques: lime softening, ion exchange and reverse osmosis. Unless softening is also a treatment goal for the water utility, these processes can be a costly addition to the water treatment process.

Some alternative treatment techniques include EDR (Electrodialysis Reversal), HMO (hydrous manganese oxide) addition, and removal in conjunction with manganese in iron and manganese removal processes using potassium permanganate. EDR can be quite expensive due to high capital cost as well as high operating costs. Co-removal with manganese in a manganese greensand or manganese oxide coated media is an inexpensive technique for radium removal, but the water supply must have naturally occurring manganese in sufficient quantities for the process to work. Since the well water for this pilot, although above the SMCL, is relatively low in manganese for direct removal, the addition of HMO overcomes this limitation. The manganese oxide-based media when used for radium removal have the disadvantage of accumulating radium on the media over time, complicating future disposal.

HMO addition involves the preparation and controlled dosage of manganese dioxide to the water to be treated prior to filtration. Radium is thought to have a natural affinity for manganese dioxide, effectively adsorbing onto the surface of the HMO particles, which are subsequently filtered out of the finished water. Since radium-226 and radium-228 are chemically identical, they are assumed to have comparable removal efficiencies.

Radium directly adsorbs onto manganese oxide-based media causing the media to become more radioactive over time and increasing the rate of radon formation. Such manganese oxide-based media are often referred to as accumulative media. As the radium activity increases on the accumulative media, the radium removal efficiency will diminish as the adsorption of radium approaches equilibrium. Eventually the accumulative media will require replacement and need to be properly disposed as radioactive waste. Moreover, accumulative media are more susceptible to iron fouling; further shortening the useful life of the accumulative media. In this pilot, Tonka Water's IMAR™ media, which consists of proprietary sizes of silica sand with an anthracite cap, limits such concerns; since unlike the accumulative manganese oxide-based media, IMAR™ does not strongly adsorb radium.

The use of HMO has been demonstrated to be effective for radium removal[5] and to be a function of only the distribution coefficient (K_d) associated with the particular water and the HMO dosage. Based on Tonka Water's experience and AWWA literature, an HMO dosage of 1.0 mg/L as Mn typically achieves greater than 80% radium removal in waters low in known interferants (e.g. barium).

[5] Valentine, R.L., Kurt A., Meyer, J., Walsh, D., and Mielke, W. 1992. Radium Removal Using Preformed Hydrous Manganese Oxides. AWWA Research Foundation, Denver, CO

In this pilot study, hypochlorite was added to treat ammonia, and oxidize iron, thereby forming iron solids, while the addition of hydrous manganese oxides (HMO) provided contact oxidation of the manganese along with adsorption of the radium; all of which were then removed using filtration.

1.3 Ammonia

Ammonia is naturally occurring in water and may also be present from agricultural and industrial activities. Ammonia levels in drinking water are not considered a health hazard since ammonia is produced in the body and efficiently metabolized and excreted. When chlorine is added to waters containing ammonia, the ammonia reacts with the chlorine exerting extra chlorine demand. The treatment of ammonia with chlorine may take the form of breakpoint chlorination, whereby the ammonia is completely oxidized and residual free chlorine concentration is produced. Sometimes ammonia is added for chloramination in the water treatment plant for disinfection of long distribution lines.

2 Objectives

Through both the *Safe Drinking Water Act* and the *National Primary and Secondary Drinking Water Standards*, the Environmental Protection Agency (EPA) has established a maximum contaminant level (MCL) for combined radium 226+228 as 5 pCi/L and a secondary standard (SMCL) for manganese as $\leq$0.05 mg/L. Average raw water characteristics from the pilot study can be observed in tables 5-9.

The primary objectives of the pilot study were to determine the following:

1. The ability of the pilot to achieve, at a minimum, effluent manganese levels of 0.05 mg/L.

2. The ability of the pilot to achieve a maximum effluent combined radium 226+228 level of less than 5 pCi/L and gross alpha of less than 15 pCi/L.

    a. The ability of the pilot to achieve a maximum effluent combined radium 226+228 level of less than 2.5 pCi/L per the City of Inver Grove Height's preferred level.

3. The chlorine and TonkaZorb™ (HMO) feed rates required for optimal manganese and radium removal.

4. At a loading rate of 3.0 gpm/ft^2, evaluate the effectiveness of filter media consisting of 30” of IMAR™.

5. At a loading rate of 3.0 gpm/ft^2, evaluate the effectiveness of filter media consisting of 18” of GreensandPlus™ and 12” of anthracite.

6. Filter head loss as a function of run time.

7. Approximate filter run length.

3 Methods

3.1 Equipment Description and Operation

3.1.1 Chemical Feed

Kurita America provided chemical feed equipment for hypochlorite and Tonka Water’s TonkaZorb™ Hydrous Manganese Oxide (HMO). TonkaZorb™ is a 3% by weight manganese, pre-formed HMO product developed by Kurita America and its chemical feed supply partner. The chemical feed systems consisted of peristaltic chemical metering pumps capable of pumping a maximum of approximately 33-gallons per day (GPD) and solution mix tanks.

Throughout the pilot, the diluted feedstocks were made following recipes with the following proportions:

a) Sodium Hypochlorite (Chlorine): 150 mL of 7.5% household bleach into 10 gallons of distilled water
b) TonkaZorb™: 444 mL of 3% HMO solution into 30 gallons of distilled water

3.1.2 Equipment

Two 8-inch diameter by approximately 7 feet tall filter columns were used. The filters incorporated a simultaneous air/water backwash system, underdrain system, air release valve, rate control meters, sample taps and filter media. Both filters were bedded with 30” of media and were operated at a loading rate of approximately 3.0 gpm/ft^2, corresponding to a flow rate of approximately 1.05 gpm per filter. The process depicted in the system flow schematic in Appendix A was used during this pilot. A picture of the filters used during the pilot can be seen in Figure A below.

Figure A: Photo of pilot set-up

A description of the columns used in this pilot study and service rates are provided in Table 1.

Table 1: Test Column Description

Column Name	Ø (inches)	Media Type/Depth (inches)	Loading Rate (gpm/ft²)	Flow Rate (gpm)	Backwash Method	Chemical Feed
Filter 1	8" Dia.	30" IMAR™	3.0	1.05	Simul-Wash™	Hypochlorite and HMO
Filter 2	8" Dia.	18" GreensandPlus™ 12" Anthracite	3.0	1.05	Simul-Wash™	Hypochlorite and HMO

3.1.3 Backwashing

The backwashing was performed using a simultaneous air/water backwash process that simulated Tonka Water's Simul-Wash™ method. The pilot backwash process was manually operated. Table 2 summarizes the various steps of the Simul-Wash™ process including the backwash loading rates, flow rates, duration, and waste volumes produced. The 'draindown' volume prior to the Simul-Wash™ was not included in Table 2.

Table 2: Base Backwash Parameters Used During the Pilot

Backwash Step	Water Flow Rate (gpm)	Air Flow Rate (cfm)	Duration of Step (minutes)	Waste Volume (gallons)
Simul-Wash™	1.05 (3.0 gpm/ft^2)	1.05 (3 cfm/ft^2)	10	10.5
Restratification	3.5 (10 gpm/ft^2)	None	3	10.5
Purge	1.05 (3.0 gpm/ft^2)	None	2	2.1
TOTAL			15	23.1

Prior to starting the pilot filters, the filters were backwashed to remove fines and to cleanse the media.

3.2 Equipment Monitoring

Filter flow rate, headloss (differential pressure, or Delta P), time and throughput were monitored and allowed documentation of the filter runs enabling assessment of the backwash initiation conditions and approximate filter run length (possibly controlled by iron or manganese breakthrough). Chemical feed rates and dosages were monitored and documented allowing calculation of chemical dosages as well as establishing correlation between chemical requirements and filter performance.

The equipment monitoring protocol presented in Table 3 was utilized. The data obtained from such monitoring was recorded in the field data log, which may be reviewed in Appendix C.

Table 3: Equipment Monitoring Protocol

Parameter	Frequency	Location
Differential Pressure	At least 1 time per day as needed to adjust and maintain flow rate and filter performance	Filter differential
Service Water Flows	At least 1 time per day as needed to adjust and maintain flow rate and filter performance	Filter effluents (2)
Filter backwash steps – duration, water flow rate, and volume	At each backwash	Filter backwash rotameter

Pressure gauges were provided on the filters' influent and effluent lines and differential pressure gauges were provided for monitoring headloss. Rate of flow control valves and meters were piped into the filter effluent of the filter columns to allow a constant treatment flow rate through the filters to be maintained.

3.3 Sampling and Analyses

3.3.1 Field Analyses:

Field samples were obtained regularly from:

a) Raw water (pre-chemical addition)
b) Top of Filter influent water (post-chemical addition of hypochlorite and HMO)
c) Both filter effluents

Field analyses were performed using a HACH DR/900 colorimeter for:

a) Iron using the FerroVer Method 8008
b) Manganese using the PAN Method 8149
c) Nitrogen Ammonia using the Salicylate Method 8155
d) Free chlorine using the DPD Method 8021
e) Total chlorine using DPD Method 8167

A pH meter was calibrated and used to measure both pH and temperature.

3.3.2 Laboratory Analyses:

Coincident with the field tests performed, periodic samples were drawn for independent laboratory testing to confirm field test results and test for radium 226, radium 228, and gross alpha. The laboratory analyses were conducted by Eurofins Eaton South Bend lab. Since the lab testing was

generally for confirmation of field tests, the frequency of lab testing remained at a lower frequency. The complete reports from the Eurofins are included in Appendix B of this report.

Table 4: Laboratory Methods by Parameter

Parameter	Laboratory Method
Iron	Inductively Coupled Plasma – EPA200.7
Manganese	Inductively Coupled Plasma – EPA200.7
Gross Alpha	SM 7110B
Radium-226	SM 7500 Ra B
Radium-228	SM 7500 Ra D
Alkalinity	SM 2320B
Hardness	SM 2340B
Ammonia Nitrogen	Colorimetric – SM4500NH3D

4 Results, Observations and Discussion

The pilot study consisted of two filter runs of one week each. Complete reports from Eurofins are included in Appendix B of this report. The complete field data logs are included in Appendix C. Below, Tables 5-9 depict the summary of the pilot data.

Table 5: Summary of Filter Run Results – Iron Removal

	Raw (mg/L)	Filter 1 Effluent (mg/L)	Filter 2 Effluent (mg/L)
Run 1 - Field	0.08-0.13 (0.1 avg)	0.0-0.02 (0.0 avg)	0.0-0.01 (0.0 avg)
Run 1 - Lab	0.078-0.081 (0.08 avg)	<0.01 (<0.01 avg)	<0.01 (<0.01 avg)
Run 2 - Field	0.14-0.38 (0.27 avg)	0.0-0.02 (0.01 avg)	0.0-0.04 (0.01 avg)
Run 2 - Lab	0.07-0.19 (0.11 avg)	<0.01 (0.01 avg)	<0.01 (0.01 avg)

Table 6: Summary of Filter Run Results – Manganese

	Raw (mg/L)	Top Filter 1 (mg/L)	Filter 1 Effluent (mg/L)	Top Filter 2 (mg/L)	Filter 2 Effluent (mg/L)
Run 1 - Field	0.24-0.32 (0.28 avg)	0.48-1.53 (0.88 avg)	0.01-0.03 (0.02 avg)	0.52-1.15 (0.85 avg)	0.01-0.03 (0.02 avg)
Run 1 - Lab	0.21-0.24 (0.23 avg)	0.53 (0.53 avg)	<0.002 (<0.002 avg)	0.77 (0.24 avg)	<0.002 (<0.002 avg)
Run 2 - Field	0.26-0.28 (0.27 avg)	0.75-1.15 (0.95 avg)	0.01-0.03 (0.02 avg)	0.79-1.15 (0.97 avg)	0.01-0.03 (0.02 avg)
Run 2 - Lab	0.23-0.25 (0.24 avg)	NA	<0.002-0.0056 (0.002 avg)	NA	<0.002 (<0.002 avg)

Table 7: Summary of Filter Run Results – pH

	Raw (pH)	Filter 1 Effluent (pH)	Filter 2 Effluent (pH)
Run 1 - Field	7.3-7.6 (7.38 avg)	7.0-7.6 (7.31 avg)	7.2-7.5 (7.34 avg)
Run 2 - Field	7.2-7.3 (7.23 avg)	7.3 (7.3 avg)	7.3-7.4 (7.31 avg)

Table 8: Summary of Filter Run Results – Radium 226 and 228

	Raw	Filter 1 Effluent	Filter 2 Effluent
Run 1 - Lab	8.61-10.2 (9.32 avg)	2.06-3.26 (2.67 avg)	0.0-0.72 (0.24 avg)
Run 2 - Lab	9.95-12.0 (10.92 avg)	1.27-1.87 (1.50 avg)	0.0-0.64 (0.39 avg)

Table 9: Summary of Filter Run Results – Gross Alpha

	Raw (pCi/L)	Filter 1 Effluent (pCi/L)	Filter 2 Effluent (pCi/L)
Run 1 - Lab	16.3 (16.3 avg)	4.39 (4.39avg)	5.37 (5.37 avg)
Run 2 - Lab	14.2-20.4 (16.97 avg)	1.67-11.7 (7.69 avg)	1.47-8.42 (6.02 avg)

4.1 Chemical Addition

4.1.1 Chlorine Chemical Addition in Filter 1 &2 as Sodium Hypochlorite (Bleach)

Chlorine was dosed to both filters with a goal of a 0.8 mg/L free chlorine residual. Chlorine was consumed by iron, manganese, and ammonia. Based off raw water quality the required dosage for chlorine is between 2.0-2.2 mg/L. Actual dosage for the water treatment plant will be determined upon start up.

Figure B: Run 1 Ammonia Concentration

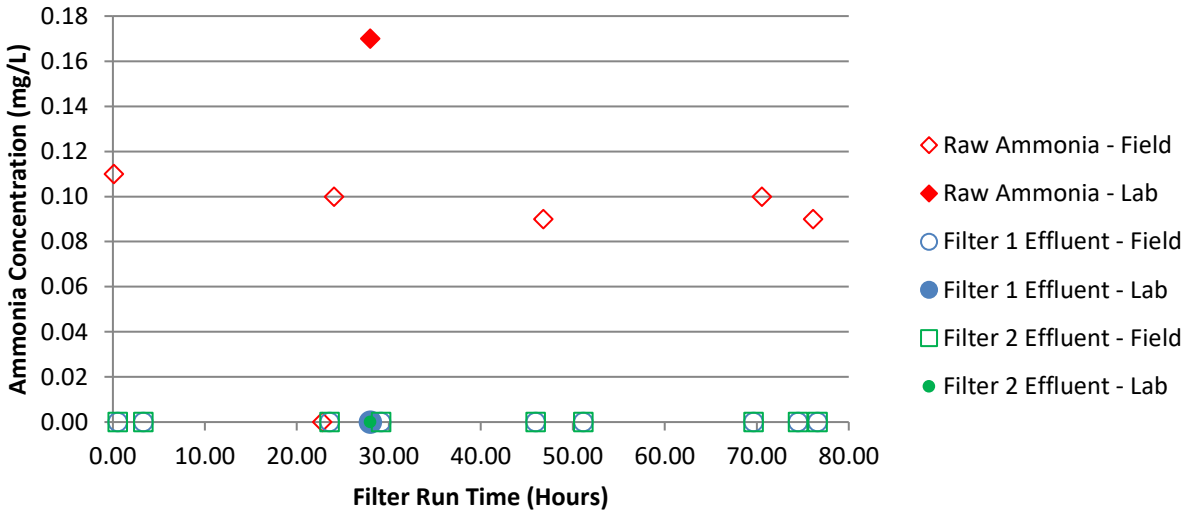
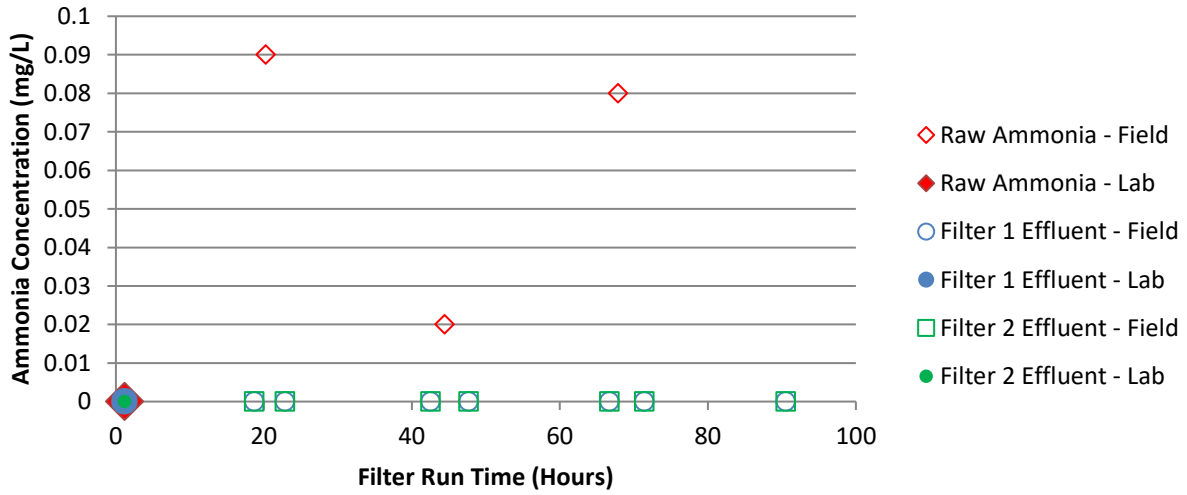


Figure C: Run 2 Ammonia Concentration



4.1.2 TonkaZorb™ (HMO) Chemical Addition in Filter 2, Measured as Mn

TonkaZorb™ (HMO) was dosed to a goal of 1 mg/L as Mn. It was measured from samples taken at the top of the filters. The tests confirm the presence of HMO at the top of the filters as can be seen in Figures D and E. They also confirm the HMO is removed from the process as can be seen by the Mn effluent levels. Raw water and effluent water Mn levels were all reported to be under the SCML of 0.05 mg/L.

Figure D: Run 1 Manganese Concentration

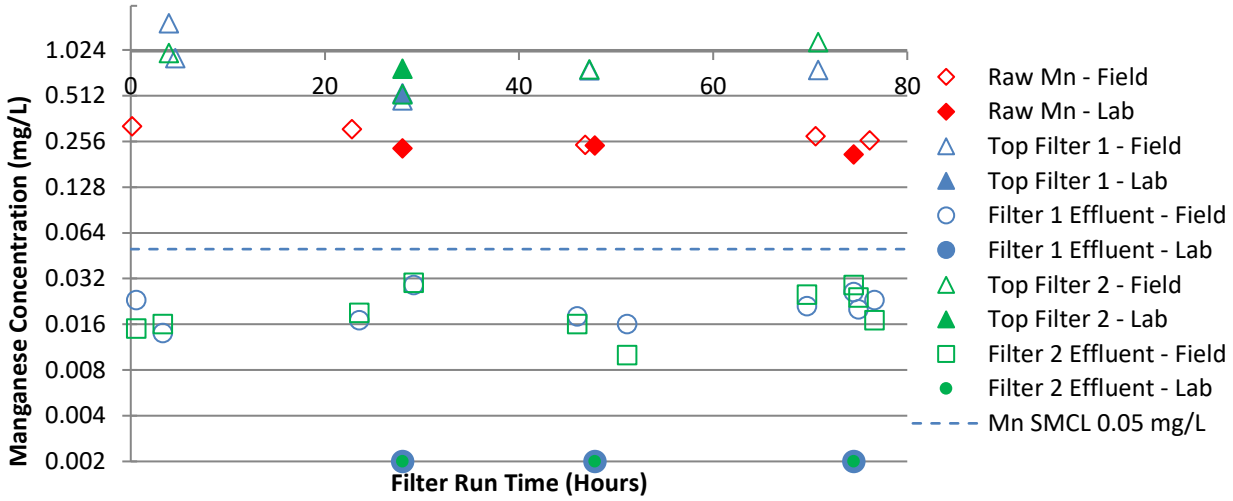
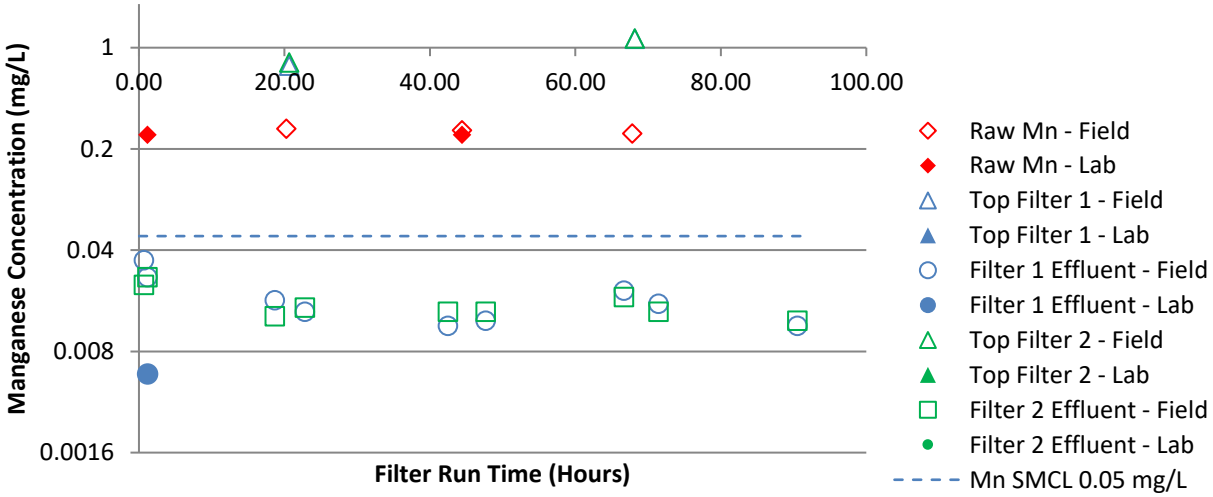


Figure E: Run 2 Manganese Concentration



4.2 Manganese and Radionuclide Removal

4.2.1 Iron

Although not a goal of this study, a summary of the raw and effluent iron results can be found in Table 5. Raw iron was seen to typically be under the SMCL of 0.3 mg/L. The filters' iron effluent results are presented by run for Filter 1 and Filter 2 using a linear scale. Excellent removal of iron was demonstrated as may be observed in Figures F and G. The iron effluent results may be observed to have been effectively and consistently maintained below the SMCL for all the runs.

Figure F: Run 1 Iron Concentration

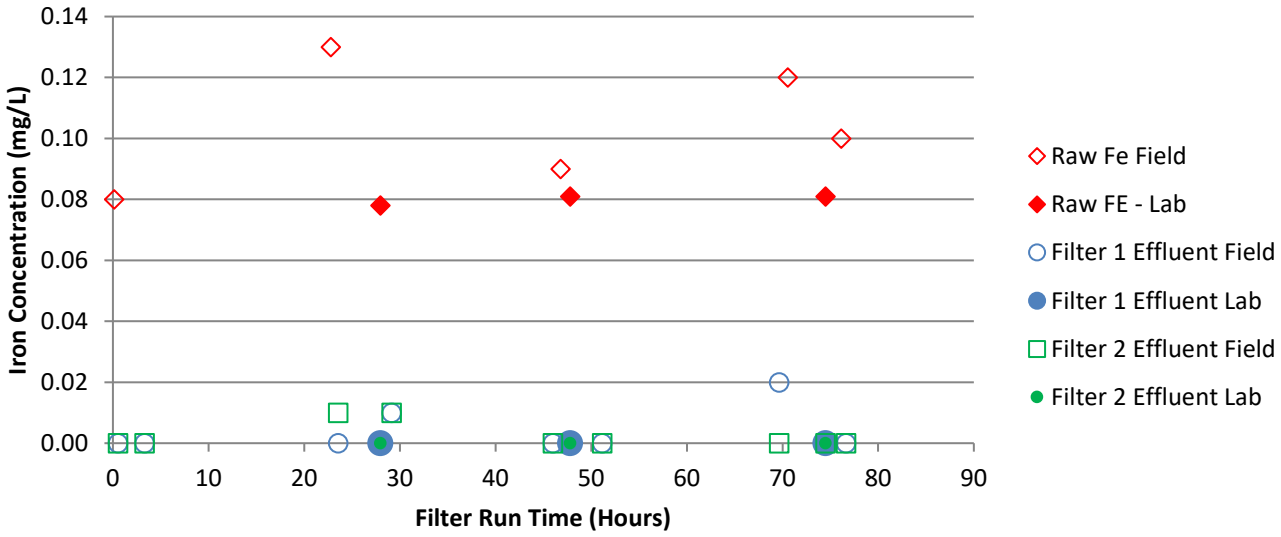
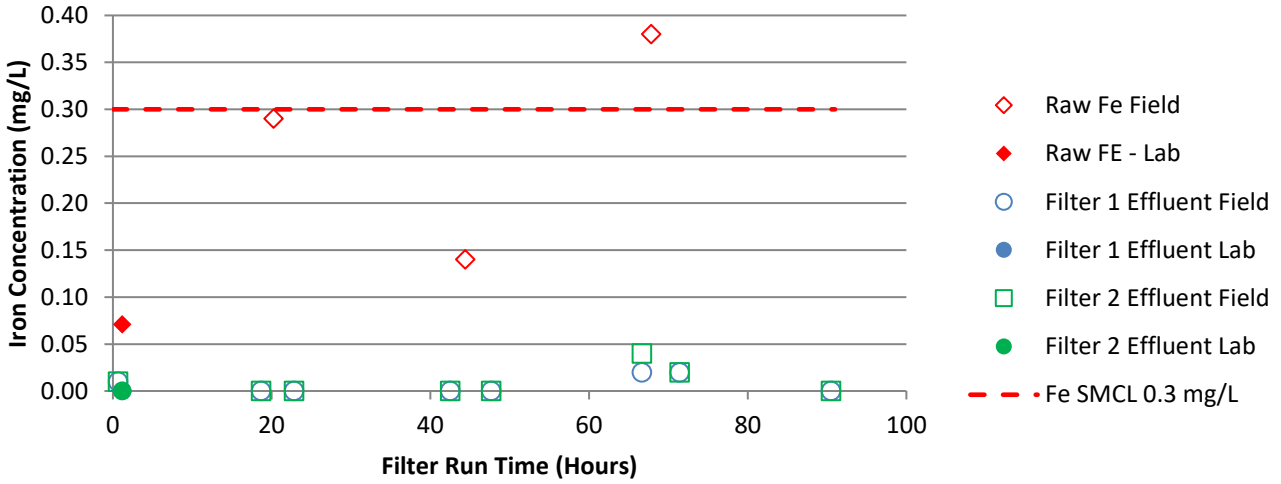


Figure G: Run 2 Iron Concentration



4.2.2 Manganese

A summary of the raw and effluent manganese results can be found in Table 6. The filters' manganese effluent results are presented in Figures D & E by run for Filter 1 and Filter 2 using a log scale. Both Filter 1 and 2 demonstrate consistent removal of manganese to below the SMCL of 0.05 mg/L for all runs. Removal rates are observed to similar for both IMAR™ and GreensandPlus™.

4.2.3 Radionuclides

A summary of the raw and effluent radium and gross alpha results can be found in Table 8 and Table 9, respectively. The filters' radionuclide effluent results are presented by run for Filter 1 and Filter 2 using a linear scale. Raw radium levels were seen to be above the SMCL for all samples. Both Filter 1 and 2 demonstrate radium removal. Filter 1 is shown to remove an average of 71% of combined radium 226 and 228 for Run 1 and 86% for Run 2. Filter 2 is shown to remove an average of 97% of combined radium for Run 1 and 96% for Run 2.

Figure H: Run 1 Combined Radium and Gross Alpha Removal

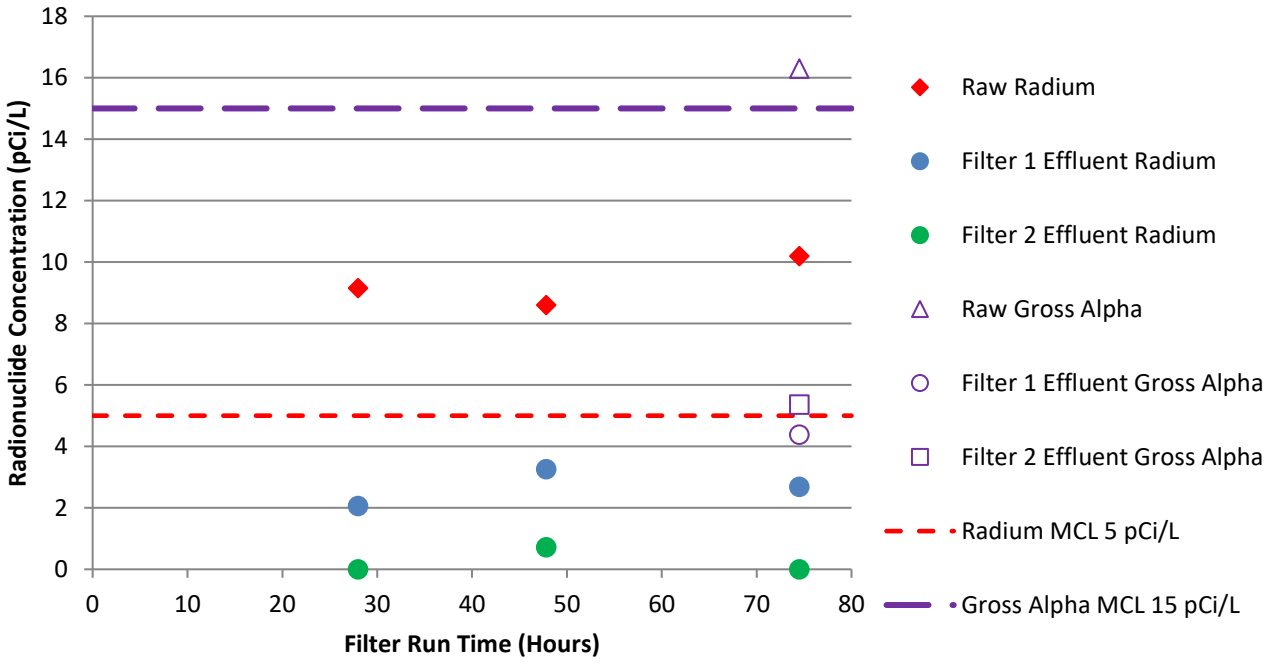
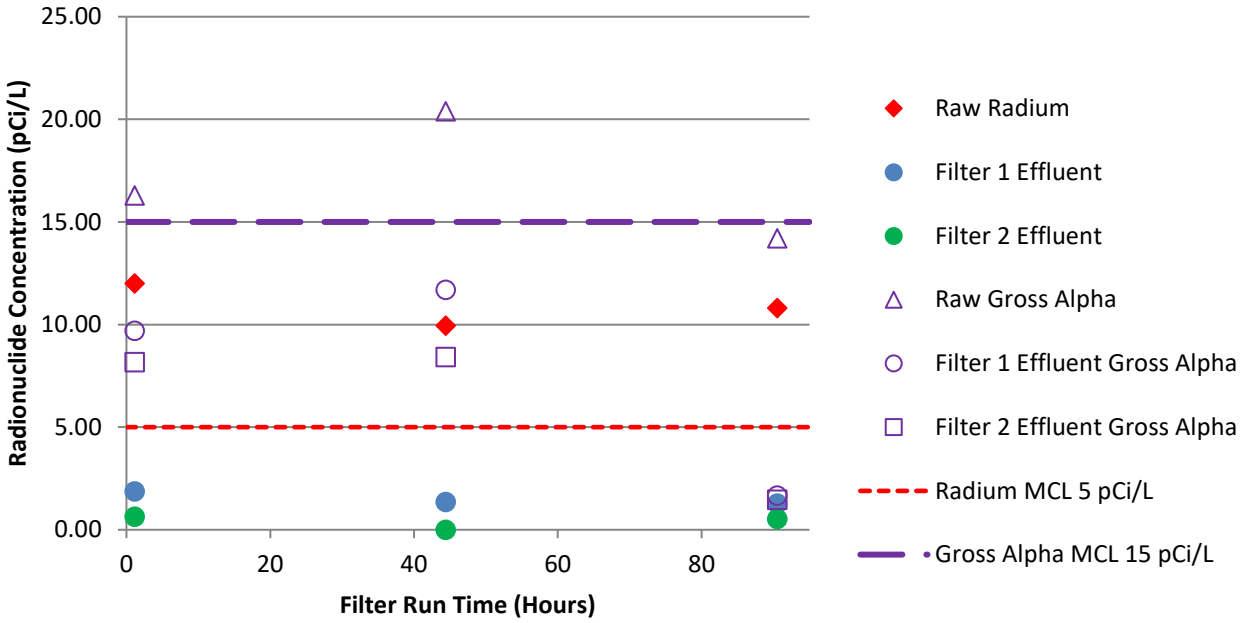


Figure I: Run 2 Combined Radium and Gross Alpha Removal



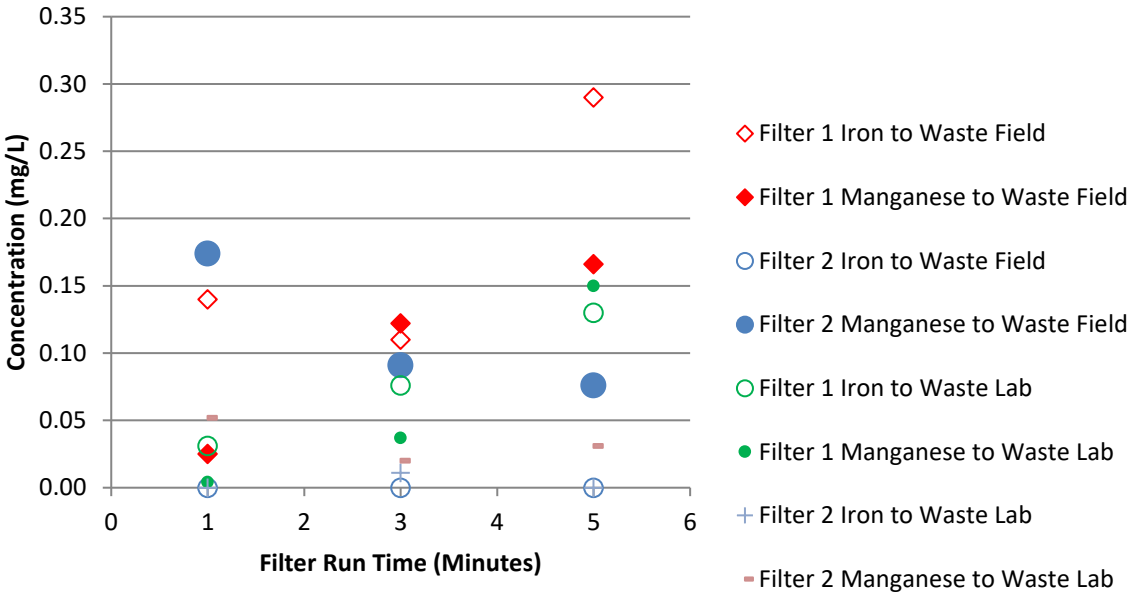
4.3 Headloss and Run Length

There was no observable headloss for the duration of the pilot study. The contaminants were filtered out as fine particles so it is expected that breakthrough would occur before an increase in headloss. There was also no observable breakthrough for the duration of the pilot study. Backwash was initiated based on time. Run times were 76 hours and 90 hours.

4.4 Backwash and Filter to Waste

Samples were taken during the first 5 minutes of filter start-up after backwash to observe the levels of iron and manganese in the effluent. As can be seen in Figure J, there are higher levels of iron and manganese in the effluent than in normal operation. This is attributed to the media bed being disturbed and not 100% of the iron and manganese being removed during backwash. Some of this leftover iron and manganese is then free to exit in the filter effluents. It takes a short period of time for the media bed to go back to equilibrium and achieve the effluent results seen earlier in the report.

Figure J: Filter to Waste Iron and Manganese



5 Conclusions

1. Both filters, dosed with chlorine, and at a loading rate of 3.0 gpm/ft^2 effectively lowered manganese to below its respective SMCL (Mn<0.05 mg/L) to an average of ≥0.002 for both run 1 and 2 for both the IMAR™ and GreensandPlus™ media beds. GreensandPlus™ showed no clear advantage over the IMAR™ in terms of its performance of Mn removal.

2. Both filters, dosed with Kurita Water's proprietary blend of TonkaZorb™ Hydrous Manganese Oxide (HMO), and at a loading rate of 3.0 gpm/ft^2 effectively lowered manganese to below its respective SMCL (Mn<0.05 mg/L) to an average of ≥0.002 for both run 1 and 2 for both the IMAR™ and GreensandPlus™ media beds. GreensandPlus™ showed no clear advantage over the IMAR™ in terms of its performance of Mn removal.
   5 pCi/L and gross alpha of less than 15 pCi/L.

3. Both filters were dosed with chlorine bleach (sodium hypochlorite) and TonkaZorb™ at the same dosages. The chlorine dosage was approximately 2.0-2.2mg/L to achieve a free chlorine residual of ~ 0.8mg/L. Breakpoint chlorination was achieved during this pilot. The HMO dosage was 1ppm as Mn, this in addition to the raw manganese created a Mn concentration above the filter bed >1ppm to aid the removal of Radium and Gross Alpha. Both filters were able to effectively remove Mn, Fe and NH_3 with these dosaages.

4. At a loading rate of 3.0 gpm/ft2, the 30" of Tonka Water IMAR™ dual media performed in such that all effluent lab samples were below their respective SMCL or MCL for Fe, Mn and Combined Radium. Per the stretch goal of <2.5pCi/L of the City of Inver Grove Heights, by the end of the pilot the IMAR™ filter was able to achieve this after a pseudo steady state of HMO feed was established to coat the media. Given the high concentration of oxidized manganese added to the filter, this allowed the additional filtration of Mn without the addition of permanganate and only needed the addition of chlorine to complete the oxidation of Mn and Fe in the source water. If given more time, eventually it is expected that the IMAR™ filter will perform relatively evenly in its ability to remove combined radium to that of a GreensandPlus™ bedded filter. Run 1 average effluent of radium was 2.67pCi/L (71.4% removal) and run 2 average radium was 1.50pCi/L (86.3% removal).

5. At a loading rate of 3.0 gpm/ft2, the 18" of GreensandPlus™ /12" of anthracite dual media performed in such that all effluent lab samples were below their respective SMCL or MCL for Fe, Mn and Combined Radium. The media was able to remove the radium to a lower concentration than the IMAR™ filter, however as the pilot progressed, the performance gap between the two was closing and it is possible that given more time eventually will perform similarly to the IMAR™. Run 1 average effluent of radium was 0.24pCi/L (97.5% removal) and run 2 average radium was 0.39pCi/L (96.4% removal).

6. No head loss was observed during this pilot as the pilot did not generate any. Runtime cannot be determined by this.

7. The run lengths will need to be field determined on the full-scale system based on well combinations. Due to time constraints and needing to backwash the filter to show performance of backwashing and repeatability of the experiment, the 1st run had to be terminated after 1 week (or ~ 76 hours of runtime) and the second run was terminated at ~90 hours of runtime. At the end of each run, neither filters were showing signs of breakthrough so at the very least with the well combinations tested, the filters can reliably run for >72 hours. This should be studied further by IGH operators via ladder study with well combinations to determine Mn breakthrough to determine run lengths.

   The Tonka Water's Simul-Wash™ backwash system was simulated during the pilot. This method successfully cleaned the filter media between runs.

6 Recommendations

The recommendations listed below are provided using the results from this pilot.

1. Full scale manganese removal using oxidation via chlorine addition followed by media filtration bedded with 30" IMAR™ at a 3.0 gpm/ft^2 loading rate. The GreensandPlus™ preformed better in terms of Radium removal but removed the radium to much farther than what is necessary and over time is a slightly accumulative media which will hold onto radium. It is further recommended to bed the system with IMAR™ as it was able to still achieve the stretch goal of <2.5pCi/L and was still improving by the end of the pilot at a fraction of the price of GreensadPlus™.

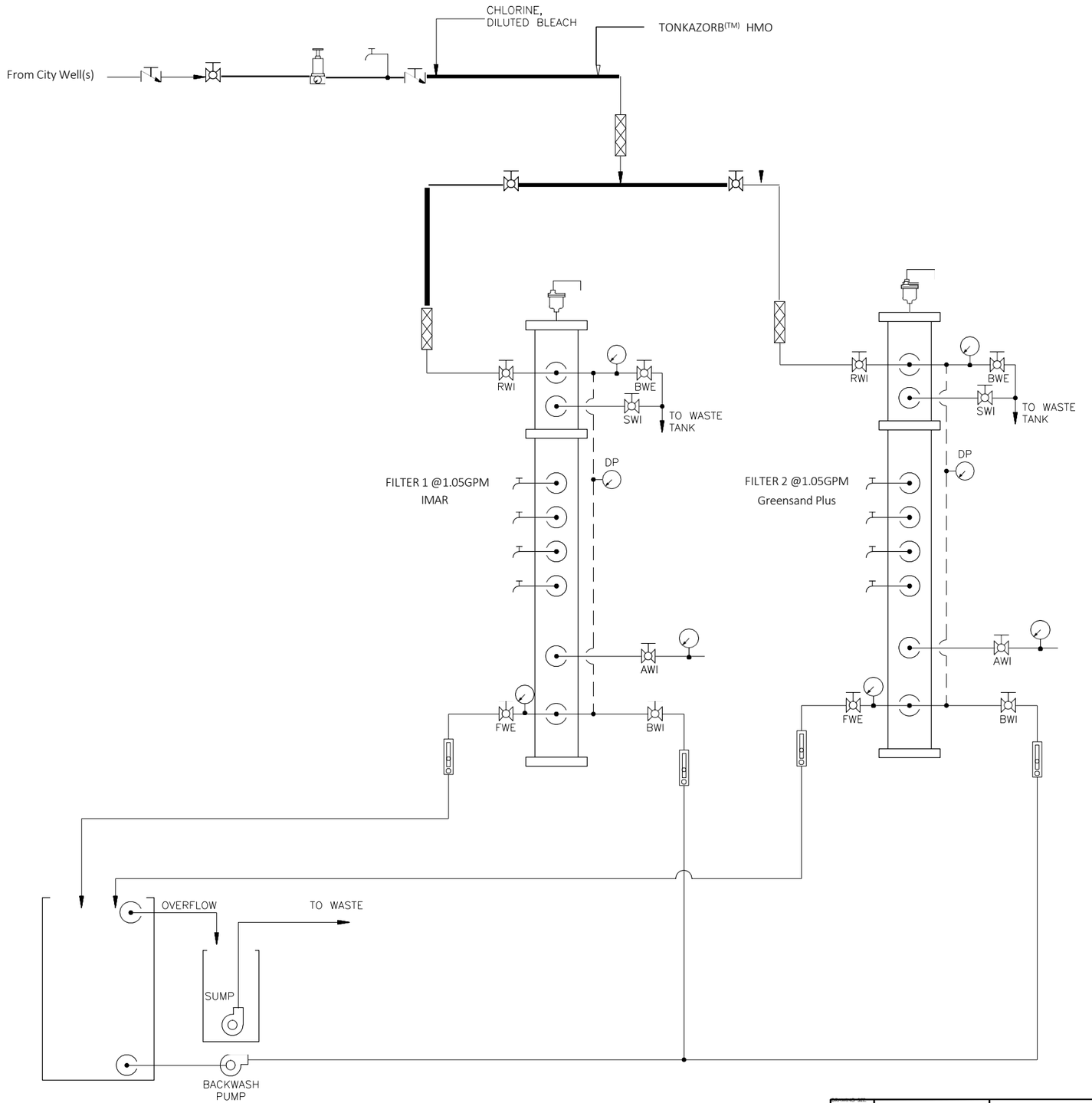
2. Full scale radium removal using chemical Kurita America TonkaZorb™ Hydrous Manganese Oxide dosed to a 1.0mg/L dosage followed by media filtration.

3. Pre filtration chlorine injection should be added to breakpoint chlorination at a dosage of 2.0-2.2 mg/L based on pilot data to achieve a residual of 0.8 mg/L (depends on well combninations).

4. An air and water backwash system such as Tonka Water's SimulWash™ to minimize waste volumes and achieve proper cleaning. This would require the installation of SimulWash™ troughs. SimulWash™ troughs will fit in the existing filters and still allow for enough freeboard.

APPENDIX A

Pilot Flow Schematic



LEGEND

- PUMP
- FLOW DIRECTION
- CONNECTION POINT
- PIPING CROSSOVER
- TEE CONNECTION TO TANK
- ELBOW CONNECTION TO TANK
- BALL VALVE
- STATIC MIXER
- AIR RELEASE VALVE
- SAMPLE TAP
- PRESSURE GAUGE
- ROTAMETER
- HAND WHEEL OPERATED
- PRESSURE REGULATING VALVE
- CHECK VALVE

VALVE NOMENCLATURE

RWI	RAW WATER INFLUENT
BWE	BACKWASH EFFLUENT
FWE	FILTERED WATER EFFLUENT
BWI	BACKWASH INFLUENT
SWE	SIMULWASH EFFLUENT
AWI	AIRWASH INFLUENT

NOTE: SOME ITEMS SHOWN MAY BE BY OTHERS – REFER TO TONKA LETTER OF QUOTATION FOR ITEMS IN TONKA SCOPE OF SUPPLY. SYSTEM SCHEMATIC SHOWN FOR REFERENCE PURPOSES ONLY.

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PROJECT MGR:	
APPR. BY:	
START DATE:	4/28/2022
DWG. SCALE:	NONE
APPR. DATE:	

PILOT SCHEMATIC

PRE-SUBMITTAL DRAWING

Inver Grove Heights, MN

SHEET NUMBER: 1 OF 1 | REV: 1

DRAWING NUMBER:

for quote

APPENDIX B

Laboratory Results and Laboratory Reports

eurofins | Environment Testing

1 2 3 4 5 6 7 8 9 10 11 12 13 14

ANALYTICAL REPORT

PREPARED FOR

Attn: Lynda Kruse
UC Laboratory
129 North Main
PO BOX 551
Janesville, Minnesota 56048

Generated 7/11/2023 1:33:40 PM

JOB DESCRIPTION

UC Laboratory

JOB NUMBER

810-65505-1

Eurofins Eaton Analytical South Bend
110 S Hill Street
South Bend IN 46617

See page two for job notes and contact information.

myEOL

Job Notes

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The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Eaton Analytical, LLC Project Manager.

Authorization

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Authorized for release by
Joe Mattheis, Project Manager I
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(574)233-4777

Table of Contents

Definitions/Glossary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-65505-1

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 810-65505-1

Laboratory: Eurofins Eaton Analytical South Bend

Narrative

Job Narrative
810-65505-1

Receipt
The samples were received on 6/7/2023 8:45 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 1.2°C and 1.8°C

Metals
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
Method SM7500_Ra_D: Sample had a high biased barium carrier recovery. Results may be low biased, but because result is less than the detection limit of 1pCi/L sample is unaffected. The barium carrier limits are 41.5-63.5 mg. The sample barium precipitate is 83.0 mg.

Method SM7500_Ra_D: Sample had a low biased barium carrier recovery. Results may be high biased, but because result is less than the detection limit of 1pCi/L sample is unaffected. The barium carrier limits are 41.5-63.5 mg. The sample barium precipitate is 35.1 mg.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-65505-1

Client Sample ID: Inver Grove Heights, Raw 1-1_45079.023 — Lab Sample ID: 810-65505-1

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Magnesium	27		0.10		mg/L	1		200.7	Total/NA
Calcium	73		0.10		mg/L	1		200.7	Total/NA
Iron	0.078		0.010		mg/L	1		200.7	Total/NA
Manganese	230		2.0		ug/L	1		200.8	Total/NA
Hardness as calcium carbonate	290		0.66		mg/L	1		SM 2340B	Total Recoverable
Calcium hardness as calcium carbonate	180		0.25		mg/L	1		SM 2340B	Total Recoverable
Magnesium hardness as calcium carbonate	110		0.41		mg/L	1		SM 2340B	Total Recoverable
Alkalinity, Total	280		1.0		mg/L	1		SM 2320B	Total/NA
Ammonia, Nitrogen	0.17		0.10		mg/L	1		SM 4500 NH3 D	Total/NA

Client Sample ID: Inver Grove Heights, Filter 1 1-1_45079.024 — Lab Sample ID: 810-65505-2

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Magnesium	26		0.10		mg/L	1		200.7	Total/NA
Calcium	71		0.10		mg/L	1		200.7	Total/NA
Hardness as calcium carbonate	290		0.66		mg/L	1		SM 2340B	Total Recoverable
Calcium hardness as calcium carbonate	180		0.25		mg/L	1		SM 2340B	Total Recoverable
Magnesium hardness as calcium carbonate	110		0.41		mg/L	1		SM 2340B	Total Recoverable
Alkalinity, Total	270		1.0		mg/L	1		SM 2320B	Total/NA

Client Sample ID: Inver Grove Heights, Filter 2 1-1_45079.025 — Lab Sample ID: 810-65505-3

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Magnesium	27		0.10		mg/L	1		200.7	Total/NA
Calcium	71		0.10		mg/L	1		200.7	Total/NA
Hardness as calcium carbonate	290		0.66		mg/L	1		SM 2340B	Total Recoverable
Calcium hardness as calcium carbonate	180		0.25		mg/L	1		SM 2340B	Total Recoverable
Magnesium hardness as calcium carbonate	110		0.41		mg/L	1		SM 2340B	Total Recoverable
Alkalinity, Total	280		1.0		mg/L	1		SM 2320B	Total/NA

Client Sample ID: Inver Grove Heights, Raw 1-2_45079.028 — Lab Sample ID: 810-65505-4

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Iron	0.081		0.010		mg/L	1		200.7	Total/NA
Manganese	240		2.0		ug/L	1		200.8	Total/NA

Client Sample ID: Inver Grove Heights, Filter 1 1-2_45079.029 — Lab Sample ID: 810-65505-5

No Detections.

Client Sample ID: Inver Grove Heights, Filter 2 1-2_45079.030 — Lab Sample ID: 810-65505-6

No Detections.

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-65505-1

Client Sample ID: Inver Grove Heights, TOF 1-R1_45079.026 — Lab Sample ID: 810-65505-7

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Manganese	530		2.0		ug/L	1		200.8	Total Recoverable

Client Sample ID: Inver Grove Heights, TOF 2-R1_45079.027 — Lab Sample ID: 810-65505-8

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Manganese	770		2.0		ug/L	1		200.8	Total Recoverable

This Detection Summary does not include radiochemical test results.

Client Sample ID: Inver Grove Heights, Raw 1-1_45079.023

Lab Sample ID: 810-65505-1

Date Collected: 05/31/23 13:45

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	27		0.10		mg/L			06/13/23 11:05	1
Calcium	73		0.10		mg/L			06/13/23 11:05	1
Iron	0.078		0.010		mg/L			06/13/23 11:05	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	230		2.0		ug/L			06/12/23 19:44	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	290		0.66		mg/L			06/20/23 14:25	1
Calcium hardness as calcium carbonate	180		0.25		mg/L			06/20/23 14:25	1
Magnesium hardness as calcium carbonate	110		0.41		mg/L			06/20/23 14:25	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total (SM 2320B)	280		1.0		mg/L			06/08/23 14:54	1
Ammonia, Nitrogen (SM 4500 NH3 D)	0.17		0.10		mg/L			06/13/23 08:51	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	9.16				1.00	0.450	pCi/L		06/27/23 14:39	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	8.37				1.00	0.450	pCi/L	06/12/23 11:53	06/26/23 09:54	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	0.790				1.00	0.390	pCi/L	06/12/23 11:47	07/07/23 12:50	1

Client Sample ID: Inver Grove Heights, Filter 1 1-1_45079.024

Lab Sample ID: 810-65505-2

Date Collected: 05/31/23 13:50

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	26		0.10		mg/L			06/13/23 11:07	1
Calcium	71		0.10		mg/L			06/13/23 11:07	1
Iron	<0.010		0.010		mg/L			06/13/23 11:07	1

Client Sample ID: Inver Grove Heights, Filter 1 1-1_45079.024

Lab Sample ID: 810-65505-2

Date Collected: 05/31/23 13:50

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/12/23 19:47	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	**290**		0.66		mg/L			06/20/23 14:25	1
Calcium hardness as calcium carbonate	**180**		0.25		mg/L			06/20/23 14:25	1
Magnesium hardness as calcium carbonate	**110**		0.41		mg/L			06/20/23 14:25	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total (SM 2320B)	**270**		1.0		mg/L			06/08/23 14:35	1
Ammonia, Nitrogen (SM 4500 NH3 D)	<0.10		0.10		mg/L			06/13/23 09:44	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**2.06**				1.00	0.940	pCi/L		06/27/23 14:39	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**2.06**				1.00	0.290	pCi/L	06/12/23 11:53	06/26/23 09:54	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-1.86	U			1.00	0.940	pCi/L	06/12/23 11:47	07/07/23 12:50	1

Client Sample ID: Inver Grove Heights, Filter 2 1-1_45079.025

Lab Sample ID: 810-65505-3

Date Collected: 05/31/23 13:55

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	**27**		0.10		mg/L			06/13/23 11:09	1
Calcium	**71**		0.10		mg/L			06/13/23 11:09	1
Iron	<0.010		0.010		mg/L			06/13/23 11:09	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/12/23 19:49	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	**290**		0.66		mg/L			06/20/23 14:25	1
Calcium hardness as calcium carbonate	**180**		0.25		mg/L			06/20/23 14:25	1

Client Sample ID: Inver Grove Heights, Filter 2 1-1_45079.025

Lab Sample ID: 810-65505-3

Date Collected: 05/31/23 13:55

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: SM 2340B - Total Hardness (as CaCO3) by calculation - Total Recoverable (Continued)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium hardness as calcium carbonate	**110**		0.41		mg/L			06/20/23 14:25	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total (SM 2320B)	**280**		1.0		mg/L			06/08/23 14:44	1
Ammonia, Nitrogen (SM 4500 NH3 D)	<0.10		0.10		mg/L			06/13/23 08:58	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.000	U			1.00	0.660	pCi/L		06/23/23 09:04	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	0.0300	U			1.00	0.560	pCi/L	06/12/23 11:53	06/22/23 10:23	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.750	U			1.00	0.660	pCi/L	06/12/23 11:47	07/07/23 12:50	1

Client Sample ID: Inver Grove Heights, Raw 1-2_45079.028

Lab Sample ID: 810-65505-4

Date Collected: 06/01/23 11:10

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	**0.081**		0.010		mg/L			06/13/23 11:11	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**240**		2.0		ug/L			06/12/23 19:57	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**8.61**				1.00	0.740	pCi/L		06/27/23 14:39	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**7.17**				1.00	0.650	pCi/L	06/12/23 11:53	06/26/23 09:54	1

Client Sample ID: Inver Grove Heights, Raw 1-2_45079.028

Lab Sample ID: 810-65505-4

Date Collected: 06/01/23 11:10

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	1.44				1.00	0.740	pCi/L	06/12/23 11:47	07/07/23 12:50	1

Client Sample ID: Inver Grove Heights, Filter 1 1-2_45079.029

Lab Sample ID: 810-65505-5

Date Collected: 06/01/23 11:15

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/13/23 11:13	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/12/23 20:00	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	3.26				1.00	0.680	pCi/L		06/27/23 14:39	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	2.22				1.00	0.470	pCi/L	06/12/23 11:53	06/26/23 09:54	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	1.04				1.00	0.680	pCi/L	06/12/23 11:47	07/07/23 12:50	1

Client Sample ID: Inver Grove Heights, Filter 2 1-2_45079.030

Lab Sample ID: 810-65505-6

Date Collected: 06/01/23 11:20

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/13/23 11:26	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/12/23 20:02	1

Client Sample ID: Inver Grove Heights, Filter 2 1-2_45079.030

Lab Sample ID: 810-65505-6

Date Collected: 06/01/23 11:20

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.720				1.00	0.590	pCi/L		06/23/23 09:04	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	0.720				1.00	0.510	pCi/L	06/12/23 11:53	06/22/23 10:24	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.320	U			1.00	0.590	pCi/L	06/12/23 11:47	07/07/23 12:50	1

Client Sample ID: Inver Grove Heights, TOF 1-R1_45079.026

Lab Sample ID: 810-65505-7

Date Collected: 05/31/23 13:50

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	530		2.0		ug/L		06/13/23 16:25	06/14/23 13:07	1

Client Sample ID: Inver Grove Heights, TOF 2-R1_45079.027

Lab Sample ID: 810-65505-8

Date Collected: 05/31/23 13:50

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Method: EPA 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	770		2.0		ug/L		06/13/23 16:25	06/14/23 13:10	1

Method: 200.7 - Metals (ICP)

Lab Sample ID: MB 810-62323/106
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<0.10		0.10		mg/L			06/13/23 14:02	1
Calcium	<0.10		0.10		mg/L			06/13/23 14:02	1
Iron	<0.010		0.010		mg/L			06/13/23 14:02	1

Lab Sample ID: MB 810-62323/12
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<0.10		0.10		mg/L			06/13/23 10:41	1
Calcium	<0.10		0.10		mg/L			06/13/23 10:41	1
Iron	<0.010		0.010		mg/L			06/13/23 10:41	1

Lab Sample ID: MB 810-62323/45
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<0.10		0.10		mg/L			06/13/23 11:52	1
Calcium	<0.10		0.10		mg/L			06/13/23 11:52	1
Iron	<0.010		0.010		mg/L			06/13/23 11:52	1

Lab Sample ID: MB 810-62323/76
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<0.10		0.10		mg/L			06/13/23 12:58	1
Calcium	<0.10		0.10		mg/L			06/13/23 12:58	1
Iron	<0.010		0.010		mg/L			06/13/23 12:58	1

Lab Sample ID: LCS 810-62323/15
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Magnesium			5.00	5.23		mg/L		105	85 - 115		
Calcium			5.00	5.18		mg/L		104	85 - 115		
Iron			5.00	5.21		mg/L		104	85 - 115		

Lab Sample ID: LLCS 810-62323/11
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Magnesium			0.0100	0.0104	J	mg/L		104	50 - 150		
Calcium			0.0100	<0.025		mg/L		124	50 - 150		
Iron			0.0100	0.0103		mg/L		103	50 - 150		

Method: 200.7 - Metals (ICP) (Continued)

Lab Sample ID: LLCS 810-62323/13
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Magnesium	0.100	0.0894	J	mg/L		89	50 - 150
Calcium	0.100	0.0819	J	mg/L		82	50 - 150

Method: 200.8 - Metals (ICP/MS)

Lab Sample ID: MB 810-62206/12
Matrix: Drinking Water
Analysis Batch: 62206

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0	ug/L			06/12/23 16:40	1

Lab Sample ID: MB 810-62206/72
Matrix: Drinking Water
Analysis Batch: 62206

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0	ug/L			06/12/23 19:15	1

Lab Sample ID: LCS 810-62206/73
Matrix: Drinking Water
Analysis Batch: 62206

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	50.0	52.4		ug/L		105	85 - 115

Lab Sample ID: LLCS 810-62206/11
Matrix: Drinking Water
Analysis Batch: 62206

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	0.300	<0.66		ug/L		97	50 - 150

Lab Sample ID: MB 810-62362/1-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0	ug/L		06/13/23 16:25	06/14/23 12:51	1

Lab Sample ID: MB 810-62362/1-A
Matrix: Drinking Water
Analysis Batch: 62519

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0	ug/L		06/13/23 16:25	06/14/23 15:24	1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 810-62362/6-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	50.0	51.2		ug/L		102	85 - 115

Lab Sample ID: LCS 810-62362/6-A
Matrix: Drinking Water
Analysis Batch: 62519

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	50.0	50.7		ug/L		101	85 - 115

Lab Sample ID: LLCS 810-62362/2-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	0.300	<0.66		ug/L		101	50 - 150

Lab Sample ID: LLCS 810-62362/2-A
Matrix: Drinking Water
Analysis Batch: 62519

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	0.300	<0.66		ug/L		98	50 - 150

Lab Sample ID: LLCS 810-62362/3-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	1.00	0.999	J	ug/L		100	50 - 150

Lab Sample ID: LLCS 810-62362/3-A
Matrix: Drinking Water
Analysis Batch: 62519

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	1.00	1.01	J	ug/L		101	50 - 150

Lab Sample ID: LLCS 810-62362/4-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	2.00	1.96	J	ug/L		98	50 - 150

Lab Sample ID: LLCS 810-62362/4-A
Matrix: Drinking Water
Analysis Batch: 62519

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	2.00	1.98	J	ug/L		99	50 - 150

Method: SM 2320B - Alkalinity

Lab Sample ID: MBL 810-61918/6
Matrix: Drinking Water
Analysis Batch: 61918

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MBL Result	MBL Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	<1.0		1.0		mg/L			06/08/23 11:44	1

Lab Sample ID: LCS 810-61918/4
Matrix: Drinking Water
Analysis Batch: 61918

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Alkalinity, Total			100	101		mg/L		101	78 - 114		

Lab Sample ID: LLCS 810-61918/5
Matrix: Drinking Water
Analysis Batch: 61918

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Alkalinity, Total			1.00	1.28		mg/L		128	50 - 150		

Method: SM 4500 NH3 D - Ammonia

Lab Sample ID: MBL 810-62268/6
Matrix: Drinking Water
Analysis Batch: 62268

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MBL Result	MBL Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Ammonia, Nitrogen	<0.046		0.10		mg/L			06/13/23 08:17	1

Lab Sample ID: LCS 810-62268/4
Matrix: Drinking Water
Analysis Batch: 62268

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Ammonia, Nitrogen			2.50	2.47		mg/L		99	84 - 113		

Lab Sample ID: LLCS 810-62268/5
Matrix: Drinking Water
Analysis Batch: 62268

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Ammonia, Nitrogen			0.100	0.0900	J	mg/L		90	50 - 150		

Method: SM7500 Ra B - Radium-226

Lab Sample ID: MB 810-62120/1-A
Matrix: Drinking Water
Analysis Batch: 63406

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62120

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	-0.2200	U			1.00	0.520	pCi/L	06/12/23 11:53	06/22/23 10:23	1

Method: SM7500 Ra B - Radium-226 (Continued)

Lab Sample ID: LCS 810-62120/2-A
Matrix: Drinking Water
Analysis Batch: 63406

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62120

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-226			5.03	4.530			1.00	0.510	pCi/L	90	90 - 110		

Lab Sample ID: 810-65505-6 MS
Matrix: Drinking Water
Analysis Batch: 63406

Client Sample ID: Inver Grove Heights, Filter 2 1-2_45079.030
Prep Type: Total/NA
Prep Batch: 62120

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-226	0.720		5.58	4.930			1.00	0.640	pCi/L	88	80 - 120		

Lab Sample ID: 810-65505-6 MSD
Matrix: Drinking Water
Analysis Batch: 63406

Client Sample ID: Inver Grove Heights, Filter 2 1-2_45079.030
Prep Type: Total/NA
Prep Batch: 62120

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RPD	RPD Limit
Ra-226	0.720		5.58	5.640			1.00	0.530	pCi/L	101	80 - 120	13	20

Method: SM7500 Ra D - Radium-228

Lab Sample ID: MB 810-62119/1-A
Matrix: Drinking Water
Analysis Batch: 65205

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62119

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.5600	U			1.00	0.680	pCi/L	06/12/23 11:47	07/07/23 12:50	1

Lab Sample ID: LCS 810-62119/2-A
Matrix: Drinking Water
Analysis Batch: 65205

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62119

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-228			4.28	3.550			1.00	0.440	pCi/L	83	80 - 120		

Lab Sample ID: 810-65505-1 MS
Matrix: Drinking Water
Analysis Batch: 65205

Client Sample ID: Inver Grove Heights, Raw 1-1_45079.023
Prep Type: Total/NA
Prep Batch: 62119

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-228	0.790		4.75	5.250			1.00	0.640	pCi/L	111	70 - 130		

Method: SM7500 Ra D - Radium-228 (Continued)

Lab Sample ID: 810-65505-1 MSD
Matrix: Drinking Water
Analysis Batch: 65205

Client Sample ID: Inver Grove Heights, Raw 1-1_45079.023
Prep Type: Total/NA
Prep Batch: 62119

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RPD	RPD Limit
Ra-228	0.790		4.74	4.700			1.00	0.540	pCi/L	99	70 - 130	11	20

Metals

Analysis Batch: 62206

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-1	Inver Grove Heights, Raw 1-1_45079.023	Total/NA	Drinking Water	200.8	
810-65505-2	Inver Grove Heights, Filter 1 1-1_45079.024	Total/NA	Drinking Water	200.8	
810-65505-3	Inver Grove Heights, Filter 2 1-1_45079.025	Total/NA	Drinking Water	200.8	
810-65505-4	Inver Grove Heights, Raw 1-2_45079.028	Total/NA	Drinking Water	200.8	
810-65505-5	Inver Grove Heights, Filter 1 1-2_45079.029	Total/NA	Drinking Water	200.8	
810-65505-6	Inver Grove Heights, Filter 2 1-2_45079.030	Total/NA	Drinking Water	200.8	
MB 810-62206/12	Method Blank	Total/NA	Drinking Water	200.8	
MB 810-62206/72	Method Blank	Total/NA	Drinking Water	200.8	
LCS 810-62206/73	Lab Control Sample	Total/NA	Drinking Water	200.8	
LLCS 810-62206/11	Lab Control Sample	Total/NA	Drinking Water	200.8	

Analysis Batch: 62323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-1	Inver Grove Heights, Raw 1-1_45079.023	Total/NA	Drinking Water	200.7	
810-65505-2	Inver Grove Heights, Filter 1 1-1_45079.024	Total/NA	Drinking Water	200.7	
810-65505-3	Inver Grove Heights, Filter 2 1-1_45079.025	Total/NA	Drinking Water	200.7	
810-65505-4	Inver Grove Heights, Raw 1-2_45079.028	Total/NA	Drinking Water	200.7	
810-65505-5	Inver Grove Heights, Filter 1 1-2_45079.029	Total/NA	Drinking Water	200.7	
810-65505-6	Inver Grove Heights, Filter 2 1-2_45079.030	Total/NA	Drinking Water	200.7	
MB 810-62323/106	Method Blank	Total/NA	Drinking Water	200.7	
MB 810-62323/12	Method Blank	Total/NA	Drinking Water	200.7	
MB 810-62323/45	Method Blank	Total/NA	Drinking Water	200.7	
MB 810-62323/76	Method Blank	Total/NA	Drinking Water	200.7	
LCS 810-62323/15	Lab Control Sample	Total/NA	Drinking Water	200.7	
LLCS 810-62323/11	Lab Control Sample	Total/NA	Drinking Water	200.7	
LLCS 810-62323/13	Lab Control Sample	Total/NA	Drinking Water	200.7	

Prep Batch: 62362

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-7	Inver Grove Heights, TOF 1-R1_45079.026	Total Recoverable	Drinking Water	200.8	
810-65505-8	Inver Grove Heights, TOF 2-R1_45079.027	Total Recoverable	Drinking Water	200.8	
MB 810-62362/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	
LCS 810-62362/6-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62362/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62362/3-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62362/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	

Analysis Batch: 62494

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-7	Inver Grove Heights, TOF 1-R1_45079.026	Total Recoverable	Drinking Water	200.8	62362
810-65505-8	Inver Grove Heights, TOF 2-R1_45079.027	Total Recoverable	Drinking Water	200.8	62362
MB 810-62362/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	62362
LCS 810-62362/6-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/3-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362

Analysis Batch: 62519

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 810-62362/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	62362
LCS 810-62362/6-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362

Metals (Continued)

Analysis Batch: 62519 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LLCS 810-62362/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/3-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362

Analysis Batch: 63122

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-1	Inver Grove Heights, Raw 1-1_45079.023	Total Recoverable	Drinking Water	SM 2340B	
810-65505-2	Inver Grove Heights, Filter 1 1-1_45079.024	Total Recoverable	Drinking Water	SM 2340B	
810-65505-3	Inver Grove Heights, Filter 2 1-1_45079.025	Total Recoverable	Drinking Water	SM 2340B	

General Chemistry

Analysis Batch: 61918

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-1	Inver Grove Heights, Raw 1-1_45079.023	Total/NA	Drinking Water	SM 2320B	
810-65505-2	Inver Grove Heights, Filter 1 1-1_45079.024	Total/NA	Drinking Water	SM 2320B	
810-65505-3	Inver Grove Heights, Filter 2 1-1_45079.025	Total/NA	Drinking Water	SM 2320B	
MBL 810-61918/6	Method Blank	Total/NA	Drinking Water	SM 2320B	
LCS 810-61918/4	Lab Control Sample	Total/NA	Drinking Water	SM 2320B	
LLCS 810-61918/5	Lab Control Sample	Total/NA	Drinking Water	SM 2320B	

Analysis Batch: 62268

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-1	Inver Grove Heights, Raw 1-1_45079.023	Total/NA	Drinking Water	SM 4500 NH3 D	
810-65505-2	Inver Grove Heights, Filter 1 1-1_45079.024	Total/NA	Drinking Water	SM 4500 NH3 D	
810-65505-3	Inver Grove Heights, Filter 2 1-1_45079.025	Total/NA	Drinking Water	SM 4500 NH3 D	
MBL 810-62268/6	Method Blank	Total/NA	Drinking Water	SM 4500 NH3 D	
LCS 810-62268/4	Lab Control Sample	Total/NA	Drinking Water	SM 4500 NH3 D	
LLCS 810-62268/5	Lab Control Sample	Total/NA	Drinking Water	SM 4500 NH3 D	

Rad

Prep Batch: 62119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-1	Inver Grove Heights, Raw 1-1_45079.023	Total/NA	Drinking Water	RAD Prep	
810-65505-2	Inver Grove Heights, Filter 1 1-1_45079.024	Total/NA	Drinking Water	RAD Prep	
810-65505-3	Inver Grove Heights, Filter 2 1-1_45079.025	Total/NA	Drinking Water	RAD Prep	
810-65505-4	Inver Grove Heights, Raw 1-2_45079.028	Total/NA	Drinking Water	RAD Prep	
810-65505-5	Inver Grove Heights, Filter 1 1-2_45079.029	Total/NA	Drinking Water	RAD Prep	
810-65505-6	Inver Grove Heights, Filter 2 1-2_45079.030	Total/NA	Drinking Water	RAD Prep	
MB 810-62119/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62119/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	
810-65505-1 MS	Inver Grove Heights, Raw 1-1_45079.023	Total/NA	Drinking Water	RAD Prep	
810-65505-1 MSD	Inver Grove Heights, Raw 1-1_45079.023	Total/NA	Drinking Water	RAD Prep	

Prep Batch: 62120

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-1	Inver Grove Heights, Raw 1-1_45079.023	Total/NA	Drinking Water	RAD Prep	
810-65505-2	Inver Grove Heights, Filter 1 1-1_45079.024	Total/NA	Drinking Water	RAD Prep	
810-65505-3	Inver Grove Heights, Filter 2 1-1_45079.025	Total/NA	Drinking Water	RAD Prep	
810-65505-4	Inver Grove Heights, Raw 1-2_45079.028	Total/NA	Drinking Water	RAD Prep	
810-65505-5	Inver Grove Heights, Filter 1 1-2_45079.029	Total/NA	Drinking Water	RAD Prep	

Rad (Continued)

Prep Batch: 62120 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65505-6	Inver Grove Heights, Filter 2 1-2_45079.030	Total/NA	Drinking Water	RAD Prep	
MB 810-62120/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62120/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	
810-65505-6 MS	Inver Grove Heights, Filter 2 1-2_45079.030	Total/NA	Drinking Water	RAD Prep	
810-65505-6 MSD	Inver Grove Heights, Filter 2 1-2_45079.030	Total/NA	Drinking Water	RAD Prep	

Lab Chronicle

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-65505-1

Client Sample ID: Inver Grove Heights, Raw 1-1_45079.023

Lab Sample ID: 810-65505-1

Date Collected: 05/31/23 13:45
Matrix: Drinking Water
Date Received: 06/07/23 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 11:05
Total/NA	Analysis	200.8		1	62206	NB	EA SB	06/12/23 19:44
Total Recoverable	Analysis	SM 2340B		1	63122	JW	EA SB	06/20/23 14:25
Total/NA	Analysis	SM 2320B		1	61918	KH	EA SB	06/08/23 14:54
Total/NA	Analysis	SM 4500 NH3 D		1	62268	KH	EA SB	06/13/23 08:51
Total/NA	Analysis	7500 Ra D		1	63521	OO	EA SB	06/27/23 14:39
Total/NA	Prep	RAD Prep			62120	SS	EA SB	06/12/23 11:53
Total/NA	Analysis	SM7500 Ra B		1	63853	SM	EA SB	06/26/23 09:54 - 06/26/23 10:24 [1]
Total/NA	Prep	RAD Prep			62119	SS	EA SB	06/12/23 11:47
Total/NA	Analysis	SM7500 Ra D		1	65205	OO	EA SB	07/07/23 12:50 - 07/07/23 14:50 [1]

Client Sample ID: Inver Grove Heights, Filter 1 1-1_45079.024

Lab Sample ID: 810-65505-2

Date Collected: 05/31/23 13:50
Matrix: Drinking Water
Date Received: 06/07/23 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 11:07
Total/NA	Analysis	200.8		1	62206	NB	EA SB	06/12/23 19:47
Total Recoverable	Analysis	SM 2340B		1	63122	JW	EA SB	06/20/23 14:25
Total/NA	Analysis	SM 2320B		1	61918	KH	EA SB	06/08/23 14:35
Total/NA	Analysis	SM 4500 NH3 D		1	62268	KH	EA SB	06/13/23 09:44
Total/NA	Analysis	7500 Ra D		1	63521	OO	EA SB	06/27/23 14:39
Total/NA	Prep	RAD Prep			62120	SS	EA SB	06/12/23 11:53
Total/NA	Analysis	SM7500 Ra B		1	63853	SM	EA SB	06/26/23 09:54 - 06/26/23 10:24 [1]
Total/NA	Prep	RAD Prep			62119	SS	EA SB	06/12/23 11:47
Total/NA	Analysis	SM7500 Ra D		1	65205	OO	EA SB	07/07/23 12:50 - 07/07/23 14:50 [1]

Client Sample ID: Inver Grove Heights, Filter 2 1-1_45079.025

Lab Sample ID: 810-65505-3

Date Collected: 05/31/23 13:55
Matrix: Drinking Water
Date Received: 06/07/23 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 11:09
Total/NA	Analysis	200.8		1	62206	NB	EA SB	06/12/23 19:49
Total Recoverable	Analysis	SM 2340B		1	63122	JW	EA SB	06/20/23 14:25
Total/NA	Analysis	SM 2320B		1	61918	KH	EA SB	06/08/23 14:44
Total/NA	Analysis	SM 4500 NH3 D		1	62268	KH	EA SB	06/13/23 08:58
Total/NA	Analysis	7500 Ra D		1	63521	OO	EA SB	06/23/23 09:04
Total/NA	Prep	RAD Prep			62120	SS	EA SB	06/12/23 11:53
Total/NA	Analysis	SM7500 Ra B		1	63406	SM	EA SB	06/22/23 10:23 - 06/22/23 10:53 [1]
Total/NA	Prep	RAD Prep			62119	SS	EA SB	06/12/23 11:47
Total/NA	Analysis	SM7500 Ra D		1	65205	OO	EA SB	07/07/23 12:50 - 07/07/23 14:50 [1]

Client Sample ID: Inver Grove Heights, Raw 1-2_45079.028

Lab Sample ID: 810-65505-4

Date Collected: 06/01/23 11:10

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 11:11
Total/NA	Analysis	200.8		1	62206	NB	EA SB	06/12/23 19:57
Total/NA	Analysis	7500 Ra D		1	63521	OO	EA SB	06/27/23 14:39
Total/NA	Prep	RAD Prep			62120	SS	EA SB	06/12/23 11:53
Total/NA	Analysis	SM7500 Ra B		1	63853	SM	EA SB	06/26/23 09:54 - 06/26/23 10:24 [1]
Total/NA	Prep	RAD Prep			62119	SS	EA SB	06/12/23 11:47
Total/NA	Analysis	SM7500 Ra D		1	65205	OO	EA SB	07/07/23 12:50 - 07/07/23 14:50 [1]

Client Sample ID: Inver Grove Heights, Filter 1 1-2_45079.029

Lab Sample ID: 810-65505-5

Date Collected: 06/01/23 11:15

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 11:13
Total/NA	Analysis	200.8		1	62206	NB	EA SB	06/12/23 20:00
Total/NA	Analysis	7500 Ra D		1	63521	OO	EA SB	06/27/23 14:39
Total/NA	Prep	RAD Prep			62120	SS	EA SB	06/12/23 11:53
Total/NA	Analysis	SM7500 Ra B		1	63853	SM	EA SB	06/26/23 09:54 - 06/26/23 10:24 [1]
Total/NA	Prep	RAD Prep			62119	SS	EA SB	06/12/23 11:47
Total/NA	Analysis	SM7500 Ra D		1	65205	OO	EA SB	07/07/23 12:50 - 07/07/23 14:50 [1]

Client Sample ID: Inver Grove Heights, Filter 2 1-2_45079.030

Lab Sample ID: 810-65505-6

Date Collected: 06/01/23 11:20

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 11:26
Total/NA	Analysis	200.8		1	62206	NB	EA SB	06/12/23 20:02
Total/NA	Analysis	7500 Ra D		1	63521	OO	EA SB	06/23/23 09:04
Total/NA	Prep	RAD Prep			62120	SS	EA SB	06/12/23 11:53
Total/NA	Analysis	SM7500 Ra B		1	63406	SM	EA SB	06/22/23 10:24 - 06/22/23 10:54 [1]
Total/NA	Prep	RAD Prep			62119	SS	EA SB	06/12/23 11:47
Total/NA	Analysis	SM7500 Ra D		1	65205	OO	EA SB	07/07/23 12:50 - 07/07/23 14:50 [1]

Client Sample ID: Inver Grove Heights, TOF 1-R1_45079.026

Lab Sample ID: 810-65505-7

Date Collected: 05/31/23 13:50

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	200.8			62362	NB	EA SB	06/13/23 16:25
Total Recoverable	Analysis	200.8		1	62494	NB	EA SB	06/14/23 13:07

Lab Chronicle

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-65505-1

Client Sample ID: Inver Grove Heights, TOF 2-R1_45079.027

Lab Sample ID: 810-65505-8

Date Collected: 05/31/23 13:50

Matrix: Drinking Water

Date Received: 06/07/23 08:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	200.8			62362	NB	EA SB	06/13/23 16:25
Total Recoverable	Analysis	200.8		1	62494	NB	EA SB	06/14/23 13:10

[1] This procedure uses a method stipulated length of time for the process. Both start and end times are displayed.

Laboratory References:

EA SB = Eurofins Eaton Analytical South Bend, 110 S Hill Street, South Bend, IN 46617, TEL (574)233-4777

Accreditation/Certification Summary

Client: UC Laboratory
Job ID: 810-65505-1
Project/Site: UC Laboratory

Laboratory: Eurofins Eaton Analytical South Bend

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Minnesota	NELAP	1989807	12-31-23

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
7500 Ra D		Drinking Water	Combined Radium 226 + 228
SM 2340B		Drinking Water	Calcium hardness as calcium carbonate
SM 2340B		Drinking Water	Magnesium hardness as calcium carbonate
SM 4500 NH3 D		Drinking Water	Ammonia, Nitrogen

Method Summary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-65505-1

Method	Method Description	Protocol	Laboratory
200.7	Metals (ICP)	EPA	EA SB
200.8	Metals (ICP/MS)	EPA	EA SB
SM 2340B	Total Hardness (as CaCO3) by calculation	SM	EA SB
SM 2320B	Alkalinity	SM	EA SB
SM 4500 NH3 D	Ammonia	SM	EA SB
7500 Ra D	Radium 226 Radium 228 Combined	SM	EA SB
SM7500 Ra B	Radium-226	SM	EA SB
SM7500 Ra D	Radium-228	SM	EA SB
200.8	Preparation, Total Recoverable Metals	EPA	EA SB
RAD Prep	Preparation, Radiologicals	None	EA SB

Protocol References:

EPA = US Environmental Protection Agency

None = None

SM = "Standard Methods For The Examination Of Water And Wastewater"

Laboratory References:

EA SB = Eurofins Eaton Analytical South Bend, 110 S Hill Street, South Bend, IN 46617, TEL (574)233-4777

Sample Summary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-65505-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
810-65505-1	Inver Grove Heights, Raw 1-1_45079.023	Drinking Water	05/31/23 13:45	06/07/23 08:45
810-65505-2	Inver Grove Heights, Filter 1 1-1_45079.024	Drinking Water	05/31/23 13:50	06/07/23 08:45
810-65505-3	Inver Grove Heights, Filter 2 1-1_45079.025	Drinking Water	05/31/23 13:55	06/07/23 08:45
810-65505-4	Inver Grove Heights, Raw 1-2_45079.028	Drinking Water	06/01/23 11:10	06/07/23 08:45
810-65505-5	Inver Grove Heights, Filter 1 1-2_45079.029	Drinking Water	06/01/23 11:15	06/07/23 08:45
810-65505-6	Inver Grove Heights, Filter 2 1-2_45079.030	Drinking Water	06/01/23 11:20	06/07/23 08:45
810-65505-7	Inver Grove Heights, TOF 1-R1_45079.026	Drinking Water	05/31/23 13:50	06/07/23 08:45
810-65505-8	Inver Grove Heights, TOF 2-R1_45079.027	Drinking Water	05/31/23 13:50	06/07/23 08:45

810-65505 Chain of Custody

Chain of Custody Record

eurofins Environment Testing America

7/11/2023

	Sampler:	Lab PM: Joe Mattheis	Carrier Tracking No(s):	COC No: 810-6672-2003.1
Client Contact: Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et.eurofinsus.com	State of Origin:	Page: Page 1 of 4
Company: UC Laboratory	PWSID:	Analysis Requested		Job #:
Address: 129 North Main PO BOX 551	Due Date Requested:			
City: Janesville	TAT Requested (days):			
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No			
Phone:	PO #:			
Email: Lynda@uclaboratory.net	WO #:			
Project Name:	Project #:			
Site:	SSOW#:			

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Radium	Ammonia	Manganese 200.7	Iron 200.8	Calcium 200.9	Magnesium 200.10	Hardness	Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	S	D	D	D	D	D	N		
Inver Grove Heights, Raw 1-1,	5/31/23	13:45		Drinking Water			X								5	45079.023
Inver Grove Heights, Filter 1 1-1,	5/31/23	13:50		Drinking Water			X								5	45079.024
Inver Grove Heights, Filter 2 1-1,	5/31/23	13:55		Drinking Water			X								5	45079.025
Inver Grove Heights, Raw 1-2,	6/1/23	11:10		Drinking Water			X								5	45079.028
Inver Grove Heights, Filter 1 1-2,	6/1/23	11:15		Drinking Water			X								5	45079.029
Inver Grove Heights, Filter 2 1-2,	6/1/23	11:20		Drinking Water			X								5	45079.030
Inver Grove Heights, Raw 1-1,	5/31/23	13:45		Drinking Water				X							1	45079.023
Inver Grove Heights, Filter 1 1-1,	5/31/23	13:50		Drinking Water				X							1	45079.024
Inver Grove Heights, Filter 2 1-1,	5/31/23	13:55		Drinking Water				X							1	45079.025
Inver Grove Heights, Raw 1-1,	5/31/23	13:45		Drinking Water					X						1	45079.023
Inver Grove Heights, Filter 1 1-1,	5/31/23	13:50		Drinking Water					X						1	45079.024

Possible Hazard Identification

☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by: Perry Pehling Wright	Date/Time: 06/07/23 0845	Company EEA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

pH Acceptable

Client Provided Sample Container

Initial Temp: 0.4, 1.0

Corrected Temp: 1.2, 1.8

IR Gun # 28 Wet

Ver: 01/16/2019

South Bend, IN
110 S Hill Street
South Bend, IN 46617
Phone (574) 233-4777 Phone (574) 233-8207

Chain of Custody Record

eurofins Environment Testing America

7/11/2023

Client Information	Sampler	Lab PM: Joe Mattheis	Carrier Tracking No(s):	COC No: 810-6672-2003.1
Client Contact: Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et.eurofinsus.com	State of Origin:	Page: Page 2 of 4
Company: UC Laboratory	PWSID:			Job #:

Address: 129 North Main PO BOX 551	Due Date Requested:	Analysis Requested	Preservation Codes:
City: Janesville	TAT Requested (days):		A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2O3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - pH 4-5 L - EDA Z - other (specify)
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No		
Phone:	PO #:		
Email: Lynda@uclaboratory.net	WO #:		Other:
Project Name:	Project #:		
Site:	SSOW#:		

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS / MSD (Yes or No)	Radium	Ammonia	Manganese 200.7	Iron 200.8	Calcium 200.9	Magnesium 200.10		Hardness	Alkalinity					Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	S	D	D	D	D		D	N						
Inver Grove Heights, Filter 2 1-1,	5/31/23	13:55		Drinking Water					X											1	45079.025
Inver Grove Heights, TOF 1-R1,	5/31/23	13:50		Drinking Water					X											1	45079.026
Inver Grove Heights, TOF 2-R1,	5/31/23	13:50		Drinking Water					X											1	45079.027
Inver Grove Heights, Raw 1-2,	6/1/23	11:10		Drinking Water					X											1	45079.028
Inver Grove Heights, Filter 1 1-2,	6/1/23	11:15		Drinking Water					X											1	45079.029
Inver Grove Heights, Filter 2 1-2,	6/1/23	11:20		Drinking Water					X											1	45079.030
Brownton, Effluent,	6/2/23	8:00		Drinking Water								X								1	*45079.019 Did not receive
Inver Grove Heights, Raw 1-1,	5/31/23	13:45		Drinking Water								X								1	45079.023
Inver Grove Heights, Filter 1 1-1,	5/31/23	13:50		Drinking Water								X								1	45079.024
Inver Grove Heights, Filter 2 1-1,	5/31/23	13:55		Drinking Water								X								1	45079.025

ppw 06/07/23

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Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
				Penny Pehling Wright	06/07/23 0845	FEA
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

pH Acceptable

Client Provided Sample Container

Cooler Temperature(s) °C and Other Remarks: Initial Temp: 0.4, 1.0 Corrected Temp: 1.2, 1.8 Wet IR Gun # 28

Ver: 01/16/2019

South Bend, IN
110 S Hill Street
South Bend, IN 46617
Phone (574) 233-4777 Phone (574) 233-8207

Chain of Custody Record

eurofins Environment Testing America

7/11/2023

Client Information	Sampler:	Lab PM: Joe Mattheis	Carrier Tracking No(s):	COC No: 810-6672-2003.1
Client Contact: Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et.eurofinsus.com	State of Origin:	Page: Page 3 of 4
Company: UC Laboratory	PWSID:			Job #:
Address: 129 North Main PO BOX 551	Due Date Requested:			
City: Janesville	TAT Requested (days):			
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No			
Phone:	PO #:			
Email: Lynda@uclaboratory.net	WO #:			
Project Name:	Project #:			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Radium	Ammonia	Manganese 200.7	Iron 200.8	Calcium 200.9	Magnesium 200.10	Hardness	Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	S	D	D	D	D	D	N		
Inver Grove Heights, Raw 1-1,	5/31/23	13:45		Drinking Water									X		1	45079.023
Inver Grove Heights, Filter 1 1-1,	5/31/23	13:50		Drinking Water									X		1	45079.024
Inver Grove Heights, Filter 2 1-1,	5/31/23	13:55		Drinking Water									X		1	45079.025
Inver Grove Heights, Raw 1-1,	5/31/23	13:45		Drinking Water						X					1	45079.023
Inver Grove Heights, Filter 1 1-1,	5/31/23	13:50		Drinking Water						X					1	45079.024
Inver Grove Heights, Filter 2 1-1,	5/31/23	13:55		Drinking Water						X					1	45079.025
Inver Grove Heights, Raw 1-2,	6/1/23	11:10		Drinking Water						X					1	45079.028
Inver Grove Heights, Filter 1 1-2,	6/1/23	11:15		Drinking Water						X					1	45079.029
Inver Grove Heights, Filter 2 1-2,	6/1/23	11:20		Drinking Water						X					1	45079.030

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Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	Relinquished by:	Date/Time:	Company	Received by: Penny Pehling Wright	Date/Time: 06/07/23 0845	Company EFA
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.:

pH Acceptable

Cooler Temperature(s) °C and Other Remarks:

Initial Temp 0.4 1.0
Corrected Temp: 1.0
IR Gun # 28 Wet

Client Provided Sample Container

Ver: 01/16/2019

South Bend, IN
110 S Hill Street
South Bend, IN 46617
Phone (574) 233-4777 Phone (574) 233-8207

Chain of Custody Record

eurofins Environment Testing America

7/11/2023

Client Information	Sampler:	Lab PM: Joe Mattheis	Carrier Tracking No(s):	COC No: 810-6672-2003.1
Client Contact: Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et.eurofinsus.com	State of Origin:	Page: Page 4 of 4
Company: UC Laboratory	PWSID:			Job #:
Address: 129 North Main PO BOX 551	Due Date Requested:			
City: Janesville	TAT Requested (days):			
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No			
Phone:	PO #:			
Email: Lynda@uclaboratory.net	WO #:			
Project Name:	Project #:			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	MS/MSD (Yes or No)	Radium	Ammonia	Manganese 200.7	Iron 200.8	Calcium 200.9	Magnesium 200.10		Hardness	Alkalinity					Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	S	D	D	D	D		D	N						
Inver Grove Heights, Raw 1-1,	5/31/23	13:45		Drinking Water							X									1	45079.023
Inver Grove Heights, Filter 1 1-1,	5/31/23	13:50		Drinking Water							X									1	45079.024
Inver Grove Heights, Filter 2 1-1,	5/31/23	13:55		Drinking Water							X									1	45079.025
Inver Grove Heights, Raw 1-1,	5/31/23	13:45		Drinking Water										X						1	45079.023
Inver Grove Heights, Filter 1 1-1,	5/31/23	13:50		Drinking Water										X						1	45079.024
Inver Grove Heights, Filter 2 1-1,	5/31/23	13:55		Drinking Water										X						1	45079.025

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by: Penny Pehlig Wright	Date/Time: 06/07/23 0845	Company: EEA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Client Provided Sample Container
pH Acceptable

Initial Temp: 0.4, 1.0
Corrected Temp: 1.2, 1.8
IR Gun # 2 wet

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: UC Laboratory

Job Number: 810-65505-1

Login Number: 65505
List Number: 1
Creator: Pehling-Wright, Penny

List Source: Eurofins Eaton Analytical South Bend

Question	Answer	Comment
The cooler's custody seal, if present, is intact.		
Sample custody seals, if present, are intact.		
Samples were received on ice.		
Cooler Temperature is acceptable.		
Cooler Temperature is recorded.		
COC is present.		
COC is filled out in ink and legible.		
COC is filled out with all pertinent information.		
There are no discrepancies between the containers received and the COC.		
Samples are received within Holding Time (excluding tests with immediate HTs)		
Sample containers have legible labels.		
Containers are not broken or leaking.		
Sample collection date/times are provided.		
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs		
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").		
Samples do not require splitting or compositing.		
Container provided by EEA		

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Lynda Kruse
UC Laboratory
129 North Main
PO BOX 551
Janesville, Minnesota 56048

Generated 7/12/2023 7:50:06 AM

JOB DESCRIPTION

Inver Grove Heights

JOB NUMBER

810-65879-1

Eurofins Eaton Analytical South Bend
110 S Hill Street
South Bend IN 46617

See page two for job notes and contact information.

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Eaton Analytical, LLC Project Manager.

Authorization

Generated
7/12/2023 7:50:06 AM

Authorized for release by
Joe Mattheis, Project Manager I
Joe.Mattheis@et.eurofinsus.com
(574)233-4777

Table of Contents

Qualifiers

Metals

Qualifier	Qualifier Description
^+	Continuing Calibration Verification (CCV) is outside acceptance limits, high biased.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Rad

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.
G	The Sample MDC is greater than the requested RL.
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 810-65879-1

Laboratory: Eurofins Eaton Analytical South Bend

Narrative

Job Narrative
810-65879-1

Receipt
The samples were received on 6/9/2023 9:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 0.4°C, 1.4°C and 2.8°C

Metals
Method 200.7_SDWA: We did not receive a separate bottle for Fe,Mn only as listed on the coc, and included them with the Ca,Mg,Hardness bottles and notified Joe for client contact45085.025 Inver Grove Heights, Raw 2-1 (810-65879-4), 45085.026 Inver Grove Heights, Filter 1 2-1 (810-65879-5) and 45085.027 Inver Grove Heights, Filter 2 2-1 (810-65879-6)

Method 200.8_SDWA: We did not receive a separate bottle for Fe,Mn only as listed on the coc, and included them with the Ca,Mg,Hardness bottles and notified Joe for client contact45085.025 Inver Grove Heights, Raw 2-1 (810-65879-4), 45085.026 Inver Grove Heights, Filter 1 2-1 (810-65879-5) and 45085.027 Inver Grove Heights, Filter 2 2-1 (810-65879-6)

Method 200.8_SDWA: The LCS had high RSD on analysis, both the internal standards and the percentages of the LCS are in range and show no bias in the result. 45085.035 Inver Grove Heights, Filter 2 to Waste 2-1 (5min) (810-65879-12) and 45085.030 Inver Grove Heights, Filter 1 to Waste 2-1 (1min) (810-65879-13)

Method 200.8_SDWA: LLCSPK flag removed from associated LLCS for reporting digested Aluminum RL at 5 ug/L. This data is qualified due to a known background issue with the digestion vessels.45085.028 Inver Grove Heights, Top Filter 1 2-1 (810-65879-10) and 45085.029 Inver Grove Heights, Top Filter 2 2-1 (810-65879-11)

Method 200.8_SDWA: The continuing calibration verification (CCV) analyzed in 810-62494 was outside the method criteria of + 10 % but within + 15% for Beryllium. As indicated in the reference method, this continuing calibration verification (CCV) will be used as the closing CCV and previous samples will not be reanalyzed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
Method SM7500_Ra_D: Sample had a high biased barium carrier recovery. Results are low biased.The barium carrier limits are 41.5-63.5 mg. The sample barium precipitate is 65.3mg.MS and MSD failed low due to high barium recoveries at 78.3/75.7.

Method SM7500_Ra_D: LCS had a low biased barium carrier recovery. The barium carrier limits are 41.5-63.5 mg. The sample barium precipitate is 28.7mg. Results are high biased but passes at 89.74, limits are 80-120. Batch unaffected.

Method SM7500_Ra_D: Sample had a low biased barium carrier recovery. Results may be high biased, but because result is less than the detection limit of 1pCi/L sample is unaffected. The barium carrier limits are 41.5-63.5 mg. The sample barium precipitate is 39.0 mg.

Method SM7500_Ra_D: Sample had a low biased barium carrier recovery. Results may be high biased, but because result is less than the detection limit of 1pCi/L sample is unaffected. The barium carrier limits are 41.5-63.5 mg. The sample barium precipitate is 30.2mg.

Method SM7500_Ra_D: The holding time for bottled water samples is calculated based on the date of opening of each sample bottle, not on the sample collection date.

Method SM7500_Ra_D: Sample had a low biased barium carrier recovery. Results may be high biased, but because result is less than the detection limit of 1pCi/L sample is unaffected. The barium carrier limits are 41.5-63.5 mg. The sample barium precipitate is 40.5mg.

Job ID: 810-65879-1 (Continued)

Laboratory: Eurofins Eaton Analytical South Bend (Continued)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Client Sample ID: 45085.039 Inver Grove Heights, Raw 1-3 — Lab Sample ID: 810-65879-1

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Iron	0.081		0.010		mg/L	1		200.7	Total/NA
Manganese	210		2.0		ug/L	1		200.8	Total/NA

Client Sample ID: 45085.040 Inver Grove Heights, Filter 1 1-3 — Lab Sample ID: 810-65879-2

No Detections.

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3 — Lab Sample ID: 810-65879-3

No Detections.

Client Sample ID: 45085.025 Inver Grove Heights, Raw 2-1 — Lab Sample ID: 810-65879-4

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Magnesium	27		0.10		mg/L	1		200.7	Total/NA
Calcium	73		0.10		mg/L	1		200.7	Total/NA
Iron	0.071		0.010		mg/L	1		200.7	Total/NA
Manganese	250		2.0		ug/L	1		200.8	Total/NA
Hardness as calcium carbonate	290		0.66		mg/L	1		SM 2340B	Total/NA
Calcium hardness as calcium carbonate	180		0.25		mg/L	1		SM 2340B	Total/NA
Magnesium hardness as calcium carbonate	110		0.41		mg/L	1		SM 2340B	Total/NA
Alkalinity, Total	290		1.0		mg/L	1		SM 2320B	Total/NA

Client Sample ID: 45085.026 Inver Grove Heights, Filter 1 2-1 — Lab Sample ID: 810-65879-5

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Magnesium	27		0.10		mg/L	1		200.7	Total/NA
Calcium	72		0.10		mg/L	1		200.7	Total/NA
Manganese	5.6		2.0		ug/L	1		200.8	Total/NA
Hardness as calcium carbonate	290		0.66		mg/L	1		SM 2340B	Total/NA
Calcium hardness as calcium carbonate	180		0.25		mg/L	1		SM 2340B	Total/NA
Magnesium hardness as calcium carbonate	110		0.41		mg/L	1		SM 2340B	Total/NA
Alkalinity, Total	270		1.0		mg/L	1		SM 2320B	Total/NA

Client Sample ID: 45085.027 Inver Grove Heights, Filter 2 2-1 — Lab Sample ID: 810-65879-6

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Magnesium	27		0.10		mg/L	1		200.7	Total/NA
Calcium	72		0.10		mg/L	1		200.7	Total/NA
Hardness as calcium carbonate	290		0.66		mg/L	1		SM 2340B	Total/NA
Calcium hardness as calcium carbonate	180		0.25		mg/L	1		SM 2340B	Total/NA
Magnesium hardness as calcium carbonate	110		0.41		mg/L	1		SM 2340B	Total/NA
Alkalinity, Total	280		1.0		mg/L	1		SM 2320B	Total/NA

Client Sample ID: 45085.036 Inver Grove Heights, Raw 2-2 — Lab Sample ID: 810-65879-7

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Iron	0.19		0.010		mg/L	1		200.7	Total/NA
Manganese	250		2.0		ug/L	1		200.8	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Client Sample ID: 45085.037 Inver Grove Heights, Filter 1 2-2 — Lab Sample ID: 810-65879-8

No Detections.

Client Sample ID: 45085.038 Inver Grove Heights, Filter 2 2-2 — Lab Sample ID: 810-65879-9

No Detections.

Client Sample ID: 45085.028 Inver Grove Heights, Top Filter 1 2-1 — Lab Sample ID: 810-65879-10

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Aluminum	3.2		2.0		ug/L	1		200.8	Total Recoverable
Barium	240		2.0		ug/L	1		200.8	Total Recoverable
Nickel	1.6		1.0		ug/L	1		200.8	Total Recoverable
Zinc	45		5.0		ug/L	1		200.8	Total Recoverable

Client Sample ID: 45085.029 Inver Grove Heights, Top Filter 2 2-1 — Lab Sample ID: 810-65879-11

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Aluminum	6.3		2.0		ug/L	1		200.8	Total Recoverable
Arsenic	1.0		1.0		ug/L	1		200.8	Total Recoverable
Barium	250		2.0		ug/L	1		200.8	Total Recoverable
Nickel	1.7		1.0		ug/L	1		200.8	Total Recoverable
Zinc	42		5.0		ug/L	1		200.8	Total Recoverable

Client Sample ID: 45085.035 Inver Grove Heights, Filter 2 to Waste 2-1 (5min) — Lab Sample ID: 810-65879-12

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Manganese	31		2.0		ug/L	1		200.8	Total/NA

Client Sample ID: 45085.030 Inver Grove Heights, Filter 1 to Waste 2-1 (1min) — Lab Sample ID: 810-65879-13

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Iron	0.031		0.010		mg/L	1		200.7	Total/NA
Manganese	4.3		2.0		ug/L	1		200.8	Total/NA

Client Sample ID: 45085.031 Inver Grove Heights, Filter 2 to Waste 2-1 (1min) — Lab Sample ID: 810-65879-14

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Manganese	52		2.0		ug/L	1		200.8	Total Recoverable

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Client Sample ID: 45085.032 Inver Grove Heights, Filter 1 to Waste 2-1 (3min)

Lab Sample ID: 810-65879-15

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Iron	0.076		0.010		mg/L	1		200.7	Total/NA
Manganese	37		2.0		ug/L	1		200.8	Total/NA

Client Sample ID: 45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3min)

Lab Sample ID: 810-65879-16

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Iron	0.011		0.010		mg/L	1		200.7	Total/NA
Manganese	20		2.0		ug/L	1		200.8	Total/NA

Client Sample ID: 45085.034 Inver Grove Heights, Filter 1 to Waste 2-1 (5min)

Lab Sample ID: 810-65879-17

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Iron	0.13		0.010		mg/L	1		200.7	Total Recoverable
Manganese	150		2.0		ug/L	1		200.8	Total Recoverable

This Detection Summary does not include radiochemical test results.

Client Sample ID: 45085.039 Inver Grove Heights, Raw 1-3

Lab Sample ID: 810-65879-1

Date Collected: 06/02/23 13:10

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.081		0.010		mg/L			06/13/23 14:19	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	210		2.0		ug/L			06/13/23 18:53	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	13.2				3.00	1.97	pCi/L	06/15/23 14:26	06/16/23 12:43	1
Gross Beta	3.37				4.00	2.39	pCi/L	06/15/23 14:26	06/16/23 12:43	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	10.2				1.00	0.570	pCi/L		06/27/23 14:26	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	8.69				1.00	0.290	pCi/L	06/13/23 11:53	06/27/23 09:07	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	1.49				1.00	0.570	pCi/L	06/13/23 11:44	07/11/23 11:18	1

Client Sample ID: 45085.040 Inver Grove Heights, Filter 1 1-3

Lab Sample ID: 810-65879-2

Date Collected: 06/02/23 13:15

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/13/23 14:22	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/13/23 18:55	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	4.39				3.00	1.63	pCi/L	06/15/23 14:26	06/16/23 12:43	1
Gross Beta	2.22				4.00	2.13	pCi/L	06/15/23 14:26	06/16/23 12:43	1

Client Sample ID: 45085.040 Inver Grove Heights, Filter 1 1-3

Lab Sample ID: 810-65879-2

Date Collected: 06/02/23 13:15

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**2.69**				1.00	0.660	pCi/L		06/27/23 14:26	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**1.99**				1.00	0.420	pCi/L	06/13/23 11:53	06/27/23 09:07	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	**0.700**				1.00	0.660	pCi/L	06/13/23 11:44	07/11/23 11:18	1

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3

Lab Sample ID: 810-65879-3

Date Collected: 06/02/23 13:20

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/13/23 14:24	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/13/23 18:58	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	**5.37**				3.00	2.35	pCi/L	06/15/23 14:22	06/16/23 16:50	1
Gross Beta	-0.100	U			4.00	1.72	pCi/L	06/15/23 14:22	06/20/23 19:33	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.000	U			1.00	0.680	pCi/L		06/30/23 09:38	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	0.120	U			1.00	0.240	pCi/L	06/13/23 11:39	06/28/23 09:12	1

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3

Lab Sample ID: 810-65879-3

Date Collected: 06/02/23 13:20

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	0.550	U			1.00	0.680	pCi/L	06/13/23 11:33	07/10/23 12:15	1

Client Sample ID: 45085.025 Inver Grove Heights, Raw 2-1

Lab Sample ID: 810-65879-4

Date Collected: 06/05/23 16:20

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	27		0.10		mg/L			06/13/23 14:26	1
Calcium	73		0.10		mg/L			06/13/23 14:26	1
Iron	0.071		0.010		mg/L			06/13/23 14:26	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	250		2.0		ug/L			06/13/23 19:01	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	290		0.66		mg/L			06/20/23 17:28	1
Calcium hardness as calcium carbonate	180		0.25		mg/L			06/20/23 17:28	1
Magnesium hardness as calcium carbonate	110		0.41		mg/L			06/20/23 17:28	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total (SM 2320B)	290		1.0		mg/L			06/13/23 12:51	1
Ammonia, Nitrogen (SM 4500 NH3 D)	<0.10		0.10		mg/L			06/13/23 10:41	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	16.3				3.00	2.26	pCi/L	06/15/23 14:22	06/16/23 16:50	1
Gross Beta	7.51				4.00	2.01	pCi/L	06/15/23 14:22	06/16/23 16:50	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	12.0				1.00	0.590	pCi/L		06/30/23 09:38	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	9.13				1.00	0.290	pCi/L	06/13/23 11:39	06/28/23 09:12	1

Client Sample ID: 45085.025 Inver Grove Heights, Raw 2-1

Lab Sample ID: 810-65879-4

Date Collected: 06/05/23 16:20

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	2.89				1.00	0.590	pCi/L	06/13/23 11:33	07/10/23 12:15	1

Client Sample ID: 45085.026 Inver Grove Heights, Filter 1 2-1

Lab Sample ID: 810-65879-5

Date Collected: 06/05/23 16:25

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	27		0.10		mg/L			06/13/23 14:28	1
Calcium	72		0.10		mg/L			06/13/23 14:28	1
Iron	<0.010		0.010		mg/L			06/13/23 14:28	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	5.6		2.0		ug/L			06/13/23 19:03	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	290		0.66		mg/L			06/20/23 17:28	1
Calcium hardness as calcium carbonate	180		0.25		mg/L			06/20/23 17:28	1
Magnesium hardness as calcium carbonate	110		0.41		mg/L			06/20/23 17:28	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total (SM 2320B)	270		1.0		mg/L			06/13/23 14:59	1
Ammonia, Nitrogen (SM 4500 NH3 D)	<0.10		0.10		mg/L			06/13/23 10:34	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	9.69				3.00	2.64	pCi/L	06/15/23 14:22	06/16/23 16:50	1
Gross Beta	4.86				4.00	2.26	pCi/L	06/15/23 14:22	06/16/23 16:50	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.87				1.00	1.04	pCi/L		06/30/23 09:38	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	1.87				1.00	0.250	pCi/L	06/13/23 11:39	06/28/23 09:12	1

Client Sample ID: 45085.026 Inver Grove Heights, Filter 1 2-1

Lab Sample ID: 810-65879-5

Date Collected: 06/05/23 16:25

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	0.180	U G			1.00	1.04	pCi/L	06/13/23 11:33	07/10/23 12:15	1

Client Sample ID: 45085.027 Inver Grove Heights, Filter 2 2-1

Lab Sample ID: 810-65879-6

Date Collected: 06/05/23 16:30

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	**27**		0.10		mg/L			06/13/23 14:30	1
Calcium	**72**		0.10		mg/L			06/13/23 14:30	1
Iron	<0.010		0.010		mg/L			06/13/23 14:30	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/13/23 19:06	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	**290**		0.66		mg/L			06/20/23 17:28	1
Calcium hardness as calcium carbonate	**180**		0.25		mg/L			06/20/23 17:28	1
Magnesium hardness as calcium carbonate	**110**		0.41		mg/L			06/20/23 17:28	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total (SM 2320B)	**280**		1.0		mg/L			06/13/23 15:17	1
Ammonia, Nitrogen (SM 4500 NH3 D)	<0.10		0.10		mg/L			06/13/23 10:24	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	**8.17**				3.00	2.85	pCi/L	06/15/23 14:22	06/16/23 16:50	1
Gross Beta	**7.99**				4.00	2.07	pCi/L	06/15/23 14:22	06/16/23 16:50	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.640	U			1.00	0.650	pCi/L		06/26/23 09:30	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**0.640**				1.00	0.300	pCi/L	06/13/23 11:39	06/23/23 09:43	1

Client Sample ID: 45085.027 Inver Grove Heights, Filter 2 2-1

Lab Sample ID: 810-65879-6

Date Collected: 06/05/23 16:30

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	0.000	U			1.00	0.650	pCi/L	06/13/23 11:33	07/10/23 12:15	1

Client Sample ID: 45085.036 Inver Grove Heights, Raw 2-2

Lab Sample ID: 810-65879-7

Date Collected: 06/07/23 10:05

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.19		0.010		mg/L			06/13/23 14:37	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	250		2.0		ug/L			06/13/23 19:08	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	20.4				3.00	2.39	pCi/L	06/15/23 14:22	06/16/23 16:50	1
Gross Beta	5.59				4.00	2.53	pCi/L	06/15/23 14:22	06/16/23 16:50	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	9.95				1.00	0.610	pCi/L		06/30/23 09:38	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	8.42				1.00	0.270	pCi/L	06/13/23 11:39	06/28/23 09:12	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	1.53				1.00	0.610	pCi/L	06/13/23 11:33	07/10/23 12:15	1

Client Sample ID: 45085.037 Inver Grove Heights, Filter 1 2-2

Lab Sample ID: 810-65879-8

Date Collected: 06/07/23 10:10

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/13/23 14:43	1

Client Sample ID: 45085.037 Inver Grove Heights, Filter 1 2-2

Lab Sample ID: 810-65879-8

Date Collected: 06/07/23 10:10

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/13/23 19:16	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	**11.7**				3.00	1.91	pCi/L	06/15/23 14:22	06/16/23 16:50	1
Gross Beta	**5.37**				4.00	1.88	pCi/L	06/15/23 14:22	06/16/23 16:50	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.35**				1.00	0.870	pCi/L		06/30/23 09:38	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**1.35**				1.00	0.340	pCi/L	06/13/23 11:39	06/28/23 09:12	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.270	U			1.00	0.870	pCi/L	06/13/23 11:33	07/10/23 12:15	1

Client Sample ID: 45085.038 Inver Grove Heights, Filter 2 2-2

Lab Sample ID: 810-65879-9

Date Collected: 06/07/23 10:15

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/13/23 14:45	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/13/23 19:19	1

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	**8.42**				3.00	2.61	pCi/L	06/15/23 14:22	06/16/23 16:50	1
Gross Beta	**3.53**				4.00	2.16	pCi/L	06/15/23 14:22	06/16/23 16:50	1

Client Sample ID: 45085.038 Inver Grove Heights, Filter 2 2-2

Lab Sample ID: 810-65879-9

Date Collected: 06/07/23 10:15

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.000	U			1.00	0.820	pCi/L		06/26/23 09:30	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	0.300	U			1.00	0.340	pCi/L	06/13/23 11:39	06/23/23 09:43	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-1.29	U			1.00	0.820	pCi/L	06/13/23 11:33	07/10/23 12:15	1

Client Sample ID: 45085.028 Inver Grove Heights, Top Filter 1 2-1

Lab Sample ID: 810-65879-10

Date Collected: 06/05/23 16:35

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**3.2**		2.0		ug/L		06/13/23 16:25	06/14/23 13:34	1
Antimony	<1.0		1.0		ug/L		06/13/23 16:25	06/14/23 13:34	1
Arsenic	<1.0		1.0		ug/L		06/13/23 16:25	06/14/23 13:34	1
Barium	**240**		2.0		ug/L		06/13/23 16:25	06/14/23 13:34	1
Beryllium	<0.30		0.30		ug/L		06/13/23 16:25	06/14/23 13:34	1
Cadmium	<0.50		0.50		ug/L		06/13/23 16:25	06/14/23 13:34	1
Chromium	<0.90		0.90		ug/L		06/13/23 16:25	06/14/23 13:34	1
Nickel	**1.6**		1.0		ug/L		06/13/23 16:25	06/14/23 13:34	1
Selenium	<2.0		2.0		ug/L		06/13/23 16:25	06/14/23 13:34	1
Silver	<0.50		0.50		ug/L		06/13/23 16:25	06/14/23 13:34	1
Thallium	<0.30		0.30		ug/L		06/13/23 16:25	06/14/23 13:34	1
Zinc	**45**		5.0		ug/L		06/13/23 16:25	06/14/23 13:34	1

Client Sample ID: 45085.029 Inver Grove Heights, Top Filter 2 2-1

Lab Sample ID: 810-65879-11

Date Collected: 06/05/23 16:35

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Method: EPA 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.3**		2.0		ug/L		06/13/23 16:25	06/14/23 13:36	1
Antimony	<1.0		1.0		ug/L		06/13/23 16:25	06/14/23 13:36	1
Arsenic	**1.0**		1.0		ug/L		06/13/23 16:25	06/14/23 13:36	1
Barium	**250**		2.0		ug/L		06/13/23 16:25	06/14/23 13:36	1
Beryllium	<0.30		0.30		ug/L		06/13/23 16:25	06/14/23 13:36	1
Cadmium	<0.50		0.50		ug/L		06/13/23 16:25	06/14/23 13:36	1
Chromium	<0.90		0.90		ug/L		06/13/23 16:25	06/14/23 13:36	1

Client Sample ID: 45085.029 Inver Grove Heights, Top Filter 2 2-1

Lab Sample ID: 810-65879-11

Date Collected: 06/05/23 16:35
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Method: EPA 200.8 - Metals (ICP/MS) - Total Recoverable (Continued)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Nickel	**1.7**		1.0		ug/L		06/13/23 16:25	06/14/23 13:36	1
Selenium	<2.0		2.0		ug/L		06/13/23 16:25	06/14/23 13:36	1
Silver	<0.50		0.50		ug/L		06/13/23 16:25	06/14/23 13:36	1
Thallium	<0.30		0.30		ug/L		06/13/23 16:25	06/14/23 13:36	1
Zinc	**42**		5.0		ug/L		06/13/23 16:25	06/14/23 13:36	1

Client Sample ID: 45085.035 Inver Grove Heights, Filter 2 to Waste 2-1 (5min)

Lab Sample ID: 810-65879-12

Date Collected: 06/05/23 13:55
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/13/23 14:47	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**31**		2.0		ug/L			06/14/23 11:31	1

Client Sample ID: 45085.030 Inver Grove Heights, Filter 1 to Waste 2-1 (1min)

Lab Sample ID: 810-65879-13

Date Collected: 06/05/23 13:51
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	**0.031**		0.010		mg/L			06/13/23 14:49	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**4.3**		2.0		ug/L			06/14/23 11:34	1

Client Sample ID: 45085.031 Inver Grove Heights, Filter 2 to Waste 2-1 (1min)

Lab Sample ID: 810-65879-14

Date Collected: 06/05/23 13:51
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L		06/13/23 16:25	06/14/23 15:20	1

Method: EPA 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**52**		2.0		ug/L		06/13/23 16:20	06/14/23 18:35	1

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Client Sample ID: 45085.032 Inver Grove Heights, Filter 1 to Waste 2-1 (3min)

Lab Sample ID: 810-65879-15

Date Collected: 06/05/23 13:53
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.076		0.010		mg/L			06/13/23 14:52	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	37		2.0		ug/L			06/13/23 19:32	1

Client Sample ID: 45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3min)

Lab Sample ID: 810-65879-16

Date Collected: 06/05/23 13:53
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.011		0.010		mg/L			06/13/23 14:54	1

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	20		2.0		ug/L			06/13/23 19:34	1

Client Sample ID: 45085.034 Inver Grove Heights, Filter 1 to Waste 2-1 (5min)

Lab Sample ID: 810-65879-17

Date Collected: 06/05/23 13:55
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Method: EPA 200.7 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.13		0.010		mg/L		06/13/23 16:25	06/14/23 15:22	1

Method: EPA 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	150		2.0		ug/L		06/13/23 16:20	06/14/23 18:38	1

Method: 200.7 - Metals (ICP)

Lab Sample ID: MB 810-62323/106
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<0.10		0.10		mg/L			06/13/23 14:02	1
Calcium	<0.10		0.10		mg/L			06/13/23 14:02	1
Iron	<0.010		0.010		mg/L			06/13/23 14:02	1

Lab Sample ID: MB 810-62323/12
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<0.10		0.10		mg/L			06/13/23 10:41	1
Calcium	<0.10		0.10		mg/L			06/13/23 10:41	1
Iron	<0.010		0.010		mg/L			06/13/23 10:41	1

Lab Sample ID: MB 810-62323/45
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<0.10		0.10		mg/L			06/13/23 11:52	1
Calcium	<0.10		0.10		mg/L			06/13/23 11:52	1
Iron	<0.010		0.010		mg/L			06/13/23 11:52	1

Lab Sample ID: MB 810-62323/76
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<0.10		0.10		mg/L			06/13/23 12:58	1
Calcium	<0.10		0.10		mg/L			06/13/23 12:58	1
Iron	<0.010		0.010		mg/L			06/13/23 12:58	1

Lab Sample ID: LCS 810-62323/107
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Magnesium			5.00	4.97		mg/L		99	85 - 115		
Calcium			5.00	4.93		mg/L		99	85 - 115		
Iron			5.00	4.91		mg/L		98	85 - 115		

Lab Sample ID: LLCS 810-62323/11
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Magnesium			0.0100	0.0104	J	mg/L		104	50 - 150		
Calcium			0.0100	<0.025		mg/L		124	50 - 150		
Iron			0.0100	0.0103		mg/L		103	50 - 150		

Method: 200.7 - Metals (ICP) (Continued)

Lab Sample ID: LLCS 810-62323/13
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Magnesium			0.100	0.0894	J	mg/L		89	50 - 150		
Calcium			0.100	0.0819	J	mg/L		82	50 - 150		

Lab Sample ID: 810-65879-7 MS
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: 45085.036 Inver Grove Heights, Raw 2-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Magnesium	27		5.00	31.6	4	mg/L		86	70 - 130		
Calcium	73		5.00	77.8	4	mg/L		86	70 - 130		
Iron	0.19		5.00	5.10		mg/L		98	70 - 130		

Lab Sample ID: 810-65879-7 MSD
Matrix: Drinking Water
Analysis Batch: 62323

Client Sample ID: 45085.036 Inver Grove Heights, Raw 2-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Magnesium	27		5.00	31.6	4	mg/L		85	70 - 130	0	20
Calcium	73		5.00	77.6	4	mg/L		82	70 - 130	0	20
Iron	0.19		5.00	5.10		mg/L		98	70 - 130	0	20

Lab Sample ID: MB 810-62355/1-A
Matrix: Drinking Water
Analysis Batch: 62710

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 62355

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L		06/13/23 16:25	06/14/23 14:27	1

Lab Sample ID: LCS 810-62355/4-A
Matrix: Drinking Water
Analysis Batch: 62710

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62355

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			5.00	5.07		mg/L		101	85 - 115		

Lab Sample ID: LLCS 810-62355/2-A
Matrix: Drinking Water
Analysis Batch: 62710

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62355

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			0.0100	0.0113		mg/L		113	50 - 150		

Method: 200.8 - Metals (ICP/MS)

Lab Sample ID: MB 810-62376/15
Matrix: Drinking Water
Analysis Batch: 62376

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/13/23 17:26	1

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 810-62376/45
Matrix: Drinking Water
Analysis Batch: 62376

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/13/23 18:45	1

Lab Sample ID: LCS 810-62376/46
Matrix: Drinking Water
Analysis Batch: 62376

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			50.0	50.7		ug/L		101	85 - 115		

Lab Sample ID: LLCS 810-62376/13
Matrix: Drinking Water
Analysis Batch: 62376

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			0.300	<0.66		ug/L		104	50 - 150		

Lab Sample ID: LLCS 810-62376/14
Matrix: Drinking Water
Analysis Batch: 62376

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			1.00	0.991	J	ug/L		99	50 - 150		

Lab Sample ID: 810-65879-7 MS
Matrix: Drinking Water
Analysis Batch: 62376

Client Sample ID: 45085.036 Inver Grove Heights, Raw 2-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese	250		50.0	292	4	ug/L		89	70 - 130		

Lab Sample ID: 810-65879-7 MSD
Matrix: Drinking Water
Analysis Batch: 62376

Client Sample ID: 45085.036 Inver Grove Heights, Raw 2-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Manganese	250		50.0	297	4	ug/L		99	70 - 130	2	20

Lab Sample ID: 810-65879-16 MS
Matrix: Drinking Water
Analysis Batch: 62376

Client Sample ID: 45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3min)
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese	20		50.0	72.6		ug/L		105	70 - 130		

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: 810-65879-16 MSD
Client Sample ID: 45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3min)
Matrix: Drinking Water
Prep Type: Total/NA
Analysis Batch: 62376

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Manganese	20		50.0	70.7		ug/L		101	70 - 130	3	20

Lab Sample ID: MB 810-62456/12
Client Sample ID: Method Blank
Matrix: Drinking Water
Prep Type: Total/NA
Analysis Batch: 62456

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/14/23 11:10	1

Lab Sample ID: LCS 810-62456/13
Client Sample ID: Lab Control Sample
Matrix: Drinking Water
Prep Type: Total/NA
Analysis Batch: 62456

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			50.0	52.8		ug/L		106	85 - 115		

Lab Sample ID: LLCS 810-62456/11
Client Sample ID: Lab Control Sample
Matrix: Drinking Water
Prep Type: Total/NA
Analysis Batch: 62456

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			0.300	<0.66		ug/L		85	50 - 150		

Lab Sample ID: MB 810-62361/1-A
Client Sample ID: Method Blank
Matrix: Drinking Water
Prep Type: Total Recoverable
Analysis Batch: 62538
Prep Batch: 62361

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L		06/13/23 16:20	06/14/23 17:05	1

Lab Sample ID: LCS 810-62361/6-A
Client Sample ID: Lab Control Sample
Matrix: Drinking Water
Prep Type: Total Recoverable
Analysis Batch: 62538
Prep Batch: 62361

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			50.0	50.9		ug/L		102	85 - 115		

Lab Sample ID: LLCS 810-62361/2-A
Client Sample ID: Lab Control Sample
Matrix: Drinking Water
Prep Type: Total Recoverable
Analysis Batch: 62538
Prep Batch: 62361

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			0.300	<0.66		ug/L		96	50 - 150		

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: LLCS 810-62361/3-A
Matrix: Drinking Water
Analysis Batch: 62538

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62361

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	1.00	0.986	J	ug/L		99	50 - 150

Lab Sample ID: LLCS 810-62361/4-A
Matrix: Drinking Water
Analysis Batch: 62538

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62361

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	2.00	1.89	J	ug/L		94	50 - 150

Lab Sample ID: MB 810-62362/1-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	<2.0		2.0	ug/L		06/13/23 16:25	06/14/23 12:51	1
Antimony	<1.0		1.0	ug/L		06/13/23 16:25	06/14/23 12:51	1
Arsenic	<1.0		1.0	ug/L		06/13/23 16:25	06/14/23 12:51	1
Barium	<2.0		2.0	ug/L		06/13/23 16:25	06/14/23 12:51	1
Cadmium	<0.50		0.50	ug/L		06/13/23 16:25	06/14/23 12:51	1
Chromium	<0.90		0.90	ug/L		06/13/23 16:25	06/14/23 12:51	1
Nickel	<1.0		1.0	ug/L		06/13/23 16:25	06/14/23 12:51	1
Selenium	<2.0		2.0	ug/L		06/13/23 16:25	06/14/23 12:51	1
Silver	<0.50		0.50	ug/L		06/13/23 16:25	06/14/23 12:51	1
Thallium	<0.30		0.30	ug/L		06/13/23 16:25	06/14/23 12:51	1
Zinc	<5.0		5.0	ug/L		06/13/23 16:25	06/14/23 12:51	1

Lab Sample ID: LCS 810-62362/6-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	50.0	52.5		ug/L		105	85 - 115
Antimony	50.0	54.9		ug/L		110	85 - 115
Arsenic	50.0	50.7		ug/L		101	85 - 115
Barium	50.0	50.3		ug/L		101	85 - 115
Beryllium	50.0	53.0	^+	ug/L		106	85 - 115
Cadmium	50.0	51.0		ug/L		102	85 - 115
Chromium	50.0	51.6		ug/L		103	85 - 115
Nickel	50.0	49.7		ug/L		99	85 - 115
Selenium	50.0	50.7		ug/L		101	85 - 115
Silver	50.0	50.8		ug/L		102	85 - 115
Thallium	50.0	50.7		ug/L		101	85 - 115
Zinc	50.0	50.2		ug/L		100	85 - 115

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: LLCS 810-62362/2-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.300	0.352	J	ug/L		117	50 - 150
Arsenic	0.300	<0.60		ug/L		138	50 - 150
Barium	0.300	<0.34		ug/L		97	50 - 150
Beryllium	0.300	0.310	^+	ug/L		103	50 - 150
Cadmium	0.300	0.250	J	ug/L		83	50 - 150
Chromium	0.300	<0.43		ug/L		122	50 - 150
Nickel	0.300	<0.53		ug/L		80	50 - 150
Silver	0.300	<0.28		ug/L		82	50 - 150
Thallium	0.300	0.284	J	ug/L		95	50 - 150

Lab Sample ID: LLCS 810-62362/3-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	1.00	1.11		ug/L		111	50 - 150
Arsenic	1.00	1.07		ug/L		107	50 - 150
Barium	1.00	1.01	J	ug/L		101	50 - 150
Nickel	1.00	0.944	J	ug/L		94	50 - 150
Selenium	1.00	<1.4		ug/L		98	50 - 150
Zinc	1.00	<2.3		ug/L		112	50 - 150

Lab Sample ID: LLCS 810-62362/4-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	2.00	1.91	J	ug/L		95	50 - 150
Selenium	2.00	2.15		ug/L		108	50 - 150
Zinc	2.00	<2.3		ug/L		104	50 - 150

Lab Sample ID: LLCS 810-62362/5-A
Matrix: Drinking Water
Analysis Batch: 62494

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 62362

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Aluminum	5.00	6.90		ug/L		138	50 - 150
Zinc	5.00	5.23		ug/L		105	50 - 150

Method: SM 2320B - Alkalinity

Lab Sample ID: MBL 810-62341/7
Matrix: Drinking Water
Analysis Batch: 62341

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MBL Result	MBL Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	<1.0		1.0		mg/L			06/13/23 12:36	1

Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: LCS 810-62341/5
Matrix: Drinking Water
Analysis Batch: 62341

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Alkalinity, Total	100	104		mg/L		104	78 - 114

Lab Sample ID: LLCS 810-62341/6
Matrix: Drinking Water
Analysis Batch: 62341

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Alkalinity, Total	1.00	1.18		mg/L		118	50 - 150

Lab Sample ID: 810-65879-4 DU
Matrix: Drinking Water
Analysis Batch: 62341

Client Sample ID: 45085.025 Inver Grove Heights, Raw 2-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity, Total	290		289		mg/L		0.05	20

Method: SM 4500 NH3 D - Ammonia

Lab Sample ID: MBL 810-62268/6
Matrix: Drinking Water
Analysis Batch: 62268

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MBL Result	MBL Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia, Nitrogen	<0.046		0.10	mg/L			06/13/23 08:17	1

Lab Sample ID: LCS 810-62268/4
Matrix: Drinking Water
Analysis Batch: 62268

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia, Nitrogen	2.50	2.47		mg/L		99	84 - 113

Lab Sample ID: LLCS 810-62268/5
Matrix: Drinking Water
Analysis Batch: 62268

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia, Nitrogen	0.100	0.0900	J	mg/L		90	50 - 150

Method: 7110B - Gross Alpha and Gross Beta Radioactivity

Lab Sample ID: MB 810-62700/1-A
Matrix: Drinking Water
Analysis Batch: 62986

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62700

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	1.200	U			3.00	1.30	pCi/L	06/15/23 14:22	06/16/23 16:50	1
Gross Beta	-3.500	U			4.00	2.19	pCi/L	06/15/23 14:22	06/16/23 16:50	1

Method: 7110B - Gross Alpha and Gross Beta Radioactivity (Continued)

Lab Sample ID: LCS 810-62700/2-A
Matrix: Drinking Water
Analysis Batch: 62986

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62700

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Gross Alpha	15.4	17.89			3.00	1.53	pCi/L	116	80 - 120
Gross Beta	20.2	21.47			4.00	3.65	pCi/L	107	80 - 120

Lab Sample ID: 810-65879-3 MS
Matrix: Drinking Water
Analysis Batch: 62986

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3
Prep Type: Total/NA
Prep Batch: 62700

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Gross Alpha	5.37		15.4	25.04			3.00	2.49	pCi/L	128	70 - 130

Lab Sample ID: 810-65879-3 MS
Matrix: Drinking Water
Analysis Batch: 63216

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3
Prep Type: Total/NA
Prep Batch: 62700

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Gross Beta	-0.100	U	20.2	15.76			4.00	1.98	pCi/L	78	70 - 130

Lab Sample ID: 810-65879-3 MSD
Matrix: Drinking Water
Analysis Batch: 62986

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3
Prep Type: Total/NA
Prep Batch: 62700

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RPD	RPD Limit
Gross Alpha	5.37		15.4	22.13			3.00	2.06	pCi/L	109	70 - 130	12	20

Lab Sample ID: 810-65879-3 MSD
Matrix: Drinking Water
Analysis Batch: 63216

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3
Prep Type: Total/NA
Prep Batch: 62700

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RPD	RPD Limit
Gross Beta	-0.100	U	20.2	15.55			4.00	1.91	pCi/L	77	70 - 130	1	20

Lab Sample ID: MB 810-62703/1-A
Matrix: Drinking Water
Analysis Batch: 62982

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62703

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.6400	U			3.00	1.21	pCi/L	06/15/23 14:26	06/16/23 12:43	1
Gross Beta	0.4600	U			4.00	1.93	pCi/L	06/15/23 14:26	06/16/23 12:43	1

Method: 7110B - Gross Alpha and Gross Beta Radioactivity (Continued)

Lab Sample ID: LCS 810-62703/2-A
Matrix: Drinking Water
Analysis Batch: 62982

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62703

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Gross Alpha	15.4	18.49			3.00	1.41	pCi/L	120	80 - 120
Gross Beta	20.2	17.21			4.00	2.47	pCi/L	85	80 - 120

Method: SM7500 Ra B - Radium-226

Lab Sample ID: MB 810-62282/1-A
Matrix: Drinking Water
Analysis Batch: 63608

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62282

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	-0.1200	U			1.00	0.330	pCi/L	06/13/23 11:39	06/23/23 09:43	1

Lab Sample ID: LCS 810-62282/2-A
Matrix: Drinking Water
Analysis Batch: 63608

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62282

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Ra-226	5.03	4.550			1.00	0.280	pCi/L	90	90 - 110

Lab Sample ID: 810-65879-3 MS
Matrix: Drinking Water
Analysis Batch: 64123

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3
Prep Type: Total/NA
Prep Batch: 62282

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Ra-226	0.120	U	5.58	5.520			1.00	0.240	pCi/L	99	80 - 120

Lab Sample ID: 810-65879-3 MSD
Matrix: Drinking Water
Analysis Batch: 64123

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3
Prep Type: Total/NA
Prep Batch: 62282

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RPD	RPD Limit
Ra-226	0.120	U	5.58	6.370			1.00	0.250	pCi/L	114	80 - 120	14	20

Lab Sample ID: MB 810-62285/1-A
Matrix: Drinking Water
Analysis Batch: 63538

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62285

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	0.3900				1.00	0.340	pCi/L	06/13/23 11:53	06/23/23 09:45	1

Method: SM7500 Ra B - Radium-226 (Continued)

Lab Sample ID: LCS 810-62285/2-A
Matrix: Drinking Water
Analysis Batch: 63538

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62285

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-226			5.03	4.600			1.00	0.360	pCi/L	91	90 - 110		

Method: SM7500 Ra D - Radium-228

Lab Sample ID: MB 810-62278/1-A
Matrix: Drinking Water
Analysis Batch: 65264

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62278

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.1000	U			1.00	0.650	pCi/L	06/13/23 11:33	07/10/23 12:15	1

Lab Sample ID: LCS 810-62278/2-A
Matrix: Drinking Water
Analysis Batch: 65264

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62278

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-228			4.28	3.840			1.00	1.14	pCi/L	90	80 - 120		

Lab Sample ID: 810-65879-9 MS
Matrix: Drinking Water
Analysis Batch: 65264

Client Sample ID: 45085.038 Inver Grove Heights, Filter 2 2-2
Prep Type: Total/NA
Prep Batch: 62278

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-228	-1.29	U	4.74	4.450			1.00	0.650	pCi/L	94	70 - 130		

Lab Sample ID: 810-65879-9 MSD
Matrix: Drinking Water
Analysis Batch: 65264

Client Sample ID: 45085.038 Inver Grove Heights, Filter 2 2-2
Prep Type: Total/NA
Prep Batch: 62278

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RPD	RPD Limit
Ra-228	-1.29	U	4.74	3.480			1.00	0.670	pCi/L	73	70 - 130	24	20

Lab Sample ID: MB 810-62283/1-A
Matrix: Drinking Water
Analysis Batch: 65261

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62283

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.5600	U			1.00	0.670	pCi/L	06/13/23 11:44	07/11/23 11:18	1

Method: SM7500 Ra D - Radium-228 (Continued)

Lab Sample ID: LCS 810-62283/2-A
Matrix: Drinking Water
Analysis Batch: 65261

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62283

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-228			4.28	3.810			1.00	0.550	pCi/L	89	80 - 120		

Lab Sample ID: 810-65879-1 MS
Matrix: Drinking Water
Analysis Batch: 65261

Client Sample ID: 45085.039 Inver Grove Heights, Raw 1-3
Prep Type: Total/NA
Prep Batch: 62283

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-228	1.49		4.74	3.870	F1		1.00	0.410	pCi/L	50	70 - 130		

Lab Sample ID: 810-65879-1 MSD
Matrix: Drinking Water
Analysis Batch: 65261

Client Sample ID: 45085.039 Inver Grove Heights, Raw 1-3
Prep Type: Total/NA
Prep Batch: 62283

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RPD	RPD Limit
Ra-228	1.49		4.74	3.530	F1		1.00	0.430	pCi/L	43	70 - 130	9	20

Metals

Analysis Batch: 62323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-1	45085.039 Inver Grove Heights, Raw 1-3	Total/NA	Drinking Water	200.7	
810-65879-2	45085.040 Inver Grove Heights, Filter 1 1-3	Total/NA	Drinking Water	200.7	
810-65879-3	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	200.7	
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	200.7	
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Total/NA	Drinking Water	200.7	
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Total/NA	Drinking Water	200.7	
810-65879-7	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	200.7	
810-65879-8	45085.037 Inver Grove Heights, Filter 1 2-2	Total/NA	Drinking Water	200.7	
810-65879-9	45085.038 Inver Grove Heights, Filter 2 2-2	Total/NA	Drinking Water	200.7	
810-65879-12	45085.035 Inver Grove Heights, Filter 2 to Waste 2-1 (5	Total/NA	Drinking Water	200.7	
810-65879-13	45085.030 Inver Grove Heights, Filter 1 to Waste 2-1 (1	Total/NA	Drinking Water	200.7	
810-65879-15	45085.032 Inver Grove Heights, Filter 1 to Waste 2-1 (3	Total/NA	Drinking Water	200.7	
810-65879-16	45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3	Total/NA	Drinking Water	200.7	
MB 810-62323/106	Method Blank	Total/NA	Drinking Water	200.7	
MB 810-62323/12	Method Blank	Total/NA	Drinking Water	200.7	
MB 810-62323/45	Method Blank	Total/NA	Drinking Water	200.7	
MB 810-62323/76	Method Blank	Total/NA	Drinking Water	200.7	
LCS 810-62323/107	Lab Control Sample	Total/NA	Drinking Water	200.7	
LLCS 810-62323/11	Lab Control Sample	Total/NA	Drinking Water	200.7	
LLCS 810-62323/13	Lab Control Sample	Total/NA	Drinking Water	200.7	
810-65879-7 MS	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	200.7	
810-65879-7 MSD	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	200.7	

Prep Batch: 62355

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-14	45085.031 Inver Grove Heights, Filter 2 to Waste 2-1 (1	Total Recoverable	Drinking Water	200.2	
810-65879-17	45085.034 Inver Grove Heights, Filter 1 to Waste 2-1 (5	Total Recoverable	Drinking Water	200.2	
MB 810-62355/1-A	Method Blank	Total Recoverable	Drinking Water	200.2	
LCS 810-62355/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.2	
LLCS 810-62355/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.2	

Prep Batch: 62361

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-14	45085.031 Inver Grove Heights, Filter 2 to Waste 2-1 (1	Total Recoverable	Drinking Water	200.8	
810-65879-17	45085.034 Inver Grove Heights, Filter 1 to Waste 2-1 (5	Total Recoverable	Drinking Water	200.8	
MB 810-62361/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	
LCS 810-62361/6-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62361/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62361/3-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62361/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	

Prep Batch: 62362

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-10	45085.028 Inver Grove Heights, Top Filter 1 2-1	Total Recoverable	Drinking Water	200.8	
810-65879-11	45085.029 Inver Grove Heights, Top Filter 2 2-1	Total Recoverable	Drinking Water	200.8	
MB 810-62362/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	
LCS 810-62362/6-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62362/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62362/3-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62362/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LLCS 810-62362/5-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	

Metals

Analysis Batch: 62376

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-1	45085.039 Inver Grove Heights, Raw 1-3	Total/NA	Drinking Water	200.8	
810-65879-2	45085.040 Inver Grove Heights, Filter 1 1-3	Total/NA	Drinking Water	200.8	
810-65879-3	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	200.8	
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	200.8	
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Total/NA	Drinking Water	200.8	
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Total/NA	Drinking Water	200.8	
810-65879-7	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	200.8	
810-65879-8	45085.037 Inver Grove Heights, Filter 1 2-2	Total/NA	Drinking Water	200.8	
810-65879-9	45085.038 Inver Grove Heights, Filter 2 2-2	Total/NA	Drinking Water	200.8	
810-65879-15	45085.032 Inver Grove Heights, Filter 1 to Waste 2-1 (3	Total/NA	Drinking Water	200.8	
810-65879-16	45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3	Total/NA	Drinking Water	200.8	
MB 810-62376/15	Method Blank	Total/NA	Drinking Water	200.8	
MB 810-62376/45	Method Blank	Total/NA	Drinking Water	200.8	
LCS 810-62376/46	Lab Control Sample	Total/NA	Drinking Water	200.8	
LLCS 810-62376/13	Lab Control Sample	Total/NA	Drinking Water	200.8	
LLCS 810-62376/14	Lab Control Sample	Total/NA	Drinking Water	200.8	
810-65879-7 MS	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	200.8	
810-65879-7 MSD	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	200.8	
810-65879-16 MS	45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3	Total/NA	Drinking Water	200.8	
810-65879-16 MSD	45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3	Total/NA	Drinking Water	200.8	

Analysis Batch: 62456

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-12	45085.035 Inver Grove Heights, Filter 2 to Waste 2-1 (5	Total/NA	Drinking Water	200.8	
810-65879-13	45085.030 Inver Grove Heights, Filter 1 to Waste 2-1 (1	Total/NA	Drinking Water	200.8	
MB 810-62456/12	Method Blank	Total/NA	Drinking Water	200.8	
LCS 810-62456/13	Lab Control Sample	Total/NA	Drinking Water	200.8	
LLCS 810-62456/11	Lab Control Sample	Total/NA	Drinking Water	200.8	

Analysis Batch: 62494

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-10	45085.028 Inver Grove Heights, Top Filter 1 2-1	Total Recoverable	Drinking Water	200.8	62362
810-65879-11	45085.029 Inver Grove Heights, Top Filter 2 2-1	Total Recoverable	Drinking Water	200.8	62362
MB 810-62362/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	62362
LCS 810-62362/6-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/3-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362
LLCS 810-62362/5-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62362

Analysis Batch: 62538

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-14	45085.031 Inver Grove Heights, Filter 2 to Waste 2-1 (1	Total Recoverable	Drinking Water	200.8	62361
810-65879-17	45085.034 Inver Grove Heights, Filter 1 to Waste 2-1 (5	Total Recoverable	Drinking Water	200.8	62361
MB 810-62361/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	62361
LCS 810-62361/6-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62361
LLCS 810-62361/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62361
LLCS 810-62361/3-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62361
LLCS 810-62361/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	62361

Metals

Analysis Batch: 62710

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-14	45085.031 Inver Grove Heights, Filter 2 to Waste 2-1 (1	Total Recoverable	Drinking Water	200.7	62355
810-65879-17	45085.034 Inver Grove Heights, Filter 1 to Waste 2-1 (5	Total Recoverable	Drinking Water	200.7	62355
MB 810-62355/1-A	Method Blank	Total Recoverable	Drinking Water	200.7	62355
LCS 810-62355/4-A	Lab Control Sample	Total Recoverable	Drinking Water	200.7	62355
LLCS 810-62355/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.7	62355

Analysis Batch: 63156

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	SM 2340B	
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Total/NA	Drinking Water	SM 2340B	
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Total/NA	Drinking Water	SM 2340B	

General Chemistry

Analysis Batch: 62268

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	SM 4500 NH3 D	
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Total/NA	Drinking Water	SM 4500 NH3 D	
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Total/NA	Drinking Water	SM 4500 NH3 D	
MBL 810-62268/6	Method Blank	Total/NA	Drinking Water	SM 4500 NH3 D	
LCS 810-62268/4	Lab Control Sample	Total/NA	Drinking Water	SM 4500 NH3 D	
LLCS 810-62268/5	Lab Control Sample	Total/NA	Drinking Water	SM 4500 NH3 D	

Analysis Batch: 62341

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	SM 2320B	
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Total/NA	Drinking Water	SM 2320B	
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Total/NA	Drinking Water	SM 2320B	
MBL 810-62341/7	Method Blank	Total/NA	Drinking Water	SM 2320B	
LCS 810-62341/5	Lab Control Sample	Total/NA	Drinking Water	SM 2320B	
LLCS 810-62341/6	Lab Control Sample	Total/NA	Drinking Water	SM 2320B	
810-65879-4 DU	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	SM 2320B	

Rad

Prep Batch: 62278

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-3	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	RAD Prep	
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-7	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	RAD Prep	
810-65879-8	45085.037 Inver Grove Heights, Filter 1 2-2	Total/NA	Drinking Water	RAD Prep	
810-65879-9	45085.038 Inver Grove Heights, Filter 2 2-2	Total/NA	Drinking Water	RAD Prep	
MB 810-62278/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62278/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	
810-65879-9 MS	45085.038 Inver Grove Heights, Filter 2 2-2	Total/NA	Drinking Water	RAD Prep	
810-65879-9 MSD	45085.038 Inver Grove Heights, Filter 2 2-2	Total/NA	Drinking Water	RAD Prep	

Prep Batch: 62282

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-3	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	RAD Prep	

Rad (Continued)

Prep Batch: 62282 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-7	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	RAD Prep	
810-65879-8	45085.037 Inver Grove Heights, Filter 1 2-2	Total/NA	Drinking Water	RAD Prep	
810-65879-9	45085.038 Inver Grove Heights, Filter 2 2-2	Total/NA	Drinking Water	RAD Prep	
MB 810-62282/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62282/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	
810-65879-3 MS	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	RAD Prep	
810-65879-3 MSD	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	RAD Prep	

Prep Batch: 62283

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-1	45085.039 Inver Grove Heights, Raw 1-3	Total/NA	Drinking Water	RAD Prep	
810-65879-2	45085.040 Inver Grove Heights, Filter 1 1-3	Total/NA	Drinking Water	RAD Prep	
MB 810-62283/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62283/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	
810-65879-1 MS	45085.039 Inver Grove Heights, Raw 1-3	Total/NA	Drinking Water	RAD Prep	
810-65879-1 MSD	45085.039 Inver Grove Heights, Raw 1-3	Total/NA	Drinking Water	RAD Prep	

Prep Batch: 62285

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-1	45085.039 Inver Grove Heights, Raw 1-3	Total/NA	Drinking Water	RAD Prep	
810-65879-2	45085.040 Inver Grove Heights, Filter 1 1-3	Total/NA	Drinking Water	RAD Prep	
MB 810-62285/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62285/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	

Prep Batch: 62700

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-3	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	RAD Prep	
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Total/NA	Drinking Water	RAD Prep	
810-65879-7	45085.036 Inver Grove Heights, Raw 2-2	Total/NA	Drinking Water	RAD Prep	
810-65879-8	45085.037 Inver Grove Heights, Filter 1 2-2	Total/NA	Drinking Water	RAD Prep	
810-65879-9	45085.038 Inver Grove Heights, Filter 2 2-2	Total/NA	Drinking Water	RAD Prep	
MB 810-62700/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62700/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	
810-65879-3 MS	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	RAD Prep	
810-65879-3 MSD	45085.041 Inver Grove Heights, Filter 2 1-3	Total/NA	Drinking Water	RAD Prep	

Prep Batch: 62703

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-65879-1	45085.039 Inver Grove Heights, Raw 1-3	Total/NA	Drinking Water	RAD Prep	
810-65879-2	45085.040 Inver Grove Heights, Filter 1 1-3	Total/NA	Drinking Water	RAD Prep	
MB 810-62703/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62703/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	

Lab Chronicle

Client: UC Laboratory
Project/Site: Inver Grove Heights

Job ID: 810-65879-1

Client Sample ID: 45085.039 Inver Grove Heights, Raw 1-3

Lab Sample ID: 810-65879-1

Date Collected: 06/02/23 13:10

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:19
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 18:53
Total/NA	Prep	RAD Prep			62703	SS	EA SB	06/15/23 14:26
Total/NA	Analysis	7110B		1	62982	SS	EA SB	06/16/23 12:43 - 06/16/23 16:43 [1]
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/27/23 14:26
Total/NA	Prep	RAD Prep			62285	SS	EA SB	06/13/23 11:53
Total/NA	Analysis	SM7500 Ra B		1	63887	SM	EA SB	06/27/23 09:07 - 06/27/23 09:37 [1]
Total/NA	Prep	RAD Prep			62283	SS	EA SB	06/13/23 11:44
Total/NA	Analysis	SM7500 Ra D		1	65261	OO	EA SB	07/11/23 11:18 - 07/11/23 13:18 [1]

Client Sample ID: 45085.040 Inver Grove Heights, Filter 1 1-3

Lab Sample ID: 810-65879-2

Date Collected: 06/02/23 13:15

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:22
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 18:55
Total/NA	Prep	RAD Prep			62703	SS	EA SB	06/15/23 14:26
Total/NA	Analysis	7110B		1	62982	SS	EA SB	06/16/23 12:43 - 06/16/23 16:43 [1]
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/27/23 14:26
Total/NA	Prep	RAD Prep			62285	SS	EA SB	06/13/23 11:53
Total/NA	Analysis	SM7500 Ra B		1	63887	SM	EA SB	06/27/23 09:07 - 06/27/23 09:37 [1]
Total/NA	Prep	RAD Prep			62283	SS	EA SB	06/13/23 11:44
Total/NA	Analysis	SM7500 Ra D		1	65261	OO	EA SB	07/11/23 11:18 - 07/11/23 13:18 [1]

Client Sample ID: 45085.041 Inver Grove Heights, Filter 2 1-3

Lab Sample ID: 810-65879-3

Date Collected: 06/02/23 13:20

Matrix: Drinking Water

Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:24
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 18:58
Total/NA	Prep	RAD Prep			62700	SS	EA SB	06/15/23 14:22
Total/NA	Analysis	7110B		1	63216	SS	EA SB	06/20/23 19:33 - 06/21/23 01:33 [1]
Total/NA	Prep	RAD Prep			62700	SS	EA SB	06/15/23 14:22
Total/NA	Analysis	7110B		1	62986	SS	EA SB	06/16/23 16:50 - 06/17/23 04:50 [1]
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/30/23 09:38
Total/NA	Prep	RAD Prep			62282	SS	EA SB	06/13/23 11:39
Total/NA	Analysis	SM7500 Ra B		1	64123	SM	EA SB	06/28/23 09:12 - 06/28/23 09:42 [1]
Total/NA	Prep	RAD Prep			62278	SS	EA SB	06/13/23 11:33
Total/NA	Analysis	SM7500 Ra D		1	65264	OO	EA SB	07/10/23 12:15 - 07/10/23 14:15 [1]

Lab Chronicle

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Client Sample ID: 45085.025 Inver Grove Heights, Raw 2-1
Lab Sample ID: 810-65879-4

Date Collected: 06/05/23 16:20
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:26
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 19:01
Total/NA	Analysis	SM 2340B		1	63156	AC	EA SB	06/20/23 17:28
Total/NA	Analysis	SM 2320B		1	62341	KH	EA SB	06/13/23 12:51
Total/NA	Analysis	SM 4500 NH3 D		1	62268	KH	EA SB	06/13/23 10:41
Total/NA	Prep	RAD Prep			62700	SS	EA SB	06/15/23 14:22
Total/NA	Analysis	7110B		1	62986	SS	EA SB	06/16/23 16:50 - 06/17/23 04:50 [1]
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/30/23 09:38
Total/NA	Prep	RAD Prep			62282	SS	EA SB	06/13/23 11:39
Total/NA	Analysis	SM7500 Ra B		1	64121	SM	EA SB	06/28/23 09:12 - 06/28/23 09:42 [1]
Total/NA	Prep	RAD Prep			62278	SS	EA SB	06/13/23 11:33
Total/NA	Analysis	SM7500 Ra D		1	65264	OO	EA SB	07/10/23 12:15 - 07/10/23 14:15 [1]

Client Sample ID: 45085.026 Inver Grove Heights, Filter 1 2-1
Lab Sample ID: 810-65879-5

Date Collected: 06/05/23 16:25
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:28
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 19:03
Total/NA	Analysis	SM 2340B		1	63156	AC	EA SB	06/20/23 17:28
Total/NA	Analysis	SM 2320B		1	62341	KH	EA SB	06/13/23 14:59
Total/NA	Analysis	SM 4500 NH3 D		1	62268	KH	EA SB	06/13/23 10:34
Total/NA	Prep	RAD Prep			62700	SS	EA SB	06/15/23 14:22
Total/NA	Analysis	7110B		1	62986	SS	EA SB	06/16/23 16:50 - 06/17/23 04:50 [1]
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/30/23 09:38
Total/NA	Prep	RAD Prep			62282	SS	EA SB	06/13/23 11:39
Total/NA	Analysis	SM7500 Ra B		1	64121	SM	EA SB	06/28/23 09:12 - 06/28/23 09:42 [1]
Total/NA	Prep	RAD Prep			62278	SS	EA SB	06/13/23 11:33
Total/NA	Analysis	SM7500 Ra D		1	65264	OO	EA SB	07/10/23 12:15 - 07/10/23 14:15 [1]

Client Sample ID: 45085.027 Inver Grove Heights, Filter 2 2-1
Lab Sample ID: 810-65879-6

Date Collected: 06/05/23 16:30
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:30
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 19:06
Total/NA	Analysis	SM 2340B		1	63156	AC	EA SB	06/20/23 17:28
Total/NA	Analysis	SM 2320B		1	62341	KH	EA SB	06/13/23 15:17
Total/NA	Analysis	SM 4500 NH3 D		1	62268	KH	EA SB	06/13/23 10:24
Total/NA	Prep	RAD Prep			62700	SS	EA SB	06/15/23 14:22
Total/NA	Analysis	7110B		1	62986	SS	EA SB	06/16/23 16:50 - 06/17/23 04:50 [1]

Lab Chronicle

Client: UC Laboratory
Project/Site: Inver Grove Heights

Job ID: 810-65879-1

Client Sample ID: 45085.027 Inver Grove Heights, Filter 2 2-1

Lab Sample ID: 810-65879-6

Date Collected: 06/05/23 16:30
Date Received: 06/09/23 09:00

Matrix: Drinking Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/26/23 09:30
Total/NA	Prep	RAD Prep			62282	SS	EA SB	06/13/23 11:39
Total/NA	Analysis	SM7500 Ra B		1	63608	SM	EA SB	06/23/23 09:43 - 06/23/23 10:13 [1]
Total/NA	Prep	RAD Prep			62278	SS	EA SB	06/13/23 11:33
Total/NA	Analysis	SM7500 Ra D		1	65264	OO	EA SB	07/10/23 12:15 - 07/10/23 14:15 [1]

Client Sample ID: 45085.036 Inver Grove Heights, Raw 2-2

Lab Sample ID: 810-65879-7

Date Collected: 06/07/23 10:05
Date Received: 06/09/23 09:00

Matrix: Drinking Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:37
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 19:08
Total/NA	Prep	RAD Prep			62700	SS	EA SB	06/15/23 14:22
Total/NA	Analysis	7110B		1	62986	SS	EA SB	06/16/23 16:50 - 06/17/23 04:50 [1]
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/30/23 09:38
Total/NA	Prep	RAD Prep			62282	SS	EA SB	06/13/23 11:39
Total/NA	Analysis	SM7500 Ra B		1	64121	SM	EA SB	06/28/23 09:12 - 06/28/23 09:42 [1]
Total/NA	Prep	RAD Prep			62278	SS	EA SB	06/13/23 11:33
Total/NA	Analysis	SM7500 Ra D		1	65264	OO	EA SB	07/10/23 12:15 - 07/10/23 14:15 [1]

Client Sample ID: 45085.037 Inver Grove Heights, Filter 1 2-2

Lab Sample ID: 810-65879-8

Date Collected: 06/07/23 10:10
Date Received: 06/09/23 09:00

Matrix: Drinking Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:43
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 19:16
Total/NA	Prep	RAD Prep			62700	SS	EA SB	06/15/23 14:22
Total/NA	Analysis	7110B		1	62986	SS	EA SB	06/16/23 16:50 - 06/17/23 04:50 [1]
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/30/23 09:38
Total/NA	Prep	RAD Prep			62282	SS	EA SB	06/13/23 11:39
Total/NA	Analysis	SM7500 Ra B		1	64121	SM	EA SB	06/28/23 09:12 - 06/28/23 09:42 [1]
Total/NA	Prep	RAD Prep			62278	SS	EA SB	06/13/23 11:33
Total/NA	Analysis	SM7500 Ra D		1	65264	OO	EA SB	07/10/23 12:15 - 07/10/23 14:15 [1]

Client Sample ID: 45085.038 Inver Grove Heights, Filter 2 2-2

Lab Sample ID: 810-65879-9

Date Collected: 06/07/23 10:15
Date Received: 06/09/23 09:00

Matrix: Drinking Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:45
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 19:19

Lab Chronicle

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Client Sample ID: 45085.038 Inver Grove Heights, Filter 2 2-2
Lab Sample ID: 810-65879-9

Date Collected: 06/07/23 10:15
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RAD Prep			62700	SS	EA SB	06/15/23 14:22
Total/NA	Analysis	7110B		1	62986	SS	EA SB	06/16/23 16:50 - 06/17/23 04:50 [1]
Total/NA	Analysis	7500 Ra D		1	63710	SS	EA SB	06/26/23 09:30
Total/NA	Prep	RAD Prep			62282	SS	EA SB	06/13/23 11:39
Total/NA	Analysis	SM7500 Ra B		1	63608	SM	EA SB	06/23/23 09:43 - 06/23/23 10:13 [1]
Total/NA	Prep	RAD Prep			62278	SS	EA SB	06/13/23 11:33
Total/NA	Analysis	SM7500 Ra D		1	65264	OO	EA SB	07/10/23 12:15 - 07/10/23 14:15 [1]

Client Sample ID: 45085.028 Inver Grove Heights, Top Filter 1 2-1
Lab Sample ID: 810-65879-10

Date Collected: 06/05/23 16:35
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	200.8			62362	NB	EA SB	06/13/23 16:25
Total Recoverable	Analysis	200.8		1	62494	NB	EA SB	06/14/23 13:34

Client Sample ID: 45085.029 Inver Grove Heights, Top Filter 2 2-1
Lab Sample ID: 810-65879-11

Date Collected: 06/05/23 16:35
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	200.8			62362	NB	EA SB	06/13/23 16:25
Total Recoverable	Analysis	200.8		1	62494	NB	EA SB	06/14/23 13:36

Client Sample ID: 45085.035 Inver Grove Heights, Filter 2 to Waste 2-1 (5min)
Lab Sample ID: 810-65879-12

Date Collected: 06/05/23 13:55
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:47
Total/NA	Analysis	200.8		1	62456	CA	EA SB	06/14/23 11:31

Client Sample ID: 45085.030 Inver Grove Heights, Filter 1 to Waste 2-1 (1min)
Lab Sample ID: 810-65879-13

Date Collected: 06/05/23 13:51
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:49
Total/NA	Analysis	200.8		1	62456	CA	EA SB	06/14/23 11:34

Lab Chronicle

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Client Sample ID: 45085.031 Inver Grove Heights, Filter 2 to Waste 2-1 (1min)

Lab Sample ID: 810-65879-14

Date Collected: 06/05/23 13:51
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	200.2			62355	NB	EA SB	06/13/23 16:25
Total Recoverable	Analysis	200.7		1	62710	AC	EA SB	06/14/23 15:20
Total Recoverable	Prep	200.8			62361	NB	EA SB	06/13/23 16:20
Total Recoverable	Analysis	200.8		1	62538	NB	EA SB	06/14/23 18:35

Client Sample ID: 45085.032 Inver Grove Heights, Filter 1 to Waste 2-1 (3min)

Lab Sample ID: 810-65879-15

Date Collected: 06/05/23 13:53
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:52
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 19:32

Client Sample ID: 45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3min)

Lab Sample ID: 810-65879-16

Date Collected: 06/05/23 13:53
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	62323	AC	EA SB	06/13/23 14:54
Total/NA	Analysis	200.8		1	62376	NB	EA SB	06/13/23 19:34

Client Sample ID: 45085.034 Inver Grove Heights, Filter 1 to Waste 2-1 (5min)

Lab Sample ID: 810-65879-17

Date Collected: 06/05/23 13:55
Matrix: Drinking Water
Date Received: 06/09/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	200.2			62355	NB	EA SB	06/13/23 16:25
Total Recoverable	Analysis	200.7		1	62710	AC	EA SB	06/14/23 15:22
Total Recoverable	Prep	200.8			62361	NB	EA SB	06/13/23 16:20
Total Recoverable	Analysis	200.8		1	62538	NB	EA SB	06/14/23 18:38

[1] This procedure uses a method stipulated length of time for the process. Both start and end times are displayed.

Laboratory References:

EA SB = Eurofins Eaton Analytical South Bend, 110 S Hill Street, South Bend, IN 46617, TEL (574)233-4777

Accreditation/Certification Summary

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Laboratory: Eurofins Eaton Analytical South Bend

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Minnesota	NELAP	1989807	12-31-23

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
200.7	200.2	Drinking Water	Iron
200.8	200.8	Drinking Water	Manganese
7500 Ra D		Drinking Water	Combined Radium 226 + 228
SM 2340B		Drinking Water	Calcium hardness as calcium carbonate
SM 2340B		Drinking Water	Magnesium hardness as calcium carbonate
SM 4500 NH3 D		Drinking Water	Ammonia, Nitrogen

Method Summary

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Method	Method Description	Protocol	Laboratory
200.7	Metals (ICP)	EPA	EA SB
200.8	Metals (ICP/MS)	EPA	EA SB
SM 2340B	Total Hardness (as CaCO3) by calculation	SM	EA SB
SM 2320B	Alkalinity	SM	EA SB
SM 4500 NH3 D	Ammonia	SM	EA SB
7110B	Gross Alpha and Gross Beta Radioactivity	SM	EA SB
7500 Ra D	Radium 226 Radium 228 Combined	SM	EA SB
SM7500 Ra B	Radium-226	SM	EA SB
SM7500 Ra D	Radium-228	SM	EA SB
200.2	Preparation, Total Recoverable Metals	EPA	EA SB
200.8	Preparation, Total Recoverable Metals	EPA	EA SB
RAD Prep	Preparation, Radiologicals	None	EA SB

Protocol References:

EPA = US Environmental Protection Agency

None = None

SM = "Standard Methods For The Examination Of Water And Wastewater"

Laboratory References:

EA SB = Eurofins Eaton Analytical South Bend, 110 S Hill Street, South Bend, IN 46617, TEL (574)233-4777

Sample Summary

Client: UC Laboratory
Job ID: 810-65879-1
Project/Site: Inver Grove Heights

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
810-65879-1	45085.039 Inver Grove Heights, Raw 1-3	Drinking Water	06/02/23 13:10	06/09/23 09:00
810-65879-2	45085.040 Inver Grove Heights, Filter 1 1-3	Drinking Water	06/02/23 13:15	06/09/23 09:00
810-65879-3	45085.041 Inver Grove Heights, Filter 2 1-3	Drinking Water	06/02/23 13:20	06/09/23 09:00
810-65879-4	45085.025 Inver Grove Heights, Raw 2-1	Drinking Water	06/05/23 16:20	06/09/23 09:00
810-65879-5	45085.026 Inver Grove Heights, Filter 1 2-1	Drinking Water	06/05/23 16:25	06/09/23 09:00
810-65879-6	45085.027 Inver Grove Heights, Filter 2 2-1	Drinking Water	06/05/23 16:30	06/09/23 09:00
810-65879-7	45085.036 Inver Grove Heights, Raw 2-2	Drinking Water	06/07/23 10:05	06/09/23 09:00
810-65879-8	45085.037 Inver Grove Heights, Filter 1 2-2	Drinking Water	06/07/23 10:10	06/09/23 09:00
810-65879-9	45085.038 Inver Grove Heights, Filter 2 2-2	Drinking Water	06/07/23 10:15	06/09/23 09:00
810-65879-10	45085.028 Inver Grove Heights, Top Filter 1 2-1	Drinking Water	06/05/23 16:35	06/09/23 09:00
810-65879-11	45085.029 Inver Grove Heights, Top Filter 2 2-1	Drinking Water	06/05/23 16:35	06/09/23 09:00
810-65879-12	45085.035 Inver Grove Heights, Filter 2 to Waste 2-1 (5min)	Drinking Water	06/05/23 13:55	06/09/23 09:00
810-65879-13	45085.030 Inver Grove Heights, Filter 1 to Waste 2-1 (1min)	Drinking Water	06/05/23 13:51	06/09/23 09:00
810-65879-14	45085.031 Inver Grove Heights, Filter 2 to Waste 2-1 (1min)	Drinking Water	06/05/23 13:51	06/09/23 09:00
810-65879-15	45085.032 Inver Grove Heights, Filter 1 to Waste 2-1 (3min)	Drinking Water	06/05/23 13:53	06/09/23 09:00
810-65879-16	45085.033 Inver Grove Heights, Filter 2 to Waste 2-1 (3min)	Drinking Water	06/05/23 13:53	06/09/23 09:00
810-65879-17	45085.034 Inver Grove Heights, Filter 1 to Waste 2-1 (5min)	Drinking Water	06/05/23 13:55	06/09/23 09:00

South Bend, IN
110 S Hill Street
South Bend, IN 46617
Phone (574) 233-4777 Phone (574) 233-8207

Chain of Custody Record

810-65879 Chain of Custody

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Client Information	Sampler:	Lab PM: Joe Mattheis	COC No: 310-6672-2003.1
Client Contact: Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et.eurofinsus.com	State of Origin:	Page: Page 1 of 4
Company: UC Laboratory	PWSID:	Analysis Requested	Job #:
Address: 129 North Main PO BOX 551	Due Date Requested:		
City: Janesville	TAT Requested (days):		
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No		
Phone:	PO #:		
Email: Lynda@uclaboratory.net	WO #:		
Project Name:	Project #:		
Site:	SSOW#:		

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

pH Acceptable

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Radium 226 & 228 and Gross α	Ammonia	Manganese 200.7	Iron 200.8	Calcium 200.9	Magnesium 200.10	Hardness	Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	S	D	D	D	D	D	E		
Inver Grove Heights, Raw 1-3,	6/2/23	13:10		Drinking Water			X								5	45085.039
Inver Grove Heights, Filter 1 1-3,	6/2/23	13:15		Drinking Water			X								5	45085.040
Inver Grove Heights, Filter 2 1-3,	6/2/23	13:20		Drinking Water			X								5	45085.041
Inver Grove Heights, Raw 2-1,	6/5/23	16:20		Drinking Water			X								5	45085.025
Inver Grove Heights, Filter 1 2-1,	6/5/23	16:25		Drinking Water			X								5	45085.026
Inver Grove Heights, Filter 2 2-1,	6/5/23	16:30		Drinking Water			X								5	45085.027
Inver Grove Heights, Raw 2-2,	6/7/23	10:05		Drinking Water			X								5	45085.036
Inver Grove Heights, Filter 1 2-2,	6/7/23	10:10		Drinking Water			X								5	45085.037
Inver Grove Heights, Filter 2 2-2,	6/7/23	10:15		Drinking Water			X								5	45085.038
Inver Grove Heights, Raw 1-3,	6/2/23	13:10		Drinking Water				X	*						1	45085.039
Inver Grove Heights, Raw 2-1,	6/5/23	16:20		Drinking Water				X	*						1	45085.025

Client Provided Sample Container
Bottle shows 45085.041

6-9-23 45085.027 45085.036 45085.037 45085.038 6-9-23

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: Notified Joe for client contact 6-9-23

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	6.8.23 15:30			6-9-23 0900	ELA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Initial Temp 0.4, 1.4, 2.8
Corrected Temp 0.4, 1.4, 2.8
Gun # 21

South Bend, IN
110 S Hill Street
South Bend, IN 46617
Phone (574) 233-4777 Phone (574) 233-8207

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler:	Lab PM: Joe Mattheis	Carrier Tracking No(s):	COC No: 810-6672-2003.1
Client Contact: Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et.eurofinsus.com	State of Origin:	Page: Page 2 of 4
Company: UC Laboratory	PWSID:			Job #:
Address: 129 North Main PO BOX 551	Due Date Requested:			
City: Janesville	TAT Requested (days):			
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No			
Phone:	PO #:			
Email: Lynda@uclaboratory.net	WO #:			
Project Name:	Project #:			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

pH Acceptable

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Radium	Ammonia	Manganese 200.7	Iron 200.8	Calcium 200.9	Magnesium 200.10	Hardness	Alkalinity	Total Number of containers	Special Instructions/Note:
Preservation Code:					X	X	D	S	D	D	D	D	D	N	X	
Inver Grove Heights, Filter 1 2-1,	6/5/23	16:25		Drinking Water				X							1	45085.026
Inver Grove Heights, Filter 2 2-1,	6/5/23	16:30		Drinking Water				X							1	45085.027
Inver Grove Heights, Raw 1-3,	6/2/23	13:10		Drinking Water					X	X					1	45085.039
Inver Grove Heights, Filter 1 1-3,	6/2/23	13:15		Drinking Water					X	X					1	45085.040
Inver Grove Heights, Filter 2 1-3,	6/2/23	13:20		Drinking Water					X	X					1	45085.041
Inver Grove Heights, Raw 2-1,	6/5/23	16:20		Drinking Water					X	X					1	45085.025
Brownton, Filter 1 2-1,	6/5/23	16:25		Drinking Water					X	X					1	45085.026
Inver Grove Heights, Filter 2 2-1,	6/5/23	16:30		Drinking Water					X	X					1	45085.027
Inver Grove Heights, Top Filter 1 2-1,	6/5/23	16:35		Drinking Water					X						1	45085.028
Inver Grove Heights, Top Filter 2 2-1,	6/5/23	16:35		Drinking Water					X						1	45085.029

No bottles received 6-6-23

Not Filtered per client

Client Provided Sample Container

Client contact SE 6-6-23

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | ~~Method of Shipment:~~

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
AM	6.8.23 15:30			6-9-23 0900	EGA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Initial Temp: 0.4 1.4 2.8
Corrected Temp 0.4 1.4 2.8
IR Gun # 21 1.0t

South Bend, IN
110 S Hill Street
South Bend, IN 46617
Phone (574) 233-4777 Phone (574) 233-8207

Chain of Custody Record

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Client Information	Sampler:	Lab PM: Joe Mattheis	Carrier Tracking No(s):	COC No: 810-6672-2003.1
Client Contact: Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et.eurofinsus.com	State of Origin:	Page: Page 3 of 4
Company: UC Laboratory	PWSID:			Job #:
Address: 129 North Main PO BOX 551	Due Date Requested:			
City: Janesville	TAT Requested (days):			
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No			
Phone:	PO #:			
Email: Lynda@uclaboratory.net	WO #:			
Project Name:	Project #:			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Radium	Ammonia	Manganese 200.7	Iron 200.8	Calcium 200.9	Magnesium 200.10	Hardness	Alkalinity	Total Number of containers
			Preservation Code:				D	S	D	D	D	D	D	N	
Inver Grove Heights, Raw 2-2,	6/7/23	10:05		Drinking Water					X	X					
Inver Grove Heights, Filter 1 2-2,	6/7/23	10:10		Drinking Water					X	X					
Inver Grove Heights, Filter 2 2-2,	6/7/23	10:15		Drinking Water					X	X					
Inver Grove Heights, Filter 2 to Waste 2-1 (5min),	6/5/23	13:55		Drinking Water					X	X					
Inver Grove Heights, Filter 1 to Waste 2-1 (1min),	6/5/23	13:51		Drinking Water					X	X					
Inver Grove Heights, Filter 2 to Waste 2-1 (1min),	6/5/23	13:51		Drinking Water					X	X					
Inver Grove Heights, Filter 1 to Waste 2-1 (3min),	6/5/23	13:53		Drinking Water					X	X					
Inver Grove Heights, Filter 2 to Waste 2-1 (3min),	6/5/23	13:53		Drinking Water					X	X					
Inver Grove Heights, Filter 1 to Waste 2-1 (5min),	6/5/23	13:55		Drinking Water					X	X					

pH Acceptable

Special Instructions/Note:

45085.036 ✓
45085.037 ✓
45085.038 ✓
45085.035 ✓
45085.030 ✓
45085.031 ✓
45085.032 ✓
45085.033 pH>2
45085.034 ✓

Client Provided Sample Container

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	6.8.23 15:30			6.9.23 0900	EEA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks: Initial Temp 2.4 4.2.8 Corrected Temp 0.4 4.2.6 IR Gun # 21

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Chain of Custody Record

eurofins | Environment Testing America

South Bend, IN 46617
Phone (574) 233-4777 Phone (574) 233-8207

Client Information	Sampler:	Lab PM: Joe Mattheis	Carrier Tracking No(s):	COC No: 810-6672-2003.1
Client Contact: Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et.eurofinsus.com	State of Origin:	Page: Page 4 of 4
Company: UC Laboratory	PWSID:			Job #:

Address: 129 North Main PO BOX 551	Due Date Requested:
City: Janesville	TAT Requested (days):
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No
Phone:	PO #:
Email: Lynda@uclaboratory.net	WO #:
Project Name:	Project #:
Site:	SSOW#:

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Radium	Ammonia	Manganese 200.7	Iron 200.8	Calcium 200.9	Magnesium 200.10		Hardness	Alkalinity				Total Number of containers	Special Instructions/Note:
Preservation Code:					X	X				D	D	D			N				X	
Inver Grove Heights, Raw 2-1,	6/5/23	16:20		Drinking Water							X	X		X				✓	1	45085.025
Inver Grove Heights, Filter 1 2-1,	6/5/23	16:25		Drinking Water							X	X		X				✓	1	45085.026
Inver Grove Heights, Filter 2 2-1,	6/5/23	16:30		Drinking Water							X	X		X				✓	1	45085.027
Inver Grove Heights, Raw 2-1,	6/5/23	16:20		Drinking Water											X				1	45085.025
Inver Grove Heights, Filter 1 2-1,	6/5/23	16:25		Drinking Water											X				1	45085.026
Inver Grove Heights, Filter 2 2-1,	6/5/23	16:30		Drinking Water											X				1	45085.027

pH Acceptable

Client Provided Sample Container

Initialed for Temp w/The Sample 15 6-9-23

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment: 0900
Relinquished by:	Date/Time: 6.8.23 15:30	Company	Received by:	Date/Time: 6.9.23 0930	Company EEA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 6.9.23	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: Initial Temp 0.4 1.4 2.8 Corrected Temp 0.4 1.4 2.8 IR Gun # 21 wet

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: UC Laboratory

Job Number: 810-65879-1

Login Number: 65879
List Number: 1
Creator: Spurgeon, Sheri

List Source: Eurofins Eaton Analytical South Bend

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Samples do not require splitting or compositing.	True	
Container provided by EEA	False	Client provided containers for Ammonia and Metals samples

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1 2 3 4 5 6 7 8 9 10 11 12 13 14

ANALYTICAL REPORT

PREPARED FOR

Attn: Lynda Kruse
UC Laboratory
129 North Main
PO BOX 551
Janesville, Minnesota 56048

Generated 7/14/2023 1:08:45 PM

JOB DESCRIPTION

UC Laboratory

JOB NUMBER

810-66309-1

Eurofins Eaton Analytical South Bend
110 S Hill Street
South Bend IN 46617

See page two for job notes and contact information.

myEOL

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Eaton Analytical, LLC Project Manager.

Authorization

Generated
7/14/2023 1:08:45 PM

Authorized for release by
Joe Mattheis, Project Manager I
Joe.Mattheis@et.eurofinsus.com
(574)233-4777

Table of Contents

Definitions/Glossary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-66309-1

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-66309-1

Job ID: 810-66309-1

Laboratory: Eurofins Eaton Analytical South Bend

Narrative

Job Narrative
810-66309-1

Receipt
The samples were received on 6/14/2023 9:30 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 0.6°C

Metals
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-66309-1

Client Sample ID: Inver Grove Heights, Raw 2-3 — Lab Sample ID: 810-66309-1

No Detections.

Client Sample ID: Inver Grove Heights, Filter 1 2-3 — Lab Sample ID: 810-66309-2

No Detections.

Client Sample ID: Inver Grove Heights, Fitler 2 2-3 — Lab Sample ID: 810-66309-3

No Detections.

Client Sample ID: Inver Grove Heights, Raw 2-3 — Lab Sample ID: 810-66309-4

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Manganese	230		2.0		ug/L	1		200.8	Total/NA

Client Sample ID: Inver Grove Heights, Filter 1 2-3 — Lab Sample ID: 810-66309-5

No Detections.

Client Sample ID: Inver Grove Heights, Filter 2 2-3 — Lab Sample ID: 810-66309-6

No Detections.

Client Sample ID: Inver Grove Heights, Raw 2-3 — Lab Sample ID: 810-66309-7

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Iron	0.073		0.010		mg/L	1		200.7	Total/NA

Client Sample ID: Inver Grove Heights, Filter 1 2-3 — Lab Sample ID: 810-66309-8

No Detections.

Client Sample ID: Inver Grove Heights, Filter 2 2-3 — Lab Sample ID: 810-66309-9

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: Inver Grove Heights, Raw 2-3

Lab Sample ID: 810-66309-1

Date Collected: 06/09/23 08:55

Matrix: Drinking Water

Date Received: 06/14/23 09:30

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	14.2				3.00	2.10	pCi/L	06/19/23 15:45	06/22/23 20:10	1
Gross Beta	6.83				4.00	1.97	pCi/L	06/19/23 15:45	06/22/23 20:10	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	10.6				1.00	0.700	pCi/L		07/11/23 15:20	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	8.62				1.00	0.340	pCi/L	06/19/23 10:31	07/10/23 11:22	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	2.01				1.00	0.700	pCi/L	06/19/23 10:27	07/13/23 13:48	1

Client Sample ID: Inver Grove Heights, Filter 1 2-3

Lab Sample ID: 810-66309-2

Date Collected: 06/09/23 09:00

Matrix: Drinking Water

Date Received: 06/14/23 09:30

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	1.67	U			3.00	2.43	pCi/L	06/19/23 15:45	06/22/23 20:10	1
Gross Beta	2.77				4.00	2.23	pCi/L	06/19/23 15:45	06/22/23 20:10	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.27				1.00	0.650	pCi/L		07/11/23 15:20	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	1.27				1.00	0.380	pCi/L	06/19/23 10:31	07/10/23 11:22	1

Client Sample ID: Inver Grove Heights, Filter 1 2-3

Lab Sample ID: 810-66309-2

Date Collected: 06/09/23 09:00
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.110	U			1.00	0.650	pCi/L	06/19/23 10:27	07/13/23 13:48	1

Client Sample ID: Inver Grove Heights, Fitler 2 2-3

Lab Sample ID: 810-66309-3

Date Collected: 06/09/23 09:05
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Method: SM 7110B - Gross Alpha and Gross Beta Radioactivity

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	1.47	U			3.00	2.71	pCi/L	06/19/23 15:45	06/22/23 20:10	1
Gross Beta	-1.87	U			4.00	2.29	pCi/L	06/19/23 15:45	06/22/23 20:10	1

Method: SM 7500 Ra D - Radium 226 Radium 228 Combined

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.530	U			1.00	0.690	pCi/L		07/11/23 15:20	1

Method: SM7500 Ra B - Radium-226

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**0.530**				1.00	0.440	pCi/L	06/19/23 10:31	07/10/23 11:22	1

Method: SM7500 Ra D - Radium-228

Analyte	Result	Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.660	U			1.00	0.690	pCi/L	06/19/23 10:27	07/13/23 13:48	1

Client Sample ID: Inver Grove Heights, Raw 2-3

Lab Sample ID: 810-66309-4

Date Collected: 06/09/23 08:55
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	**230**		2.0		ug/L			06/20/23 14:31	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Ammonia, Nitrogen (SM 4500 NH3 D)	<0.10		0.10		mg/L			06/23/23 15:59	1

Client: UC Laboratory
Job ID: 810-66309-1
Project/Site: UC Laboratory

Client Sample ID: Inver Grove Heights, Filter 1 2-3
Lab Sample ID: 810-66309-5
Date Collected: 06/09/23 09:00
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/20/23 14:33	1

Client Sample ID: Inver Grove Heights, Filter 2 2-3
Lab Sample ID: 810-66309-6
Date Collected: 06/09/23 09:05
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Method: EPA 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/20/23 14:40	1

Client Sample ID: Inver Grove Heights, Raw 2-3
Lab Sample ID: 810-66309-7
Date Collected: 06/09/23 08:55
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	**0.073**		0.010		mg/L			06/20/23 14:09	1

Client Sample ID: Inver Grove Heights, Filter 1 2-3
Lab Sample ID: 810-66309-8
Date Collected: 06/09/23 09:00
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/20/23 14:11	1

Client Sample ID: Inver Grove Heights, Filter 2 2-3
Lab Sample ID: 810-66309-9
Date Collected: 06/09/23 09:05
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Method: EPA 200.7 - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/20/23 14:13	1

Method: 200.7 - Metals (ICP)

Lab Sample ID: MB 810-63145/12
Matrix: Drinking Water
Analysis Batch: 63145

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/20/23 13:24	1

Lab Sample ID: MB 810-63145/44
Matrix: Drinking Water
Analysis Batch: 63145

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Iron	<0.010		0.010		mg/L			06/20/23 14:33	1

Lab Sample ID: LCS 810-63145/15
Matrix: Drinking Water
Analysis Batch: 63145

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			5.00	4.75		mg/L		95	85 - 115		

Lab Sample ID: LLCS 810-63145/11
Matrix: Drinking Water
Analysis Batch: 63145

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Iron			0.0100	0.0103		mg/L		103	50 - 150		

Method: 200.8 - Metals (ICP/MS)

Lab Sample ID: MB 810-63138/13
Matrix: Drinking Water
Analysis Batch: 63138

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<2.0		2.0		ug/L			06/20/23 14:04	1

Lab Sample ID: LLCS 810-63138/11
Matrix: Drinking Water
Analysis Batch: 63138

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			0.300	<0.66		ug/L		110	50 - 150		

Lab Sample ID: LLCS 810-63138/12
Matrix: Drinking Water
Analysis Batch: 63138

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Manganese			1.00	1.03	J	ug/L		103	50 - 150		

Method: SM 4500 NH3 D - Ammonia

Lab Sample ID: MBL 810-63695/6
Matrix: Drinking Water
Analysis Batch: 63695

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MBL Result	MBL Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Ammonia, Nitrogen	<0.046		0.10		mg/L			06/23/23 15:52	1

Lab Sample ID: LCS 810-63695/4
Matrix: Drinking Water
Analysis Batch: 63695

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Ammonia, Nitrogen			2.50	2.48		mg/L		99	84 - 113		

Lab Sample ID: LLCS 810-63695/5
Matrix: Drinking Water
Analysis Batch: 63695

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Ammonia, Nitrogen			0.100	0.0900	J	mg/L		90	50 - 150		

Lab Sample ID: 810-66309-4 MS
Matrix: Drinking Water
Analysis Batch: 63695

Client Sample ID: Inver Grove Heights, Raw 2-3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Ammonia, Nitrogen	<0.10		2.50	2.48		mg/L		96	68 - 132		

Lab Sample ID: 810-66309-4 MSD
Matrix: Drinking Water
Analysis Batch: 63695

Client Sample ID: Inver Grove Heights, Raw 2-3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Ammonia, Nitrogen	<0.10		2.50	2.53		mg/L		98	68 - 132	2	20

Method: 7110B - Gross Alpha and Gross Beta Radioactivity

Lab Sample ID: MB 810-63022/1-A
Matrix: Drinking Water
Analysis Batch: 63614

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 63022

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	-0.3700	U			3.00	1.13	pCi/L	06/19/23 15:45	06/22/23 20:10	1
Gross Beta	-3.840	U			4.00	1.90	pCi/L	06/19/23 15:45	06/22/23 20:10	1

Lab Sample ID: LCS 810-63022/2-A
Matrix: Drinking Water
Analysis Batch: 63614

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 63022

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Gross Alpha			15.4	16.04			3.00	1.53	pCi/L	104	80 - 120		
Gross Beta			20.2	21.78			4.00	3.35	pCi/L	108	80 - 120		

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-66309-1

Method: SM7500 Ra B - Radium-226

Lab Sample ID: MB 810-62960/1-A
Matrix: Drinking Water
Analysis Batch: 63731

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62960

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	-0.01000	U			1.00	0.340	pCi/L	06/19/23 10:31	06/26/23 10:07	1

Lab Sample ID: LCS 810-62960/2-A
Matrix: Drinking Water
Analysis Batch: 63731

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62960

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-226			5.03	5.290			1.00	0.430	pCi/L	105	90 - 110		

Method: SM7500 Ra D - Radium-228

Lab Sample ID: MB 810-62958/1-A
Matrix: Drinking Water
Analysis Batch: 65661

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62958

Analyte	MB Result	MB Qualifier	Count Uncert. (σ+/-)	Total Uncert. (σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.4800	U			1.00	0.740	pCi/L	06/19/23 10:27	07/13/23 13:48	1

Lab Sample ID: LCS 810-62958/2-A
Matrix: Drinking Water
Analysis Batch: 65661

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62958

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Ra-228			4.27	3.440			1.00	0.710	pCi/L	81	80 - 120		

Metals

Analysis Batch: 63138

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-66309-4	Inver Grove Heights, Raw 2-3	Total/NA	Drinking Water	200.8	
810-66309-5	Inver Grove Heights, Filter 1 2-3	Total/NA	Drinking Water	200.8	
810-66309-6	Inver Grove Heights, Filter 2 2-3	Total/NA	Drinking Water	200.8	
MB 810-63138/13	Method Blank	Total/NA	Drinking Water	200.8	
LCS 810-63138/14	Lab Control Sample	Total/NA	Drinking Water	200.8	
LLCS 810-63138/11	Lab Control Sample	Total/NA	Drinking Water	200.8	
LLCS 810-63138/12	Lab Control Sample	Total/NA	Drinking Water	200.8	

Analysis Batch: 63145

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-66309-7	Inver Grove Heights, Raw 2-3	Total/NA	Drinking Water	200.7	
810-66309-8	Inver Grove Heights, Filter 1 2-3	Total/NA	Drinking Water	200.7	
810-66309-9	Inver Grove Heights, Filter 2 2-3	Total/NA	Drinking Water	200.7	
MB 810-63145/12	Method Blank	Total/NA	Drinking Water	200.7	
MB 810-63145/44	Method Blank	Total/NA	Drinking Water	200.7	
LCS 810-63145/15	Lab Control Sample	Total/NA	Drinking Water	200.7	
LLCS 810-63145/11	Lab Control Sample	Total/NA	Drinking Water	200.7	

General Chemistry

Analysis Batch: 63695

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-66309-4	Inver Grove Heights, Raw 2-3	Total/NA	Drinking Water	SM 4500 NH3 D	
MBL 810-63695/6	Method Blank	Total/NA	Drinking Water	SM 4500 NH3 D	
LCS 810-63695/4	Lab Control Sample	Total/NA	Drinking Water	SM 4500 NH3 D	
LLCS 810-63695/5	Lab Control Sample	Total/NA	Drinking Water	SM 4500 NH3 D	
810-66309-4 MS	Inver Grove Heights, Raw 2-3	Total/NA	Drinking Water	SM 4500 NH3 D	
810-66309-4 MSD	Inver Grove Heights, Raw 2-3	Total/NA	Drinking Water	SM 4500 NH3 D	

Rad

Prep Batch: 62958

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-66309-1	Inver Grove Heights, Raw 2-3	Total/NA	Drinking Water	RAD Prep	
810-66309-2	Inver Grove Heights, Filter 1 2-3	Total/NA	Drinking Water	RAD Prep	
810-66309-3	Inver Grove Heights, Fitler 2 2-3	Total/NA	Drinking Water	RAD Prep	
MB 810-62958/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62958/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	

Prep Batch: 62960

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-66309-1	Inver Grove Heights, Raw 2-3	Total/NA	Drinking Water	RAD Prep	
810-66309-2	Inver Grove Heights, Filter 1 2-3	Total/NA	Drinking Water	RAD Prep	
810-66309-3	Inver Grove Heights, Fitler 2 2-3	Total/NA	Drinking Water	RAD Prep	
MB 810-62960/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-62960/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	

Prep Batch: 63022

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
810-66309-1	Inver Grove Heights, Raw 2-3	Total/NA	Drinking Water	RAD Prep	
810-66309-2	Inver Grove Heights, Filter 1 2-3	Total/NA	Drinking Water	RAD Prep	
810-66309-3	Inver Grove Heights, Fitler 2 2-3	Total/NA	Drinking Water	RAD Prep	

Client: UC Laboratory
Job ID: 810-66309-1
Project/Site: UC Laboratory

Rad (Continued)

Prep Batch: 63022 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 810-63022/1-A	Method Blank	Total/NA	Drinking Water	RAD Prep	
LCS 810-63022/2-A	Lab Control Sample	Total/NA	Drinking Water	RAD Prep	

Lab Chronicle

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-66309-1

Client Sample ID: Inver Grove Heights, Raw 2-3

Lab Sample ID: 810-66309-1

Date Collected: 06/09/23 08:55

Matrix: Drinking Water

Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RAD Prep			63022	SS	EA SB	06/19/23 15:45
Total/NA	Analysis	7110B		1	63614	SS	EA SB	06/22/23 20:10 - 06/23/23 06:10 [1]
Total/NA	Analysis	7500 Ra D		1	65244	OO	EA SB	07/11/23 15:20
Total/NA	Prep	RAD Prep			62960	SS	EA SB	06/19/23 10:31
Total/NA	Analysis	SM7500 Ra B		1	65061	SM	EA SB	07/10/23 11:22 - 07/10/23 11:52 [1]
Total/NA	Prep	RAD Prep			62958	SS	EA SB	06/19/23 10:27
Total/NA	Analysis	SM7500 Ra D		1	65661	OO	EA SB	07/13/23 13:48 - 07/13/23 15:48 [1]

Client Sample ID: Inver Grove Heights, Filter 1 2-3

Lab Sample ID: 810-66309-2

Date Collected: 06/09/23 09:00

Matrix: Drinking Water

Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RAD Prep			63022	SS	EA SB	06/19/23 15:45
Total/NA	Analysis	7110B		1	63614	SS	EA SB	06/22/23 20:10 - 06/23/23 06:10 [1]
Total/NA	Analysis	7500 Ra D		1	65244	OO	EA SB	07/11/23 15:20
Total/NA	Prep	RAD Prep			62960	SS	EA SB	06/19/23 10:31
Total/NA	Analysis	SM7500 Ra B		1	65061	SM	EA SB	07/10/23 11:22 - 07/10/23 11:52 [1]
Total/NA	Prep	RAD Prep			62958	SS	EA SB	06/19/23 10:27
Total/NA	Analysis	SM7500 Ra D		1	65661	OO	EA SB	07/13/23 13:48 - 07/13/23 15:48 [1]

Client Sample ID: Inver Grove Heights, Fitler 2 2-3

Lab Sample ID: 810-66309-3

Date Collected: 06/09/23 09:05

Matrix: Drinking Water

Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RAD Prep			63022	SS	EA SB	06/19/23 15:45
Total/NA	Analysis	7110B		1	63614	SS	EA SB	06/22/23 20:10 - 06/23/23 06:10 [1]
Total/NA	Analysis	7500 Ra D		1	65244	OO	EA SB	07/11/23 15:20
Total/NA	Prep	RAD Prep			62960	SS	EA SB	06/19/23 10:31
Total/NA	Analysis	SM7500 Ra B		1	65061	SM	EA SB	07/10/23 11:22 - 07/10/23 11:52 [1]
Total/NA	Prep	RAD Prep			62958	SS	EA SB	06/19/23 10:27
Total/NA	Analysis	SM7500 Ra D		1	65661	OO	EA SB	07/13/23 13:48 - 07/13/23 15:48 [1]

Client Sample ID: Inver Grove Heights, Raw 2-3

Lab Sample ID: 810-66309-4

Date Collected: 06/09/23 08:55

Matrix: Drinking Water

Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.8		1	63138	CA	EA SB	06/20/23 14:31
Total/NA	Analysis	SM 4500 NH3 D		1	63695	KH	EA SB	06/23/23 15:59

Lab Chronicle

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-66309-1

Client Sample ID: Inver Grove Heights, Filter 1 2-3

Lab Sample ID: 810-66309-5

Date Collected: 06/09/23 09:00
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.8		1	63138	CA	EA SB	06/20/23 14:33

Client Sample ID: Inver Grove Heights, Filter 2 2-3

Lab Sample ID: 810-66309-6

Date Collected: 06/09/23 09:05
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.8		1	63138	CA	EA SB	06/20/23 14:40

Client Sample ID: Inver Grove Heights, Raw 2-3

Lab Sample ID: 810-66309-7

Date Collected: 06/09/23 08:55
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	63145	AC	EA SB	06/20/23 14:09

Client Sample ID: Inver Grove Heights, Filter 1 2-3

Lab Sample ID: 810-66309-8

Date Collected: 06/09/23 09:00
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	63145	AC	EA SB	06/20/23 14:11

Client Sample ID: Inver Grove Heights, Filter 2 2-3

Lab Sample ID: 810-66309-9

Date Collected: 06/09/23 09:05
Matrix: Drinking Water
Date Received: 06/14/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	200.7		1	63145	AC	EA SB	06/20/23 14:13

[1] This procedure uses a method stipulated length of time for the process. Both start and end times are displayed.

Laboratory References:

EA SB = Eurofins Eaton Analytical South Bend, 110 S Hill Street, South Bend, IN 46617, TEL (574)233-4777

Accreditation/Certification Summary

Client: UC Laboratory
Job ID: 810-66309-1
Project/Site: UC Laboratory

Laboratory: Eurofins Eaton Analytical South Bend

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Minnesota	NELAP	1989807	12-31-23

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
7500 Ra D		Drinking Water	Combined Radium 226 + 228
SM 4500 NH3 D		Drinking Water	Ammonia, Nitrogen

Method Summary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-66309-1

Method	Method Description	Protocol	Laboratory
200.7	Metals (ICP)	EPA	EA SB
200.8	Metals (ICP/MS)	EPA	EA SB
SM 4500 NH3 D	Ammonia	SM	EA SB
7110B	Gross Alpha and Gross Beta Radioactivity	SM	EA SB
7500 Ra D	Radium 226 Radium 228 Combined	SM	EA SB
SM7500 Ra B	Radium-226	SM	EA SB
SM7500 Ra D	Radium-228	SM	EA SB
RAD Prep	Preparation, Radiologicals	None	EA SB

Protocol References:

EPA = US Environmental Protection Agency

None = None

SM = "Standard Methods For The Examination Of Water And Wastewater"

Laboratory References:

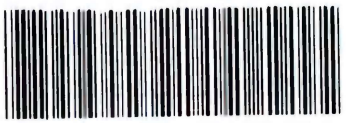
EA SB = Eurofins Eaton Analytical South Bend, 110 S Hill Street, South Bend, IN 46617, TEL (574)233-4777

Sample Summary

Client: UC Laboratory
Project/Site: UC Laboratory

Job ID: 810-66309-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
810-66309-1	Inver Grove Heights, Raw 2-3	Drinking Water	06/09/23 08:55	06/14/23 09:30
810-66309-2	Inver Grove Heights, Filter 1 2-3	Drinking Water	06/09/23 09:00	06/14/23 09:30
810-66309-3	Inver Grove Heights, Fitler 2 2-3	Drinking Water	06/09/23 09:05	06/14/23 09:30
810-66309-4	Inver Grove Heights, Raw 2-3	Drinking Water	06/09/23 08:55	06/14/23 09:30
810-66309-5	Inver Grove Heights, Filter 1 2-3	Drinking Water	06/09/23 09:00	06/14/23 09:30
810-66309-6	Inver Grove Heights, Filter 2 2-3	Drinking Water	06/09/23 09:05	06/14/23 09:30
810-66309-7	Inver Grove Heights, Raw 2-3	Drinking Water	06/09/23 08:55	06/14/23 09:30
810-66309-8	Inver Grove Heights, Filter 1 2-3	Drinking Water	06/09/23 09:00	06/14/23 09:30
810-66309-9	Inver Grove Heights, Filter 2 2-3	Drinking Water	06/09/23 09:05	06/14/23 09:30



810-66309 Chain of Custody

Chain of Custody Record

eurofins Environment Testing America

7/14/2023

Sampler:	Lab PM: Joe Mattheis	Carrier Tracking No(s):	COC No: 810-6672-2003.1
Lynda Kruse	Phone:	E-Mail: Joe.Mattheis@et eurofinsus.com	State of Origin:	Page: Page 1 of 4
Company: UC Laboratory	PWSID:		Job #:

Address: 129 North Main PO BOX 551	Due Date Requested:	
City: Janesville	TAT Requested (days):	
State, Zip: MN, 56048	Compliance Project: Δ Yes Δ No	
Phone:	PO #:	
Email: Lynda@uclaboratory.net	WO #:	
Project Name:	Project #:	
Site:	SSOW#:	

Analysis Requested

Client Provided Sample Container

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Radium 226 & 228 and Gross α	Ammonia	Manganese 200.7	Iron 200.8								Total Number of containers	Special Instructions/Note:
Preservation Code:							D	S	D	D	D	D	D	N					
Inver Grove Heights, Raw 2-3,	6/9/23	8:55		Drinking Water			X											5	45089.017
Inver Grove Heights, Filter 1 2-3,	6/9/23	9:00		Drinking Water			X											5	45089.018
Inver Grove Heights, Filter 2 2-3,	6/9/23	9:05		Drinking Water			X											5	45089.019
Inver Grove Heights, Raw 2-3,	6/9/23	8:55		Drinking Water				X										5	45089.017
Inver Grove Heights, Raw 2-3,	6/9/23	8:55		Drinking Water					X									5	45089.017
Inver Grove Heights, Filter 1 2-3,	6/9/23	9:00		Drinking Water					X									5	45089.018
Inver Grove Heights, Filter 2 2-3,	6/9/23	9:05		Drinking Water					X									1	45089.019
Inver Grove Heights, Raw 2-3,	6/9/23	8:55		Drinking Water						X								1	45089.017
Inver Grove Heights, Filter 1 2-3,	6/9/23	9:00		Drinking Water						X								1	45089.018
Inver Grove Heights, Filter 2 2-3,	6/9/23	9:05		Drinking Water						X								1	45089.019
																		-	

Initial Temp 0.6
Corrected Temp 0.6
IR Gun # 18

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time:	Company	Received by: / Date/Time: / Company
Relinquished by:	Date/Time:	Company	Received by: / Date/Time: / Company
Relinquished by:	Date/Time:	Company	Received by: KD / Date/Time: 6-14-23 0930 / Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:	WC

Ver: 01/16/2019

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Login Sample Receipt Checklist

Client: UC Laboratory

Job Number: 810-66309-1

Login Number: 66309
List Number: 1
Creator: DePriest, Kellie

List Source: Eurofins Eaton Analytical South Bend

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Samples do not require splitting or compositing.	True	
Container provided by EEA	False	Client provided containers

APPENDIX C

Summary Field Results

TonkaWater - A Kurita America Brand

Pilot Name:

Inver Grove Heights

Date	Time	Δ Time Filter 1 (min)	Δ Time Filter 2 (min)	Δ Time Filter 1 (hrs)	Δ Time Filter 2 (hrs)	Filter 1, 1.0 ppm, HMO, IMAR, 1.05gpm	Filter 2, 1.0 ppm, HMO, GS+, 1.05	Filter 1 Total Operating Time	Filter 2 Total Operating Time	Flow Totalizer		Wells On	HMO, IMAR, 1.05gpm			Filter 2, 1.0 ppm, HMO, GS+, 1.05			Chemcal Pump Settings										Raw Water Influent					Filter 1, 1.0 ppm, HMO, IMAR, 1.05gpm									
Date	Time									Flow totalizer between pilot and well	Calculated flow rate from totalizer (gpm)		Initial Flow	Corrected Flow	Initial Delta P	Initial Flow	Corrected Flow	Initial Delta P	Sodium hypochlorite, to Filter 1 33gpd	Sodium hypochlorite, to Filter 1 % of max	# Filter 1 Chlorine Dosage mg/L Cl	Filter 1 Chlorine Dosage mg/L Cl	Sodium hypochlorite, to Filter 2 33gpd	Sodium hypochlorite, to Filter 2 % of max	# Filter 2 Chlorine Dosage mg/L Cl	Filter 2 Chlorine Dosage mg/L Cl	HMO Pump 1 Setting 33gpd	% of max	HMO to filter. PUMP 1. 33gpd gpm	Mn Filter 1 + Mn Filter 2 + Cl mg/L	HMO Dosage mg/L Cl	Filter 1 + Filter 2 + Cl mg/L	pH Field	Temp Field	Ammonia	Fe Field	Mn Field	pH	Temp	Ammonia	Fe	Mn	Fe Filter to Waste	Mn Filter to Waste	Mn top of filter	Mn top of filter, 0.45um filter	Free Cl_2
						Filter Runtime (Hours)	Filter Runtime (Hours)			2x			3x	3x	3x	3x	3x	3x			# Filter Pumps				# Filter Pumps								1x	1x	2-3x	2-3x	2-3x			1-2x	1-2x	2-3x
										day			day	day	day	day	day	day													day	day	wk	run	run	After Backwash		run	run	day
Date	Time Actual									(gallons)	Calculated flow rate from totalizer (gpm)		(gpm)	(gpm)	(in H2O)	(gpm)	(gpm)	(in H2O)	% of max		mg/L Cl	mg/L Cl	% of max		mg/L Cl	mg/L Cl	% of max						(pH)	(C)	(mg/L)	(mg/L)	(mg/L)			(mg/L)	(mg/L)	(mg/L)
				0.00	0.00																																				
5/30/2023	10:12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	74056	0	7,8,9	1.05		5	1.05		5	35				35				54															
	10:20	8	8	0.13	0.13	0.13	0.13	0.13	0.13																						7.6	53.5	0.11	0.08	0.321					
	10:55	25	25	0.42	0.42	0.55	0.55	0.55	0.55																											7.0	53.3	0.00	0.00	0.023					0.57
	11:20	25	25	0.42	0.42	0.97	0.97	0.97	0.97										40				40																	
	11:45	25	25	0.42	0.42	1.38	1.38	1.38	1.38										refill				refill																	0.55
	11:56	9	9	0.15	0.15	1.53	1.53	1.53	1.53										50				50																	
	12:00	4	4	0.07	0.07	1.60	1.60	1.60	1.60	74276	2.29																														
	13:40	100	100	1.67	1.67	3.27	3.27	3.27	3.27	74483	2.07		1.05			1.05																									
	13:43	3	3	0.05	0.05	3.32	3.32	3.32	3.32																						7.2	54.8	0.00	0.00	0.014					0.98
	14:20	37	37	0.62	0.62	3.93	3.93	3.93	3.93										refill				refill				refill													
	14:51	31	31	0.52	0.52	4.45	4.45	4.45	4.45	74631	2.08																													
?31	15:00	9	9	0.15	0.15	4.60	4.60	4.60	4.60																															
1/5/1900	15:10	10	10	0.17	0.17	4.77	4.77	4.77	4.77	74672	2.16		1.05	1.10	5	1.05	1.10	5																						
5/31/2023	8:45	1055	1055	17.58	17.58	22.35	22.35	22.35	22.35	76925	2.14		1.05		5	1.05		5	refill				refill																	
5/31/2023	8:50	5	5	0.08	0.08	22.43	22.43	22.43	22.43										25				25																	
	9:02	12	12	0.20	0.20	22.63	22.63	22.63	22.63																															
	9:07	0	0	0.00	0.00	22.63	22.63	22.63	22.63																															
	9:18	9	9	0.15	0.15	22.78	22.78	22.78	22.78																						7.3	53.8	0.00	0.13	0.307					
	10:04	46	46	0.77	0.77	23.55	23.55	23.55	23.55																											7.4	54.5	0.00	0.00	0.017					1.80
	10:21	17	17	0.28	0.28	23.83	23.83	23.83	23.83										20				20																	
	10:35	14	14	0.23	0.23	24.07	24.07	24.07	24.07																								0.10							
	10:44	9	9	0.15	0.15	24.22	24.22	24.22	24.22																															1.55
	10:50	6	6	0.10	0.10	24.32	24.32	24.32	24.32										15				15																	
	11:21	31	31	0.52	0.52	24.83	24.83	24.83	24.83																															0.95
	11:47	26	26	0.43	0.43	27.23	27.23	27.23	27.23																															
	13:35	118	118	1.97	1.97	26.80	26.80	26.80	26.80																															0.95
	13:40	5	5	0.08	0.08	27.32	27.32	27.32	27.32	77510	1.96																													
	14:20	40	40	0.67	0.67	27.98	27.98	27.98	27.98																														0.476		
	15:00	40	40	0.67	0.67	28.65	28.65	28.65	28.65										refill				refill																	
	15:30	30	30	0.50	0.50	29.15	29.15	29.15	29.15		2.11																														0.97
	16:35	65	65	1.08	1.08	30.23	30.23	30.23	30.23	77889																														
6/1/2023	8:40	925	925	15.42	15.42	45.65	45.65	45.65	45.65	79915	2.19																													
	9:00	20	20	0.33	0.33	45.98	45.98	45.98	45.98																											7.2	53.4	0.00	0.00	0.018					1.28
	9:30	30	30	0.50	0.50	46.48	46.48	46.48	46.48										13				13				refill													
	9:50	20	20	0.33	0.33	46.82	46.82	46.82	46.82																						7.4	53.0	0.09	0.09	0.242					
	10:00	10	10	0.17	0.17	46.98	46.98	46.98	46.98																															0.77
	10:15	15	15	0.25	0.25	47.23	47.23	47.23	47.23										15				15																	
	10:50	35	35	0.58	0.58	47.82	47.82	47.82	47.82																															0.94
	14:10	200	200	3.33	3.33	51.15	51.15	51.15	51.15	80606	2.09																									7.6	54.1	0.00	0.00	0.016					0.90
	14:50	40	40	0.67	0.67	51.82	51.82	51.82	51.82										refill				refill				refill													
	8:35	1065	1065	17.75	17.75	69.57	69.57	69.57	69.57	82893	2.07																													
	8:40	5	5	0.08	0.08	69.65	69.65	69.65	69.65																						7.3	54.1	0.00	0.02	0.021					1.02
	9:35	55	55	0.92	0.92	70.57	70.57	70.57	70.57																						7.3	52.4	0.10	0.12	0.277					
	9:50	15	15	0.25	0.25	70.82	70.82	70.82	70.82																														0.754		
	10:20	30	30	0.50	0.50	71.32	71.32	71.32	71.32	83107	2.04																													
	11:15	55	55	0.92	0.92	72.23	72.23	72.23	72.23	83234	2.31																													
	12:50	95	95	1.58	1.58	73.82	73.82	73.82	73.82	83436	2.13																													
	13:30	40	40	0.67	0.67	74.48	74.48	74.48	74.48																											7.3	53.5	0.00	0.00	0.026					0.95

TonkaWater - A Kurita America Brand										Pilot Name:		Inver Grove Heights																																		
Date	Time Actual	Δ Time Filter 1 (min)	Δ Time Filter 2 (min)	Δ Time Filter 1 (hrs)	Δ Time Filter 2 (hrs)	Filter 1, 1.0 ppm, HMO, IMAR, 1.05gpm Filter Runtime (Hours)	Filter 2, 1.0 ppm, HMO, GS+, 1.05 Filter Runtime (Hours)	Filter 1 Total Operating Time	Filter 2 Total Operating Time	Flow Totalizer: Flow totalizer between pilot and well (gallons)	Calculated flow rate from totalizer (gpm)	Wells On	HMO, IMAR, 1.05gpm: Initial Flow (gpm)	Corrected Flow (gpm)	Initial Delta P (in H2O)	Filter 2, 1.0 ppm, HMO, GS+, 1.05: Initial Flow (gpm)	Corrected Flow (gpm)	Initial Delta P (in H2O)	Chemcal Pump Settings: Sodium hypochlorite, to Filter 1 33gpd (% of max)	Sodium hypochlorite, to Filter 1 (% of max)	# Filter (mg/L Cl)	Chlorine Dosage Filter 1 (mg/L Cl)	Sodium hypochlorite, to Filter 2 33gpd (% of max)	Sodium hypochlorite, to Filter (% of max)	# Filter 2 (mg/L Cl)	Chlorine Dosage Filter 2 (mg/L Cl)	HMO Pump 1 Setting 33gpd (% of max)	HMO, to filter, PUMP 1, 33gpd	HMO Dosage Filter 1 (mg/L Mn)	Filter 2 (mg/L Mn)	(mg/L Cl)	Raw Water Influent: pH Field (pH)	Temp Field (C)	Ammonia (mg/L)	Fe Field (mg/L)	Mn Field (mg/L)	Filter 1, 1.0 ppm, HMO, IMAR, 1.05gpm: pH (pH)	Temp (C)	Ammonia (mg/L)	Fe (mg/L)	Mn (mg/L)	Fe Filter to Waste (mg/L)	Mn Filter to Waste (mg/L)	Mn top of filter (mg/L)	Mn top of filter, 0.45um filter (mg/L)	Free Cl_2 (mg/L)
										2x			3x	3x	3x	3x	3x	3x			#	St			#	St						1x	1x	2-3x	2-3x	2-3x	1x	1x	1-2x	2-3x	2-3x			1-2x	1-2x	2-3x
										day			day	day	day	day	day	day														day	day	wk	run	run	day	day	day	day	day	After Backwash		run	run	day
	14:00	30	30	0.50	0.50	74.98	74.98	74.98	74.98																																0.020					
	14:34	34	34	0.57	0.57	75.55	75.55	75.55	75.55	83650	2.06																																			
	14:49	15	15	0.25	0.25	75.80	75.80	75.80	75.80																																					
6/5/2023	8:40	0	0	0.00	0.00	75.80	75.80	75.80	75.80	83686																																				
	9:00	20	20	0.33	0.33	76.13	76.13	76.13	76.13										refill				refill				refill					7.3	52.8	0.09	0.10	0.259										
	9:30	30	30	0.50	0.50	76.63	76.63	76.63	76.63																												7.3	54.2	0.00	0.00	0.023					0.97
	10:05	35	35	0.58	0.58	77.22	77.22	77.22	77.22	83869	2.15																																			
	11:35	90	90	1.50	1.50	78.72	78.72	78.72	78.72	84044	1.94																																			
	13:00	85	85	1.42	1.42	80.13	80.13	80.13	80.13	84220	2																																			
	13:51			0.00	0.00	0.00	0.00	0.00	0.00																																	0.14	0.025			
	13:53			0.00	0.00	0.00	0.00	0.00	0.00																																	0.11	0.122			
	13:55			0.00	0.00	0.00	0.00	0.00	0.00																																	0.29	0.166			
	14:20	0	0	0.00	0.00	0.00	0.00	0.00	0.00	84290																																				
	15:00	40	40	0.67	0.67	0.67	0.67	0.67	0.67																												7.3	54.0		0.01	0.034					1.37
	15:30	30	30	0.50	0.50	**1.17**	1.17	1.17	1.17																																0.026					1.32
	16:55	85	85	1.42	1.42	2.58	2.58	2.58	2.58	84611	2																																			
6/6/2023	8:50	955	955	15.92	15.92	18.50	18.50	18.50	18.50	86586	2																																			
	9:00	10	10	0.17	0.17	18.67	18.67	18.67	18.67																												7.3	54.2	0.00	0.00	0.018					+
	9:15	15	15	0.25	0.25	18.92	18.92	18.92	18.92										10				10																							
	9:45	30	30	0.50	0.50	19.42	19.42	19.42	19.42																		refill																			
	9:55	10	10	0.17	0.17	19.58	19.58	19.58	19.58																																					0.63
	10:00	5	5	0.08	0.08	19.67	19.67	19.67	19.67										12				12																							
	10:30	30	30	0.50	0.50	20.17	20.17	20.17	20.17																																					0.77
	10:35	5	5	0.08	0.08	20.25	20.25	20.25	20.25																							7.3	52.6	0.09	0.29	0.275										
	11:00	25	25	0.42	0.42	20.67	20.67	20.67	20.67																																			0.752		
	11:10	10	10	0.17	0.17	20.83	**20.83**	20.83	20.83																																					+
	11:15	5	5	0.08	0.08	20.92	20.92	20.92	20.92										11				11																							
	11:50	35	35	0.58	0.58	21.50	21.50	21.50	21.50																																					+
	11:55	5	5	0.08	0.08	21.58	21.58	21.58	21.58										10				10																							
	12:20	25	25	0.42	0.42	22.00	22.00	22.00	22.00																																					0.61
	12:25	5	5	0.08	0.08	22.08	22.08	22.08	22.08										11				11																							
	13:10	45	45	0.75	0.75	22.83	22.83	22.83	22.83																												7.3	53.9	0.00	0.00	0.015					0.55
	13:20	10	10	0.17	0.17	23.00	23.00	23.00	23.00										12				12																							
	14:00	40	40	0.67	0.67	23.67	23.67	23.67	23.67																																					0.68
	14:15	15	15	0.25	0.25	23.92	23.92	23.92	23.92																																					0.56
	14:20	5	5	0.08	0.08	24.00	24.00	24.00	24.00										13				13																							
	14:55	35	35	0.58	0.58	24.58	24.58	24.58	24.58																																					0.77
	15:00	5	5	0.08	0.08	24.67	24.67	24.67	24.67	87366	2								14				14																							
6/7/2023	8:40	1060	1060	17.67	17.67	42.33	42.33	42.33	42.33	89589	2																																			
	8:50	10	10	0.17	0.17	42.50	42.50	42.50	42.50																												7.3	54.1	0.00	0.00	0.012					0.88
	10:45	115	115	1.92	1.92	44.42	44.42	44.42	44.42																							7.2	53.6	0.02	0.14	0.268										
	11:25	40	40	0.67	0.67	45.08	45.08	45.08	45.08	89920	2																																			
	14:00	155	155	2.58	2.58	47.67	47.67	47.67	47.67	90246	2.10																										7.3	54.4	0.00	0.00	0.013					0.87
	15:05	65	65	1.08	1.08	48.75	48.75	48.75	48.75	90382	2																																			
6/8/2023	8:50	1065	1065	17.75	17.75	66.50	66.50	66.50	66.50	92594	2																																			
	9:00	10	10	0.17	0.17	66.67	66.67	66.67	66.67										15				15														7.3	53.7	0.00	0.02	0.021					0.69
	10:10	70	70	1.17	1.17	67.83	67.83	67.83	67.83																							7.2	53.5	0.08	0.38	0.255										
	10:30	20	20	0.33	0.33	68.17	68.17	68.17	68.17																																			1.150		
	13:45	195	195	3.25	3.25	71.42	71.42	71.42	71.42	93202	2																										7.3	54.1	0.00	0.02	0.017					0.78

TonkaWater - A Kurita America Brand

Pilot Name: Inver Grove Heights

Date	Time Actual	Δ Time Filter 1 (min)	Δ Time Filter 2 (min)	Δ Time Filter 1 (hrs)	Δ Time Filter 2 (hrs)	Filter 1, 1.0 ppm, HMO, IMAR, 1.05gpm Filter Runtime (Hours)	Filter 2, 1.0 ppm, HMO, GS+, 1.05 Filter Runtime (Hours)	Filter 1 Total Operating Time	Filter 2 Total Operating Time	Flow Totalizer: Flow totalizer between pilot and well 2x day (gallons)	Calculated flow rate from totalizer (gpm)	Wells On	HMO, IMAR, 1.05gpm: Initial Flow 3x day (gpm)	Corrected Flow 3x day (gpm)	Initial Delta P 3x day (in H2O)	Filter 2, 1.0 ppm, HMO, GS+, 1.05: Initial Flow 3x day (gpm)	Corrected Flow 3x day (gpm)	Initial Delta P 3x day (in H2O)	Chemcal Pump Settings: Sodium hypochlorite, to Filter 1 33gpd (% of max)	Sodium hypochlorite, to Filter 1 (% of max)	Chlorine Dosage # Filter (mg/L Cl)	Chlorine Dosage St p Filter 1 (mg/L Cl)	Sodium hypochlorite, to Filter 2 33gpd (% of max)	Sodium hypochlorite, to Filter (% of m)	Chlorine Dosage # Filter 2 (mg/L Cl)	St p Filter 2 (mg/L Cl)	HMO Pump 1 Setting 33gpd (% of max)	HMO, to filter, PUMP 1, 33gpd (% of)	HMO Dosage Filter 1 (mg/L Mn)	S t Filter 2 (mg/L Mn)	S t i l (mg/L Cl)	Raw Water Influent: pH Field 1x day (pH)	Temp Field 1x day (C)	Ammonia 2-3x wk (mg/L)	Fe Field 2-3x run (mg/L)	Mn Field 2-3x run (mg/L)	Filter 1, 1.0 ppm, HMO, IMAR, 1.05gpm: pH 1x day (pH)	Temp 1x day (C)	Ammonia 1-2x day (mg/L)	Fe 2-3x day (mg/L)	Mn 2-3x day (mg/L)	Fe Filter to Waste After Backwash (mg/L)	Mn Filter to Waste After Backwash (mg/L)	Mn top of filter 1-2x run (mg/L)	Mn top of filter, 0.45um filter 1-2x run (mg/L)	Free Cl_2 2-3x day (mg/L)
	15:05	80	80	1.33	1.33	72.75	72.75	72.75	72.75	93372	2																																			
6/9/2023	8:35	1050	1050	17.50	17.50	90.25	90.25	90.25	90.25	95612	2																																			
	8:50	15	15	0.25	0.25	90.50	90.50	90.50	90.50																												7.3	53.9	0.00	0.00	0.012					0.79
	9:30	40	40	0.67	0.67	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
			0	0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	91.17	91.17	91.17	91.17																																					
				0.00	0.00	**91.17**	91.17	91.17	91.17																																					
				0.00	0.00		91.17	91.17	91.17																																					
				0.00	0.00		91.17	91.17	91.17																																					
				0.00	0.00		91.17	91.17	91.17																																					
				0.00	0.00		91.17	91.17	91.17																																					
				0.00	0.00		91.17	91.17	91.17																																					

TonkaWater -															
Date	Time			Filter 2, 1.0 ppm, HMO, GS+, 1.05											
Date	Time	Total Cl_2		pH	Temp	Ammonia	Fe	Mn	Fe Filter to Waste	Mn Filter to Waste	Mn top of filter	Mn top of filter , 0.45um filter	Free Cl_2	Total Cl_2	
		2-3x		1x	1x	1-2x	2-3x	2-3x	After backwash		1-2x	1-2x	2-3x	2-3x	
		day		day	day	day	day	day			run	run	day	day	
Date	Time Actual	(mg/L)		(pH)	(C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	
5/30/2023	10:12														start pilot run 1, add 60 gallons to total flow
	10:20														
	10:55	0.73		7.2	53.7	0.00	0.00	0.015					0.51	0.72	
	11:20														
	11:45	0.76											0.55	0.65	refill chlorine- 10 gallons + 200ml bleach
	11:56														turn up Cl2
	12:00														
	13:40														
	13:43	1.13		7.2	54.5	0.00	0.00	0.016					1.00	1.08	
	14:20										0.976				refill cl2 and HMO tanks
	14:51														
?31	15:00														retested tof
1/5/1900	15:10														
5/31/2023	8:45														change concentration of cl 200ml/5 gallons (double concentration, half speed)
5/31/2023	8:50														
	9:02														disassembled dp gauge, pilot off
	9:07														pilot back on
	9:18														
	10:04	2.10		7.4	54.4	0.00	0.01	0.019					1.69	1.96	
	10:21														adjusted Cl pump speed to 20%
	10:35														
	10:44												1.52		
	10:50														
	11:21												0.94		
	11:47														
	13:35												0.91		
	13:40														
	14:20										0.522				
	15:00														
	15:30	1.18		7.4	54.0	0.00	0.01	0.030					0.73	1.16	
	16:35														
6/1/2023	8:40														
	9:00	1.53		7.3	53.4	0.00	0.00	0.016					1.30	1.49	
	9:30														
	9:50														
	10:00												0.75		
	10:15										0.762				
	10:50												0.93		
	14:10	1.08		7.5	53.9	0.00	0.00	0.010					0.92	1.05	
	14:50														
	8:35														
	8:40	1.22		7.4	53.8	0.00	0.00	0.025					1.10	1.20	
	9:35														
	9:50										1.152				
	10:20														
	11:15														
	12:50														
	13:30	1.11		7.3	53.5	0.00	0.00	0.029					0.94	1.10	

TonkaWater -															
Date	Time			Filter 2, 1.0 ppm, HMO, GS+, 1.05											
Date	Time	Total Cl_2		pH	Temp	Ammonia	Fe	Mn	Fe Filter to Waste	Mn Filter to Waste	Mn top of filter	Mn top of filter , 0.45um filter	Free Cl_2	Total Cl_2	
		2-3x		1x	1x	1-2x	2-3x	2-3x	After backwash		1-2x	1-2x	2-3x	2-3x	
		day		day	day	day	day	day			run	run	day	day	
Date	Time Actual	(mg/L)		(pH)	(C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	
	14:00							0.024							
	14:34														
	14:49														
6/5/2023	8:40														
	9:00														
	9:30	1.13		7.4	54.2	0.00	0.00	0.017					1.00	1.06	
	10:05														
	11:35														
	13:00														BACKWASH
	13:51								0.00	0.174					
	13:53								0.00	0.091					
	13:55								0.00	0.076					
	14:20														
	15:00	1.32		7.3	53.6		0.01	0.023					1.18	0.18	
	15:30	1.39						0.026					1.22	1.31	
	16:55														
6/6/2023	8:50														
	9:00	+		7.4	54.3	0.00	0.00	0.014					+	+	
	9:15														
	9:45														
	9:55	0.78											0.58	0.74	
	10:00														
	10:30												0.72		
	10:35														
	11:00										0.788				
	11:10												2.08		
	11:15														
	11:50												+		
	11:55														
	12:20												0.57		
	12:25														
	13:10	0.72		7.3	53.4	0.00	0.00	0.016					0.59	0.71	
	13:20														
	14:00												0.71		
	14:15												0.70		
	14:20														
	14:55												0.80		
	15:00														
6/7/2023	8:40														
	8:50	1.02		7.3	53.8	0.00	0.00	0.015					0.89	1.01	
	10:45														
	11:25														
	14:00	1.04		7.3	54.0	0.00	0.00	0.015					0.91	0.93	
	15:05														
6/8/2023	8:50														
	9:00	0.66		7.3	53.4	0.00	0.04	0.019					0.67	0.64	
	10:10														
	10:30										1.154				
	13:45	0.92		7.3	54.0	0.00	0.02	0.015					0.75	0.91	

TonkaWater -															
Date	Time			Filter 2, 1.0 ppm, HMO, GS+, 1.05											
Date	Time	Total Cl_2		pH	Temp	Ammonia	Fe	Mn	Fe Filter to Waste	Mn Filter to Waste	Mn top of filter	Mn top of filter , 0.45um filter	Free Cl_2	Total Cl_2	
		2-3x		1x	1x	1-2x	2-3x	2-3x	After backwash		1-2x	1-2x	2-3x	2-3x	
		day		day	day	day	day	day			run	run	day	day	
Date	Time Actual	(mg/L)		(pH)	(C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	
	15:05														
6/9/2023	8:35														
	8:50	0.93		7.3	53.6	0.00	0.00	0.013					0.80	0.97	
	9:30														