

This presentation premiered at WaterSmart Innovations

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City of Phoenix

WATER SERVICES DEPARTMENT
Quality Reliability Value

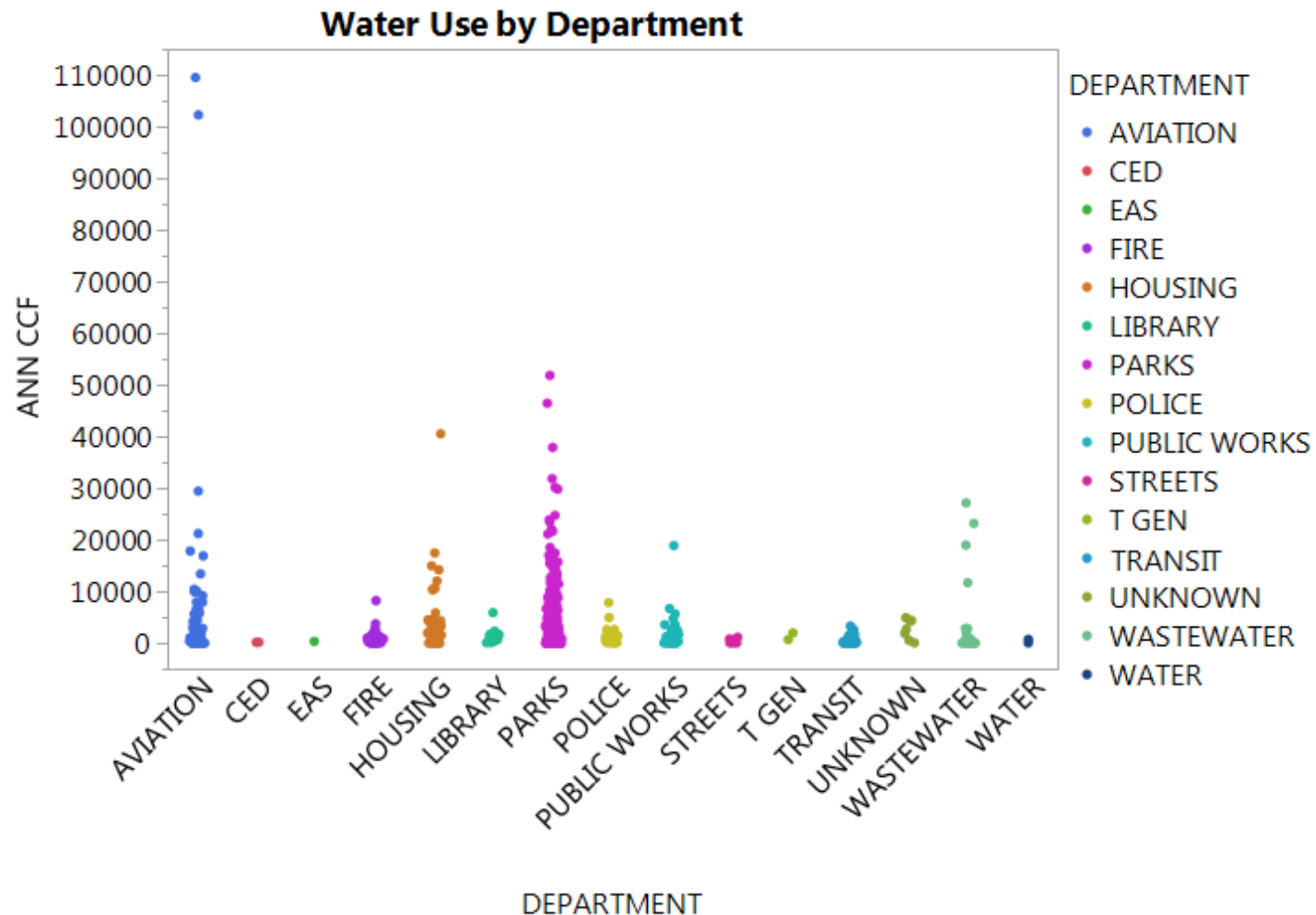
COOLING TOWER SYSTEM UPGRADES AT SKY HARBOR INTERNATIONAL AIRPORT



OVERVIEW

- Terminal 4 Cooling Towers
 - Project Review
 - Performance and Additional Changes
- New Installation at Terminal 3 Complete
- Rental Car Center

- Sky Harbor Airport
- 9,600 tons of cooling (all of Terminal 4)





SYSTEM CONDITIONS PRE-RENOVATION

- Heavy Scale and Corrosion
 - Chemical and physical removal
- 2.5 Cycles of Concentration at peak efficiency
- Conflict: Chemical Company vs Chiller Company
- Storage of Strong Acids (Health and Safety Concerns)

PROPOSED SYSTEM UPGRADES

- Add water softener
 - Swap the calcium (removal) with sodium (ion exchange)
- Add mixed oxidant generator (MIOX)
 - Use salt to generate bleach (predominant) and peroxide (minor)
 - Replaces Biocide
- Replace all media







OTHER IMPROVEMENTS





OTHER UPGRADES
SS PIPE INSTALLATION

NO MORE RUST CRABS



CIRCULATION JETS IN BASINS



ESTIMATED COSTS & RETURN ON INVESTMENT (SIMPLE PAYBACK)

- Initial estimate = \$295,000 (Capital and Labor)
- Actual = \$407,000 (Includes Media/Pipes)
- Estimated savings = \$140,000 per year
 - (Water = \$100K, Chemicals = \$40K)
- Estimated ROI = 2.9 years

HOW ARE WE DOING?

- 2.5 years in operation
- Monthly chemical monitoring
- Relocation of MIOX salt tank
- Achieving 6.5 COC on regular basis
- Water savings **underestimated (21 million gallons saved in 2018, or \$128,000, just in water)**
- **Actual ROI more like 2 years**

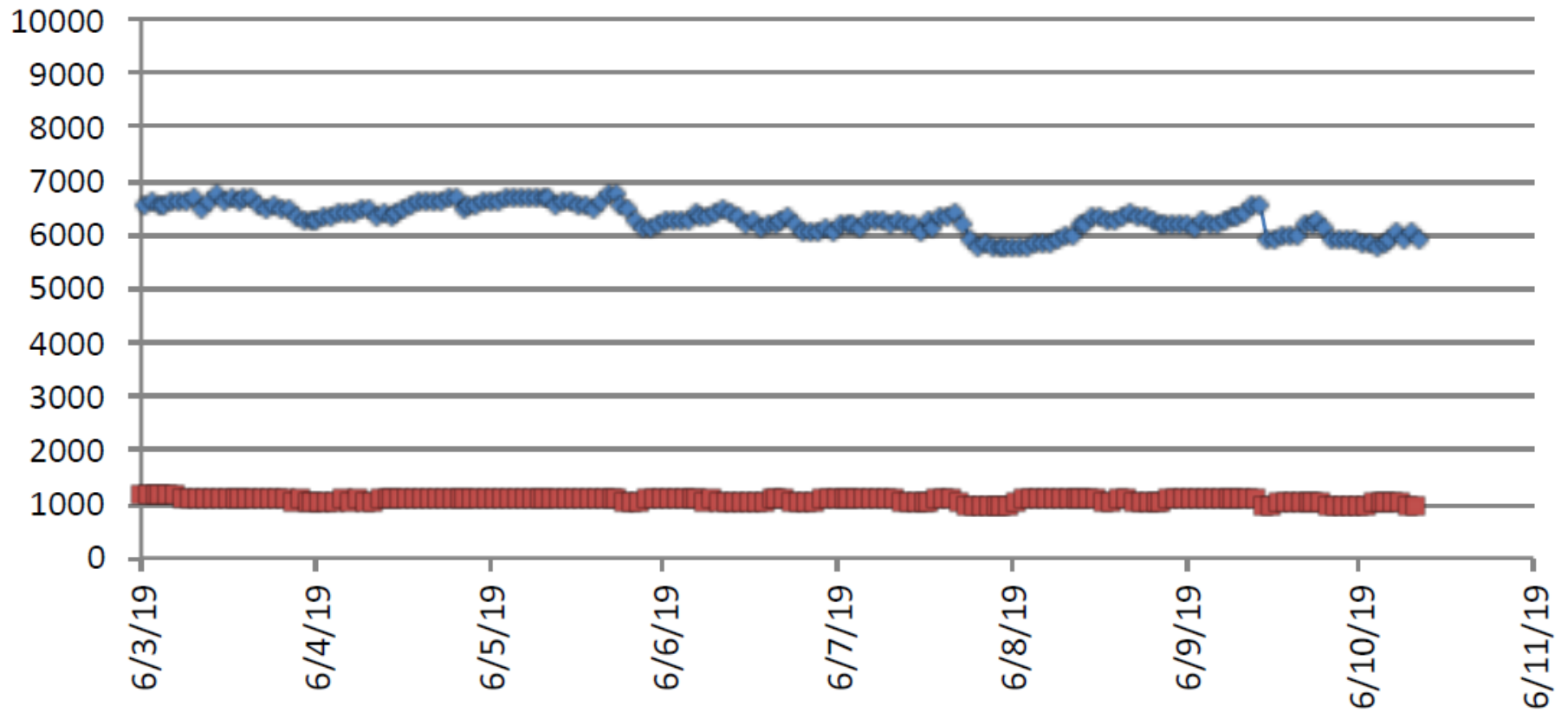
HOW ARE WE DOING?

- Water savings projected to be 26 MG in 2019
- Saved 13K pounds of chemicals in 2018
- Adding soft water feed to MIOX to control varying water quality
- Cleaning of media in towers is now done with garden hose
- Addressing implications if wastewater salinity standard is established
- Future Capital savings and reduced O & M costs not included in ROI (will be reviewed)

S1	Cond	10813 μ S
S3	MU Cond	1670 μ S
AT1	49340	144.68ppb
AT3	HACH CL	0.32ppm
DIC	Bleed	224970gal

No Alarms

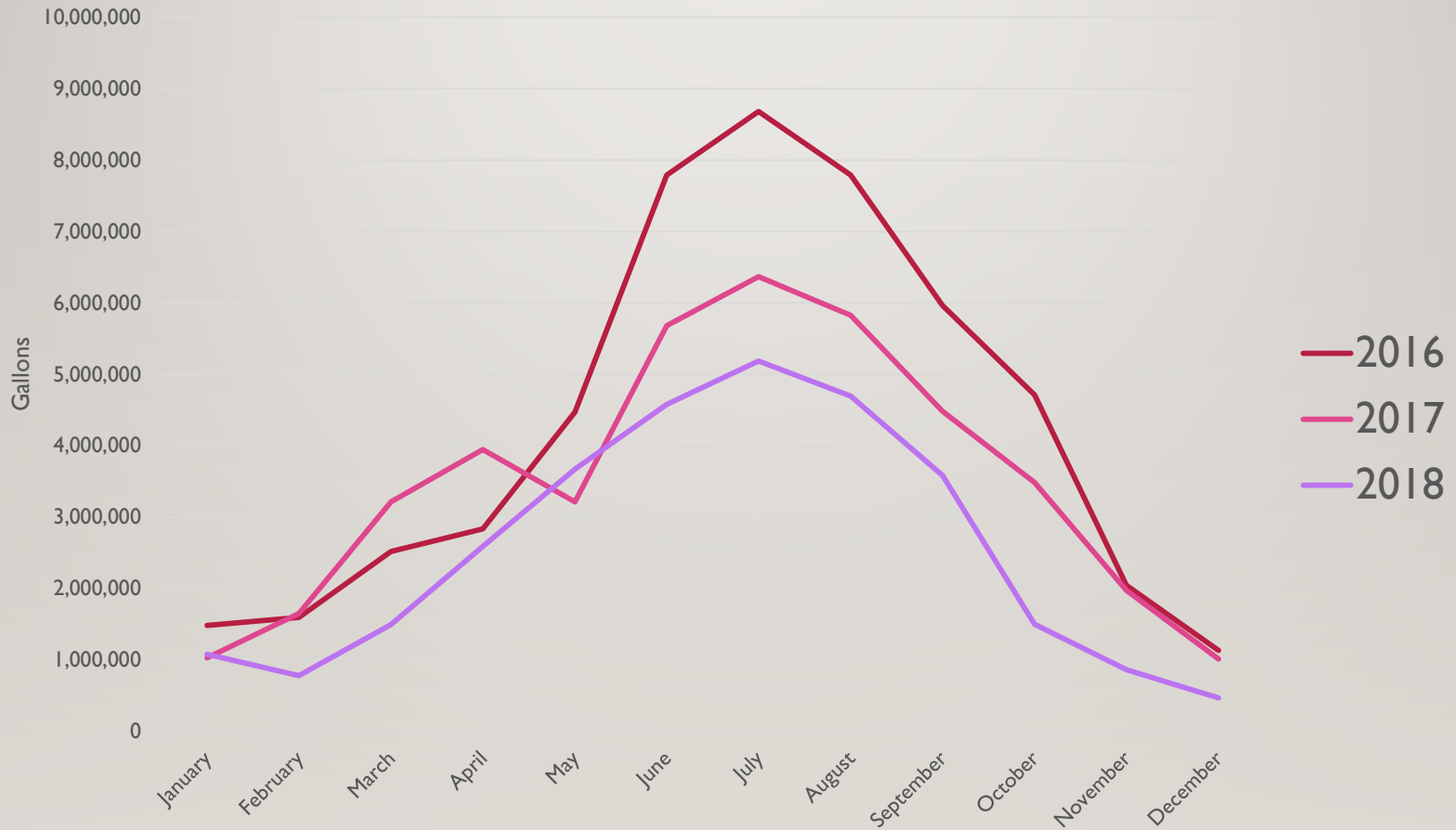
Terminal 4 Conductivity uS



Conductivity shows excellent control - no issues. Red line is make up conductivity line, showing excellent control. Tower conductivity currently increasing

ACTUAL WATER SAVING

Water Usage By Month for 2016 to 2018



ADDITIONAL INSTALLATIONS

- Replication of system in Terminal 3
(completed)
- Rental Car Center

TERMINAL 3

- New Cooling Towers
- 4 X 1,000 tons
- No previous performance for comparison – savings similar to T4
- Estimated 10 MG water savings

RENTAL CAR CENTER

- Replace Media
- 3 X 600 tons
- Same systems: Softening/MIOX
- Estimated 4 MG water savings

WHAT ABOUT SALINITY?

- No change to systems
- Minor operational changes
- 5 – 10 years to come into compliance if standard is adopted
- Compliance would not affect overall performance

QUESTIONS

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