Optimizing Cooling Tower to Reduce Water and Costs

TEMA – San Antonio Chapter

March 17, 2026

Presented by Annikki Chamberlain, Mimir Water

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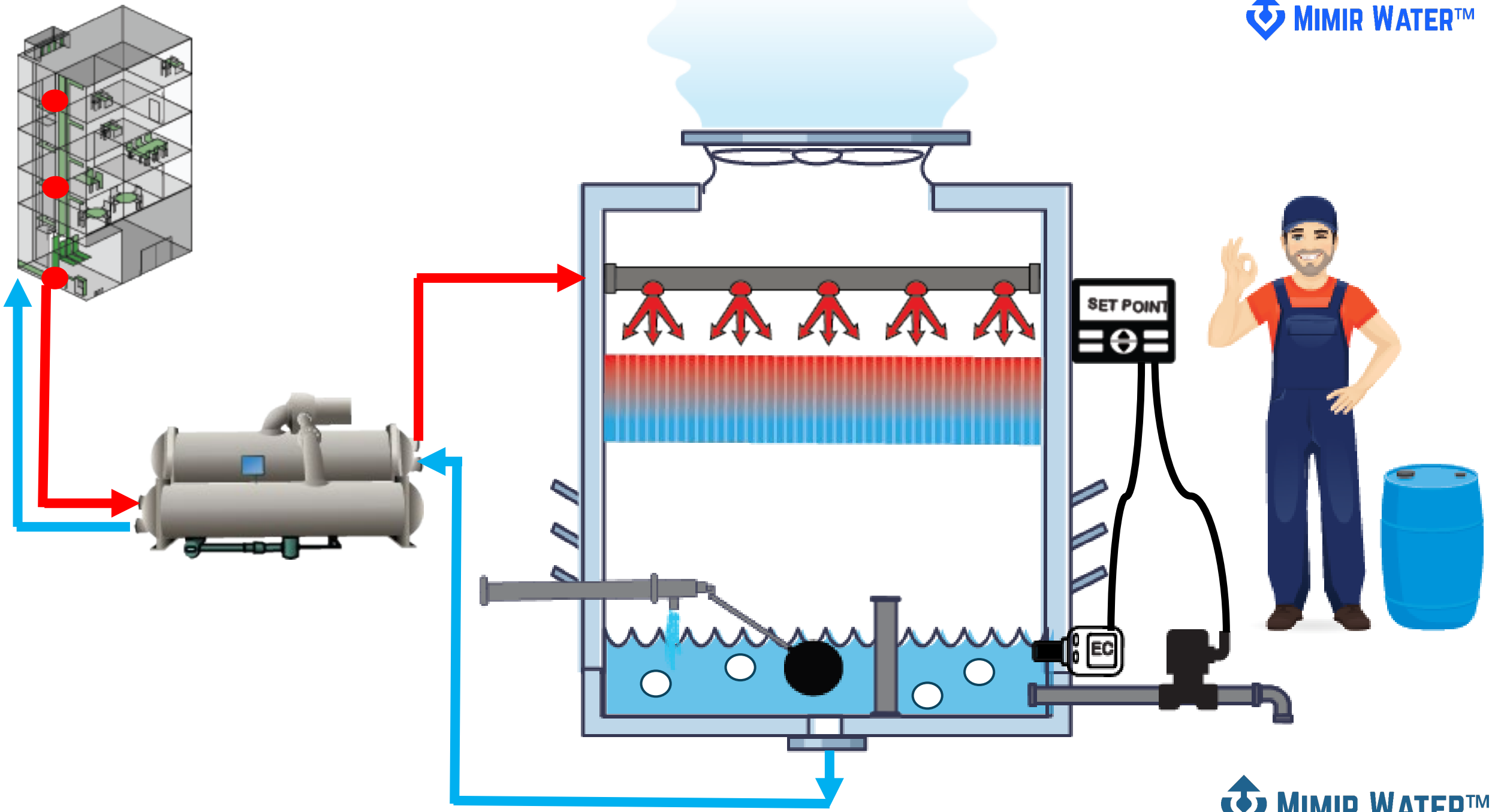
The Mimir Water Efficiency Hierarchy

Strategy for Longterm Water Management



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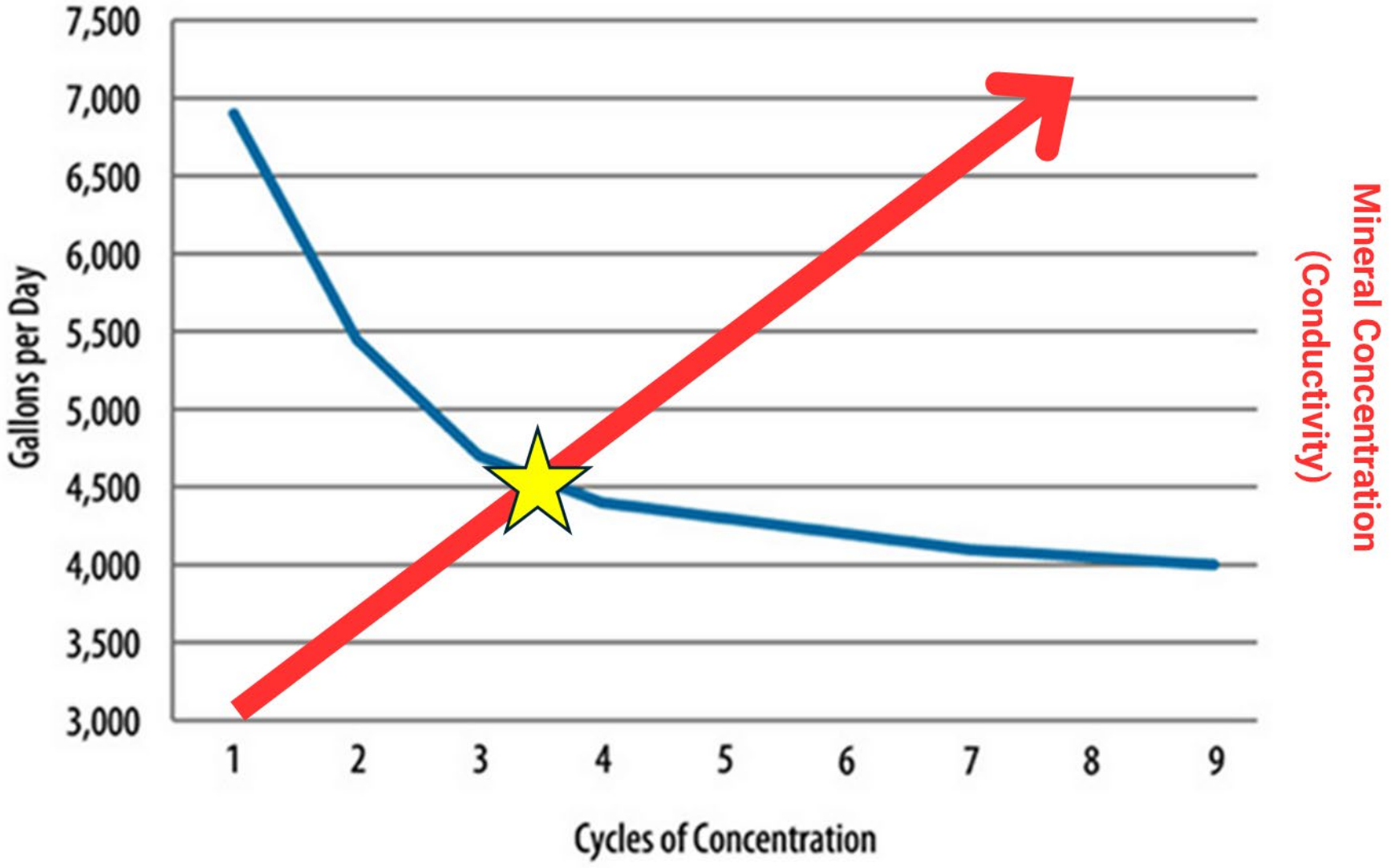
Optimal Cycles



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Waste vs Scale

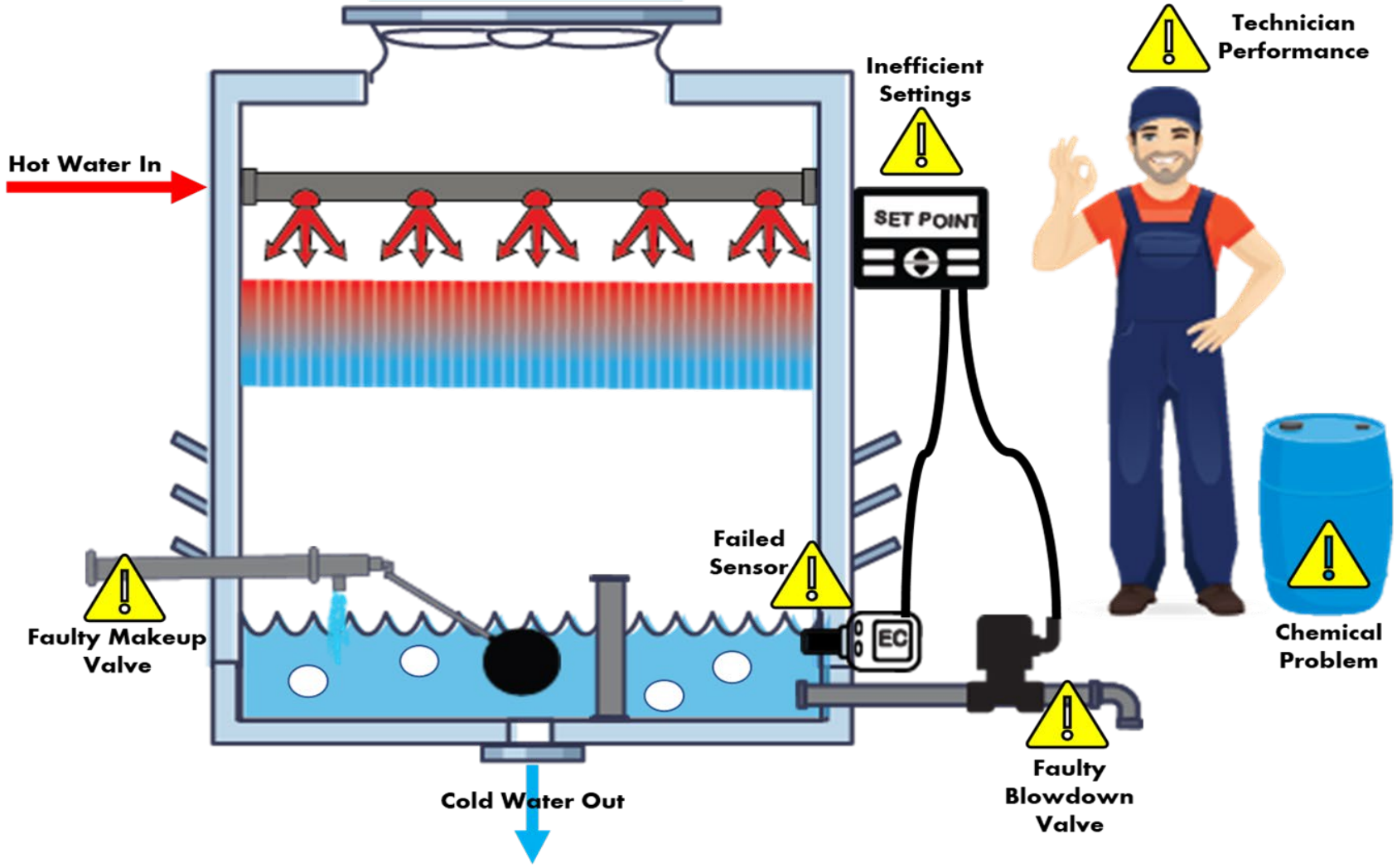
Waste

Scale

Common Problems

Mechanical Problems:
- Faulty Valves
- High Water Level
- Controller Power
- Sensor Issues
- Empty Chemical

Operational Problems:
- Miscalibrated Sensors
- Low/High Set Point



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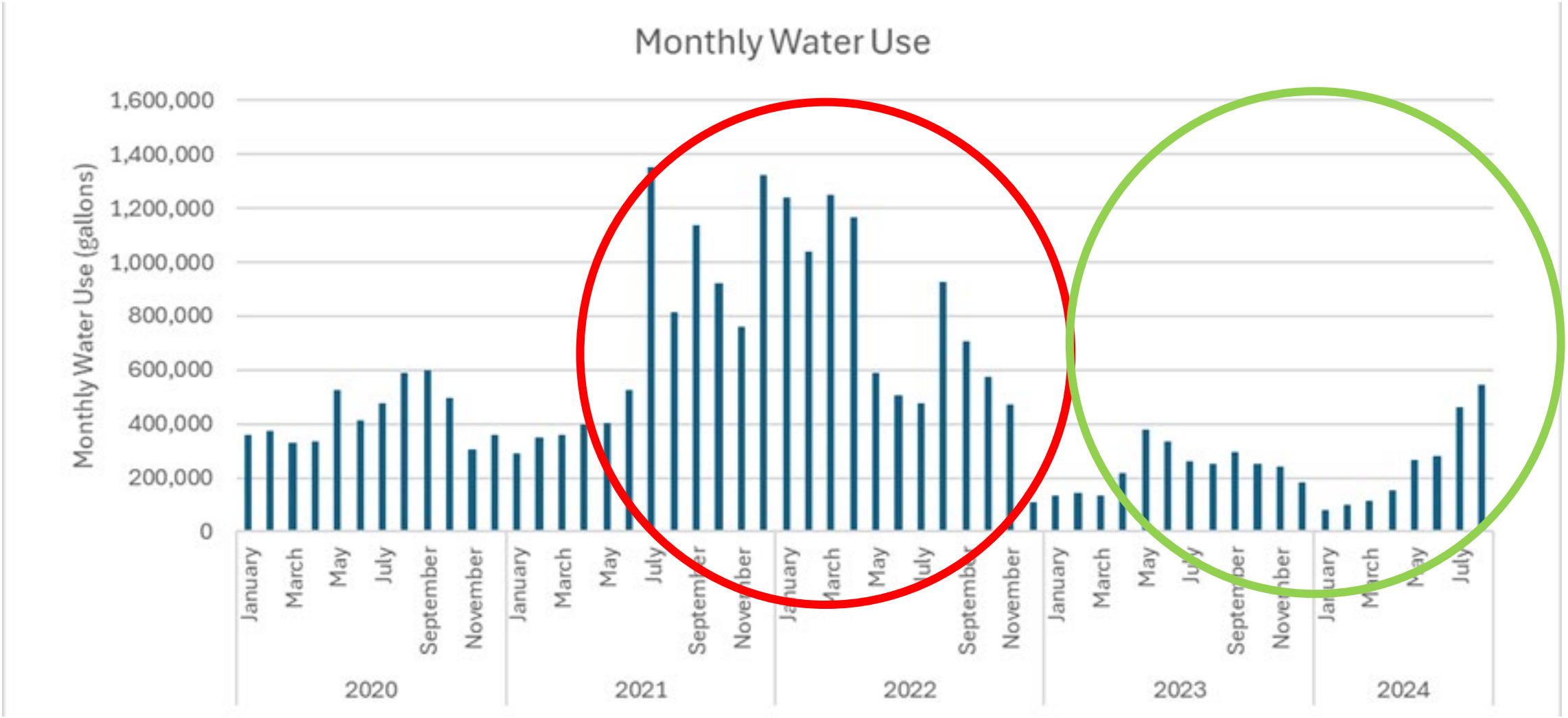
Operational Control = Water Efficiency



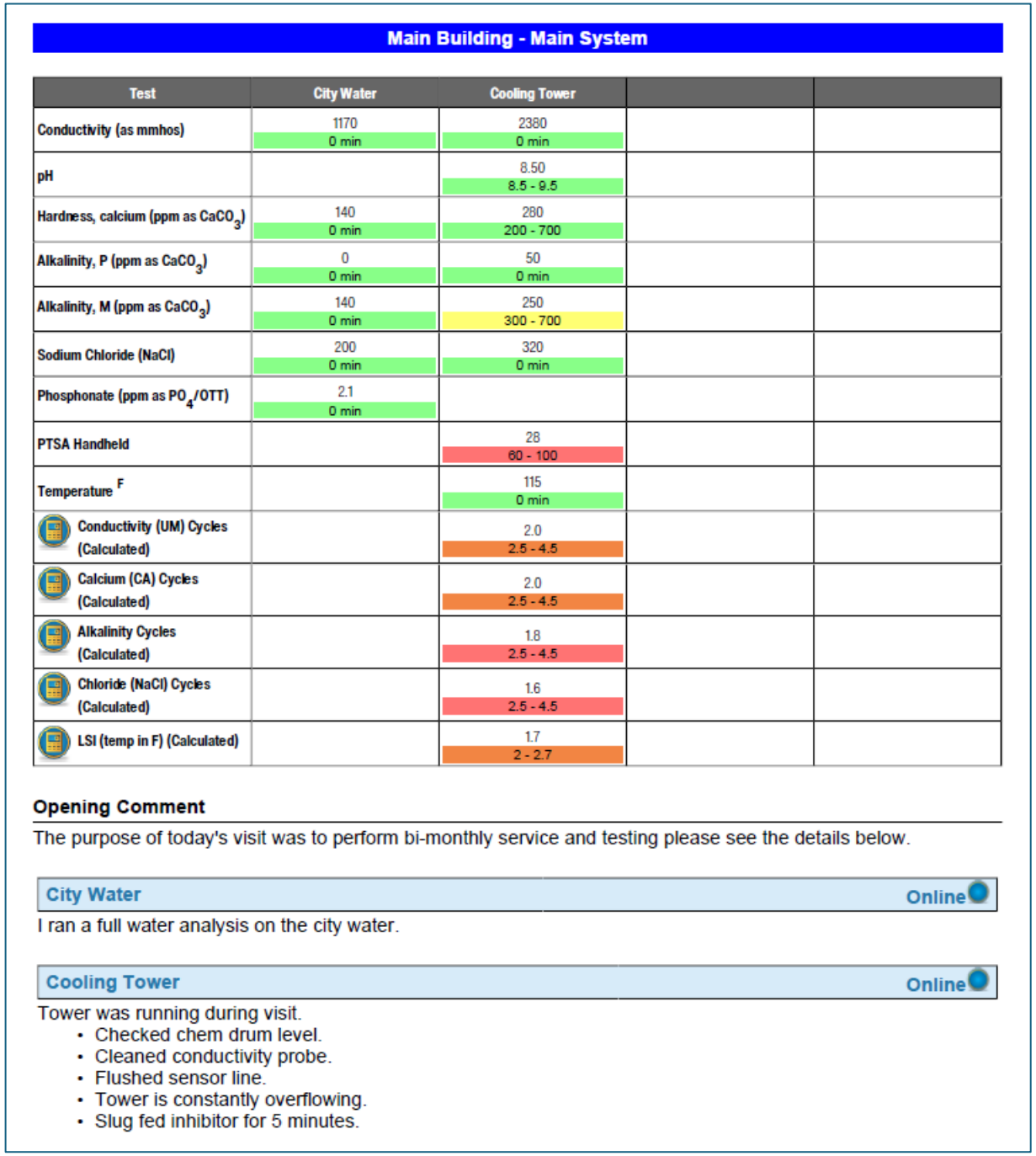
No control = water waste

Good control = water efficiency

Service Reports

Regular Service Reports provide crucial information on tower performance and issues.

Integrate cooling tower service reports into you normal routines.



Main Building - Main System

Test	City Water	Cooling Tower		
Conductivity (as mmhos)	1170 0 min	2380 0 min		
pH		8.50 8.5 - 9.5		
Hardness, calcium (ppm as $CaCO_3$)	140 0 min	280 200 - 700		
Alkalinity, P (ppm as $CaCO_3$)	0 0 min	50 0 min		
Alkalinity, M (ppm as $CaCO_3$)	140 0 min	250 300 - 700		
Sodium Chloride (NaCl)	200 0 min	320 0 min		
Phosphonate (ppm as PO_4/OTT)	2.1 0 min			
PTSA Handheld		28 60 - 100		
Temperature F		115 0 min		
Conductivity (UM) Cycles (Calculated)		2.0 2.5 - 4.5		
Calcium (CA) Cycles (Calculated)		2.0 2.5 - 4.5		
Alkalinity Cycles (Calculated)		1.8 2.5 - 4.5		
Chloride (NaCl) Cycles (Calculated)		1.6 2.5 - 4.5		
LSI (temp in F) (Calculated)		1.7 2 - 2.7		

Opening Comment

The purpose of today's visit was to perform bi-monthly service and testing please see the details below.

City Water Online

I ran a full water analysis on the city water.

Cooling Tower Online

Tower was running during visit.

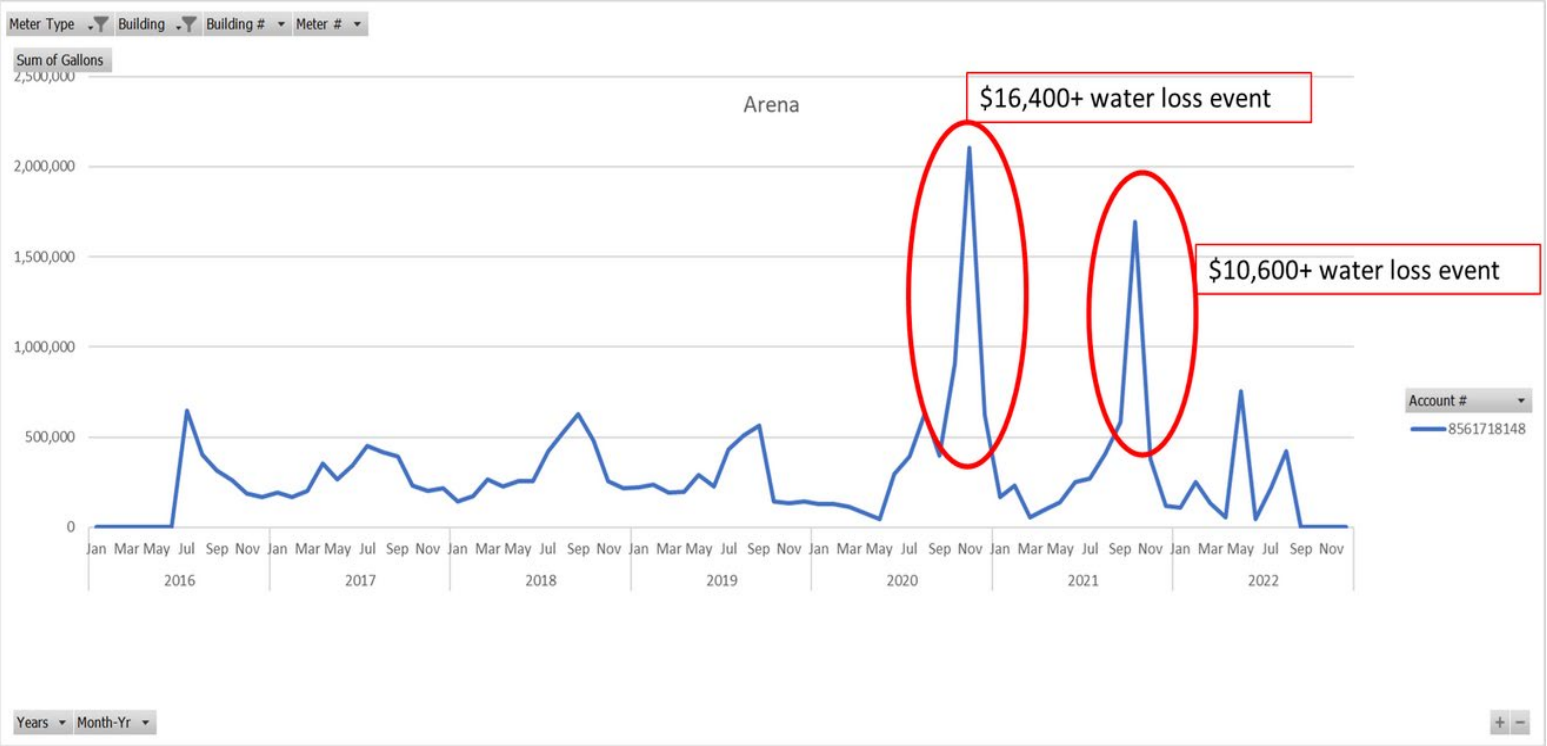
- Checked chem drum level.
- Cleaned conductivity probe.
- Flushed sensor line.
- Tower is constantly overflowing.
- Slug fed inhibitor for 5 minutes.

Waste: Expensive

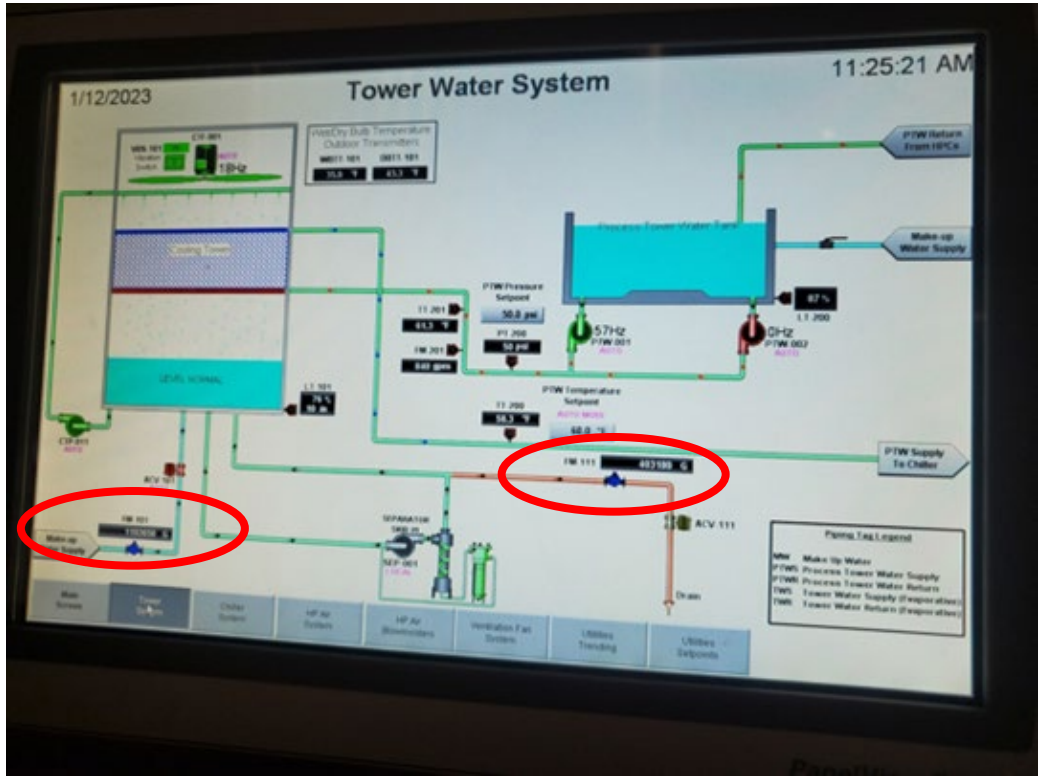
Cooling Tower — Online

Tower was running during visit.

- Checked chem drum level.
- Cleaned conductivity probe.
- ~~Flushed sensor line.~~
- Tower is constantly overflowing.
- ~~Slug fed inhibitor for 5 minutes.~~



Scale: Very, Very Expensive



New Tower	Online

Big problems with the new tower this visit. Upon arrival the first thing I noticed was that the controller was turned off. We have had this issue in the past and it's going to cause major issues. The power out here is on a GFI and it trips sometimes. So this tower has been cycling up since the 4th. This tower was 4-5 times cycled up higher than it should be and that's a sure fire way to get scale in the tower. I have it up and going again and is in the process of blowing down to get us back in range.

SOPs

Regular but simple tower checks will avoid 90% of the waste/scale problems quickly.

Integrate a simple SOP into cooling tower management program.

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MIMIR WATER'S 5 RULES FOR COOLING TOWER WATER CONTROL

RULE 1 – NO OVERFLOW

If water is overflowing:

- Lower water level with float valve or level sensor
- Check that float or solenoid closes fully

No overflow → OK

RULE 2 – NO UNRESOLVED ALARMS

If controller has an alarm:

- Identify it
- Correct it
- Do not ignore it

No alarm → OK

*If **NO FLOW** alarm appears:

- Tower OFF → OK
- Tower RUNNING → Check recirculation line or contact service provider

RULE 3 – HIGH CONDUCTIVITY[1] → BLOWDOWN MUST OPEN

If High Conductivity alarm:

- Run manual blowdown
- Confirm valve opens
- Confirm water discharges to drain

RULE 4 – LOW CONDUCTIVITY[2] → BLOWDOWN MUST CLOSE

If Low Conductivity alarm:

- Confirm blowdown valve is fully closed
- If reading is >150 µS/cm below setpoint → valve likely stuck open
- Doublecheck for overflow

RULE 5 – CONDUCTIVITY STAYS NEAR SETPOINT

Conductivity should remain within **±200 µS/cm of setpoint.**

If outside this range (even without alarm):

- Verify controller reading
- Clean probe if needed
- Check blowdown valve operation
- Contact service provider

Within Range → OK

NEVER TRUST A VALVE!

[1] Require Water Treatment Provider to set high and low conductivity alarms +/- 500 from setpoint
Questions: support@mimirwater.com

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Monitor Performance, Not Water

Cycles of Concentration (COC) is the standard performance metric.

Low COC

Too Much Blowdown
Stuck Valve
Sensor Issue
Low SetPoint
Water Waste

Target COC

Water Quality
Water Treatment
Operating Conditions

High COC

Not Enough Blowdown
Stuck Valve
Sensor Issue
High Set Point
Scale

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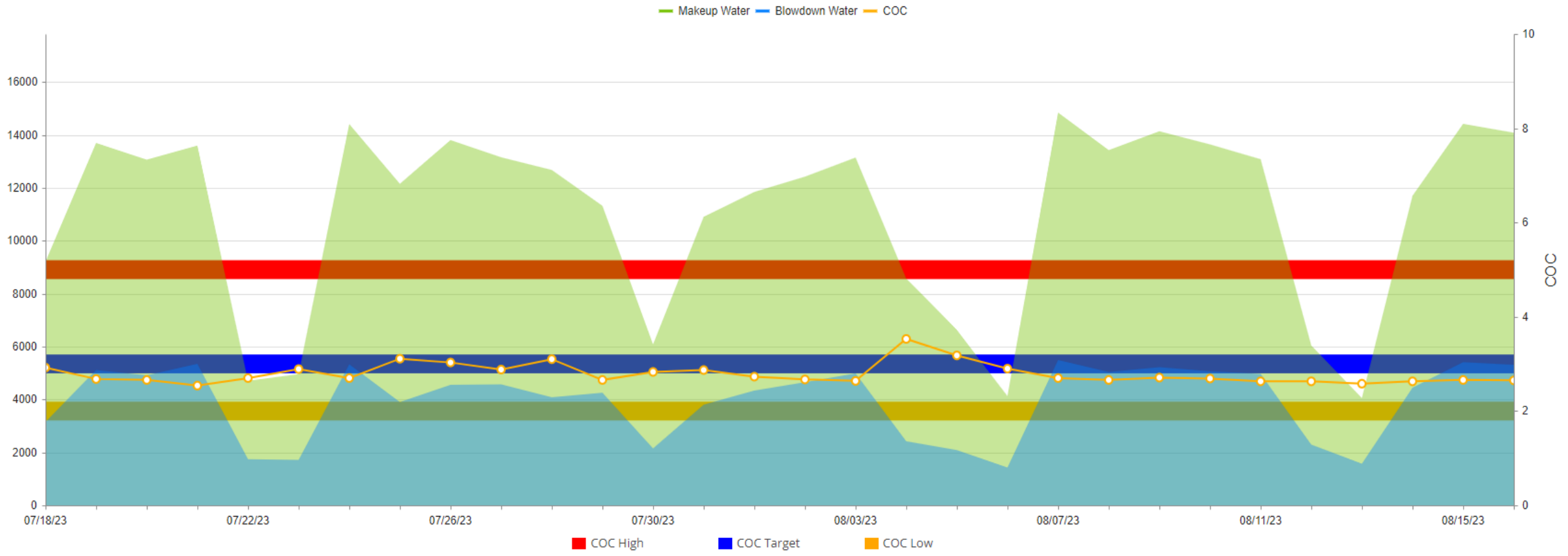
Water Use vs Efficiency

Makeup & Blowdown Water



Makeup Water :	330,010.00 G	BlowDown Water :	119,409.00 G	COC (Simplified) :	2.764

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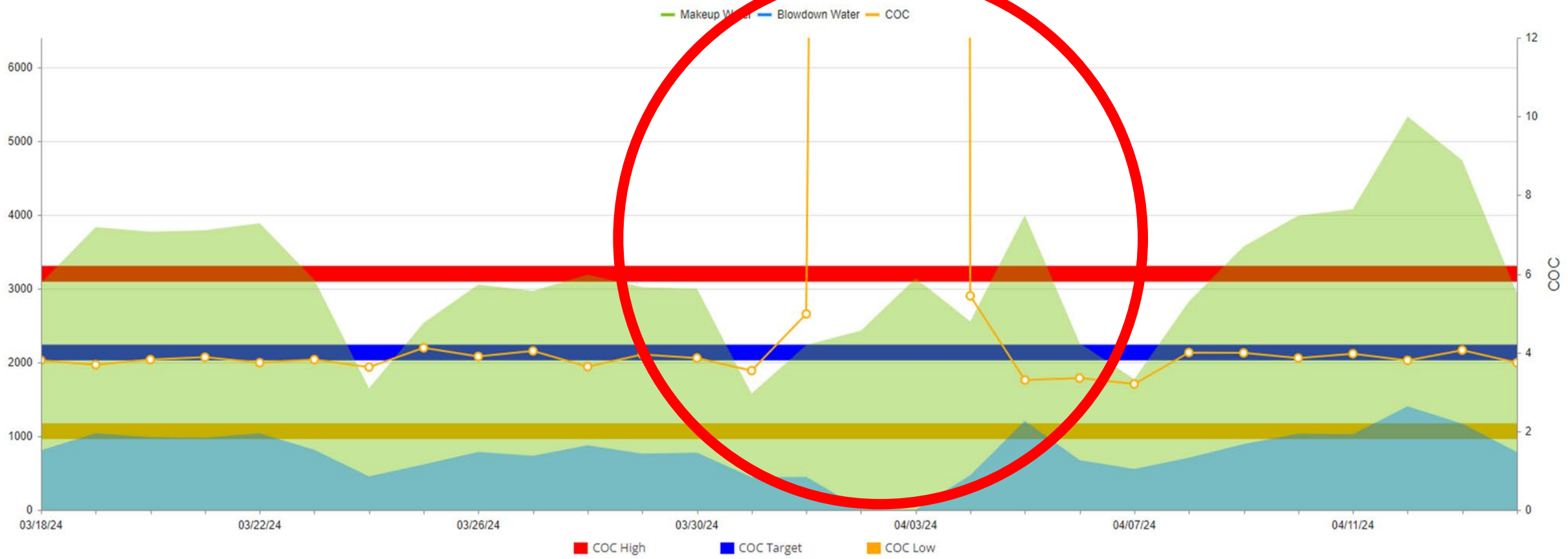
Departure from Optimal

PDF

Makeup & Blowdown Water



Makeup Water :	88,332.00 G	BlowDown Water :	21,512.00 G	COC (Simplified) :	4.106

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School District Cooling Tower

Domestic Winter Use:

50k gallon per month

Domestic Summer Use:

400k gallon per month

Case Study: Prevent Waste

Alert: Low Efficiency

Low Efficiency

Too Much Blowdown
Stuck Valve
Sensor Issue
Low Set Point
Water Waste

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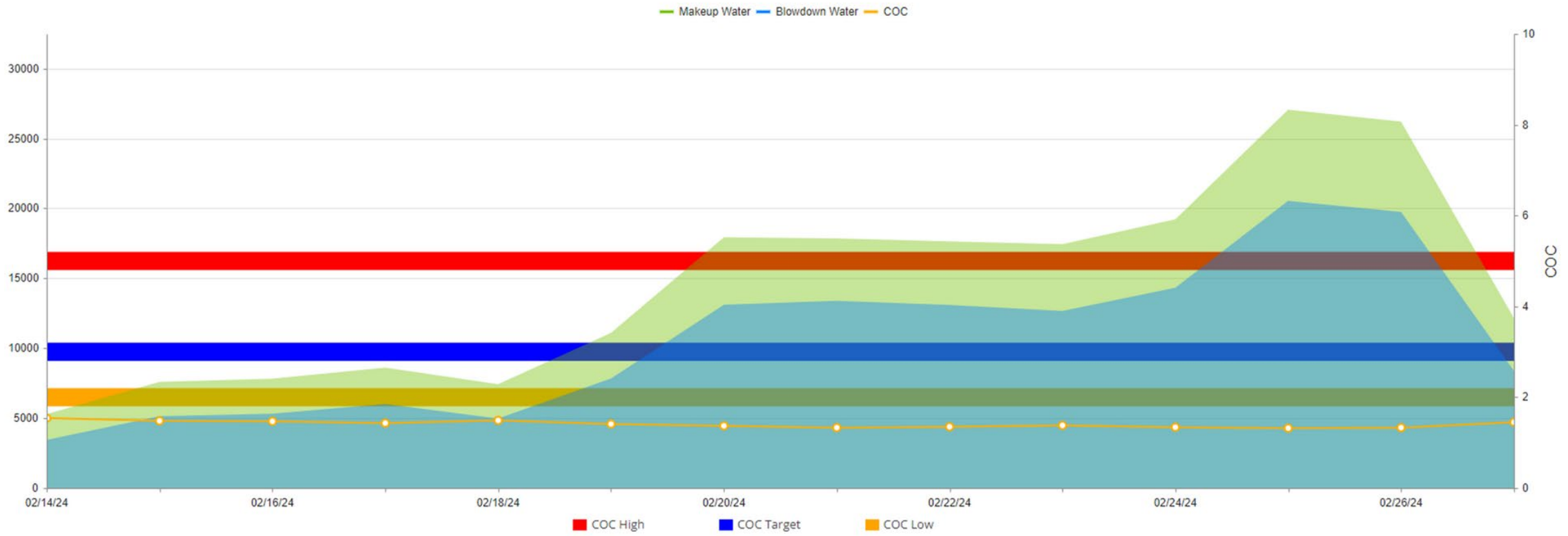
PDF

Makeup & Blowdown Water



Makeup Water :	203,383.00 G	BlowDown Water :	147,997.00 G	COC (Simplified) :	1.374

Sodium Nitrite (ppm as $NaNO_2$)			650 800 min	
Phosphonate (ppm as PO_4/OTT)	2.1 0 min	3.5 4 - 8		
Calcium (CA) Cycles (Calculated)		1.1 1.7 - 2.5		
Conductivity (UM) Cycles (Calculated)		1.1 1.7 - 2.5		
Chloride (NaCl) Cycles (Calculated)		1.2 1.7 - 2.5		
Alkalinity Cycles (Calculated)		1.3 1.7 - 2.5		
Temperature F		110 0 min		
LSI (temp in F) (Calculated)		1.3 1.7 - 2.5		

Opening Comment

- The purpose of today's visit is for the biweekly testing and service of the tower and chemical equipment.

City Water — Online

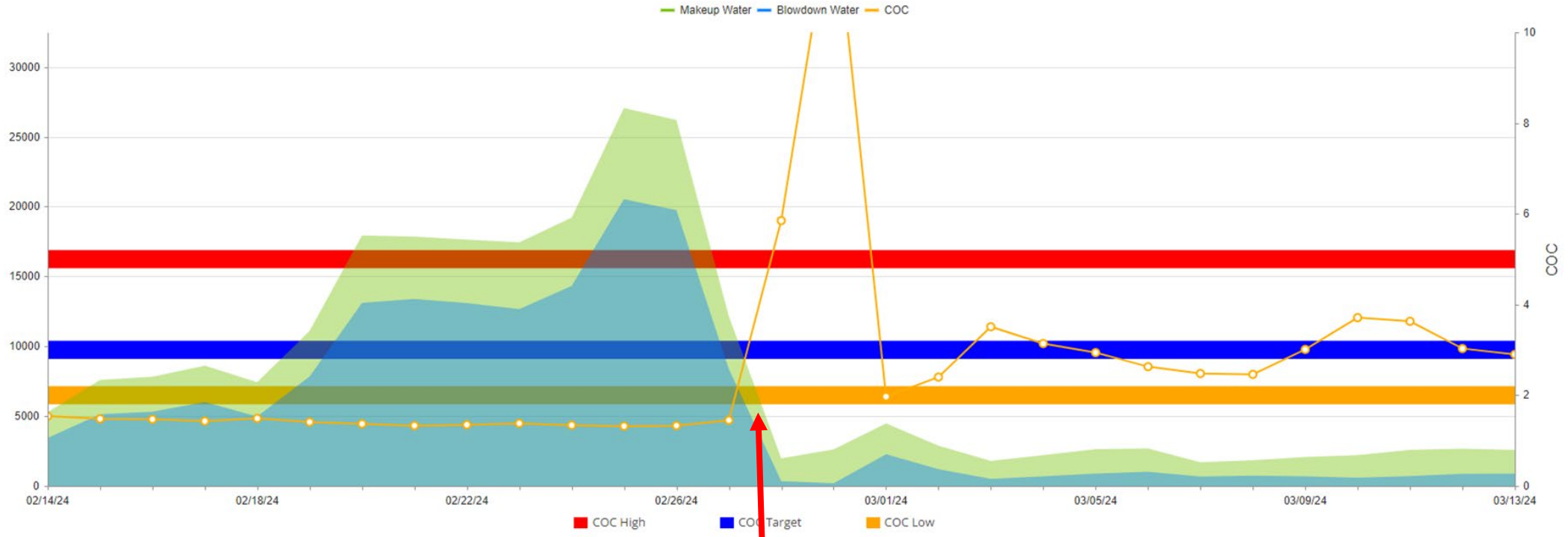
- Ran full water analysis on incoming city water.
- Setpoint to 4300 to maintain LSI.

Cooling Tower — Online

- Tower online at this time.
- Conductivity is below setpoint.
- Tower is running lower cycles due to change in city water quality also due to the conductivity probe being out of calibration.
  I have calibrated the probe to current system conductivity and tower is blowing down to meet set point.
- Inhibitor is within range.

PDF

Makeup & Blowdown Water



Makeup Water :	240,303.00 G	BlowDown Water :	160,331.00 G	COC (Simplified) :	1.499

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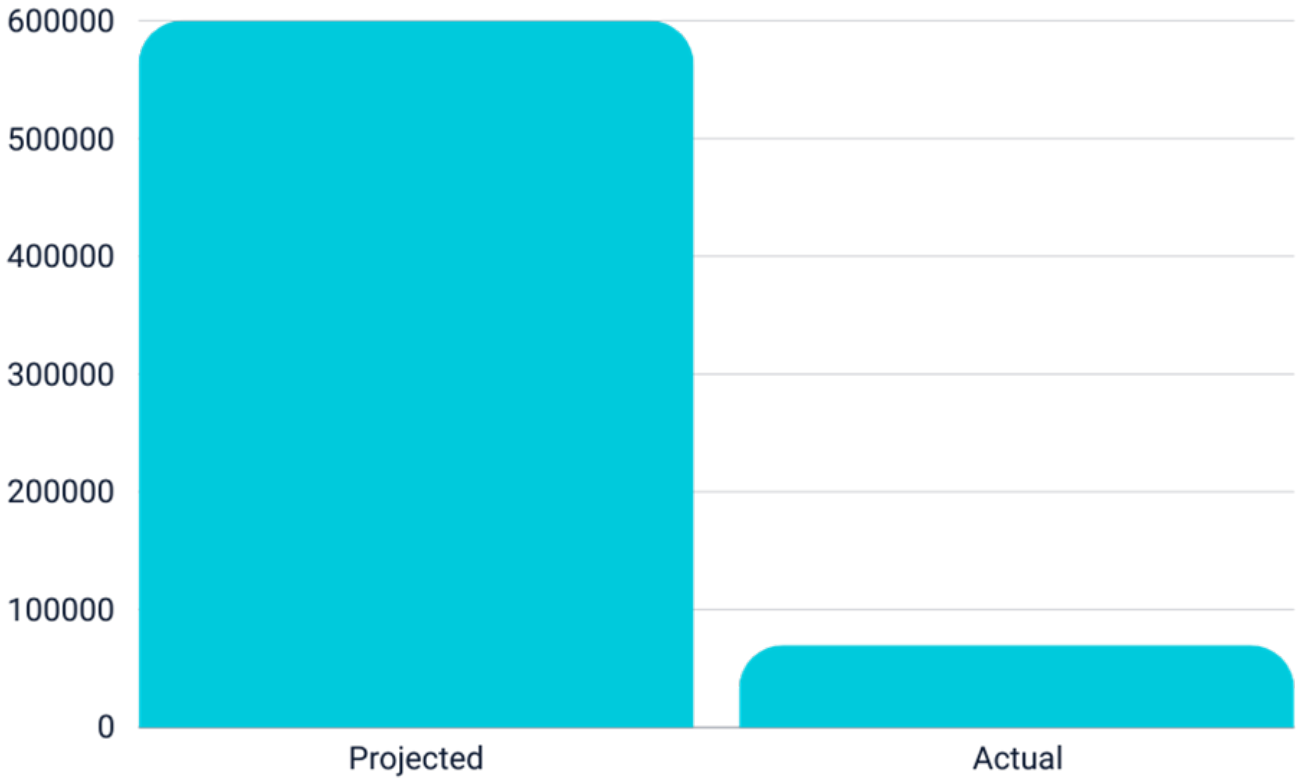
School District Cooling Tower

Gallons Saved: 540,000

Dollars Saved: $10,000/month

Cost: $0



Advanced Diagnostics

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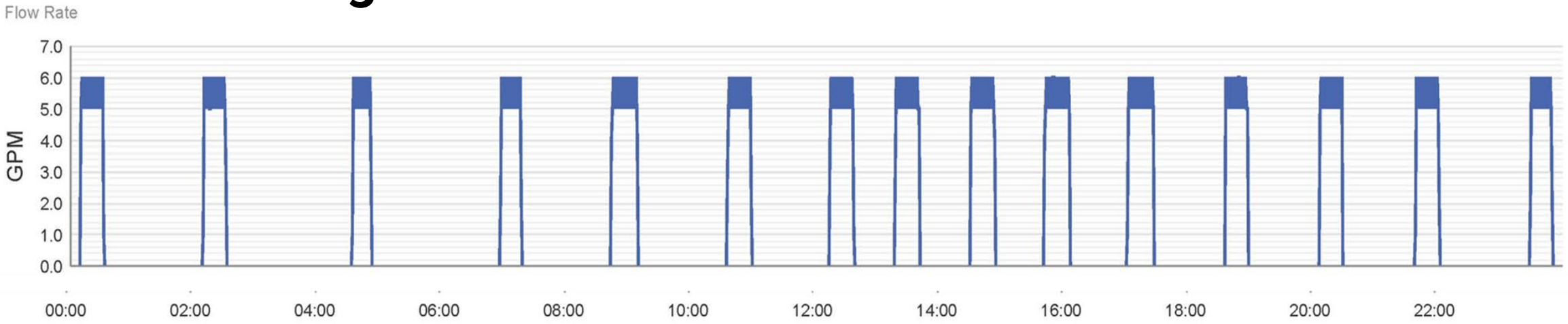

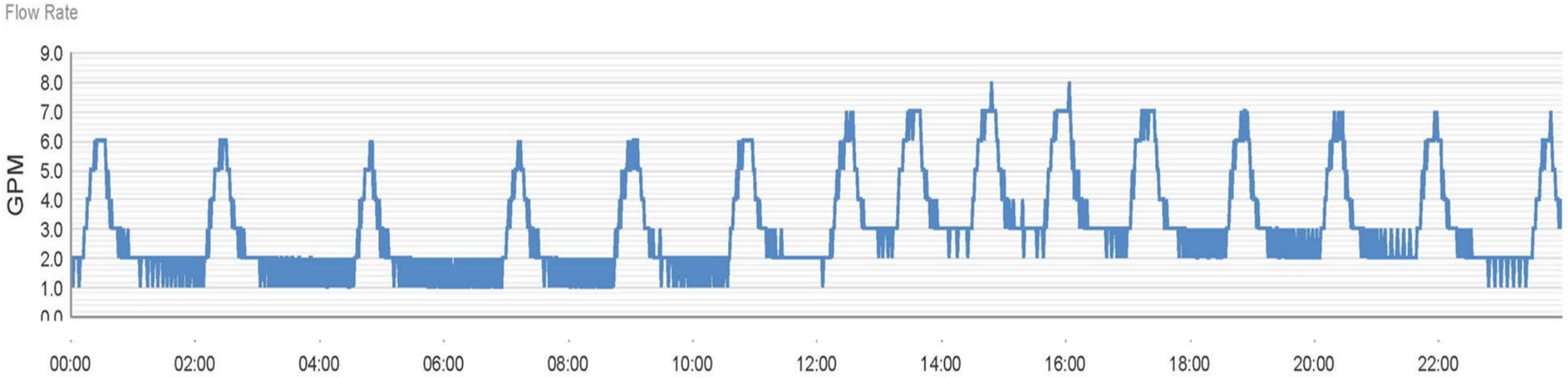

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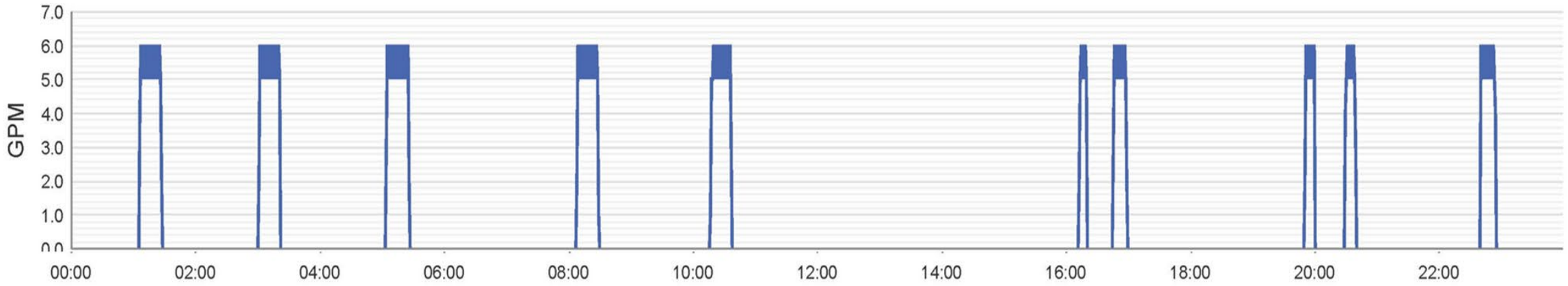
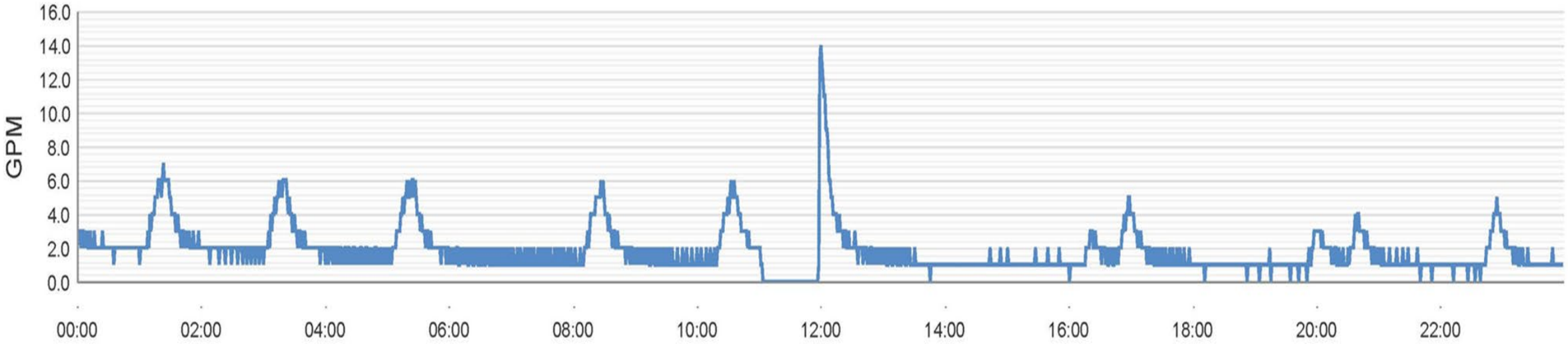
Flow Rate



Flow Rate

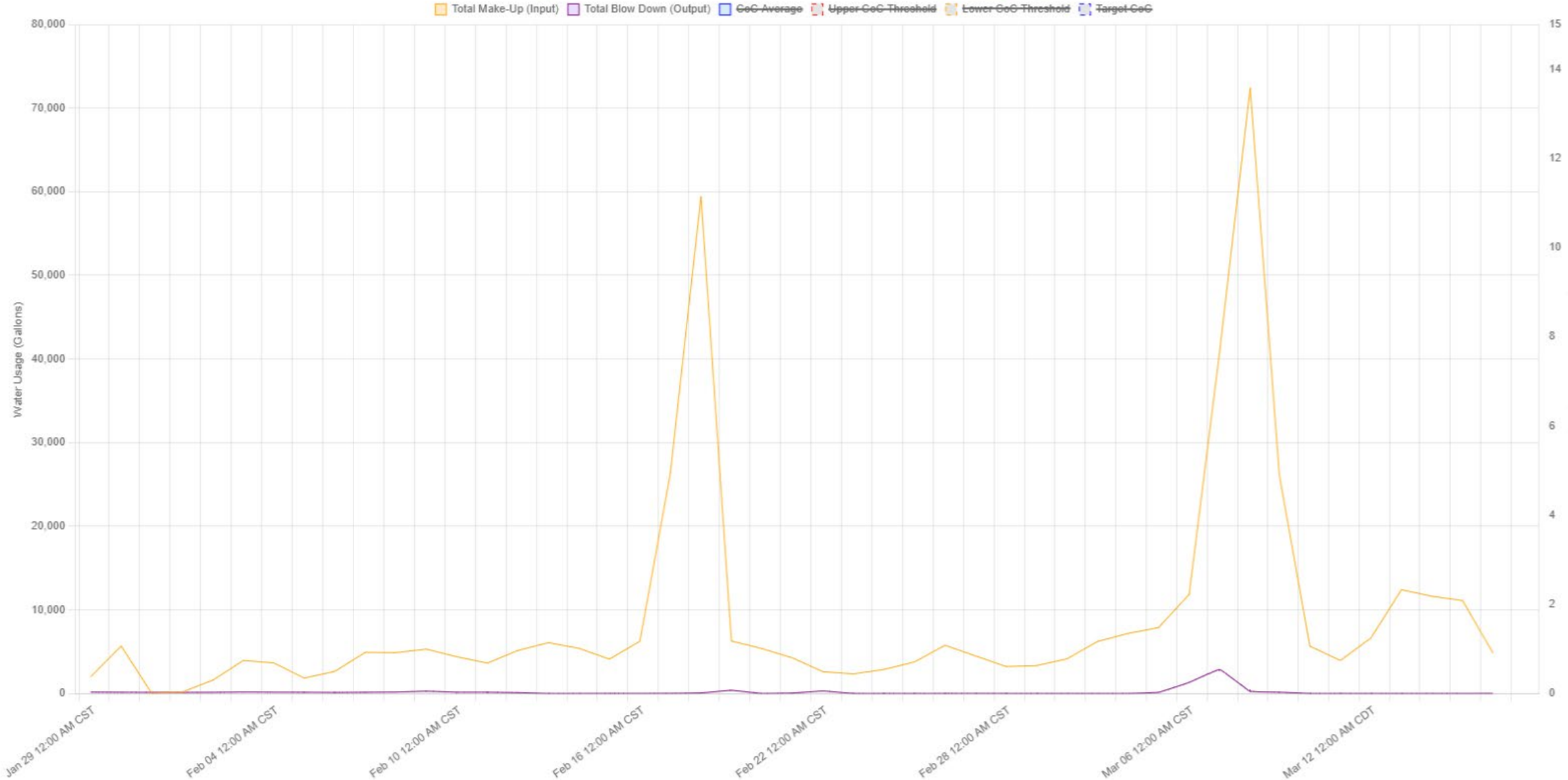


Start Date: 01/28/2026 09:29 PM

End Date: 03/16/2026 09:29 PM

Submit

TM



434,572.00
MAKEUP WATER (GALLONS)

7,874.00
BLOWDOWN WATER (GALLONS)

55.19 COC
TARGET 3.00 COC

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Start Date: 03/12/2026 09:29 PM

End Date: 03/16/2026 09:29 PM

Submit

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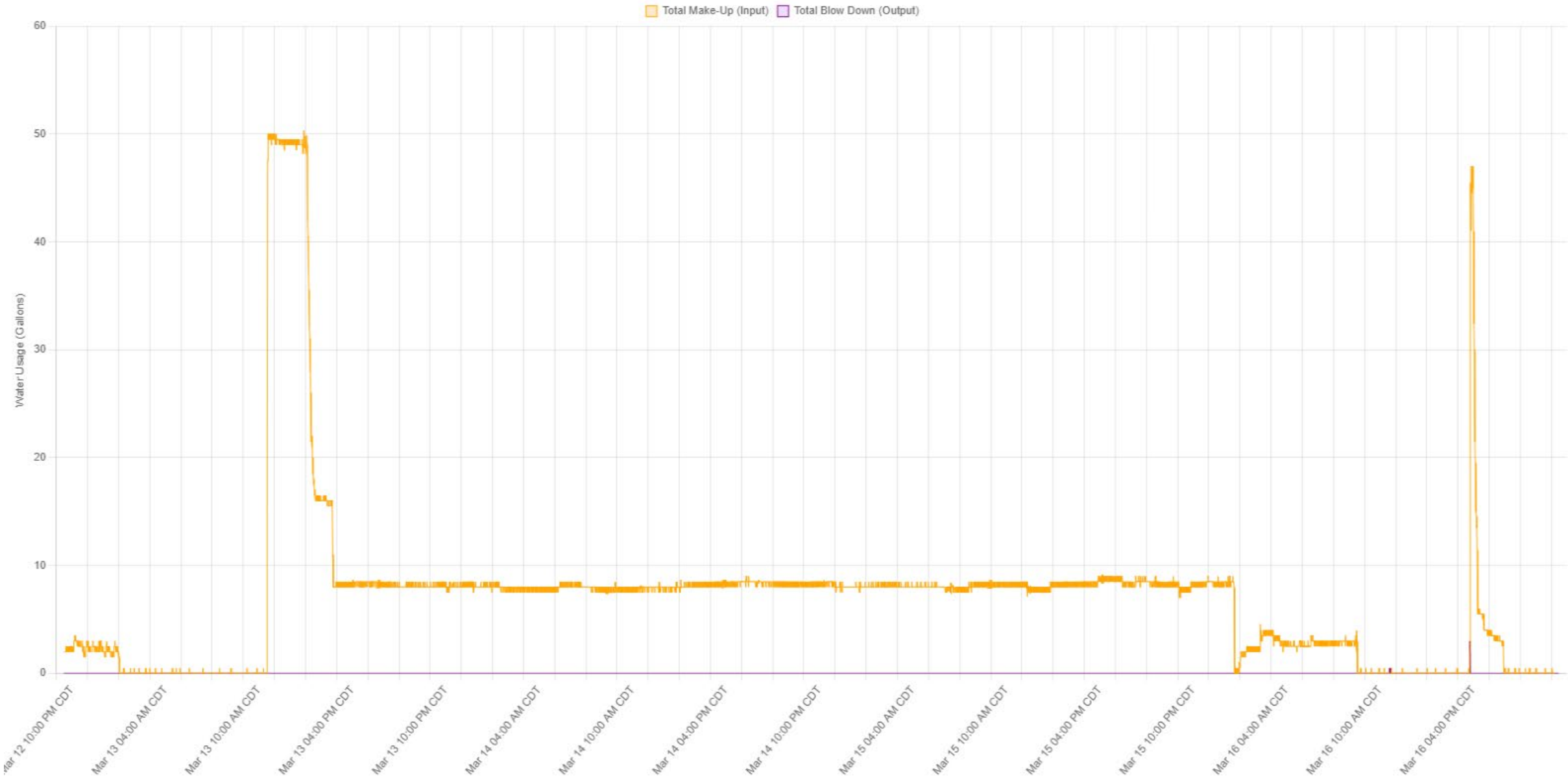

40,857.47

MAKEUP WATER (GALLONS)

5.50

BLOWDOWN WATER (GALLONS)

7,428.63 COC

TARGET 3.00 COC

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End Date: 02/07/2026 09:29 PM

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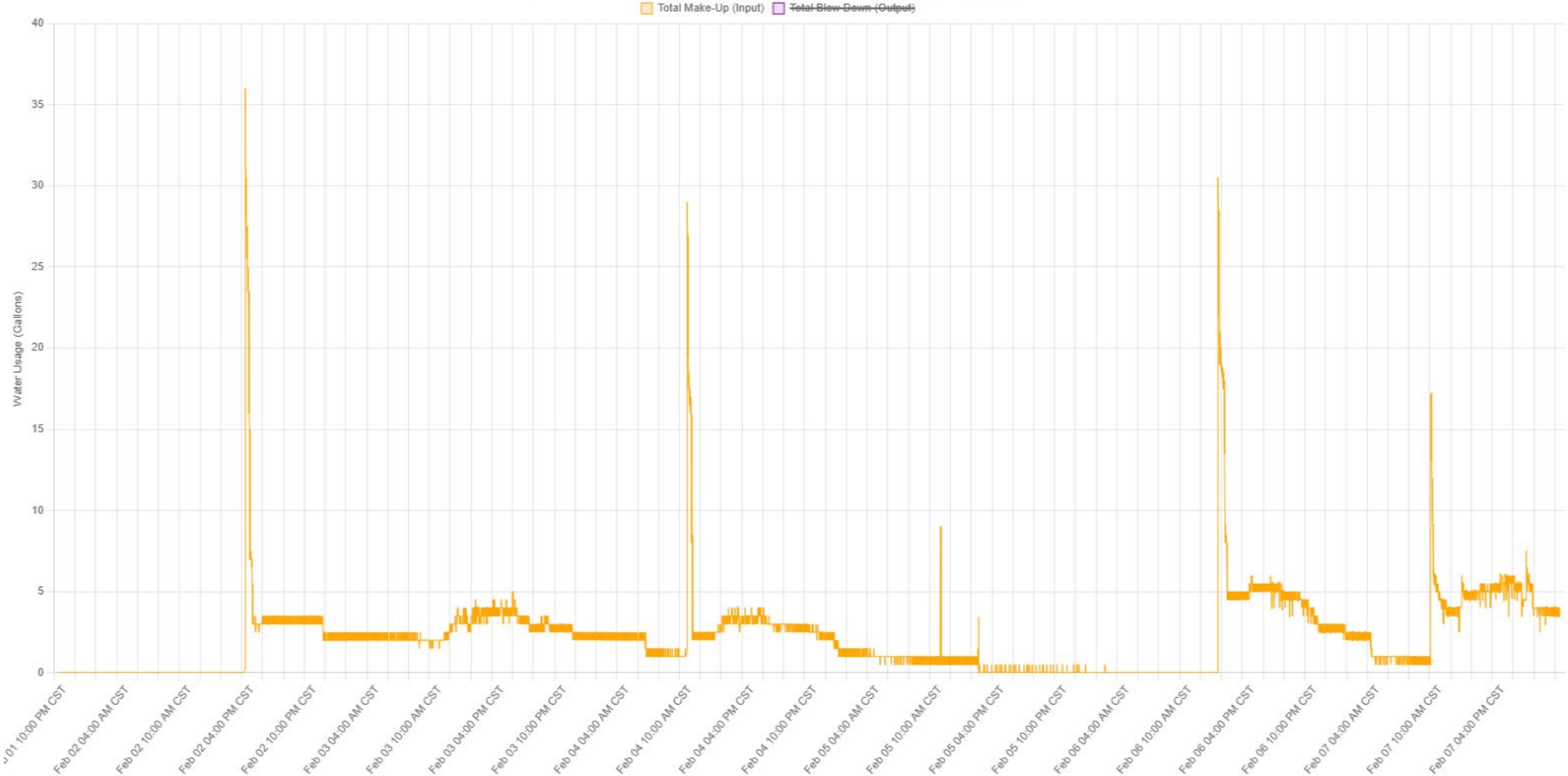

18,951.00

MAKEUP WATER (GALLONS)

898.00

BLOWDOWN WATER (GALLONS)

21.10 COC

TARGET 3.00 COC

Case Study: “it’s on our daily checks”

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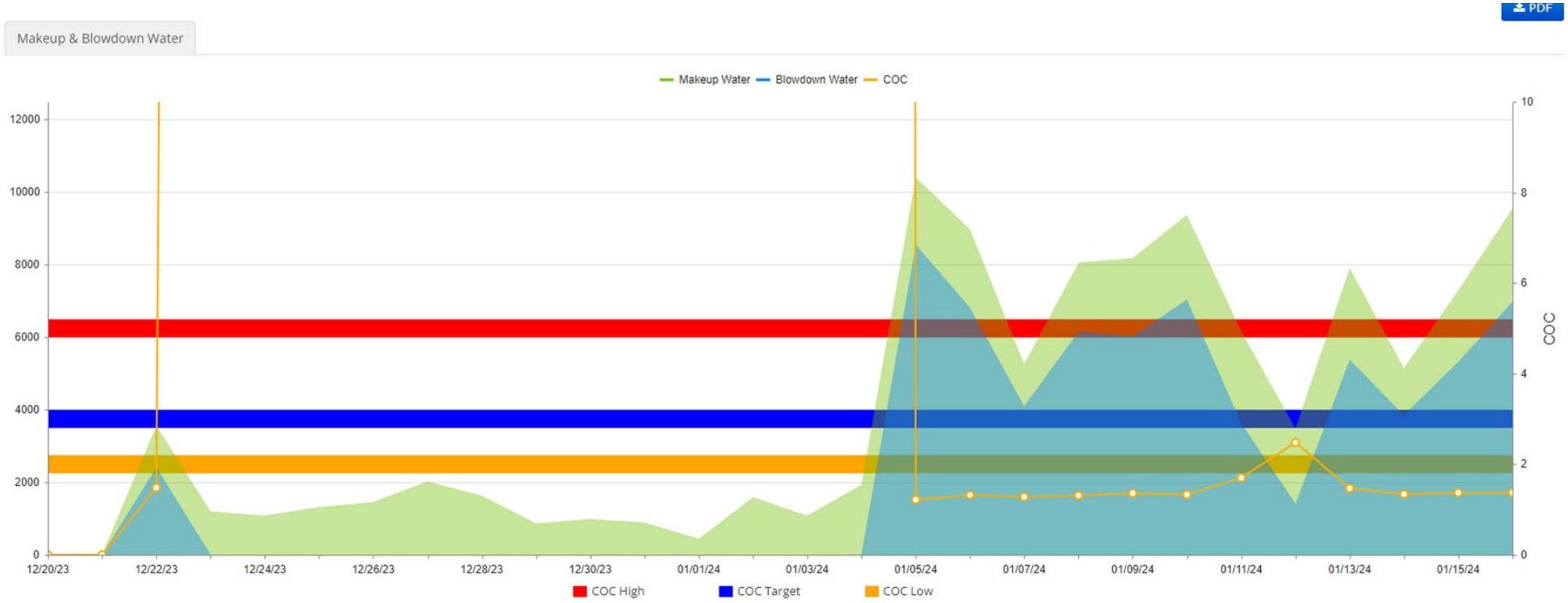


Makeup Water :	109,851.00 G	BlowDown Water :	67,725.00 G	COC (Simplified) :	1.622

Case Study: “it’s on our daily checks”

Conductivity : 10900!

Questions?

- Annikki Chamberlain, Mimir Water
  - annikki@mimirwater.com
- Patrick Middleton, SAWS
  - Patrick.Middleton@saws.org

March 17, 2026

Commercial Conservation Programs

Patrick Middleton
Project Coordinator, Conservation

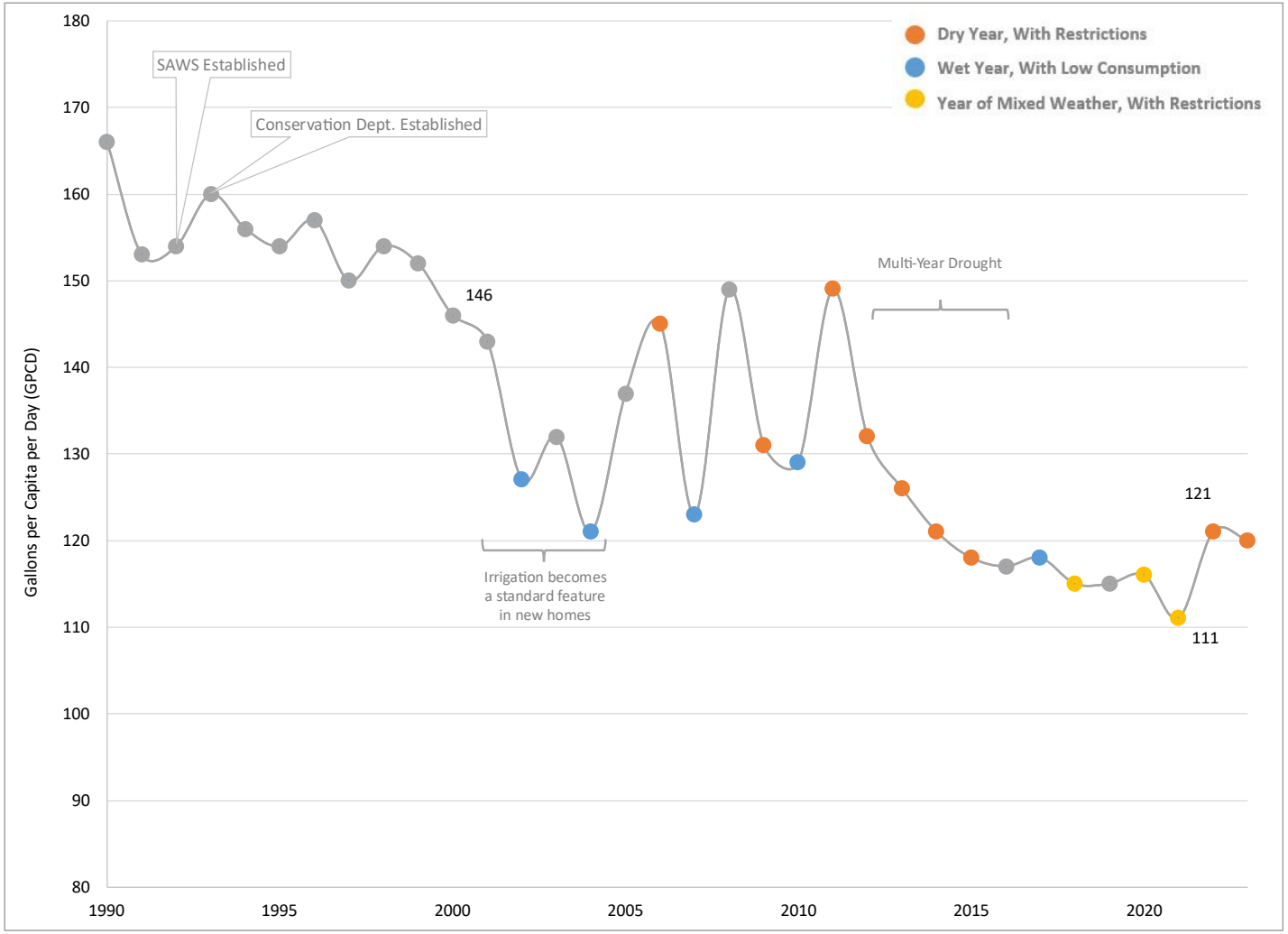
Texas Energy Managers Association

San Antonio Water System®

Conservation Investment

Commercial Conservation Fund

- Commercial conservation fee recommended by the Community Conservation Committee to fund commercial conservation programs. Dedicated commercial conservation meter fee approved by City Council in 1997.



Landscape Irrigation

Annual Irrigation Checkup

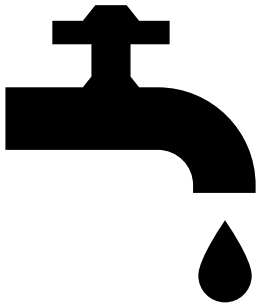
- **Reasonable Regulation**
  - Prevent water waste
  - Improve landscape irrigation efficiency
  - Establish effective communication channels

Who's Required?

- **Large Use (over 1M gals)**
- **Large Property (over 5 acres)**

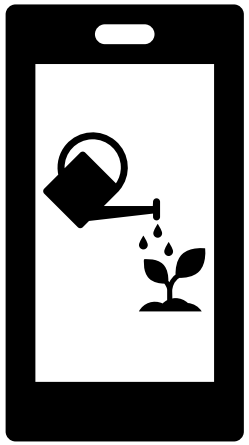
Landscape Irrigation

Irrigation Rebates



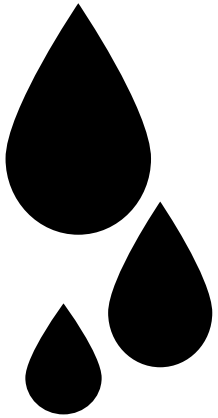
Irrigation Design Rebate

Efficiency targeted changes to irrigation systems.



Smart Irrigation Controller Rebate

Upgrade single-controller systems to approved smart model.



Smart Irrigation System Rebate

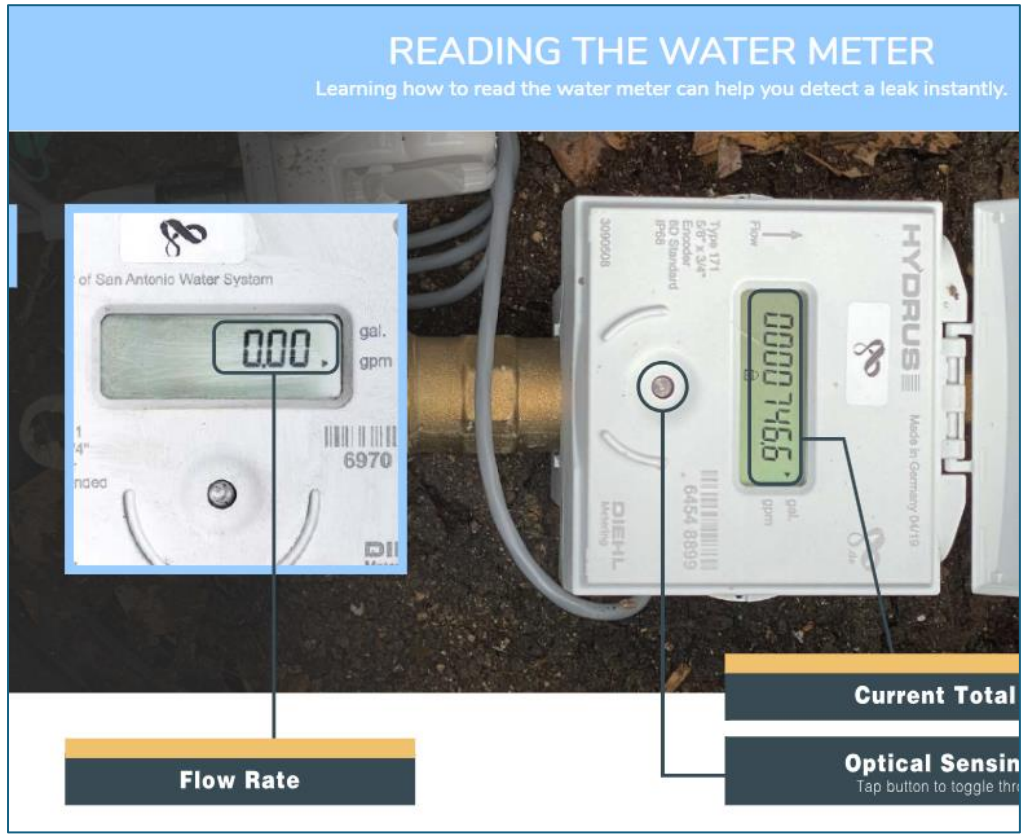
Upgrade existing systems to central control smart network.

Electronic Water Meters

Leak Alerts

- Alert Sent if >5 gph (.08 gpm) of continuous use for >48 hrs

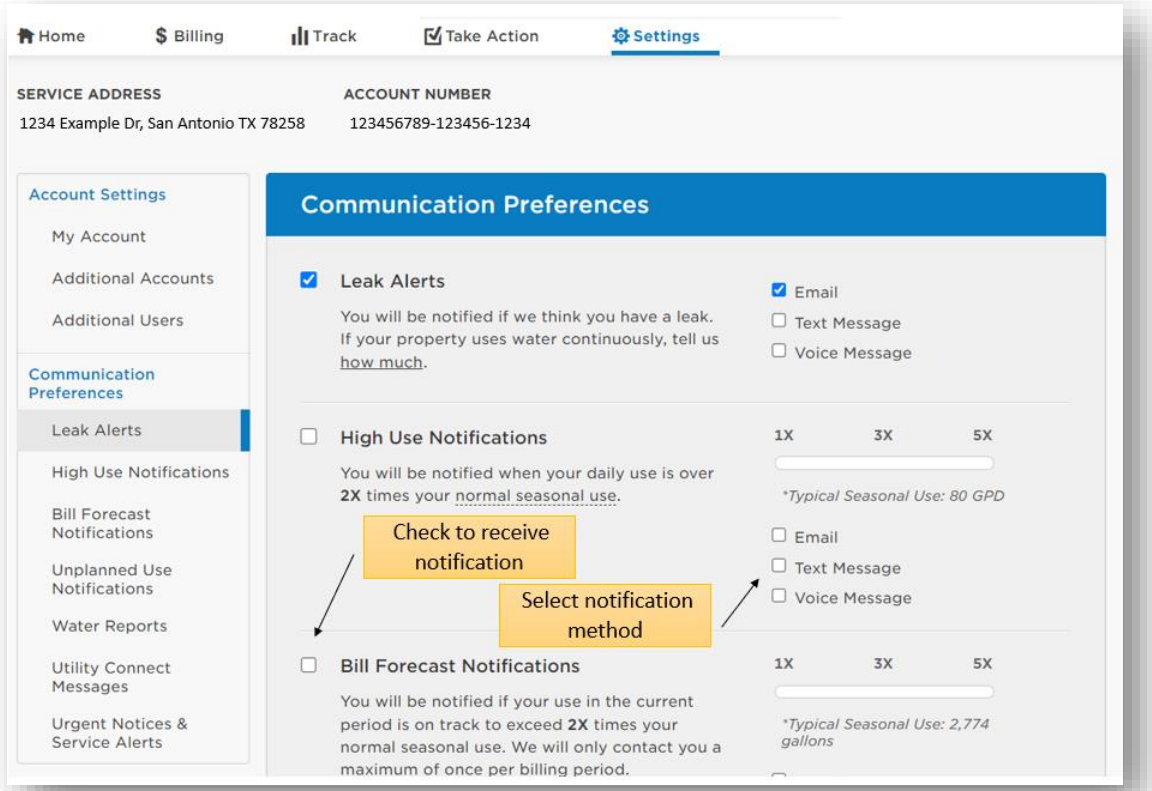
- Onsite leak detection: GPM and Total Gallons digital screen



Understanding Data

WaterSmart Customer Portal

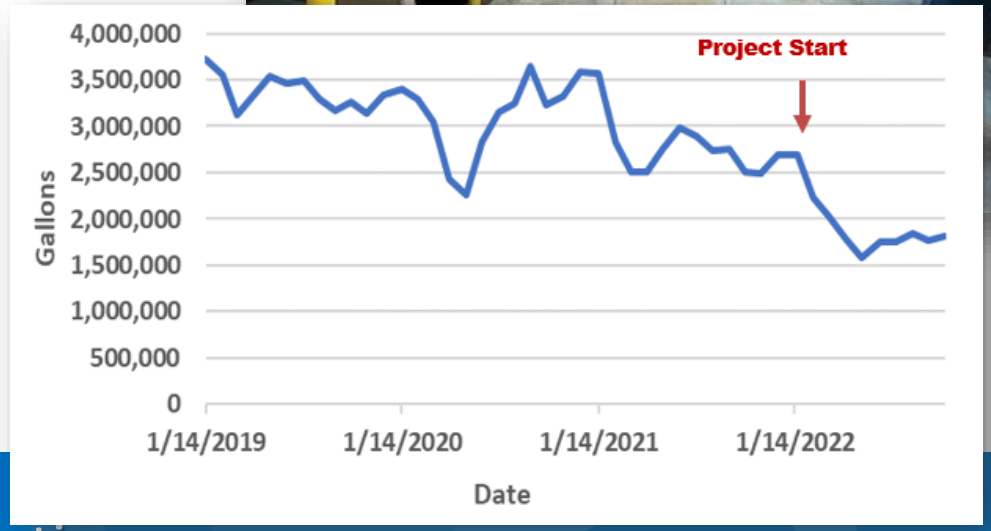
- Customers have the option to sign up for additional use notifications
  - High Use Notifications
  - Bill Forecast Notifications
  - Unplanned Use Notifications
- Customers have the option to combine accounts and add additional users
- Continuous Use Response



saws.watersmart.com

Custom Rebates

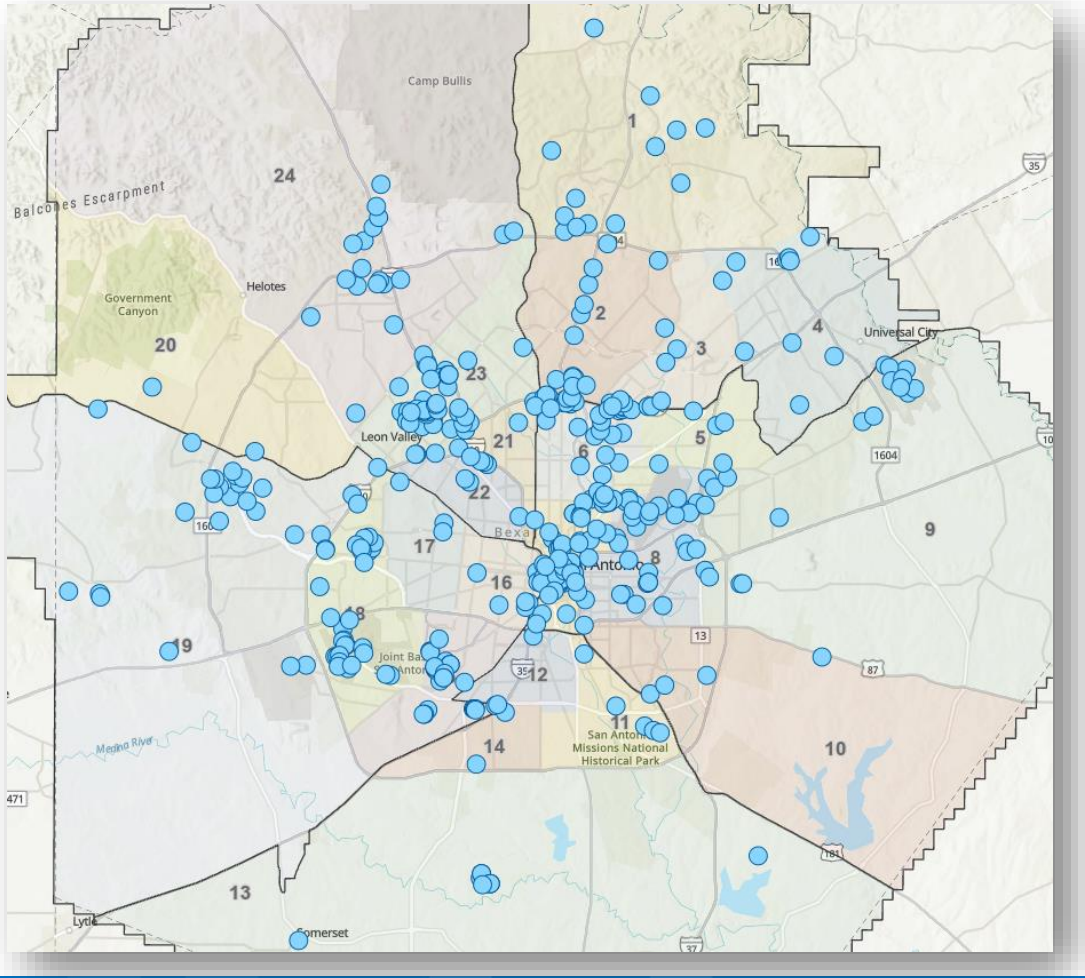
- Designed for flexibility
- Projects reviewed individually
- Rebate amount based on acre-feet of water saved over a specified period
- Rebate paid up front or yearly based on performance
- $1,255 per acre-foot for peak
  - $627 per acre-foot year-round
  - Up to 50% of the installation cost



Cooling Tower Regulations

City Code Ch. 34 / SAWS Utility Service Regulations

- All cooling towers, not utilizing recycled water, shall operate a minimum of four (4) cycles of concentration
- All cooling towers shall be operated with conductivity controllers, as well as make-up and blowdown meters.



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