

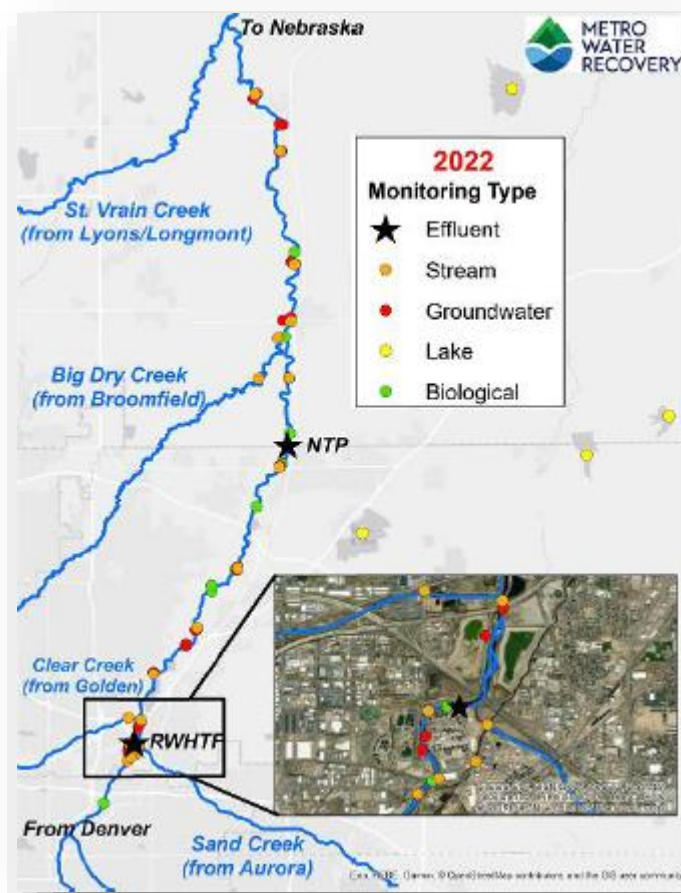
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2022 Water Quality Report Overview of Metro's Monitoring

Metro has been monitoring the South Platte River from Denver to Platteville for over 50 years. This monitoring has included river habitat, fish, macroinvertebrates, reservoirs, pre & post restoration improvements, stormwater, groundwater, and special studies. We provide reliable data to support regulatory policies and plant upgrades to protect the region's health and environment. Not only does Metro "get your water", but we also follow it down the river.

Every year, Metro's Water Quality Division (Water Quality) performs extensive monitoring along the South Platte River, Barr Lake, and Milton Reservoir to capture a pulse on overall health of the watershed. For more than 10 years, Water Quality has generated an annual report that shares results of this extensive monitoring.



Metro's Monitoring Locations by Type

After a decades-long habitat improvement project—among other innovations and initiatives—native fish and aquatic macroinvertebrates are thriving in the river. We encourage you to visit our [Stewardship webpage](#), where we highlight Metro's efforts and initiatives to preserve and protect the South Platte River.

For more information about Metro's Water Quality Division, please contact Jim Dorsch (Senior Water Quality Manager) at JDorsch@MetroWaterRecovery.com.

[Link to Metro's 2022 Water Quality Report](#)

Aurora Westside Interceptor Rehabilitation

Year-long Infrastructure Project

Metro Water Recovery is about to begin a year-long project to rehabilitate segments of corroded pipe within Aurora and Denver.

These pipe segments were identified through Metro’s Interceptor Condition Assessment Program, which aims to find pipe segments that show severe corrosion or have high risks of failure. This annual, collaborative effort between Metro’s Resource Recovery & Reuse, Transmissions and Engineering Teams involves video inspections of our extensive interceptor pipeline system and provides condition ratings for individual pipe segments.

The most current assessment effort identified about 23,000 feet of existing pipe within the Aurora Westside Interceptor that need rehabilitation. Through the Aurora Westside Interceptor Rehabilitation Project, these segments of pipe will be rehabilitated. Metro has contracted with Inliner Solutions to perform the work.

This work will rehabilitate the pipeline using a construction method known as cured-in-place pipe (CIPP). CIPP involves installing a liner into a pipe, pressurizing it, and then heat-curing the liner. This essentially creates a pipe within a pipe.



Typical CIPP Process

CIPP allows crews to complete work within a small footprint. However, it cannot be performed during live flow conditions, so temporary above-ground bypass pumping is used. Short-term road closures or traffic detours may be needed along those routes. Inliner Solutions will complete construction at 11 bypass locations. Construction at each location should take about four weeks, with work occurring from September 2023 through July 2024.

Metro is conducting outreach to inform stakeholders of any temporary disturbances. For more information, visit the [project website](#) or contact Public Information Specialist Amy Lovatt at alovatt@metrowaterrecovery.com.

Current/Upcoming Work Areas

- Bypass 1: Dayton St. from S. Parker Rd. To Mississippi Ave. (September 18th through October 25th)**
- Bypass 2: Dayton St. from Florida Ave. to Kentucky Dr. (October 23rd through November 20th)**
- Bypass 3: Dayton St. from Kentucky Dr. to Alameda Ave. (November 21st through December 22nd)**

NTP Completes Historic Tie-In with City of Brighton

On July 27, Metro's Northern Treatment Plant (NTP) officially completed a tie-in with the City of Brighton. The tie-in increases NTP's influent flows by 2.5 million gallons per day (MGD) to a daily average of 8.0 MGD.

The tie-in came with a series of challenges. In fact, NTP employees faced a massive rain event in May spurring an emergency response from the Operations team. Subsequent rain events throughout the spring sustained these high influent flows, creating pumping conditions that NTP had never experienced before.

According to Kim Cowan, NTP Director of Operations and Maintenance, the increase helped NTP understand how to refocus for high-flow rates. "The silver lining to this was that it uncovered several issues with the plant's control logic, which had previously been developed for low-flow conditions and had not been tested at these higher flow rates," Cowan said. "At peak flow times, we now see an awkward flow that is higher than the top-end of a small pump and lower than the low-end of a big pump. This requires some finesse on the control systems side, as well as some modifications to the pumps to avoid surging the plant whenever a big pump kicks on."

NTP now sees nearly double average influent flow seen during the plant's startup in 2017. The [Second Creek Interceptor project](#) will boost flows by an anticipated 5-6 MGD in 2024, bringing influent flows into the double-digits.

These increases in flow, in addition to industrial dischargers that are sending higher strength flows to the plant, will lead to additional O&M efforts and operational changes to ensure Metro is able to treat everything that comes down the pipes to the NTP. In fact, the NTP is kicking off a handful of project action requests (PARs), small projects, and O&M efforts to support its present and future growth spurts.

"Life at NTP is rapidly changing, and keeping up with all the changes requires a level of dedication, adaptability, and ingenuity that these teams have displayed in abundance," Cowan added. "We have some true rock stars here at NTP, and they will help this growing plant reach and exceed all expectations, no question!"



Welcome New Metro Board Members!

July 2023:

Travis Bogan – City of Denver
Sharon Israel – City of Arvada
Marena Lertch – City of Aurora
Josh Redman – City of Thornton
Thomas Roode – City of Denver

August 2023:

Clint Blackhurst – City of Brighton

September 2023:

Bonnie Baird – City of Alameda

[Check out Metro's website to reference all Board Members](#)

Introducing Tanja Rauch-Williams

Chief Innovation Officer

Born and raised close to Frankfurt, Germany, Tanja got hooked on water early with her swim team and was inspired by her outstanding chemistry teacher who took interested middle school students to the local creek in town to identify and count invertebrates in summer months.

She moved to Berlin in 1992 a couple of years after the wall came down to study Environmental Engineering, and later, also Environmental Policy. She was part of an NGO that worked with the Senate to turn Berlin into the first state in Germany to guarantee feed-in-tariffs for solar power.

At the end of the 90s Tanja hitch hiked by sail boat from the Canary Islands to Belize to volunteer for an international environmental organization. She developed with local engineers a solid waste management plan for the small Mayan village San Antonio, while learning Spanish from the locals and the art of tortilla manufacturing. She finished her graduate studies at Arizona State University a year later, conducting research as part of a large potable water reuse research project covering various infiltration sites in Arizona and California.

In 2001 Tanja transferred with her PhD advisor to Colorado School of Mines in Golden. By the time she held her degree in hand she held a kid and husband in the other and could not get enough of Colorado's mountain trails. She started to work for Carollo Engineers who were locally in need of wastewater process modeling.



Tanja Rauch-Williams enjoying a hike.

One of her first projects was planning a brand new facility in Brighton and working through process design for a project called PAR 942.

Fasting forward 18 years, Tanja has led various larger and international research projects related to nutrient removal, emerging contaminants, water reuse, energy, and codigestion. She has advised treatment facilities in and outside of Colorado on permit compliance, treatment efficiency, innovation, and resource recovery. Their daughter Sonja is now at CSU studying environmental engineering (Yeah!) and their son Tarik is in his last year at Golden High. Her step-daughter is getting married in Hawaii this October!

Tanja is very excited joining the Metro team moving forward. The coming years will be defining in how we manage and treat scarce water resources in our state. Metro is very well positioned to make leading contributions towards sustainable infrastructure and operations solutions.

Unprecedented Year at METROGRO Farm Record-Breaking Rain

In Deer Trail, CO you'll find our METROGRO Farm. This 80 square mile farm is the place that Metro applies biosolids, growing crops like winter barley, milo, and wheat.

Typically, by August, crops have been harvested. However, this summer proved to be different.

With afternoon thunderstorms being a near-daily occurrence, the harvest was delayed. If you ask our summer interns, harvest contractors, or longtime employees like METROGRO Farm Administrator, Jason Zimbleman, they will describe this year's season in a single word: *Unprecedented*.

Rain is usually celebrated, but when the annual rainfall happens in a matter of days, you get a year of challenges. In fact, this year shattered a 162-year record to become the wettest June on record, and the farm saw the 13" of annual rain in a 10-day period. Wheat does better with traditional hot summer days as it needs a period of heat-stress for an optimal quality crop. With afternoon storms, prolonged heat exposure has been in short supply.

Beyond the crops, the unprecedented wet summer has offered additional challenges to the METROGRO Farm. With the farm's 100 miles worth of interconnecting dirt and gravel roads, the rain has made maintenance of those roads a routine and constant issue.



Metro Board of Directors visit METROGRO Farm with storm clouds rolling in

The farm can mine their own gravel to use solely on the property from the on-site gravel pit. With the routine truck deliveries of METROGRO® Cake (the class B biosolids, made for agricultural use, created at Metro Water Recovery facilities), it is especially important to avoid big issues.

In addition to wet...everything, another problem lies within: a small insect that has caused issues for wheat fields. The wheat stem sawfly is a relatively new problem in Colorado, first being reported in the state in 2010. The wasp-like pest feeds on the stems of the stalky wheat, causing wheat heads to break below the level that a combine can harvest the head of the wheat. This insect alone can contribute to up to 20 percent of yield loss according to a [report by Colorado State University](#). The farm has planted 6-row barley as a "trap crop" to combat the infestation in hopes that the wheat stem sawfly will focus there rather than on the wheat.

Watch for the 2023 METROGRO Update to learn about the final harvest results.



Mechanical Industrial Technician (MIT) and Electrician/Instrumentation Technician (EIT) Journeyman Trainees

Currents Employee Feature Mechanical and Electrical Journeyman Trainees

The Journeyman Trainees work alongside other mechanical and electrical team members to provide critical maintenance, repairs, and modifications of equipment at the Northern Treatment Plant (NTP) and Robert W. Hite Treatment Facility (RWHTF). The Journeyman Program includes two training tracks for Mechanical Industrial Technician (MIT) and Electrician/Instrumentation Technician (EIT). [Learn more about the program and this critical team!](#)

Important Dates to Remember

Nov. 21, 2023 (5:30 pm)	Board of Directors Meeting
Dec. 15, 2023	Q4 Annual Charges Due
Dec. 19, 2023 (5:30 pm)	Board of Directors Meeting
November 2023	Commercial Water Use Reports Sent to Connectors for Review
Jan. 15, 2024	Q4 Sewer Connection Charges Due
December 2023	Commercial Water Use Report Reviews Due back to Metro
Jan. 15, 2024 (5:30 pm)	Board of Directors Meeting



[Learn more about wastewater treatment](#)

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[Previous issues of The Connector can now be found on Metro's website.](#)



Effluent Temperature Demonstration at the Northern Treatment Plant

The Northern Treatment Plant (NTP) Effluent Temperature Demonstration (PAR 1416) is a key piece of Metro Water Recovery's portfolio of strategies to reduce temperature in Segment 15 of the South Platte River. The Colorado Department of Public Health and Environment (CDPHE) Regulation 38 requires both of Metro's treatment facilities meet temperature limits in December through February to protect aquatic life.

CDPHE approved Metro Water Recovery's site application and testing plan for the project in April 2022 to advance understanding of this technology application and generate data for design and operation of full-scale systems for Metro's treatment facilities. Metro commissioned the cooling tower equipment in time for an extra season of operation, providing an opportunity to capture data earlier than anticipated.

Phase 1 of the demonstration used a sidestream of secondary effluent to evaluate the cooling tower equipment and operation. Phases 1A and 2 will test a sidestream of tertiary effluent, at two different flow rates, using the same equipment.

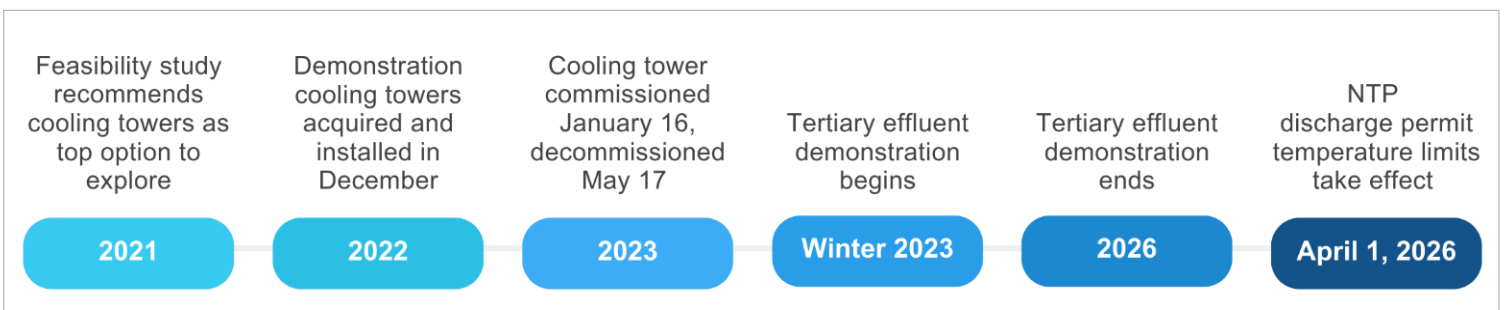
Additional detail around Regulation 38 and Metro Water Recovery's strategies are featured in the August 2021 and May 2022 editions of *Emerging Issues*. This *Innovation Quarterly* provides an update since May 2022, including the demonstration technology and methodology, testing and results, and next steps.



NTP effluent temperature demonstration cooling tower

Why Innovate?

1. New applications of cooling tower technology
2. No CDPHE design criteria in place
3. NTP and Robert W. Hite Treatment Facility compliance schedules



NTP effluent temperature compliance timeline



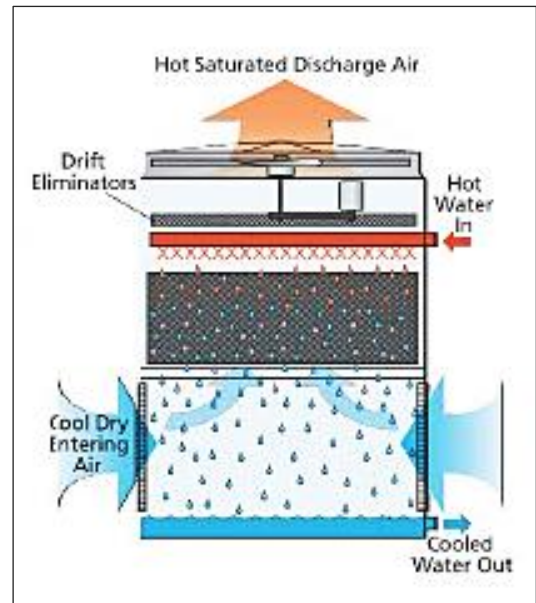
Technology and Methodology

Metro Water Recovery rented an EVAPCO cooling tower from Sys-Cool that distributes effluent over the tower's evaporative media (fill), dissipating heat as the water cascades through the fill. As illustrated to the right, the unit draws air in through inlet louvers at the base of the tower and sends it up through the fill, opposite the water flow. Warm, moist air is drawn to the top of the unit and discharged to atmosphere. The remaining water evaporates or falls to the bottom and returns to process.

Phase 1 Configuration

The secondary effluent cooling demonstration system was installed adjacent to the Tertiary Pump Station Electrical Building. The system was fed approximately 900 gallons per minute of secondary effluent via a submersible pump installed in an isolated section of the Tertiary Pump Station wet well. Cooled effluent was conveyed by gravity back to the wet well for transfer to tertiary treatment with the mainstream.

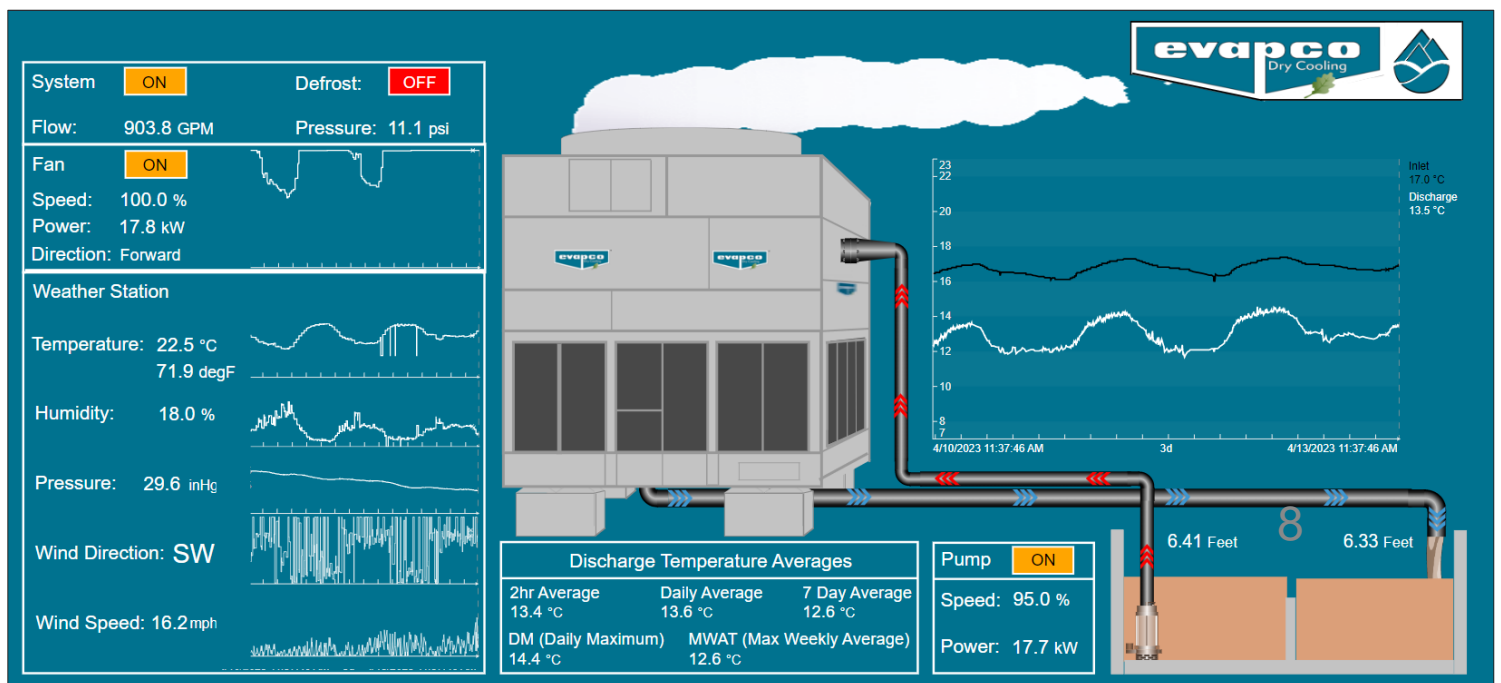
A weather station was installed on the southwest corner of the Tertiary Pump Station roof to measure temperature (referred to as the dry bulb temperature), barometric pressure, and relative humidity. These ambient conditions affect cooling tower performance and are monitored, along with other sensor data, on a dashboard (below) designed by NTP Operator Technician Jeremy Hileman.



EVAPCO cooling tower illustration



Phase 1 demonstration west of tertiary facilities in red



Operations monitoring dashboard



Testing and Preliminary Results

Metro Water Recovery submitted a Demonstration Project Testing Plan to CDPHE with the April 2022 site application, which focuses on two new applications for this technology to meet the standards listed below: (1) for wastewater effluent cooling (2) in a cold, semi-arid environment. The objectives of the testing plan are to:

- Assess the technical and environmental feasibility of cooling towers to reduce effluent temperature
- Inform the full-scale system design and cost



Ice inside the cooling tower (formed at 28.4°F)

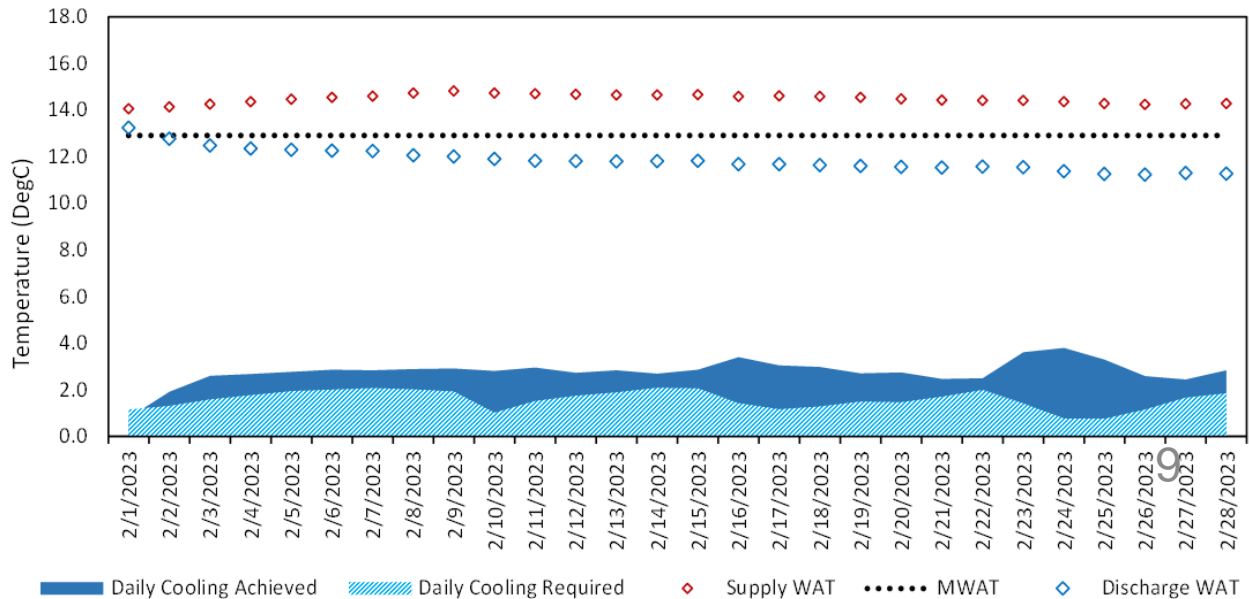
Phase 1 Preliminary Results

This cooling tower configuration effectively cooled NTP secondary effluent during February to below the CDPHE temperature limits, as shown below. Noise, odor, and air emissions met worker safety and permit limits, with minimum values for Legionella bacteria detected in two tests, indicating very low risk of exposure.

Solids accumulation in several sections of fill was more than typical, according to EVAPCO, and as a result, the smaller cross-fluted media used in this test are not recommended. Considerable icing occurred during freezing weather, but defrost programming resolved these issues with no adverse impacts to adjacent equipment observed. The plume was visible from outside the NTP on cold days.

NTP Effluent Temperature Standards

- Maximum Weekly Average Temperature (MWAT)
 - December 13.3°C (55.9°F)
 - January 19.3°C (66.7°F)
 - February 12.9°C (55.2°F)
- Daily Maximum
 - December 19.7°C (67.5°F)
 - February 14.5°C (58.1°F)
- All other months do not have an effluent limit when the compliance schedule ends, but a report of the measured result is required.



February secondary effluent Weekly Average Temperature (WAT) compared to MWAT limits



Discussion and Next Demonstration

The Phase 1 demonstration accomplished its primary objective of generating data to support the feasibility assessment and inform full-scale secondary effluent cooling tower design decisions. The relevant data used to inform full-scale design is specific to the suitability of the media fill size and an understanding of the operations and maintenance requirements, including redundancy requirements, which will affect the ultimate size and cost of the future system.

Key outcomes of the demonstration include establishing design criteria, confirming the least efficient fill media size is required, and identifying recommendations for the tertiary effluent demonstration work plan (see Lessons list).

Phases 1A and 2 Tertiary Demonstration

Metro Water Recovery purchased the cooling tower cell to save on future rental costs and ensure commissioning ahead of the upcoming winter season. Owning the unit also provides flexibility and the opportunity to relocate the system to the Robert W. Hite Treatment Facility or lend it to other utilities.

Phase 1A of the project will test fill media materials, water quality impacts, and operational conditions using tertiary effluent. This demonstration will allow staff to ascertain the impact on full-scale system design and cost between the two effluent streams.

The Phase 2 demonstration system will be designed and installed based on the findings from Phases 1 and 1A. This system will be sized to provide cooling of the projected 2026 plant flows, ensuring permit compliance when the temperature limits take effect.



NTP with tertiary effluent temperature demonstration in red

Lessons for Tertiary Demonstration

- Increase the flow for better performance
- Test more efficient fill media
- Diversify fill media vendors
- Monitor corrosion potential in the headspace of the tower
- Consider plume testing of volatile organic compounds and bioaerosols
- Omit Legionella, odor, and noise testing

If cooling towers are determined to be technically and environmentally feasible, staff will submit a request to amend the existing Site Location Approval for a permanent system. The system would be expanded in the future as needed to achieve the cooling capacity required for the rated plant flow of 28.8 MGD.



Phases 1A and 2 effluent temperature demonstration timeline

