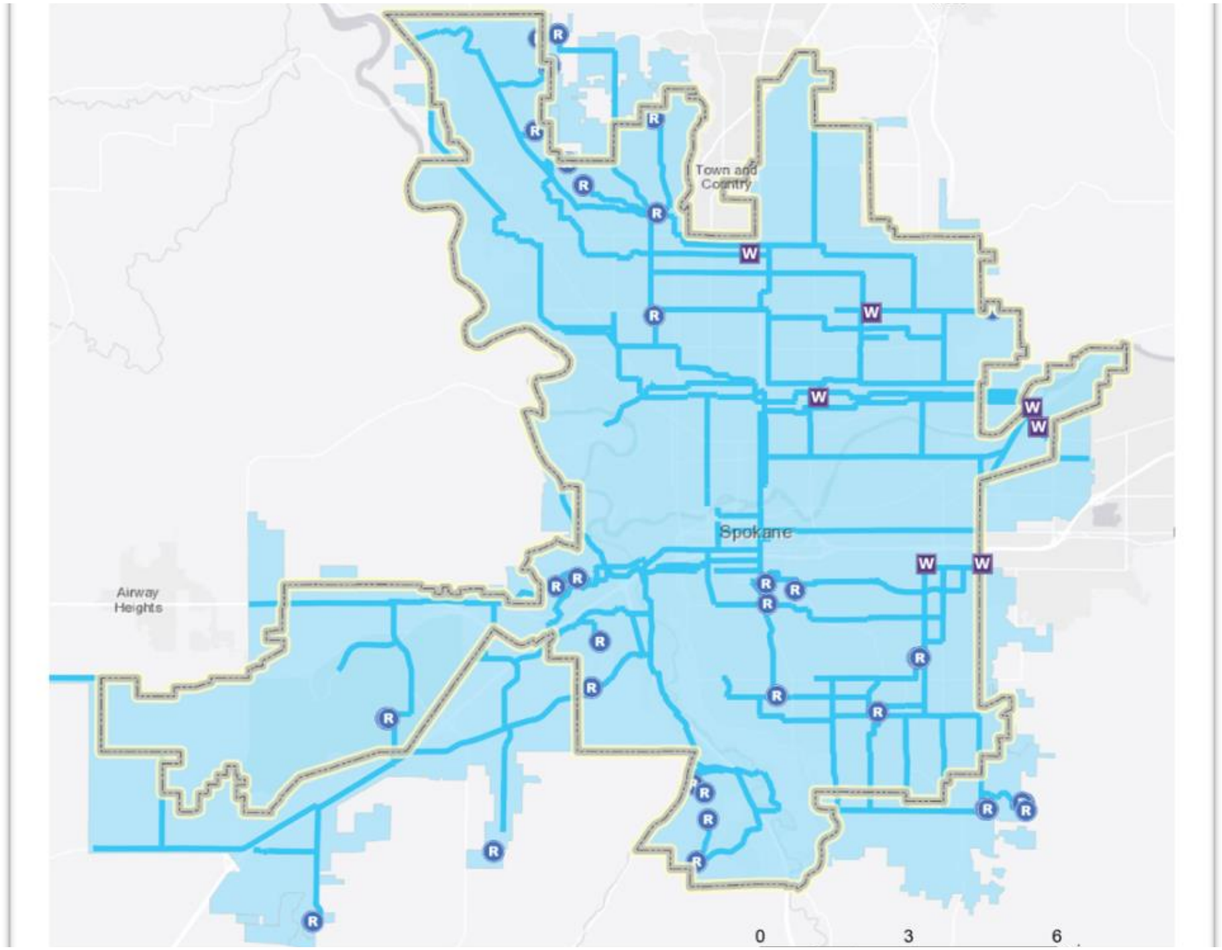
Water Wise Spokane and Spokane Public Schools use technology to improve water management.

Spokane Public Schools

CITY OF SPOKANE

SPOKANE VALLEY-RATHDRUM PRAIRE AQUIFER



GALLONS PER CAPITA PER DAY

NATIONAL: 100

SPOKANE: 200

SPOKANE COUNTY: 230

24 billon gallons per year.

Most water is used in the summer.

WATER WISE SPOKANE

CONSERVATION PROGRAM GOALS

Grow Without Additional Pumping

Reduce Peak Seasonal Demand

GOAL

ELIMINATE UNECESSARY WATER USE

Not too much

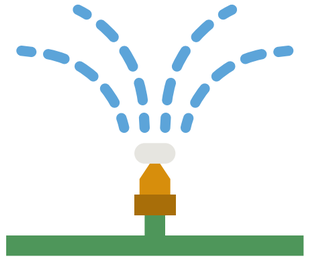
Not too little

Just the right amount!

WATER WISE SPOKANE

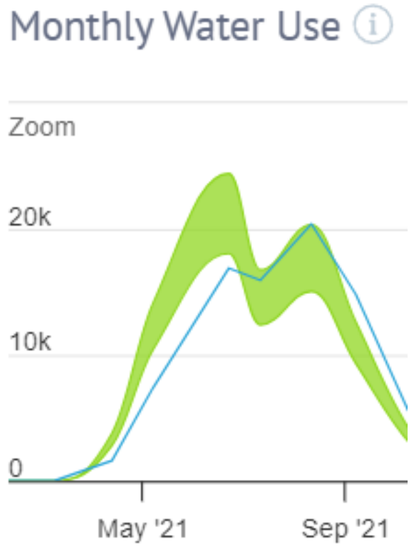
COMMERCIAL PROGRAM SERVICES

Consultation



Technology

Monitoring



GREEN GRASS, DONE RIGHT

Grass is a vital component of outdoor recreation areas, providing a range of ecological, aesthetic, and functional benefits

OVERVIEW

SPOKANE PUBLIC SCHOOLS IRRIGATION

619 Acres

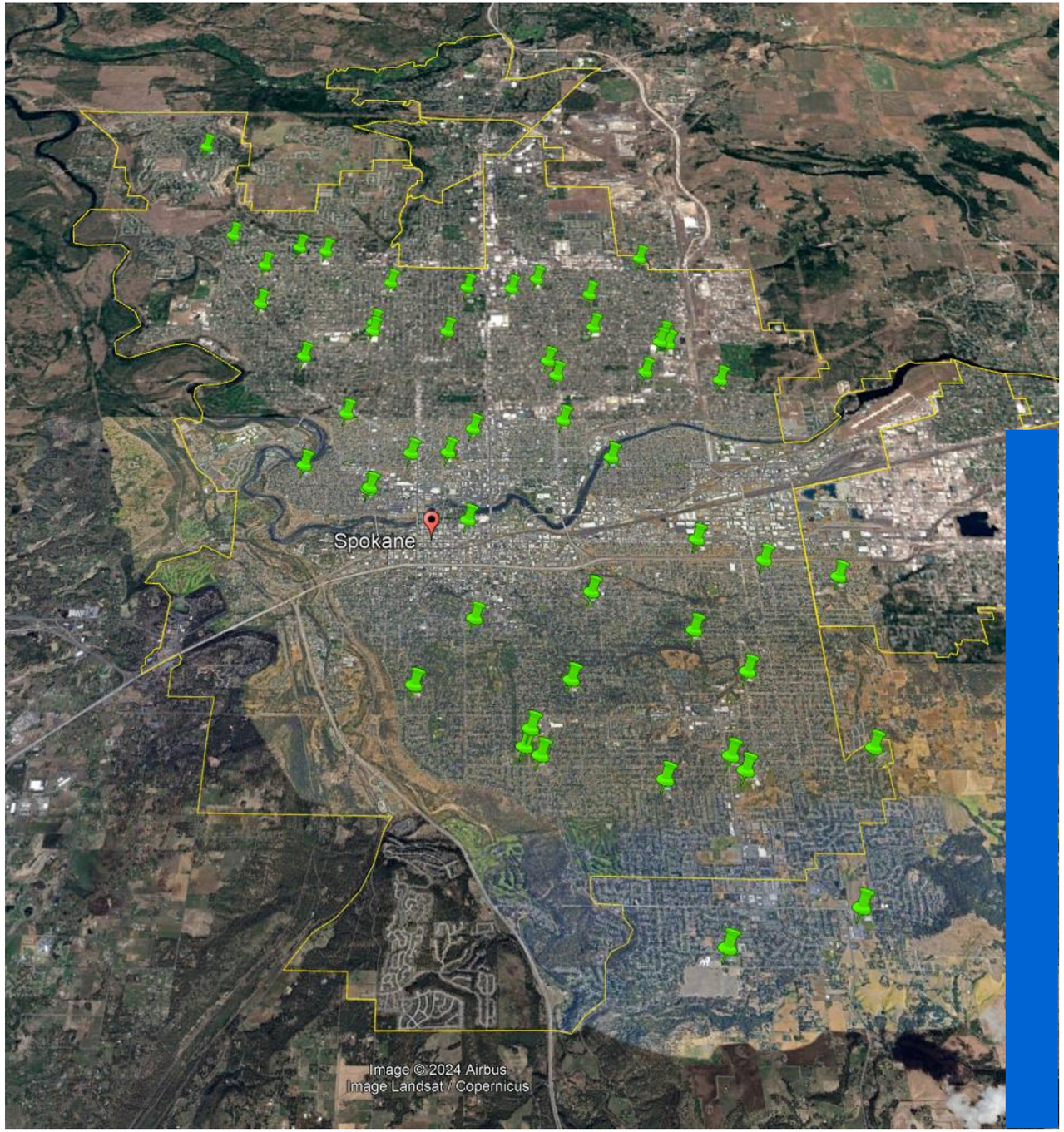
58 Sites with Irrigation

41 Sites with Smart Controllers

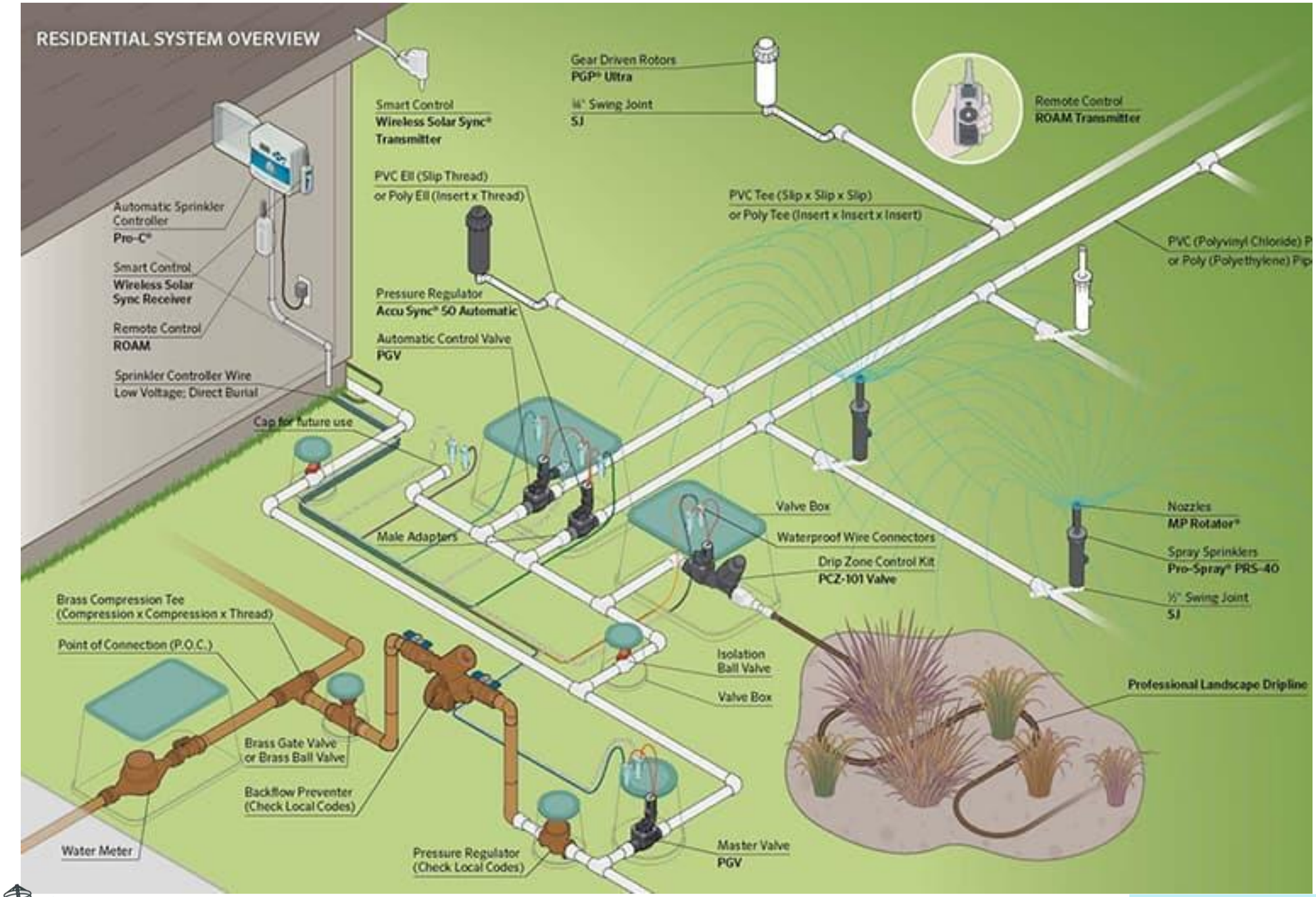
3 Techs for repairs

2 Techs to monitor/adjust

1 Irrigation Manager



MECHANICAL SYSTEM



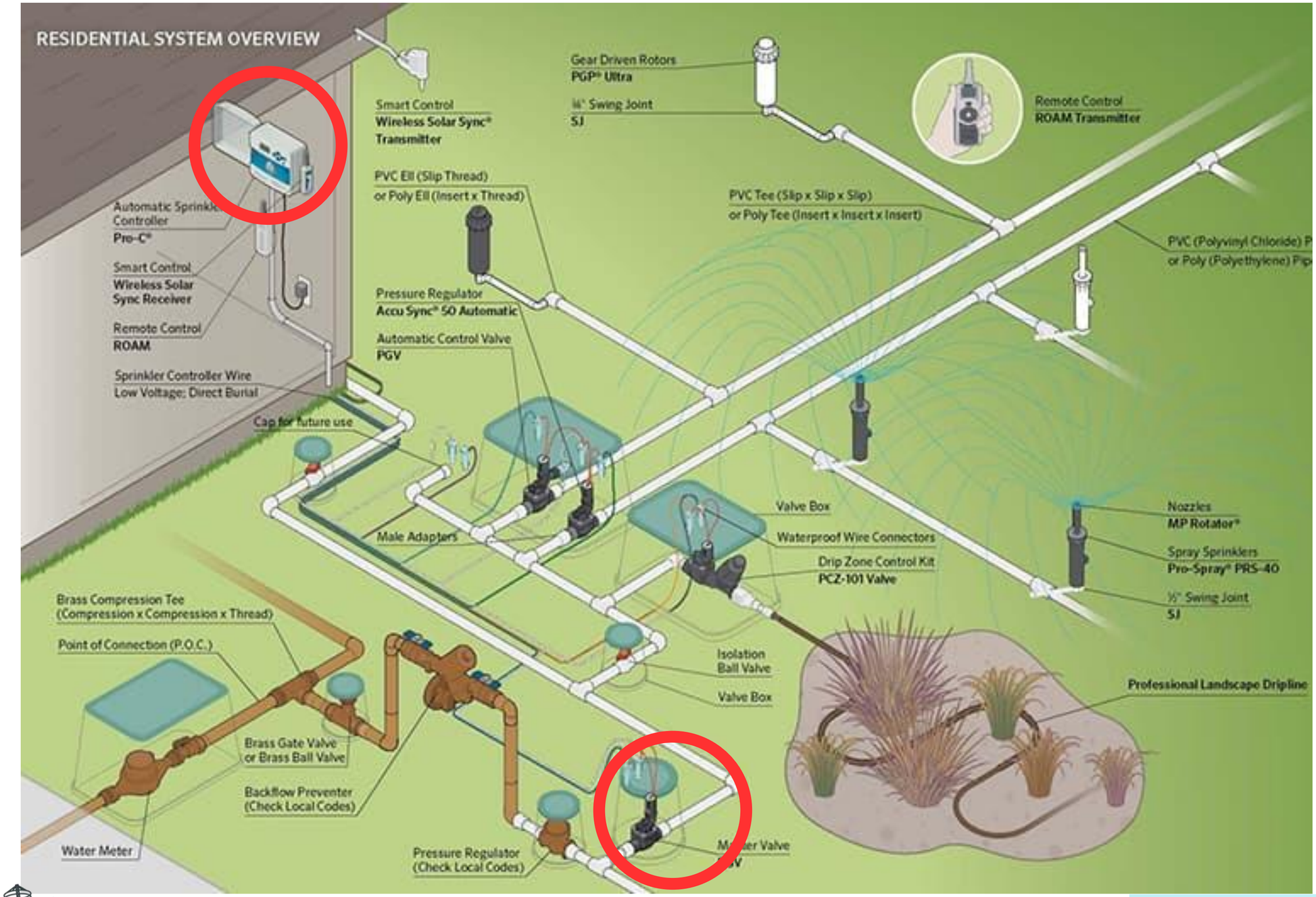
MECHANICAL REPAIRS

MECHANICAL REPAIRS

MECHANICAL REPAIRS

MECHANICAL REPAIRS

MECHANICAL SYSTEM



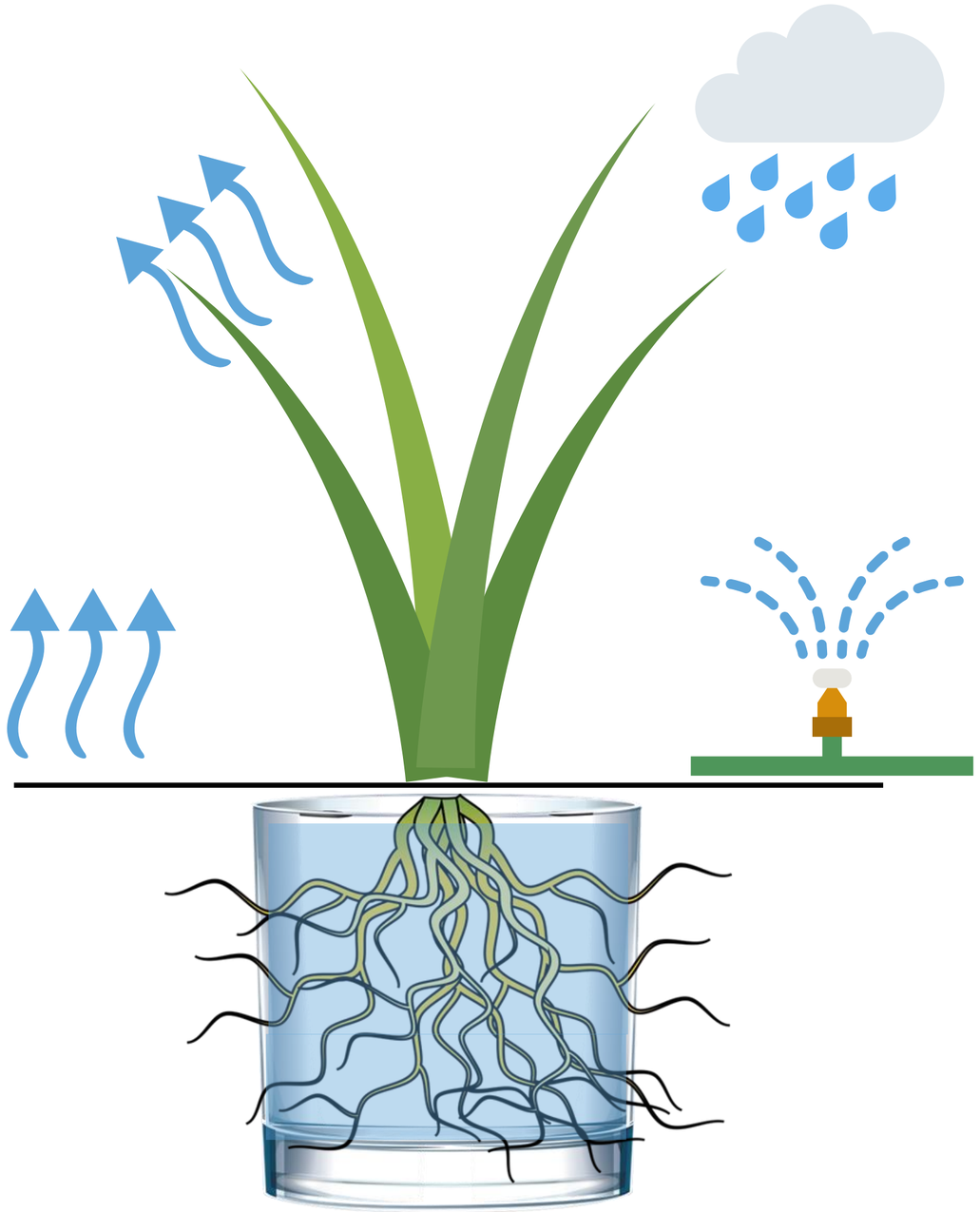
Alert/Action
Main Line Break

Alert/Action on
Zone Lines

Flow Meter &
Master Valve

WATER WISE SPOKANE

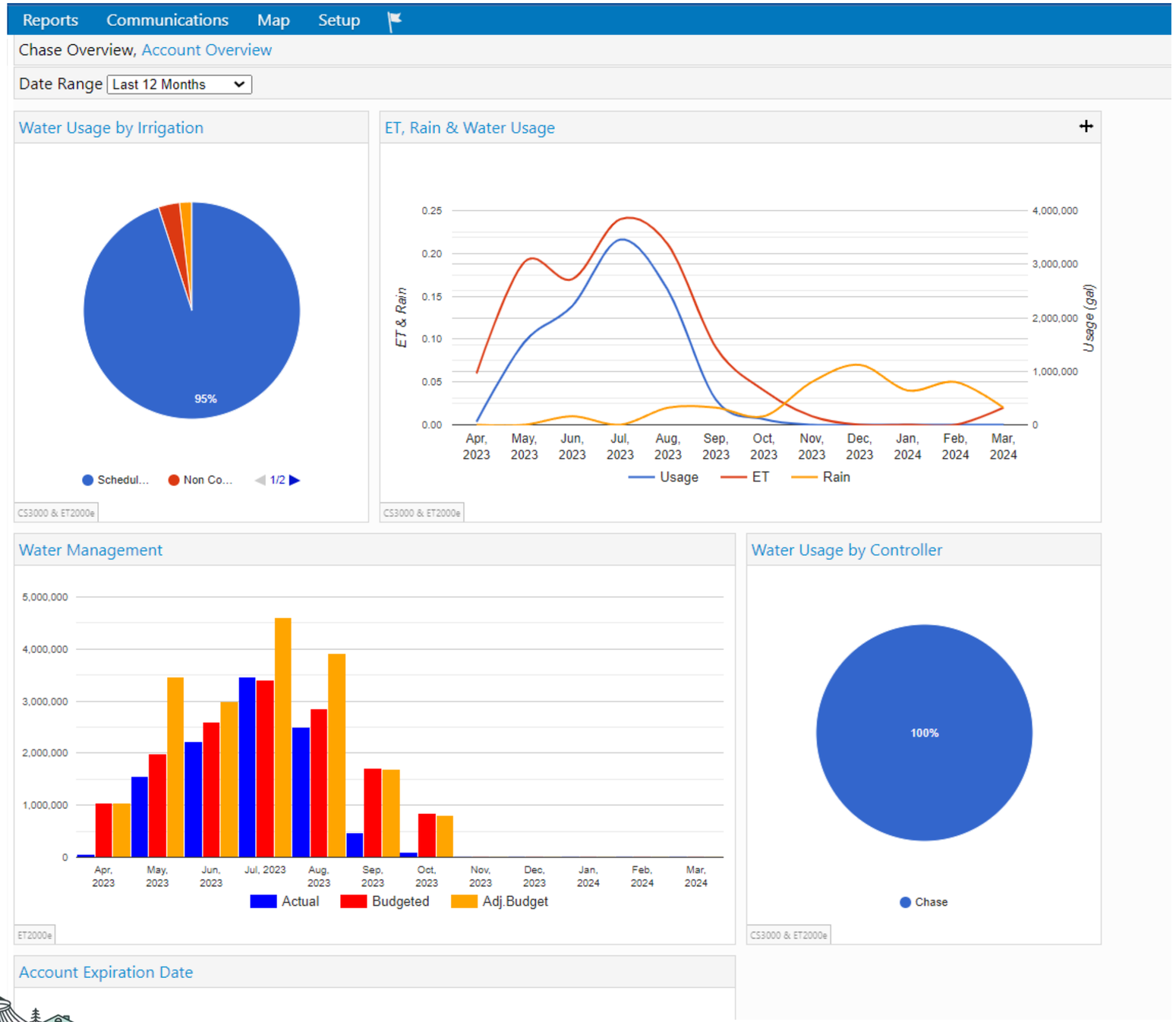
HOW IRRIGATION WORKS



EVAPOTRANSPIRATION (ET)

INCHES

OPERATIONAL SETTINGS



ET-based Watering

Cycle & Soak

Water Budget/Usage

Soil Moisture Sensors

Soil/Crop Coefficients

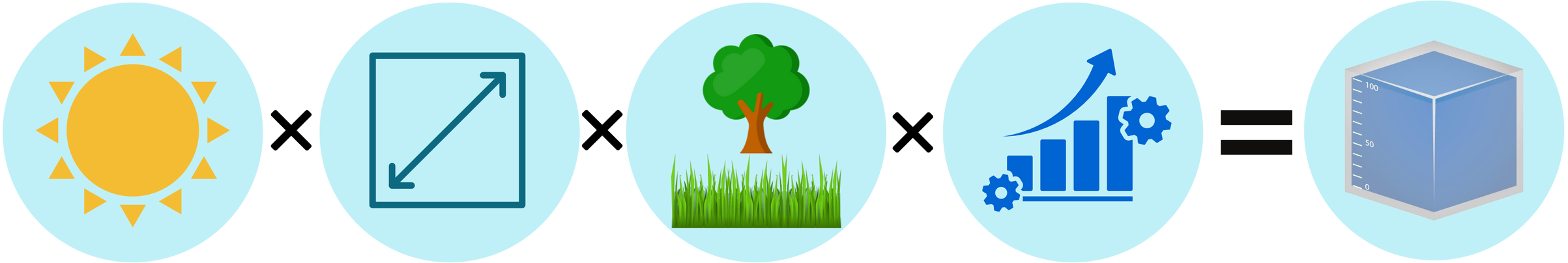
Matched Precipitation Rates

Rain/Wind Guages

GOOD COVERAGE = GOOD GRASS

IRRIGATION SCIENCE

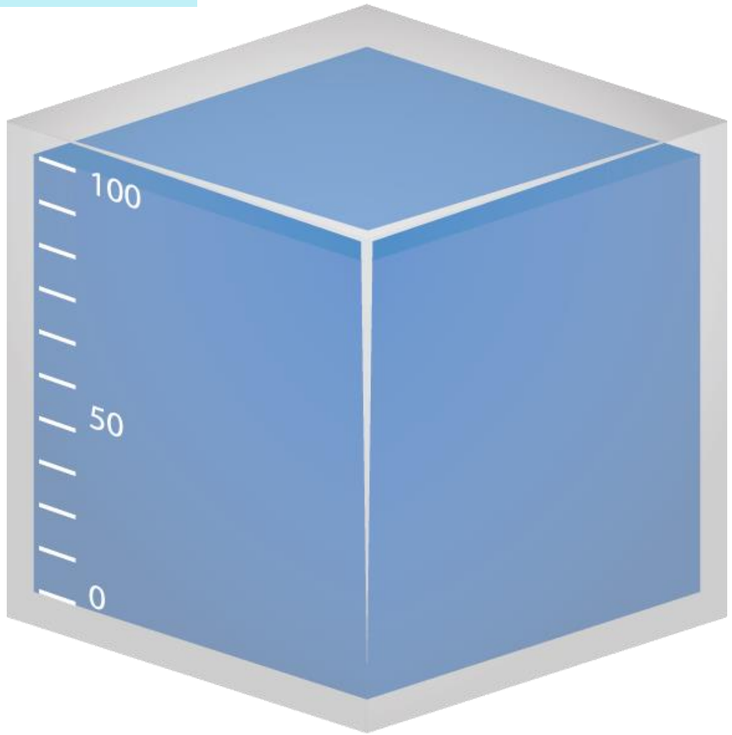
HOW MUCH WATER DO I NEED?

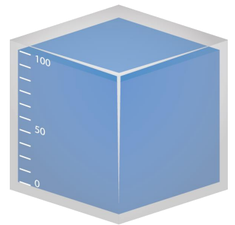


Local Weather × Landscape Area × Plant Type × System Efficiency = Water Need

WATER WISE SPOKANE

EFFICIENCY: Not too much. Not too little.



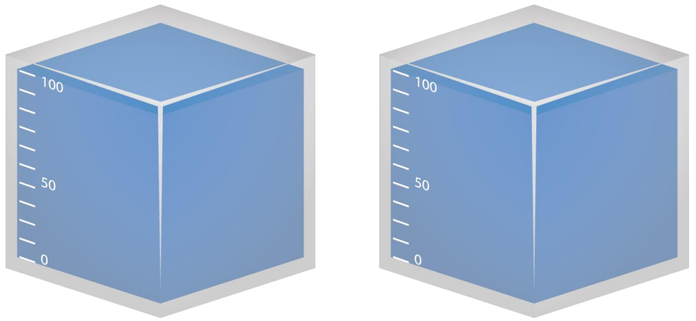


Big or small, the goal is to use the right amount for healthy grass.

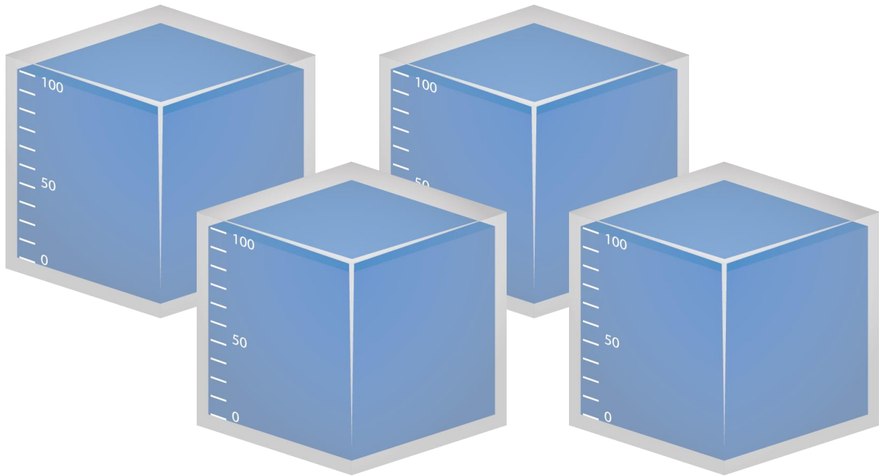
WATER WISE SPOKANE

HOW MUCH IS TOO MUCH?

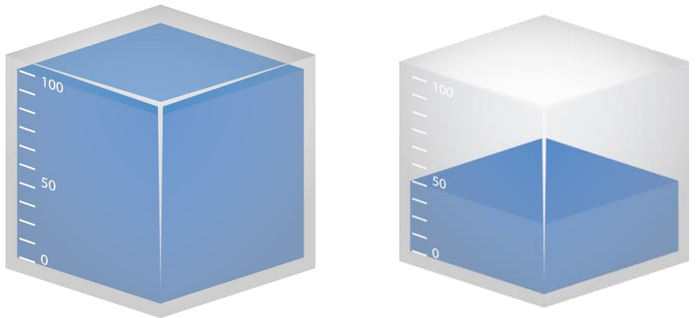
National Average: 2x



Spokane Average: 3-5x

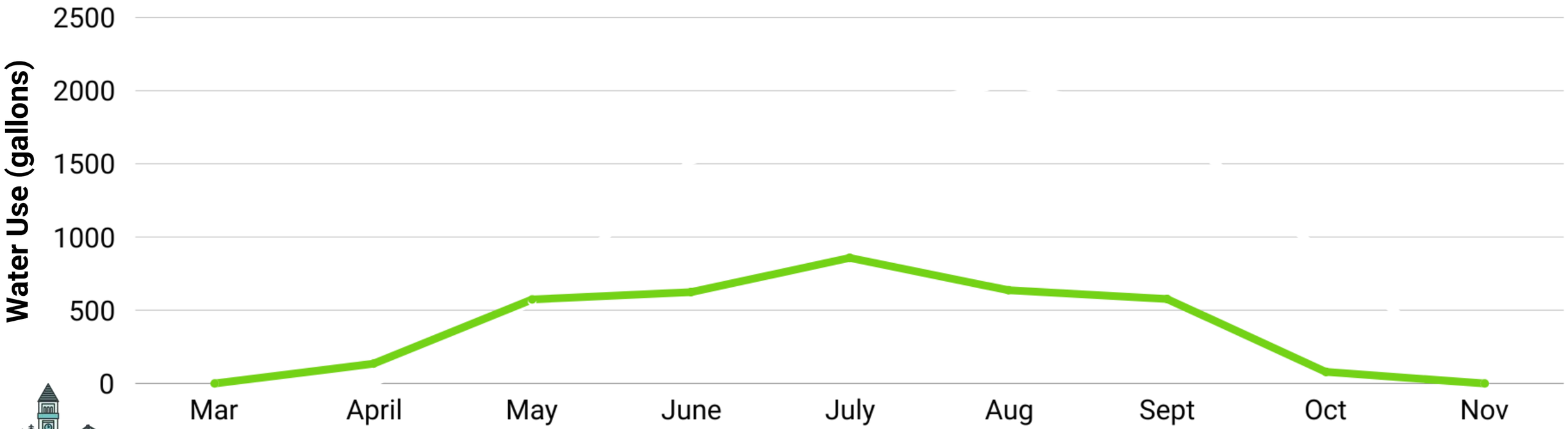


Our Goal: 1x+50%



MONTHY EFFICIENCY MONITORING

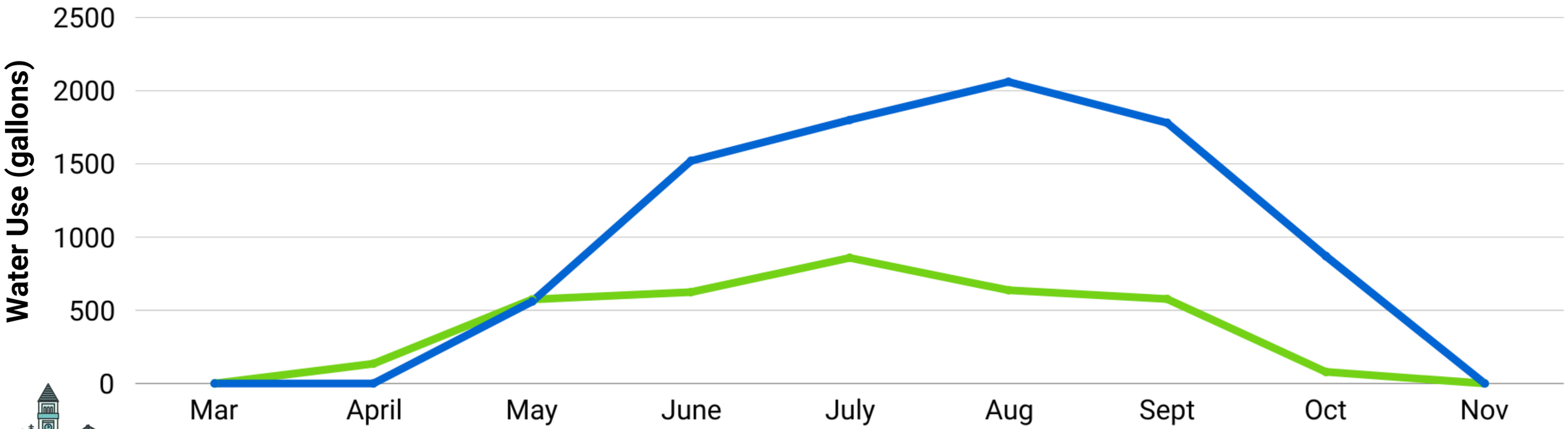
Water Need: The amount of water needed to replace water lost to plant and evaporation.



MONTHLY EFFICIENCY MONITORING

Water Need: The amount of water needed to replace water lost to plant and evaporation.

Water Use: Water actually used by the property per billing records.



MONTHLY EFFICIENCY MONITORING

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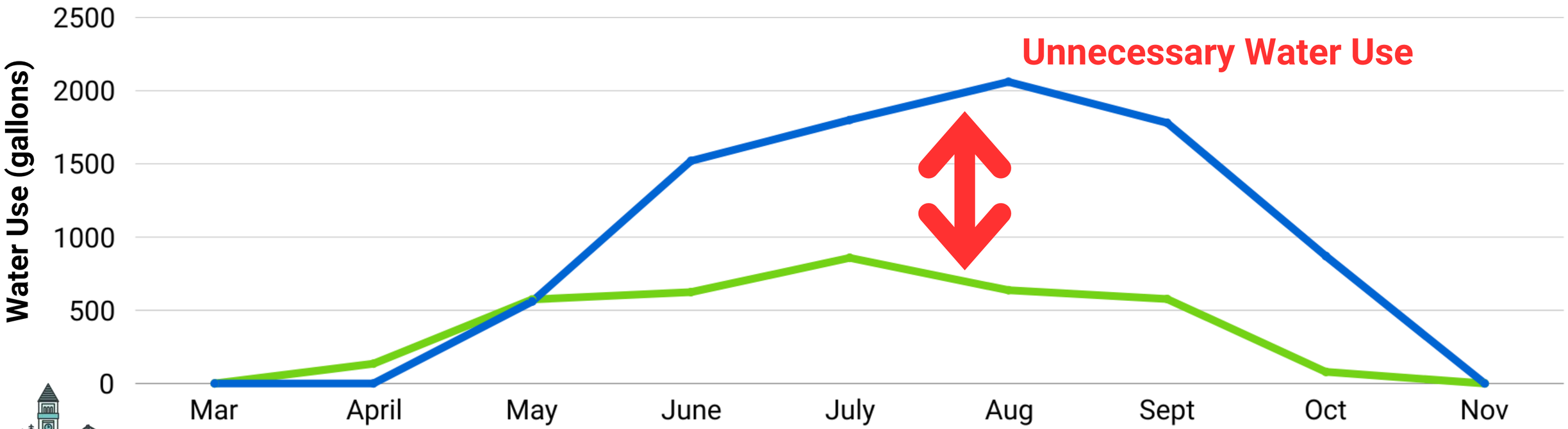


Waterfluence

Site Dashboard

Name	Acres
Hart Field South *in Spokane* Spokane School	23.7
Chase Middle *in Spokane* Spokane School	15.7
Salk Middle *in Spokane* Spokane School	12.2
Balboa Elem *in Spokane* Spokane School	5.6
Lincoln Heights *in Spokane* Spokane School	3.9
Lewis and Clark High School *in Spokane* Spokane School	3.7
Logan Elem *in Spokane* Spokane School	2.5

Irrigation Map

Shift

Edit Map

Updated 8 months ago

Shrub
54,310 ft²

Turf
977,443 ft²

Print

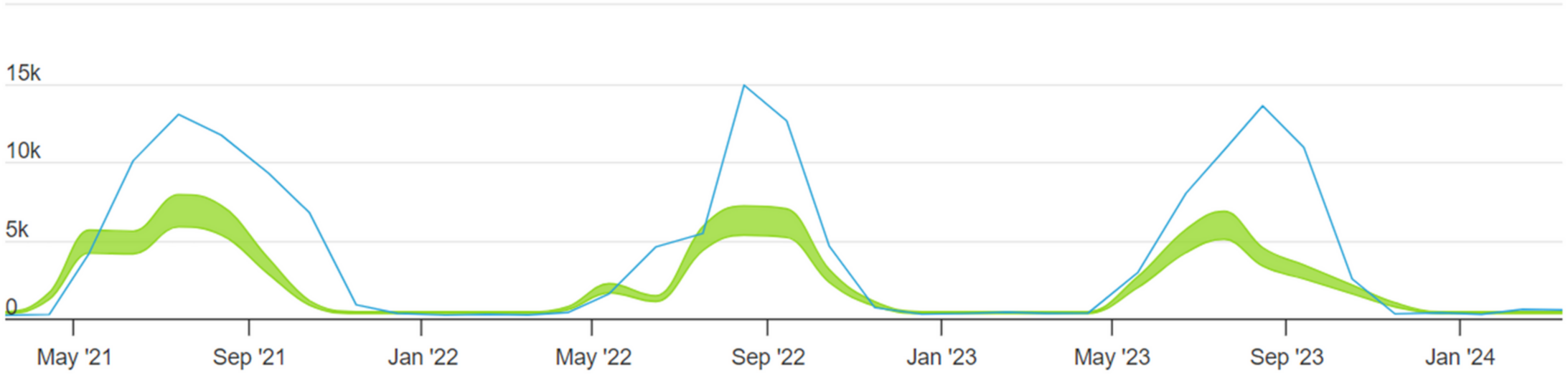
SATELLITE | MAP

Annual Performance

232%	$39k	79%	15	4.3'	1.8'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 1000 Gallons

Ft³ | Gallons | $ Cost | Depth



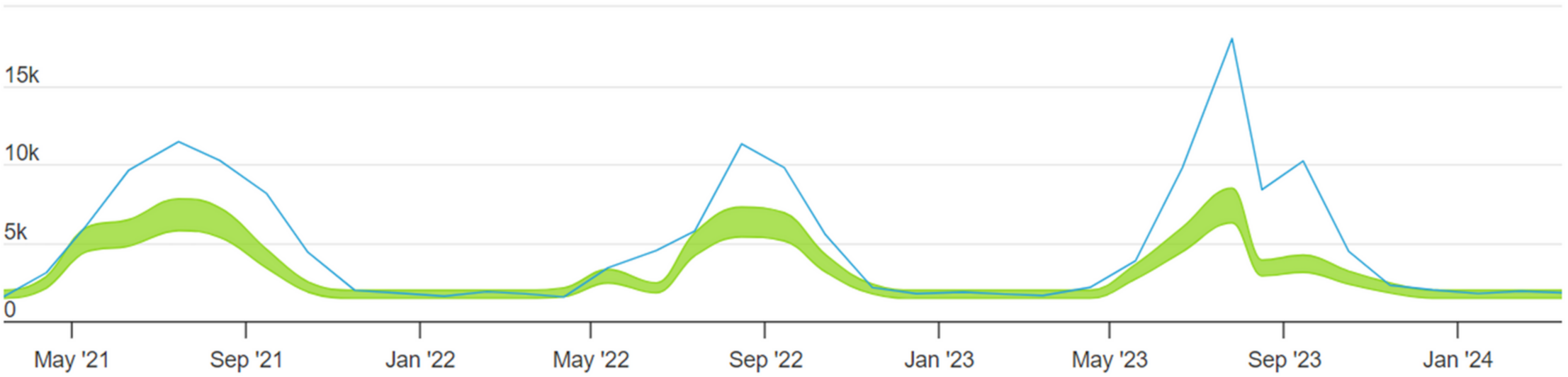
Typical Spokane Property

Annual Performance

294%	$33k	88%	21	5.0'	1.7'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 100 Cubic Feet

Ft³ | Gallons | $ Cost | Depth



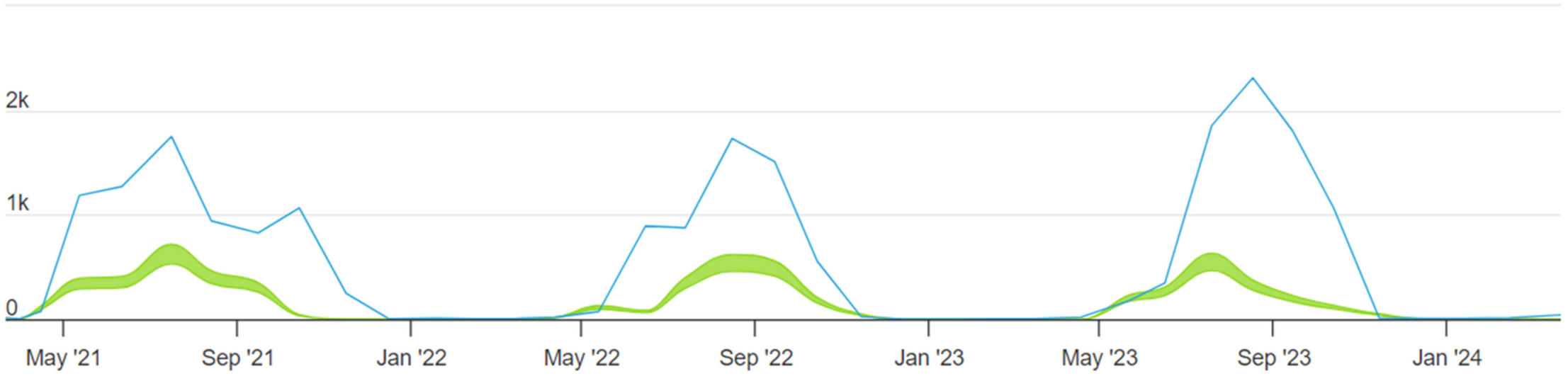
Typical Spokane Property

Annual Performance

451%	$6.5k	69%	2	7.7'	1.7'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 100 Cubic Feet

Ft³ | Gallons | $ Cost | Depth



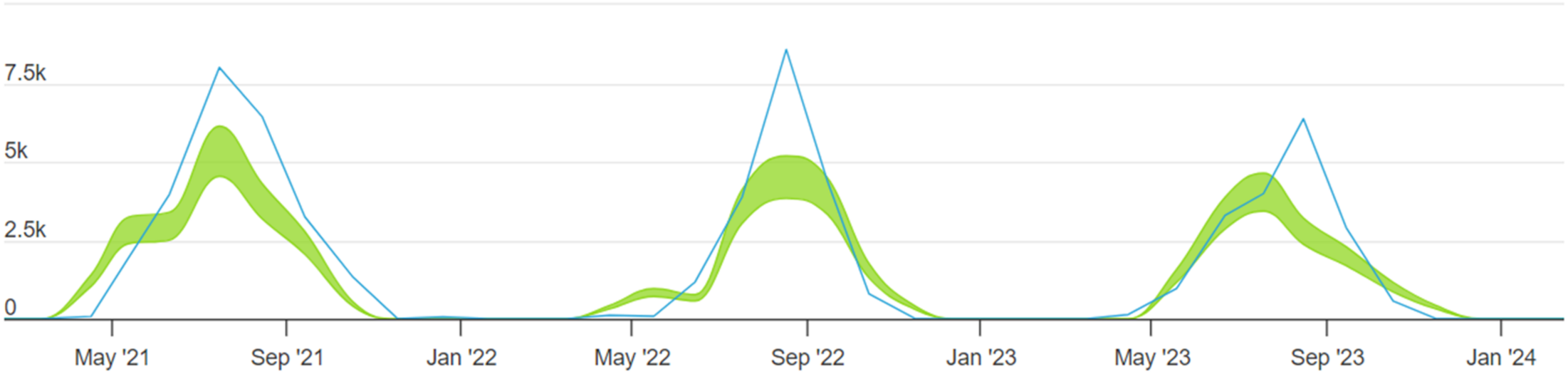
Typical Spokane Property

Annual Performance

122%	$6.7k	80%	47	2.4'	1.9'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 1000 Gallons

Ft³ | Gallons | $ Cost | Depth



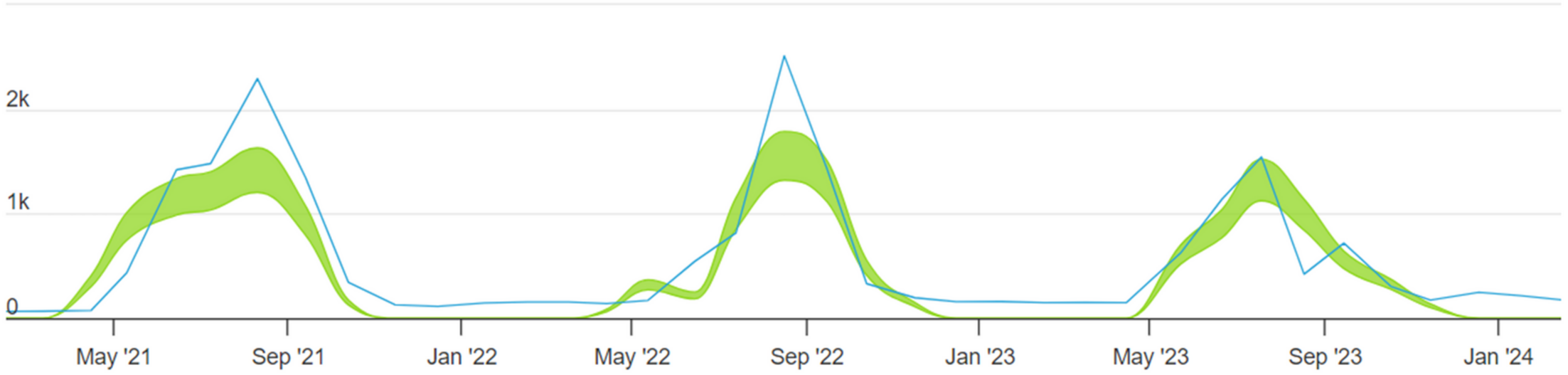
Hart Field South

Annual Performance

121%	$1.7k	82%	49	2.4'	2.0'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 100 Cubic Feet

Ft³ | Gallons | $ Cost | Depth



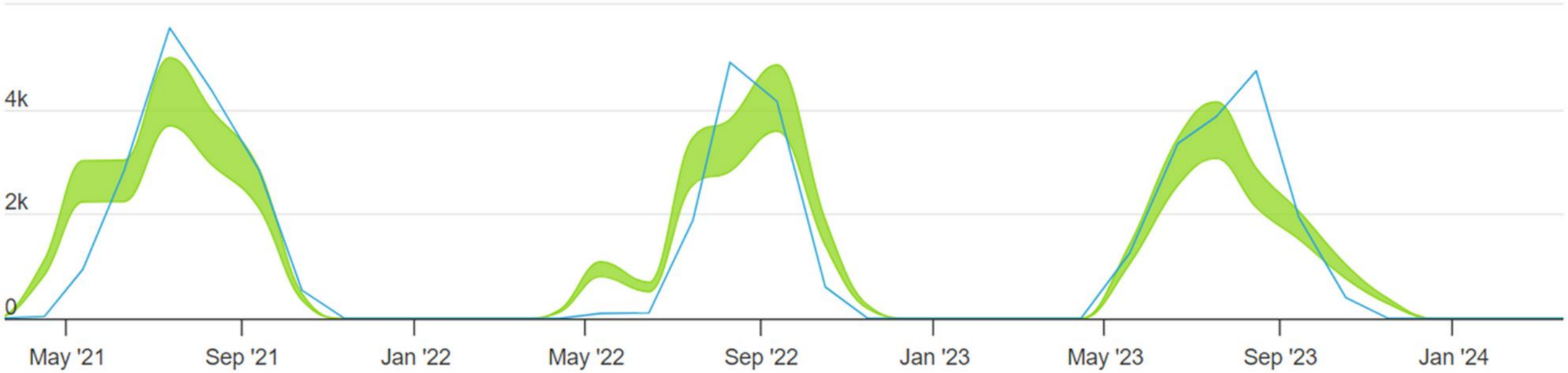
Balboa Elementary

Annual Performance

116%	$3.3k	88%	72	2.3'	2.0'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 100 Cubic Feet

Ft³ | Gallons | $ Cost | Depth



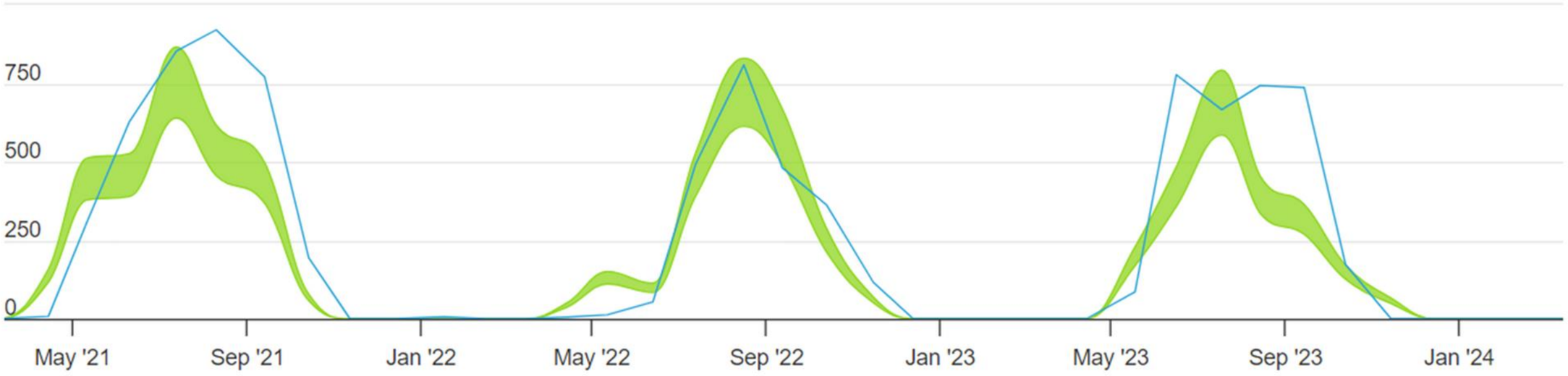
Chase Middle School

Annual Performance

143%	$1.7k	80%	33	2.7'	1.9'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 1000 Gallons

Ft³ | Gallons | $ Cost | Depth



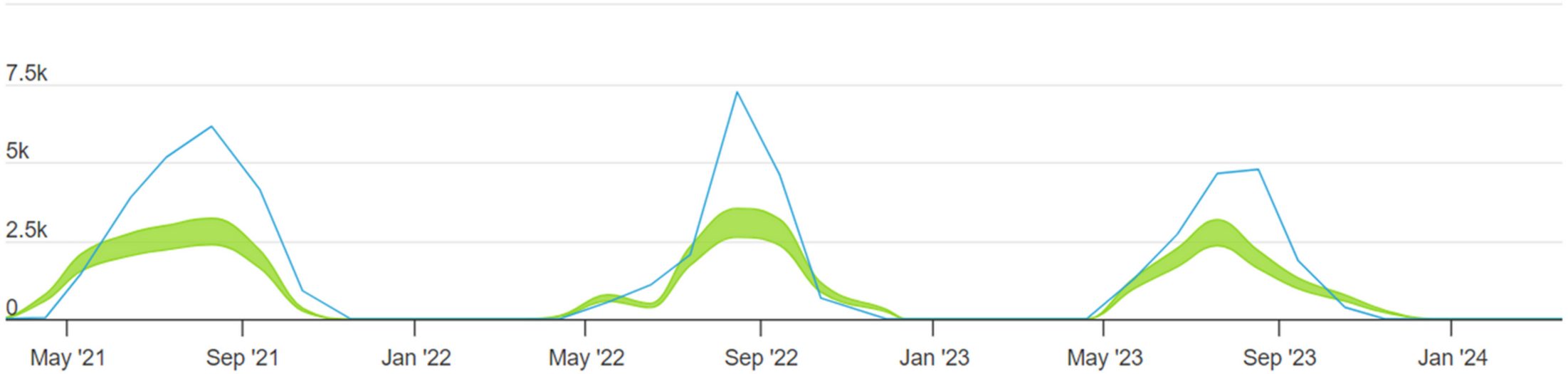
Lewis & Clark HS

Annual Performance

160%	$6.9k	87%	28	2.9'	1.8'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 100 Cubic Feet

Ft³ | Gallons | $ Cost | Depth



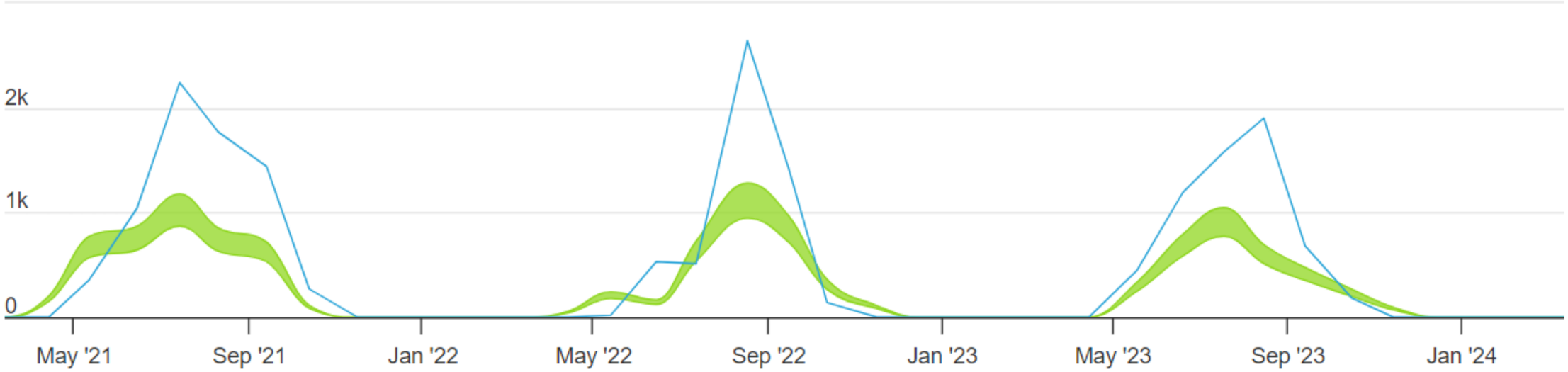
Salk MS

Annual Performance

186%	$3.1k	87%	19	3.6'	1.9'
Budget	Lost $	Seasonal	Score	Applied	Budget

Monthly 100 Cubic Feet

Ft³ | Gallons | $ Cost | Depth



Lincoln Heights

THE GOAL

BUILDINGS NEED COOLING/HEATING

OVERVIEW

HEATING & COOLING

108 Hydronic Boilers

87 Chillers

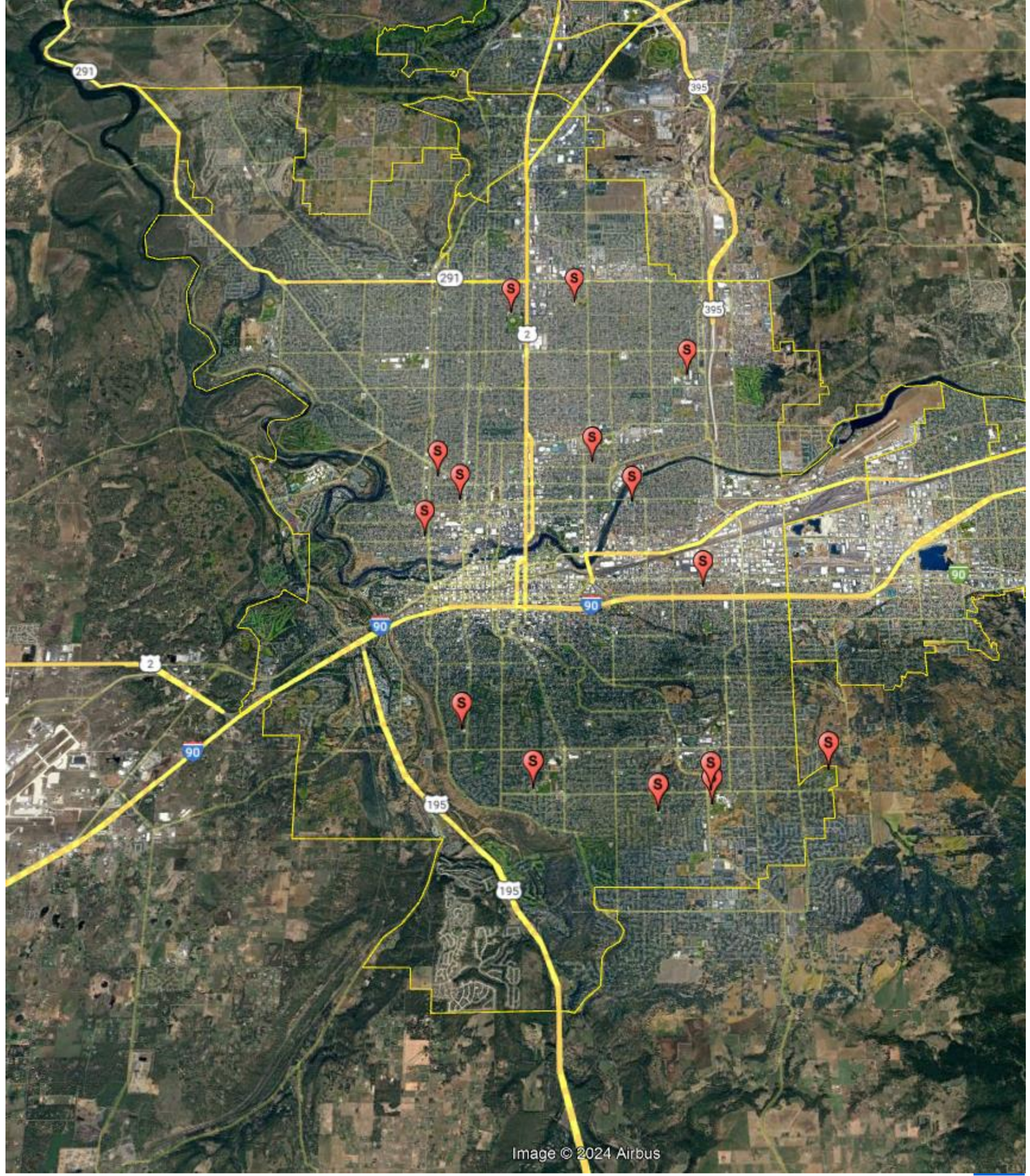
15 Steam Boilers

6 Evaporative Condensers

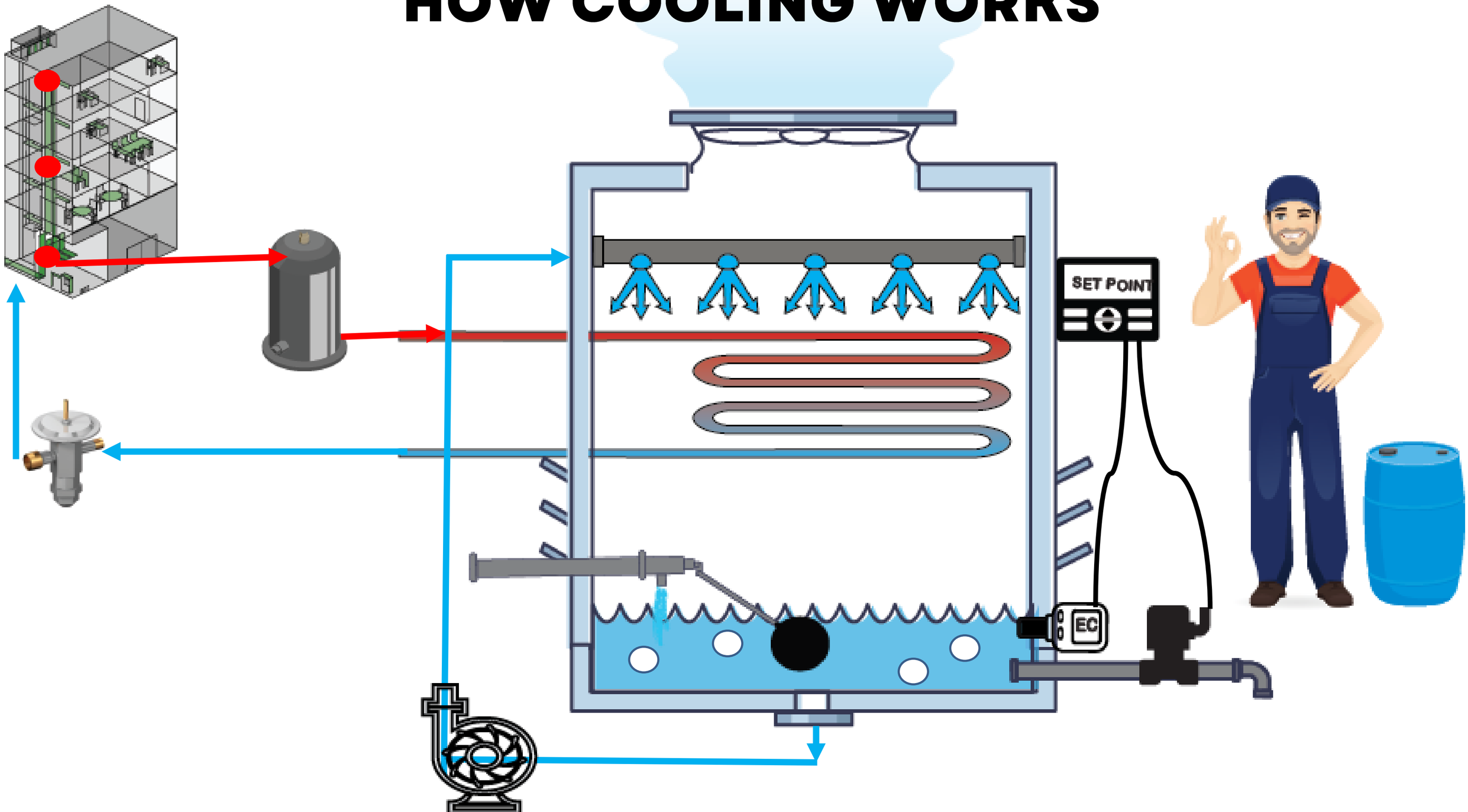
8 Techs for repairs

2 Techs to monitor/adjust

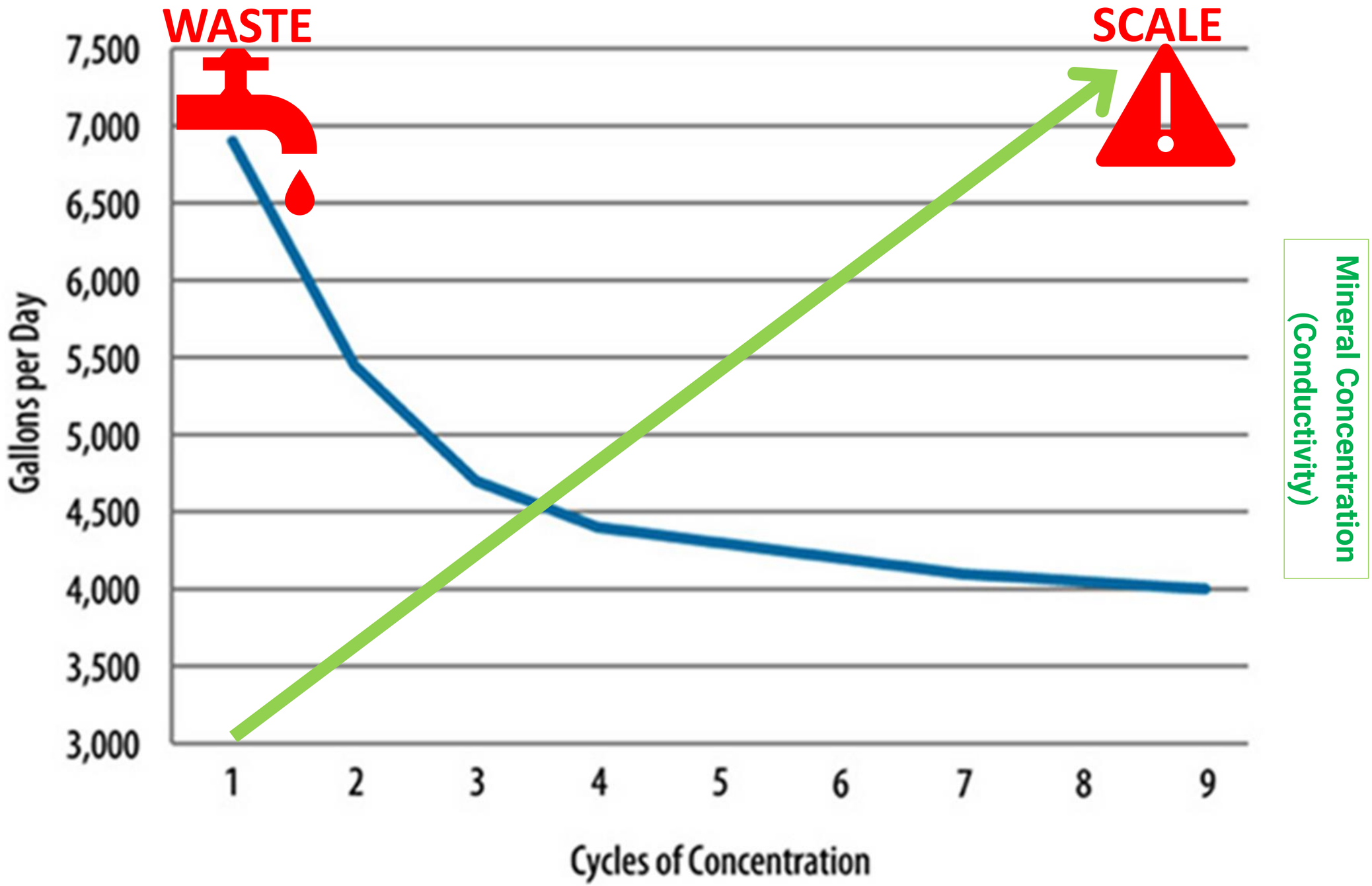
1 HVAC Manager



HOW COOLING WORKS



WHAT IS EFFICIENT?



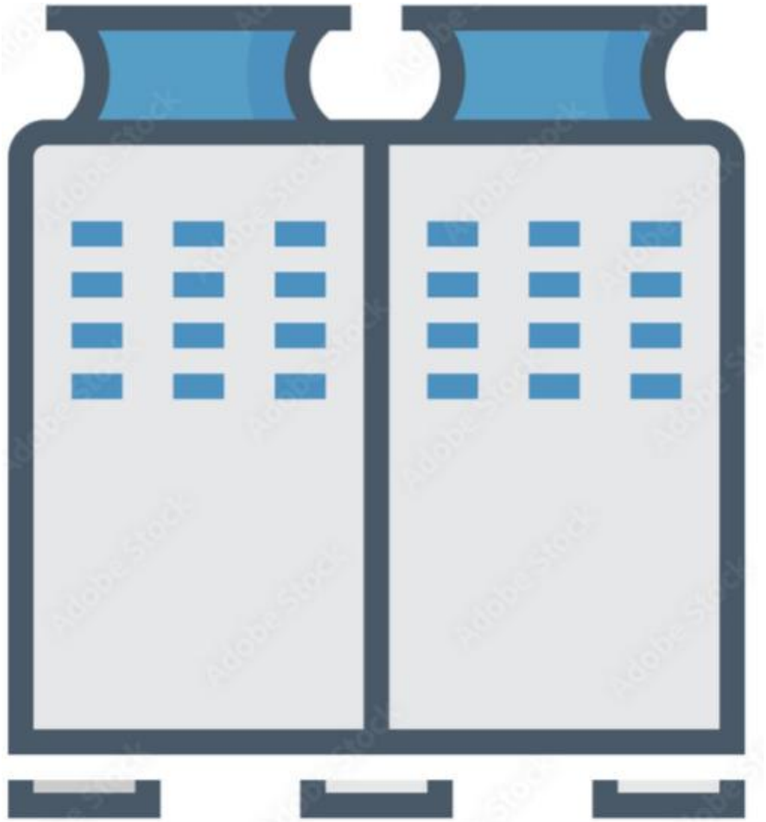
ALL WASTE IS BAD

WATER WASTE

SCALE

IT DEPENDS

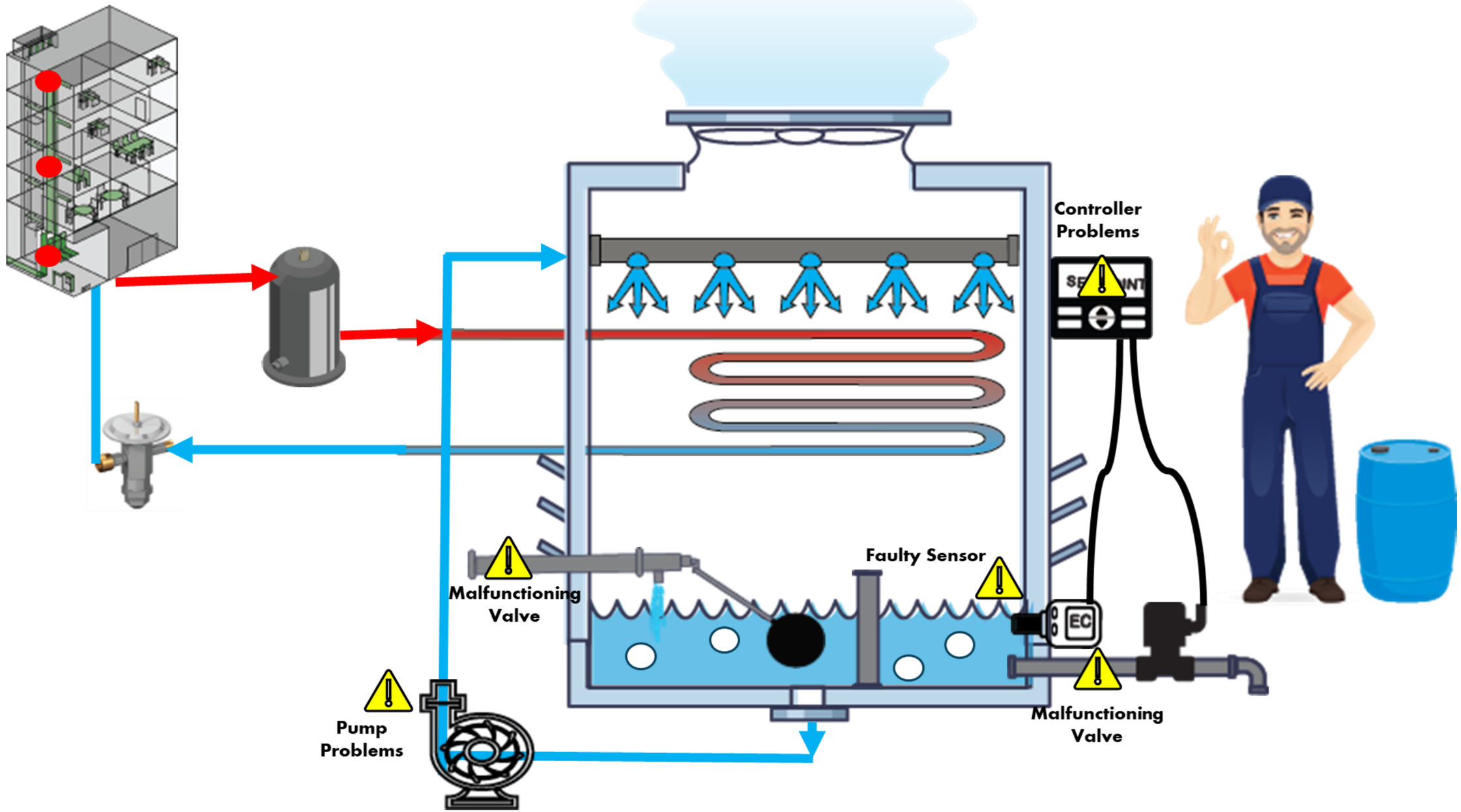
TOWER DESIGN/ CONDITIONS



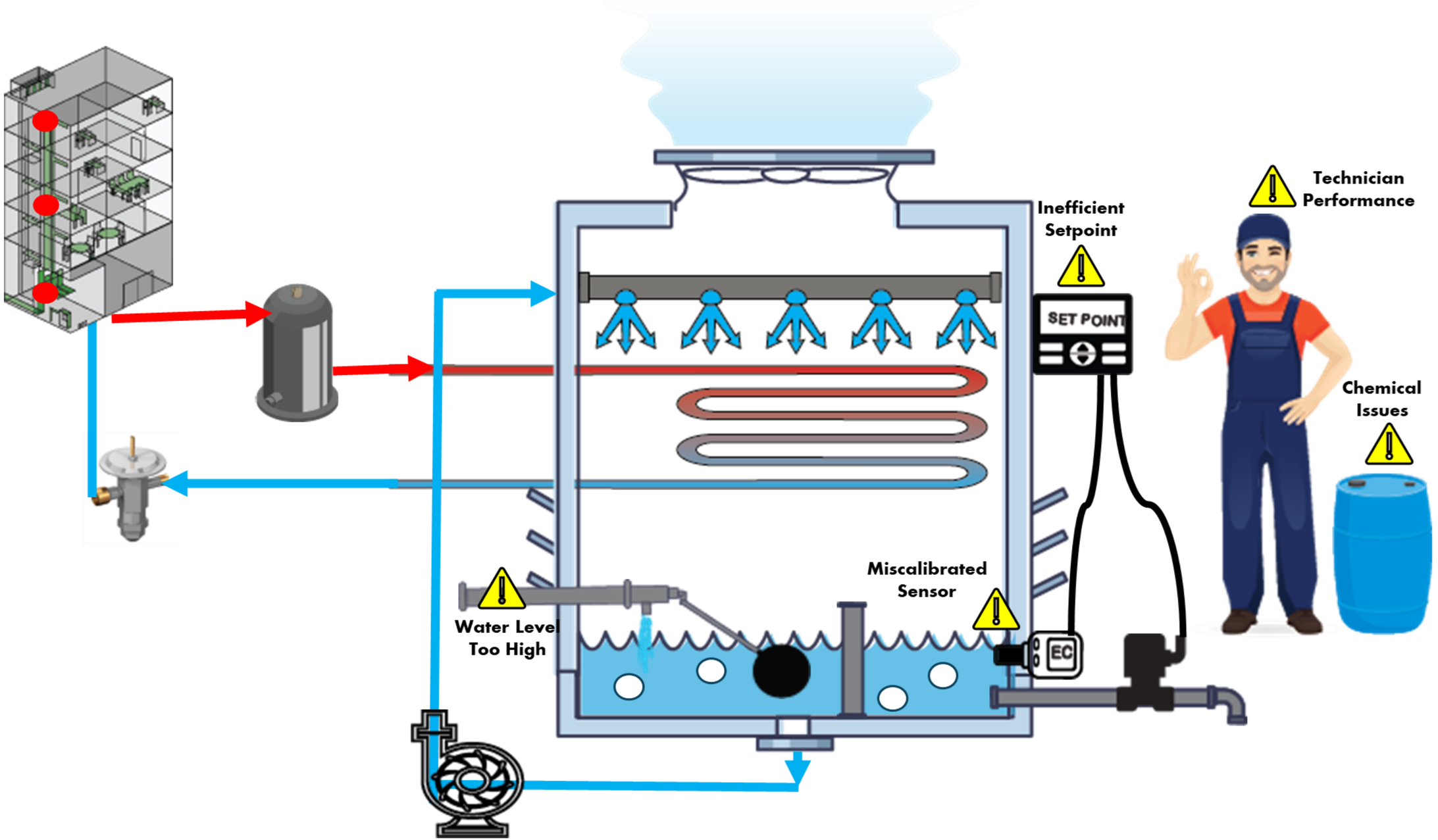
WATER QUALITY

WATER TREATMENT

MECHANICAL SYSTEM



OPERATIONAL SETTINGS



DESIGN ADJUSTMENTS

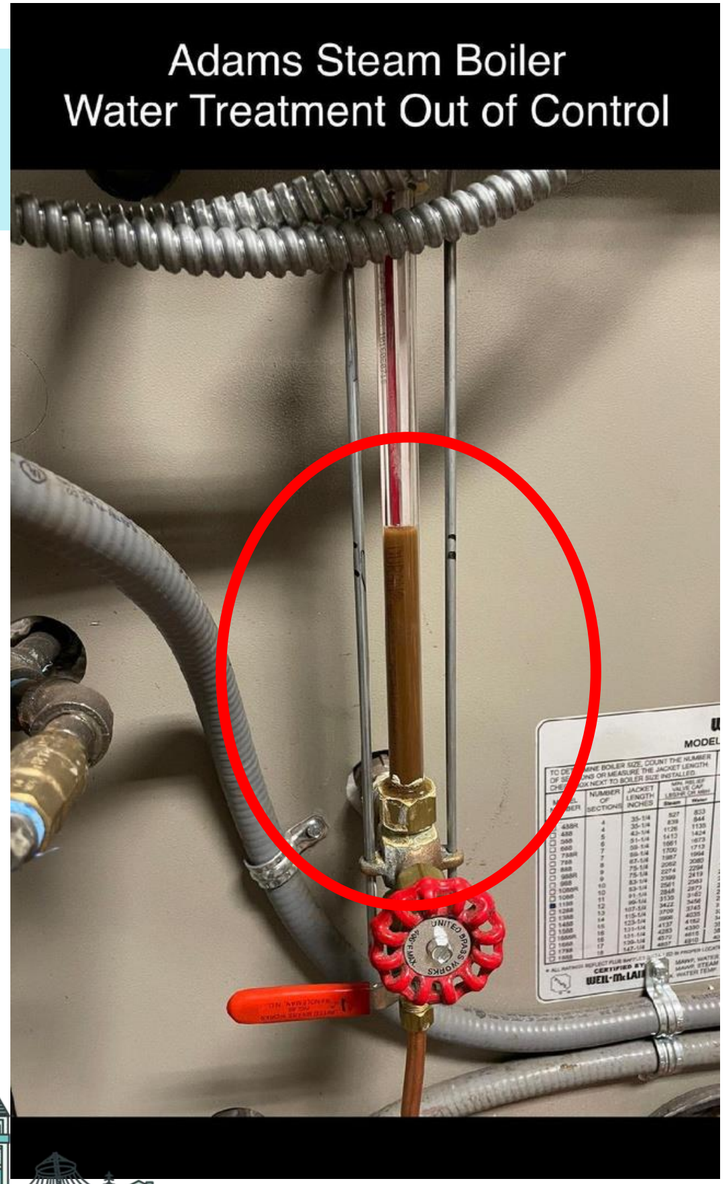
DESIGN ADJUSTMENTS

Havermale Steam Boiler
Before Chemical Controls Upgrade

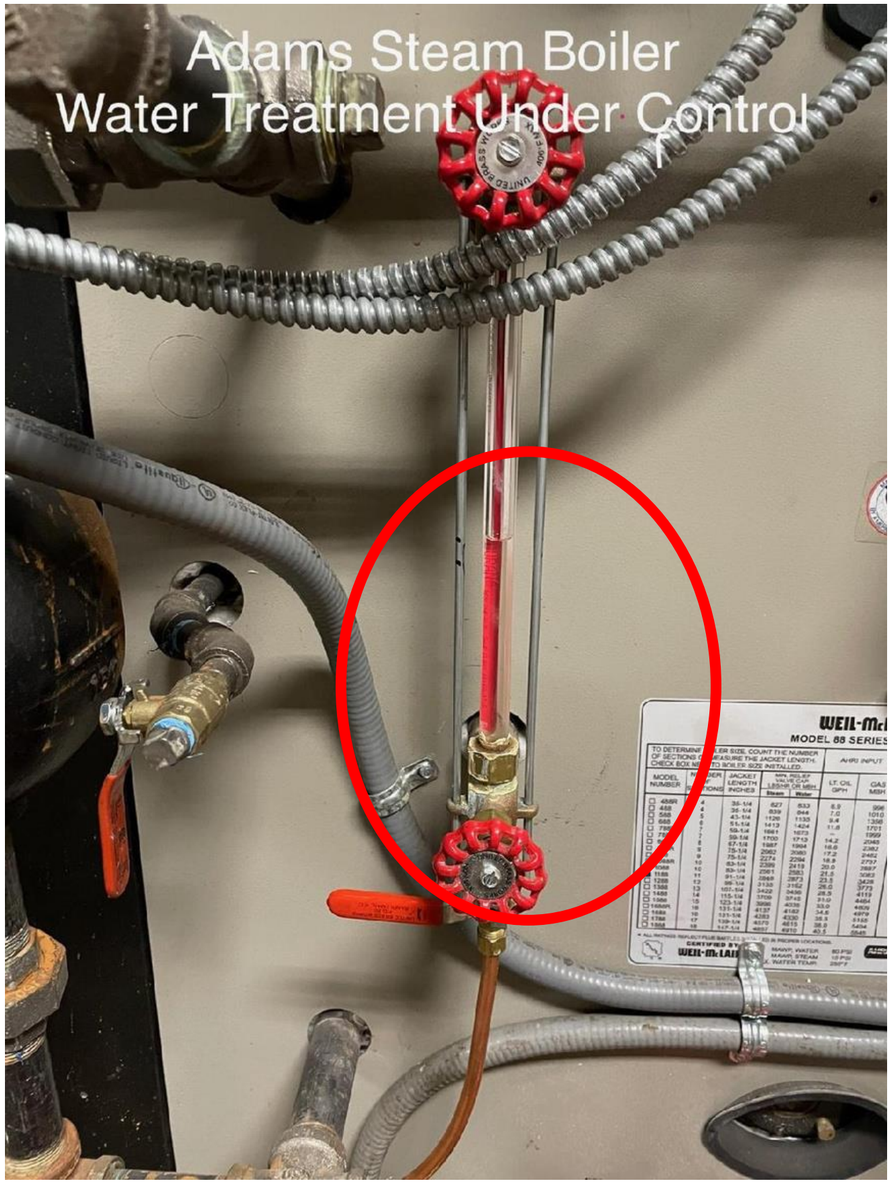
Havermale Steam Boiler
After Chemical Controls Upgrade

40% REDUCTION IN CHEMCIAL USE!

NEW CHEMICAL PROGRAM



Caustic Embrittlement at 12.5 pH



50,000 GALLON REPAIR *plus chemical, energy, asset life*

115

15

NEW CHEMICAL PROGRAM *on a budget*

Reuse existing supplies

avoiding

$10k in new stuff

REVERSING DEFERRED MAINTENANCE

REVERSING DEFERRED MAINTENANCE

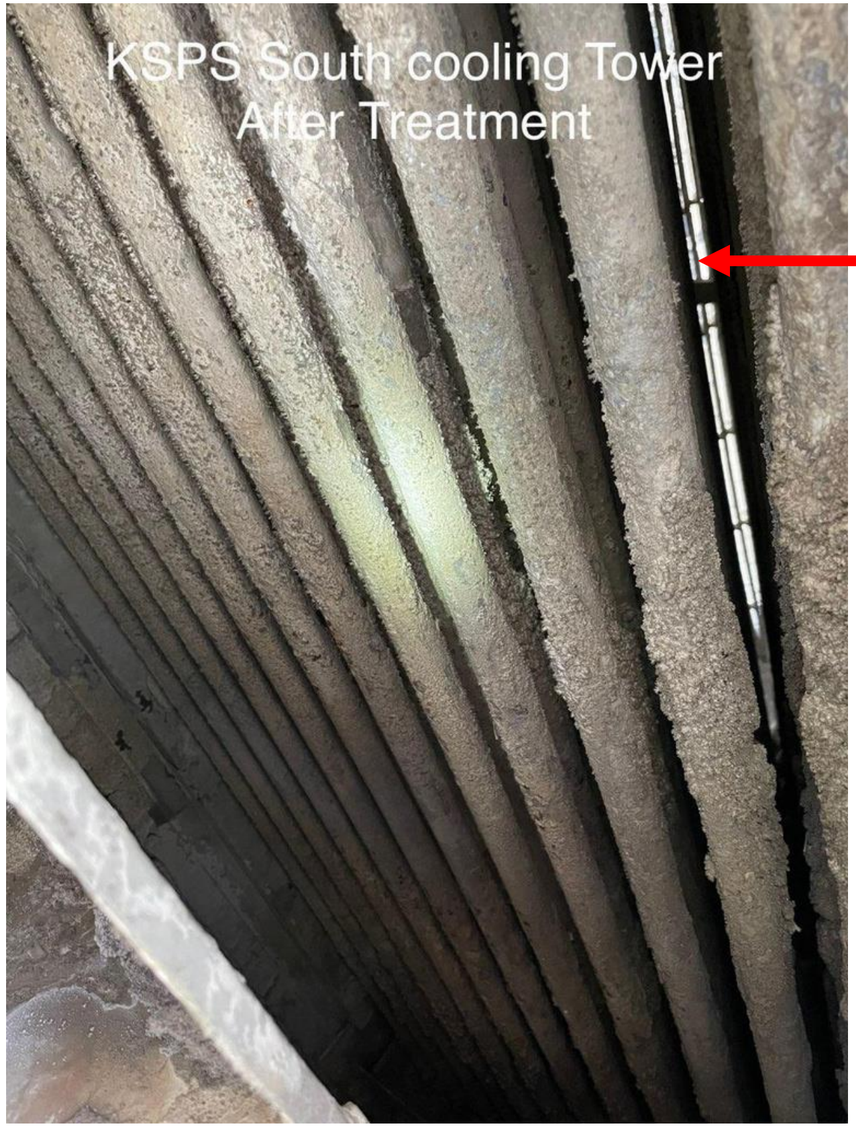
REVERSING DEFERRED MAINTENANCE

Running at 100% Load in April

Running at 25% Load in August

REVERSING DEFERRED MAINTENANCE

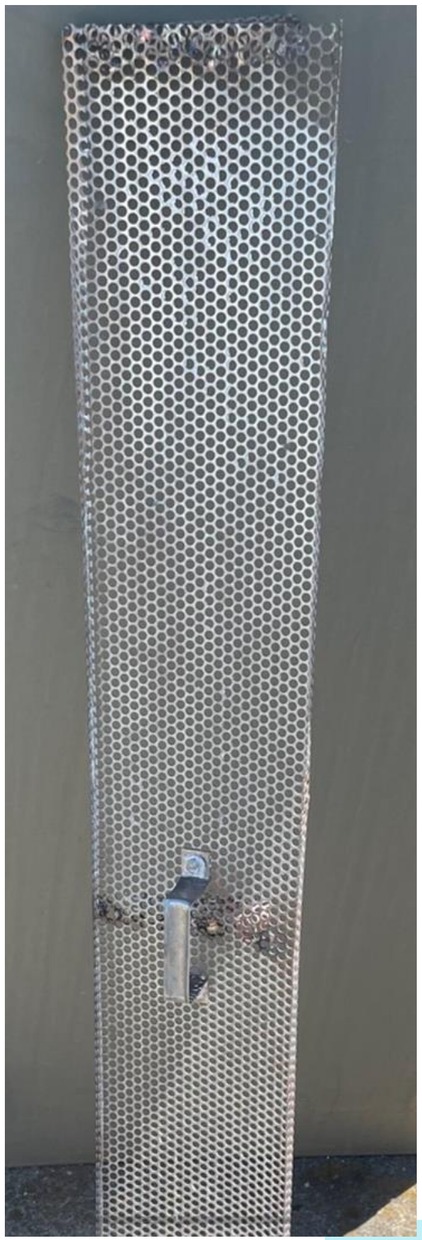
Blocked by scale



See the light of day!

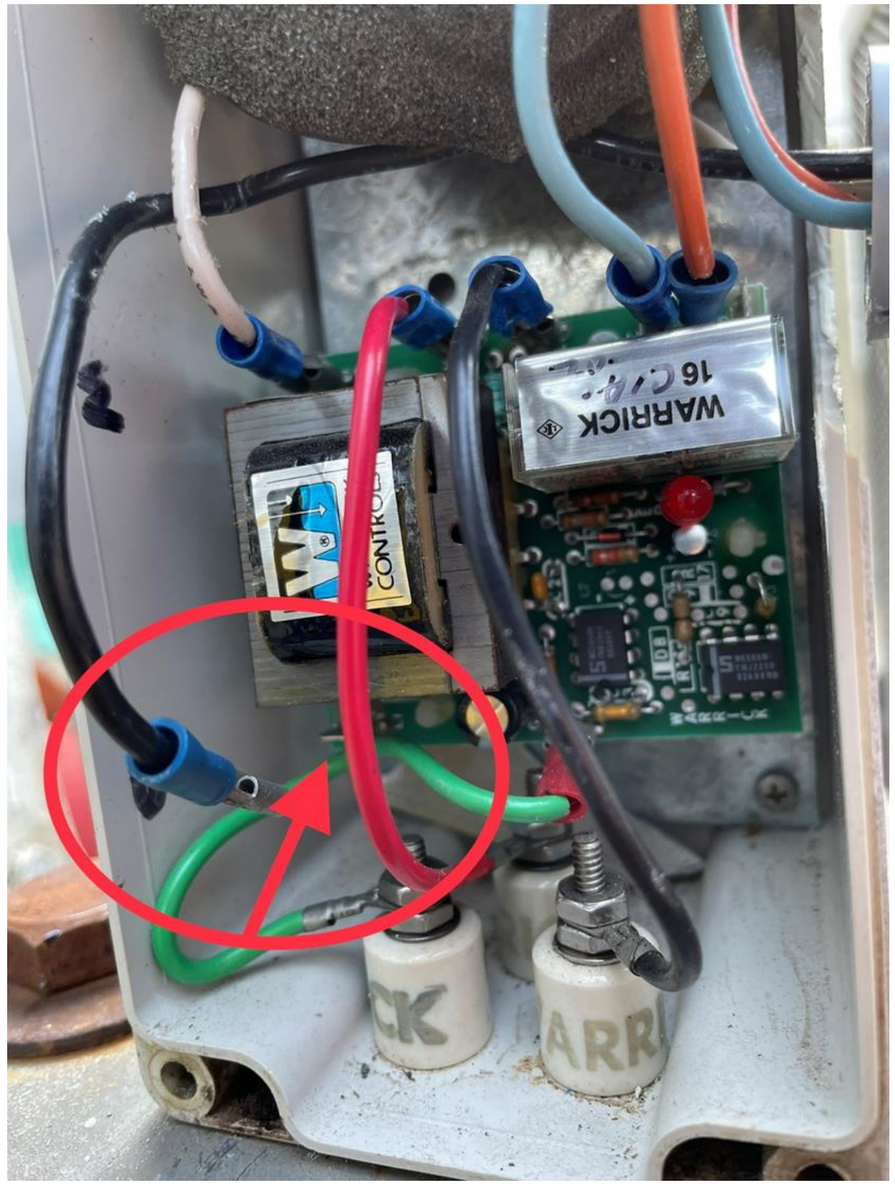
REVERSING DEFERRED MAINTENANCE

30 years of scale…
CLR? Yeah right!



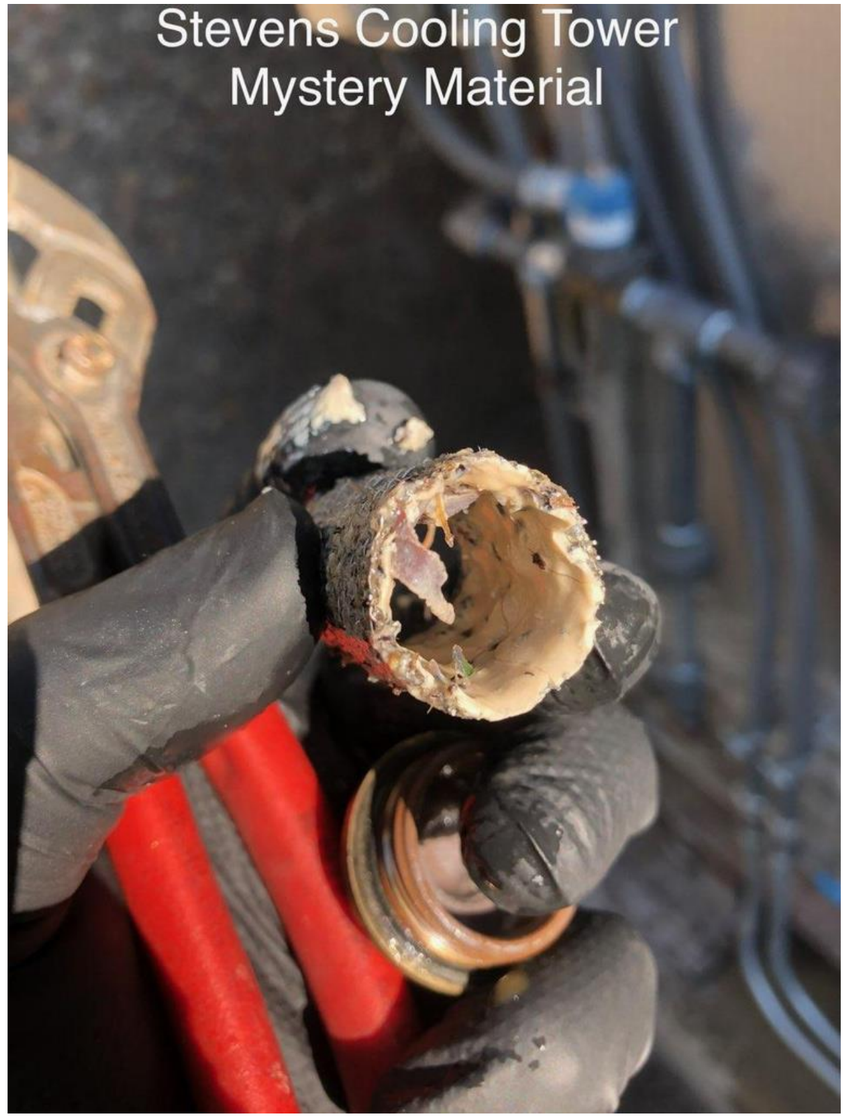
2 days of 1.8 pH
Acid Treatment

HIDDEN & HARD TO FIND

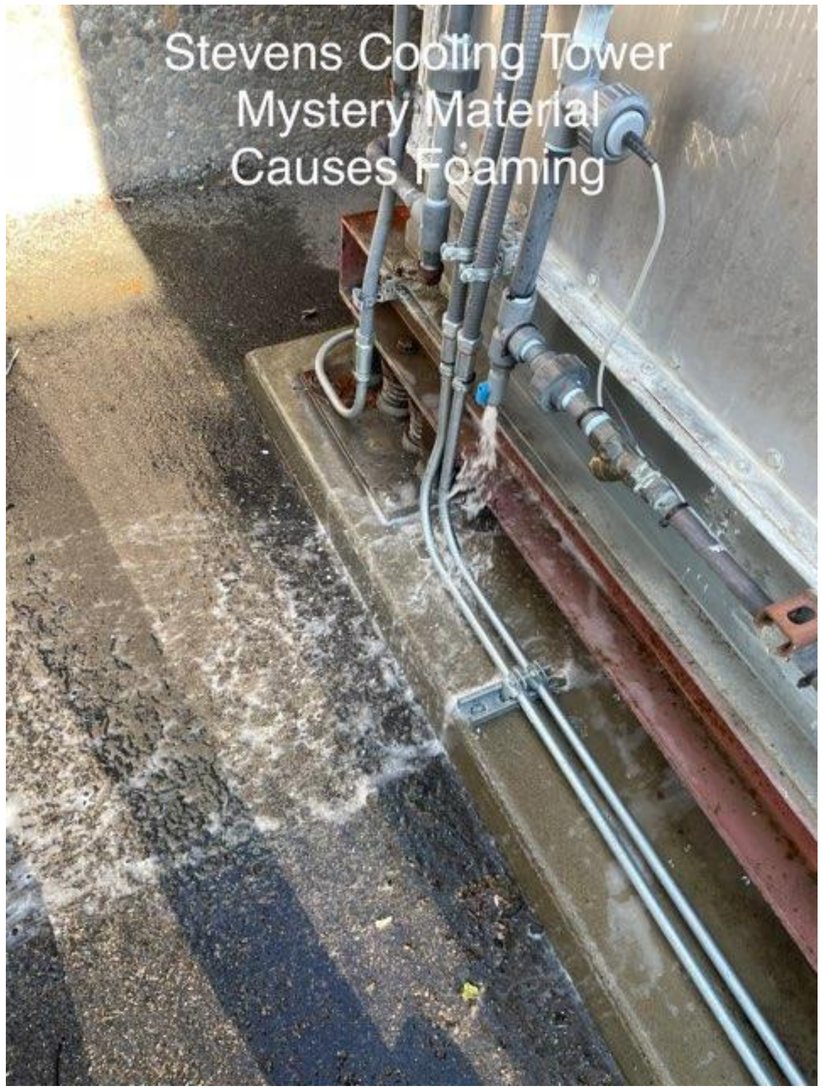


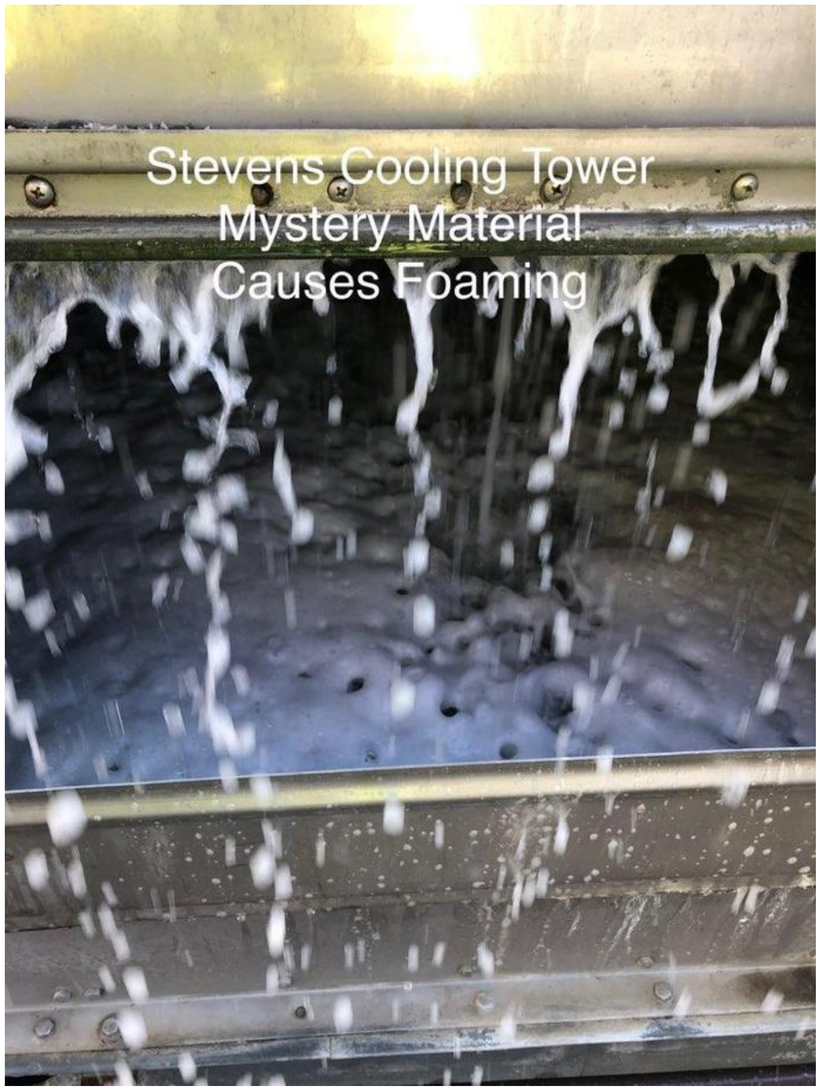
A 10,000 GALLON PROBLEM

MYSTERY PROBLEMS

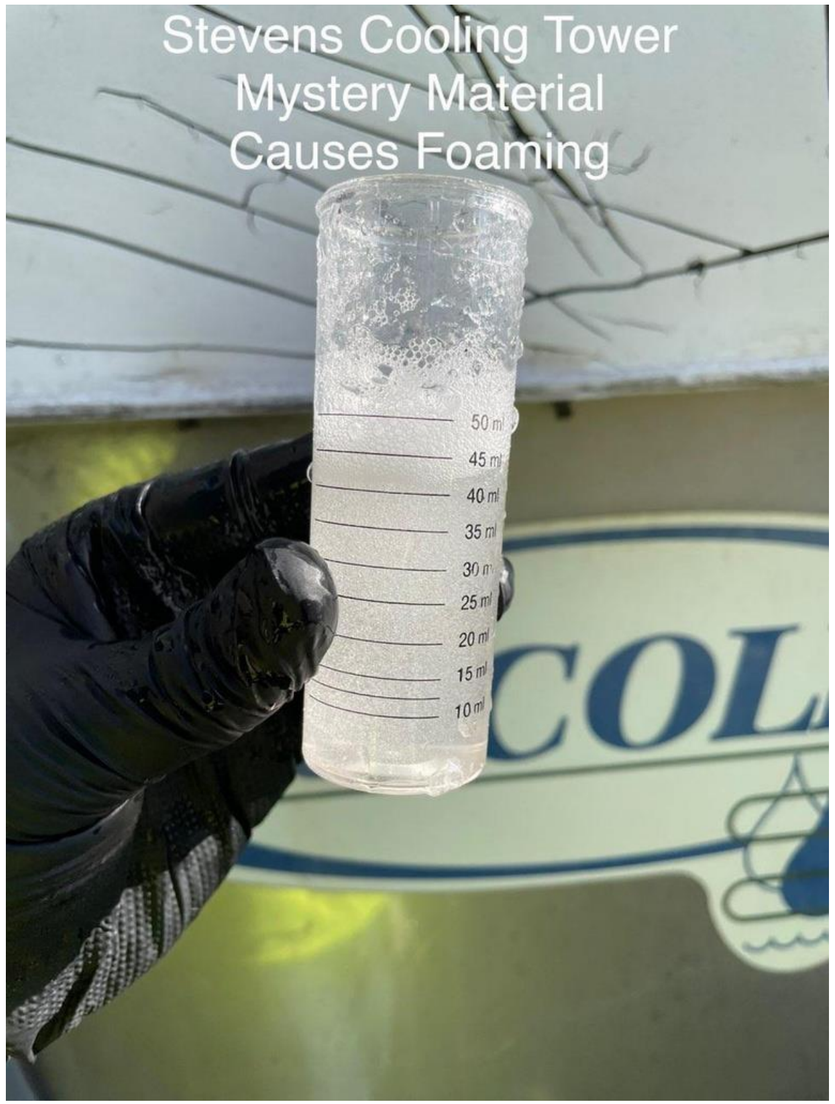


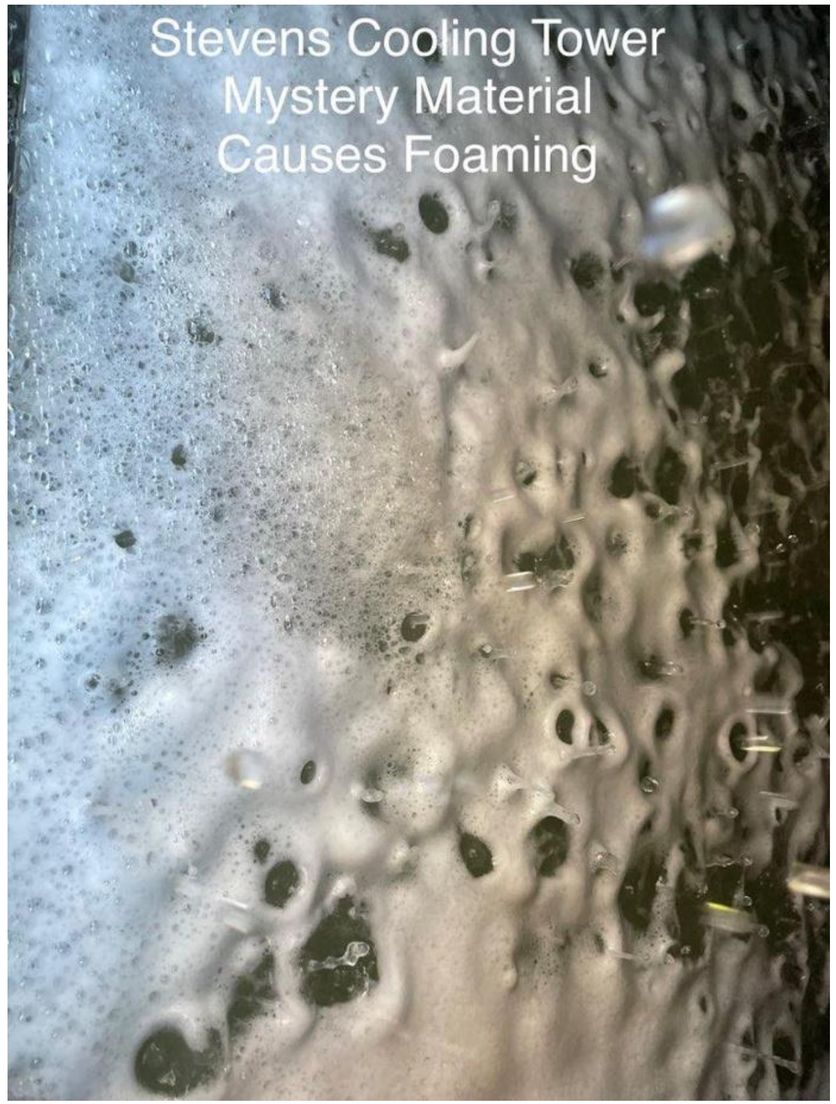
MYSTERY PROBLEMS





MYSTERY PROBLEMS





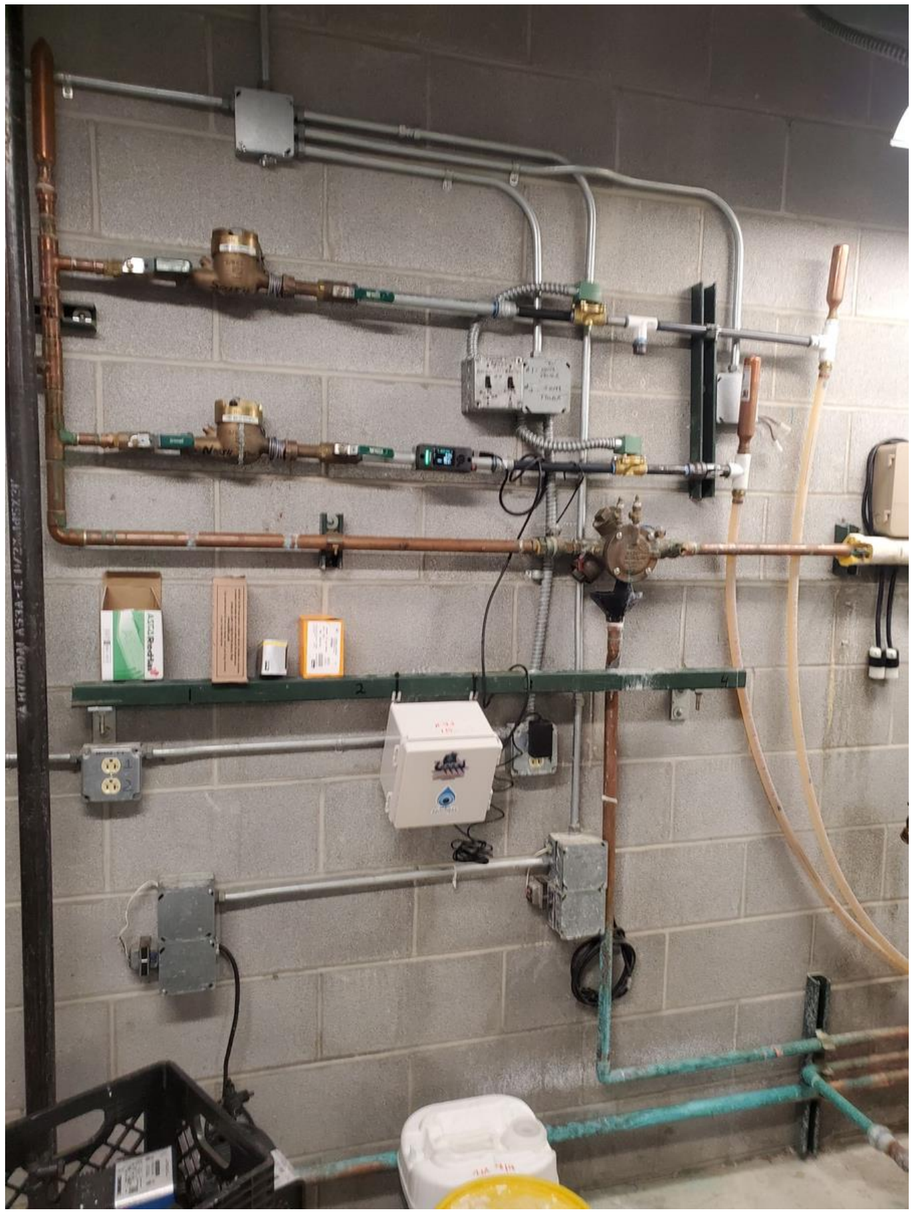
Mechanical/Operational Performance = Efficiency

SPS stays waterwise by

- Evaluating System Needs
- Investing in the right Programs
- Training for team consistency
- Re-using inhouse supplies for cost effectiveness
- Setting standards for regular site visits
- Establishing goals for cost reduction

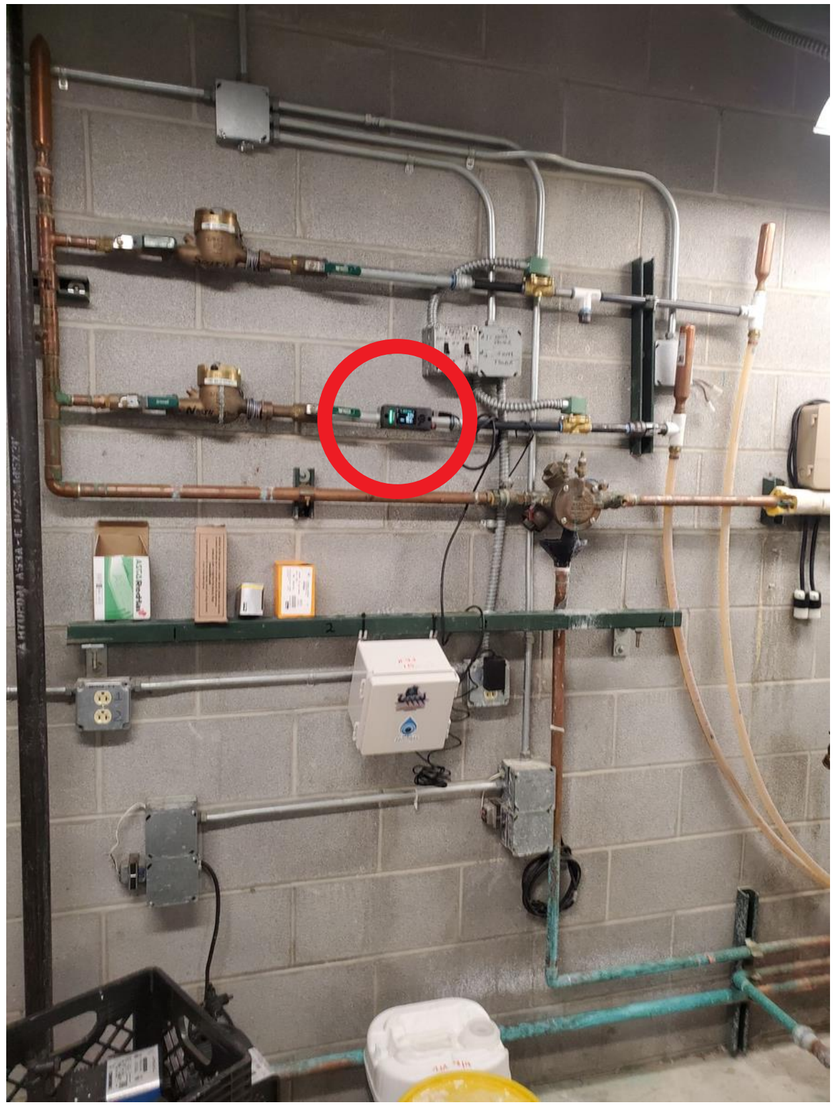
Water efficiency is an outcome of these actions!

SUBMETER PILOT

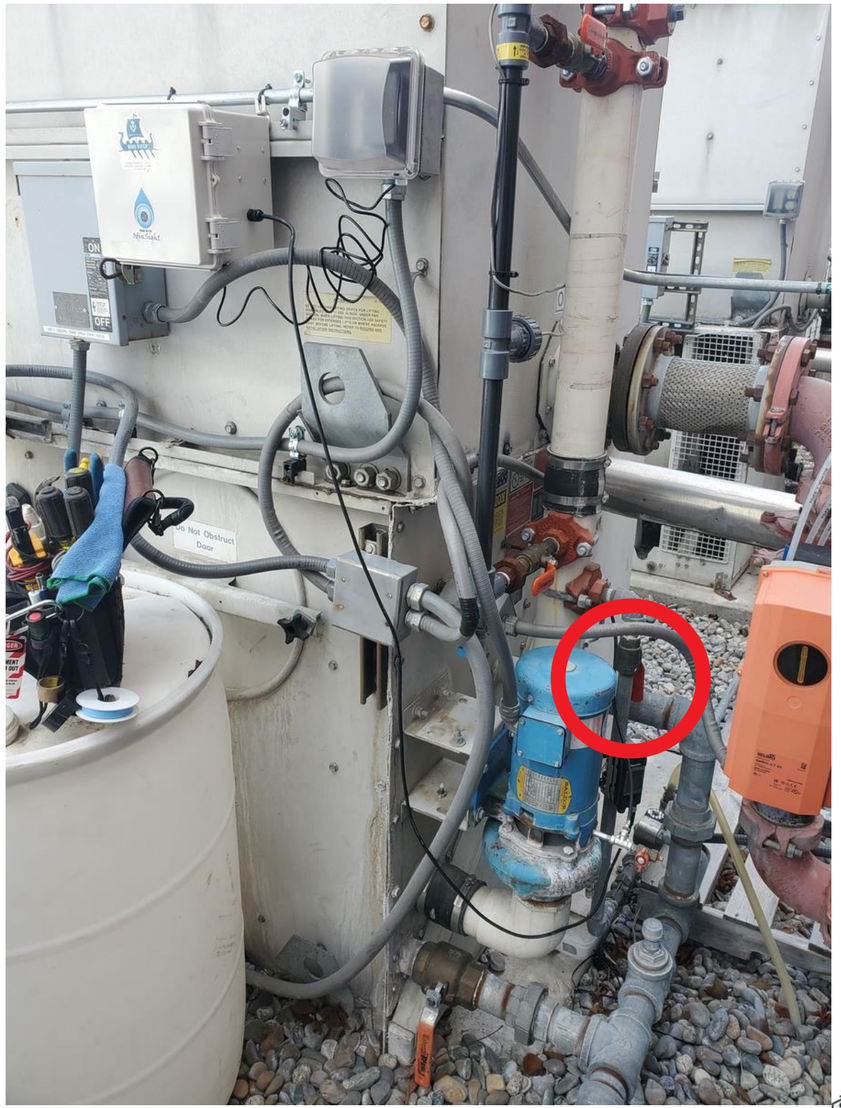


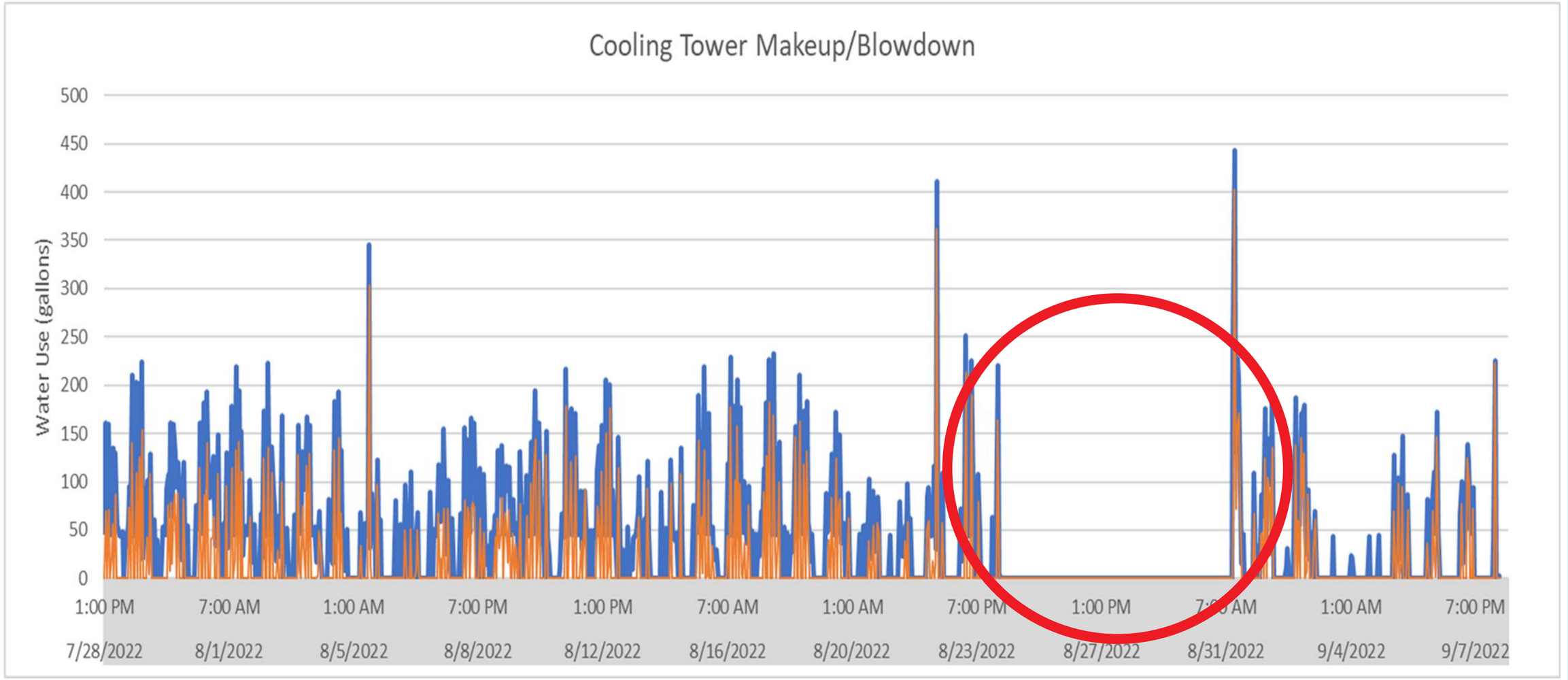
SUBMETER PILOT

Makeup Meter

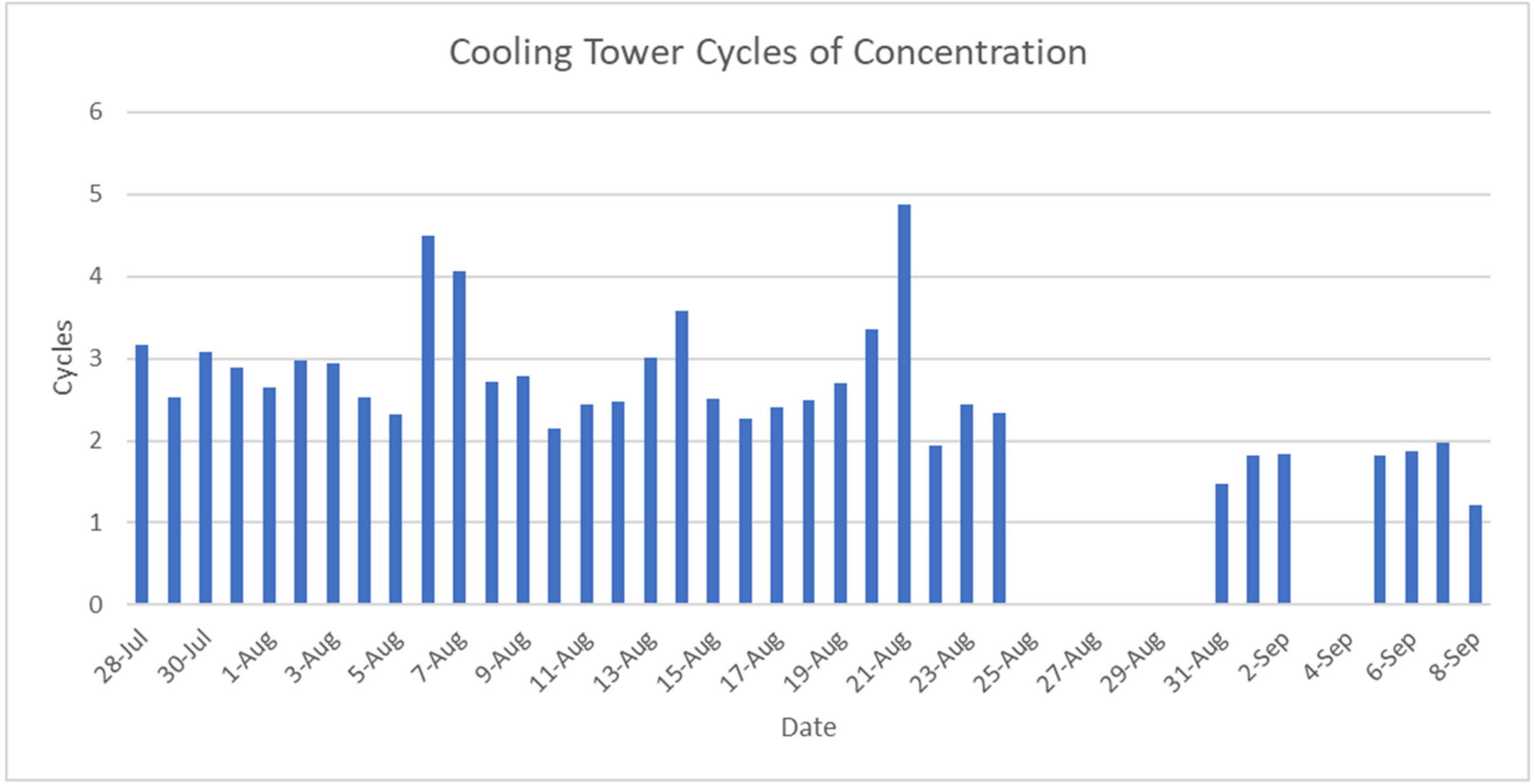


Blowdown Meter




Cooling Tower Makeup/Blowdown
Water Use (gallons)
500
450
400
350
300
250
200
150
100
50
0
1:00 PM
7:00 AM
1:00 AM
7:00 PM
1:00 PM
7:00 AM
1:00 AM
7:00 PM
1:00 PM
1:00 AM
7:00 PM
7/28/2022
8/1/2022
8/5/2022
8/8/2022
8/12/2022
8/16/2022
8/20/2022
8/23/2022
8/27/2022
8/31/2022
9/4/2022
9/7/2022

WATER USE


Cooling Tower Cycles of Concentration
Cycles
0
1
2
3
4
5
6
28-Jul
30-Jul
1-Aug
3-Aug
5-Aug
7-Aug
9-Aug
11-Aug
13-Aug
15-Aug
17-Aug
19-Aug
21-Aug
23-Aug
25-Aug
27-Aug
29-Aug
31-Aug
2-Sep
4-Sep
6-Sep
8-Sep
Date

EFFICIENCY

DAILY EFFICIENCY MONITORING

Low COC

Too Much Blowdown
Stuck Valve
Sensor Issue
Low SetPoint
Water Waste

Target COC

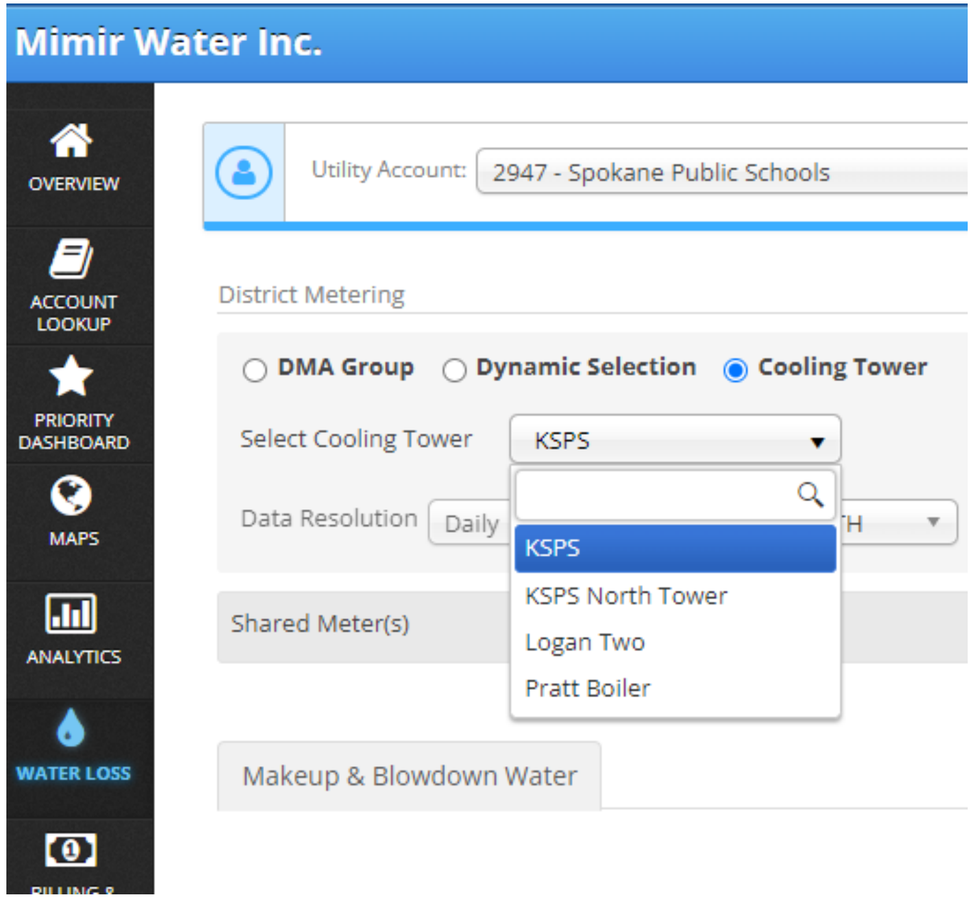
Water Quality
Water Treatment
Operating Conditions

High COC

Not Enough Blowdown
Stuck Valve
Sensor Issue
High Set Point
Scale

Overflow/waste

WATERSCOPE™



Low COC

Too Much Blowdown
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Sensor Issue
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Water Waste

Target COC

Water Quality
Water Treatment
Operating Conditions

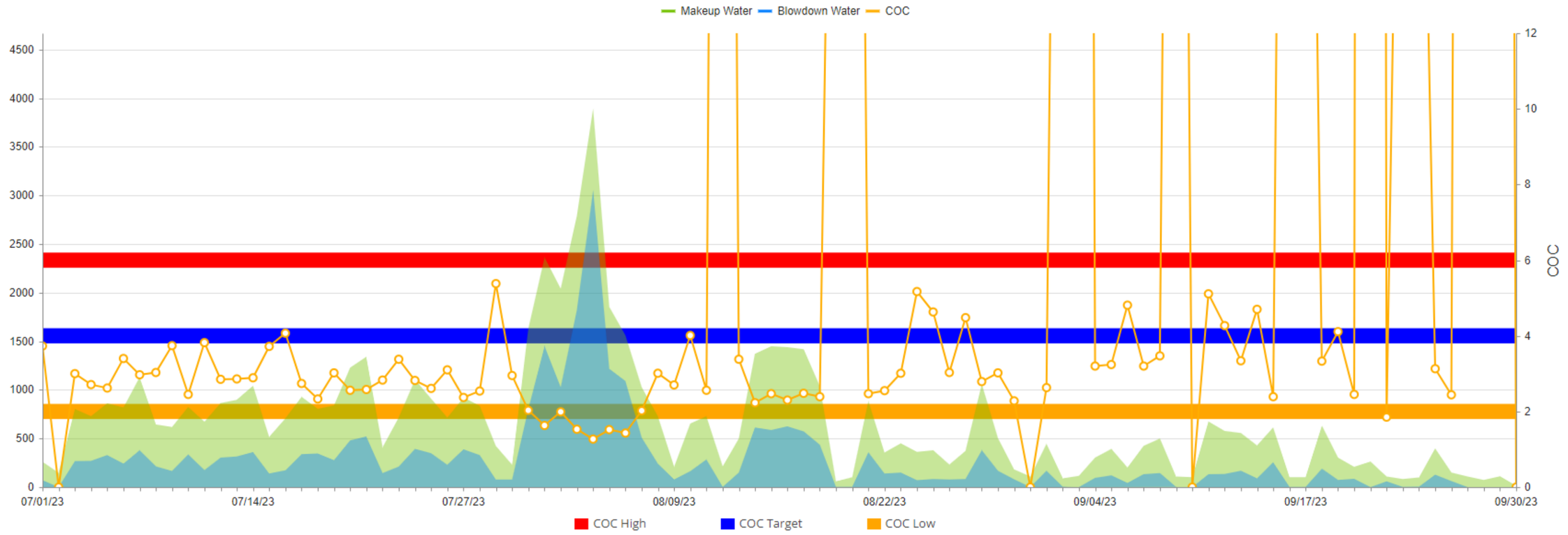
High COC

Not Enough Blowdown
Stuck Valve
Sensor Issue
High Set Point
Scale

Overflow/waste

MONITOR FOR EFFICIENCY, NOT WATER USE

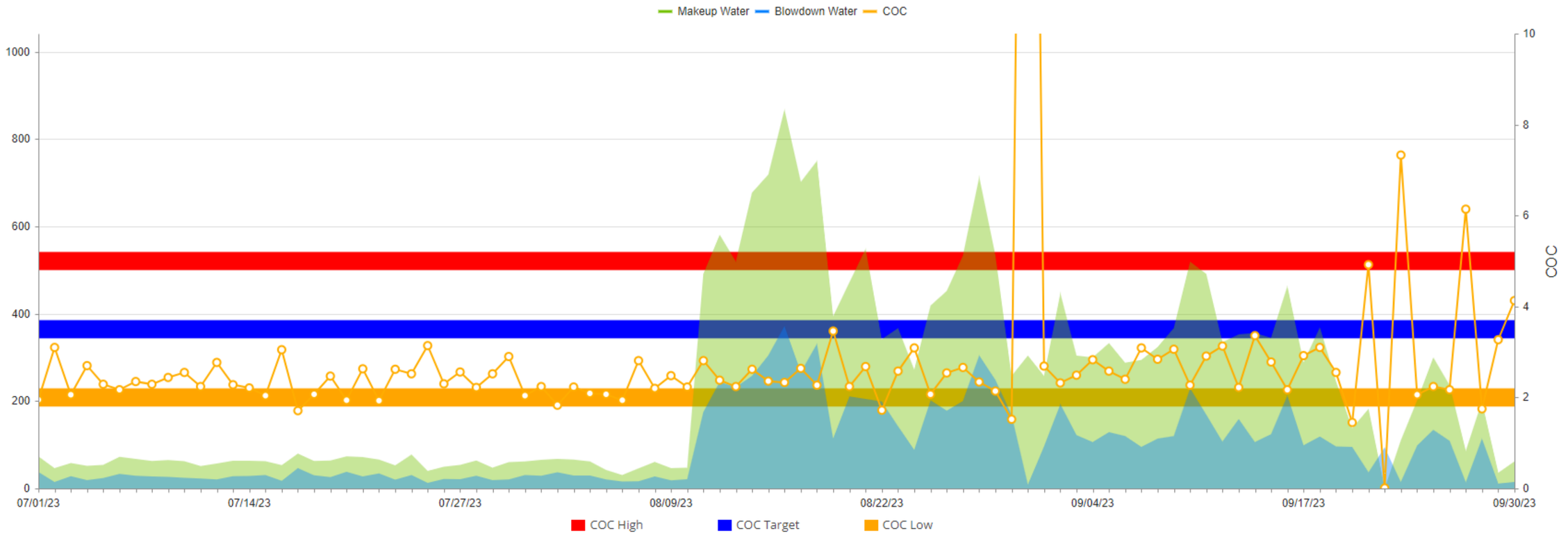
Makeup & Blowdown Water



Makeup Water :	63,188.00 G	BlowDown Water :	26,312.00 G	COC (Simplified) :	2.401

KSPS 1

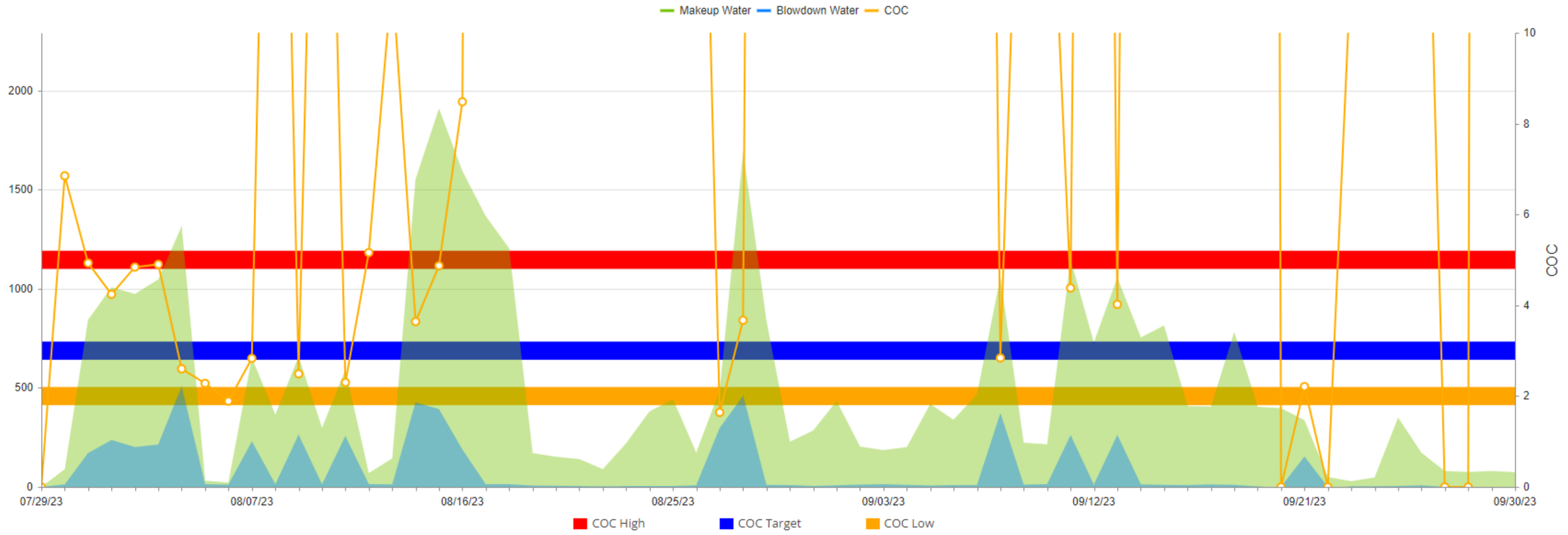
Makeup & Blowdown Water



Makeup Water :	21,572.60 G	BlowDown Water :	8,771.70 G	COC (Simplified) :	2.459

KSPS 2

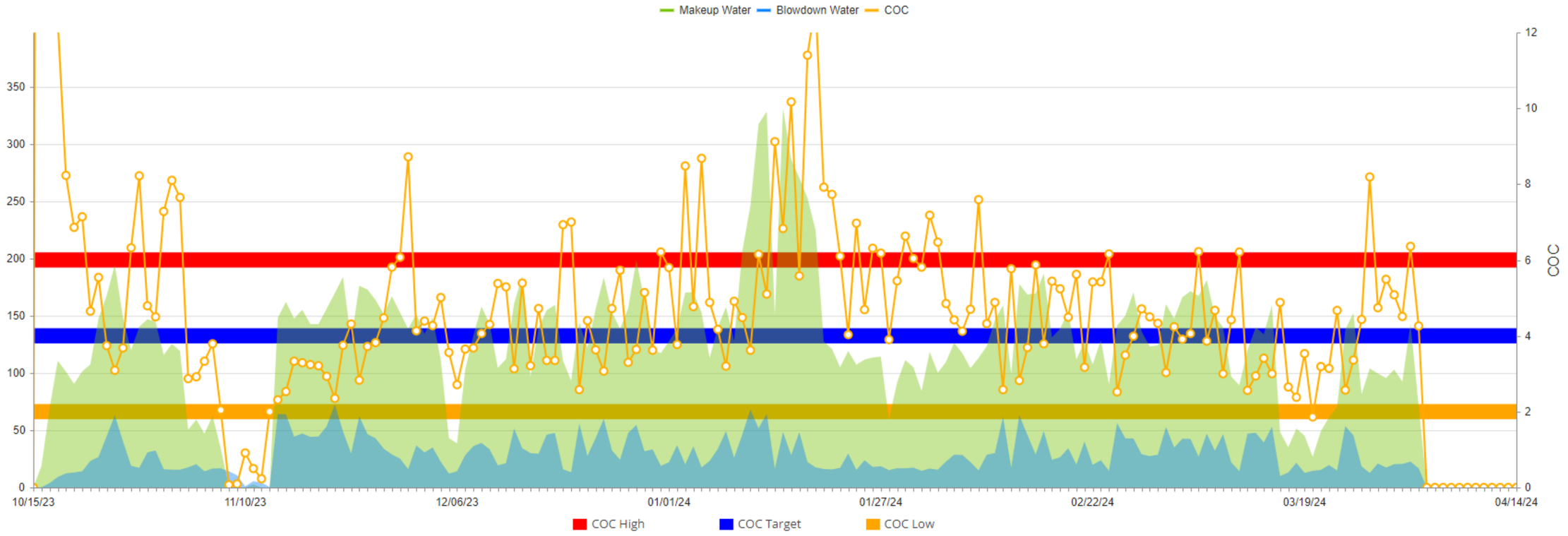
Makeup & Blowdown Water



Makeup Water :	32,967.70 G	BlowDown Water :	5,264.90 G	COC (Simplified) :	6.262

LOGAN COOLING

Makeup & Blowdown Water



Makeup Water :	21,855.90 G	BlowDown Water :	5,044.80 G	COC (Simplified) :	4.332

PRATT BOILER

THANK YOU

Water Wise Spokane

Questions?