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# ABSTRACT

With significant water crises happening around the world, the practice of water softening is antiquated and harmfully inefficient, but the negative effects of scale are hard to ignore.

A revolutionary technological development touting all the advantages of a water softener without the disadvantages, Template Assisted Crystallization® (TAC®) offers the first proven effective and consistent scale prevention method with **zero chemicals & zero waste**.

# INFORMATION OVERVIEW

- Introduction to Next-ScaleStop
- TAC® Technology
- Next-ScaleStop Properties
- Next-ScaleStop Applications
- Next-ScaleStop Features
- Next-ScaleStop Advantages
- Next-ScaleStop Design
- Next-ScaleStop vs Conventional Softening
- Case Studies
- Technological Verification
- Competitive Evaluation
- Regulatory Pressures

# NEXT-SCALESTOP : INTRODUCTION

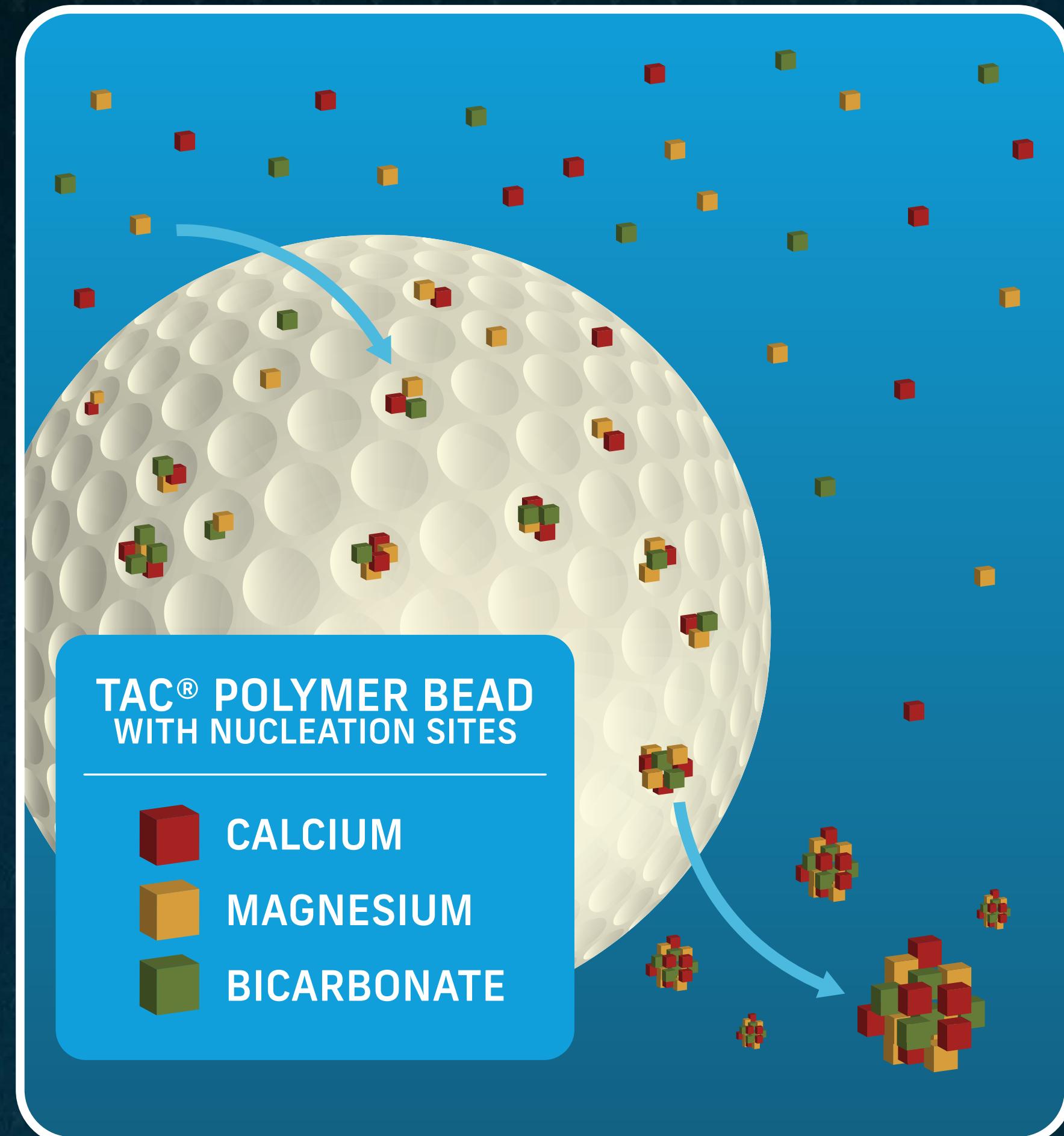
## TEMPLATE ASSISTED CRYSTALLIZATION®

A No Salt, No Chemical, Non-Backwashing,  
Zero-Discharge Alternative To Softening



Next-ScaleStop is the embodiment of a new technology, Template Assisted Crystallization® (TAC®). Near the Surface of small specially treated polymer spheres, newly formed micro-crystals of dissolved  $\text{CaCO}_3$  become preferential Templates or Sites for additional hardness ions as they precipitate. The crystals are relatively insoluble, effectively isolating the  $\text{CaCO}_3$  from the water chemistry and anything the water contacts such as pipes or fixtures.

# TAC® TECHNOLOGY



## CRYSTAL FORMATION

The surface of small polymer beads attract scale-causing ions, creating micro-crystals that become preferential templates for other ions to build on.

## CRYSTAL RELEASE

Once the crystals grow to a certain size they continue to flow through the pipeline. The crystals in solution keep the hardness out of the water so that it can't form scale or interfere with soap.

This process inactivates the minerals, causing them to flow right through pipes and down the drain, completely unnoticeable without specialized technology.

# NEXT-SCALESTOP PROPERTIES

## PHYSICAL PROPERTIES

- Composition : Specially Treated Polymer
- Size : 0.3-1 mm (Approx. 20x50 mesh)
- Color : Off-White / Pale Yellow-Beige
- Bulk Density : Approx. 1.71 lbs/L (~776 g/L)
  - Range : 1.68-1.74 lbs/L (763-789 g/L)
- Packaging : 180 Liter Drum (~308 ± 5 lbs or ~140 ± 2.3 kg)

## WATER CHEMISTRY & LIMITATIONS

- pH : 6.5 to 8.5
- Hardness, Max. : 75 Grains (1300 ppm  $\text{CaCO}_3$ )
- Temperature : 41 to 140 °F (5 to 60 °C)
- Chlorine : <3 ppm
- Iron, Ferrous : 0.3 mg/L
- Manganese : 0.05 mg/L
- Copper : 1.3 mg/L
- Oil & Polyphosphates : Remove Prior To Next-ScaleStop Use
- $\text{H}_2\text{S}$  : Must Be Removed Prior To Next-ScaleStop Use

## OPERATING CONDITIONS

- Service Flow : 4 gpm/liter Of Media (Limited By Bed Expansion)
- Bed Depth : 4-10 Inches Typical (Depending On Flow Rate)
- Freeboard : 200% Of Bed Depth (Minimum 20")
- Can Be Used In Continuous Or Intermittent Operation
- Operates In Upflow Mode, No Backwash Required



# NEXT-SCALESTOP APPLICATIONS

## FOOD SERVICE USES :

- Convection Steamers & Combi Ovens
- Flash Steamers (Easier To Clean Only)
- Proofer Ovens
- Coffee Brewers
- Espresso Machines
- Post Mix
- Dishwashers (Chemical Compatibility)

## RESIDENTIAL SCALE PREVENTION USES :

- Piping Systems
- Boilers & Tankless Water Heaters
- Solar Heating Systems
- Irrigation System Spray Head
- Humidifier / Evaporator
- Misting Systems

## COMMERCIAL, HOSPITALITY & AGRICULTURAL USES :

- Piping Systems
- Boilers
- Cooling Towers
- Tankless Water Heaters
- Solar Heating Systems
- Injection Molding Equipment
- Distiller Heating Chamber
- Irrigation System Spray Head
- Humidifier / Evaporator
- Misting Systems



ALL TRANSLATE TO LONGER LIFE FOR  
EQUIPMENT, GREATER ENERGY EFFICIENCY  
AND GOOD ENVIRONMENTAL STEWARDSHIP

# NEXT-SCALESTOP FEATURES



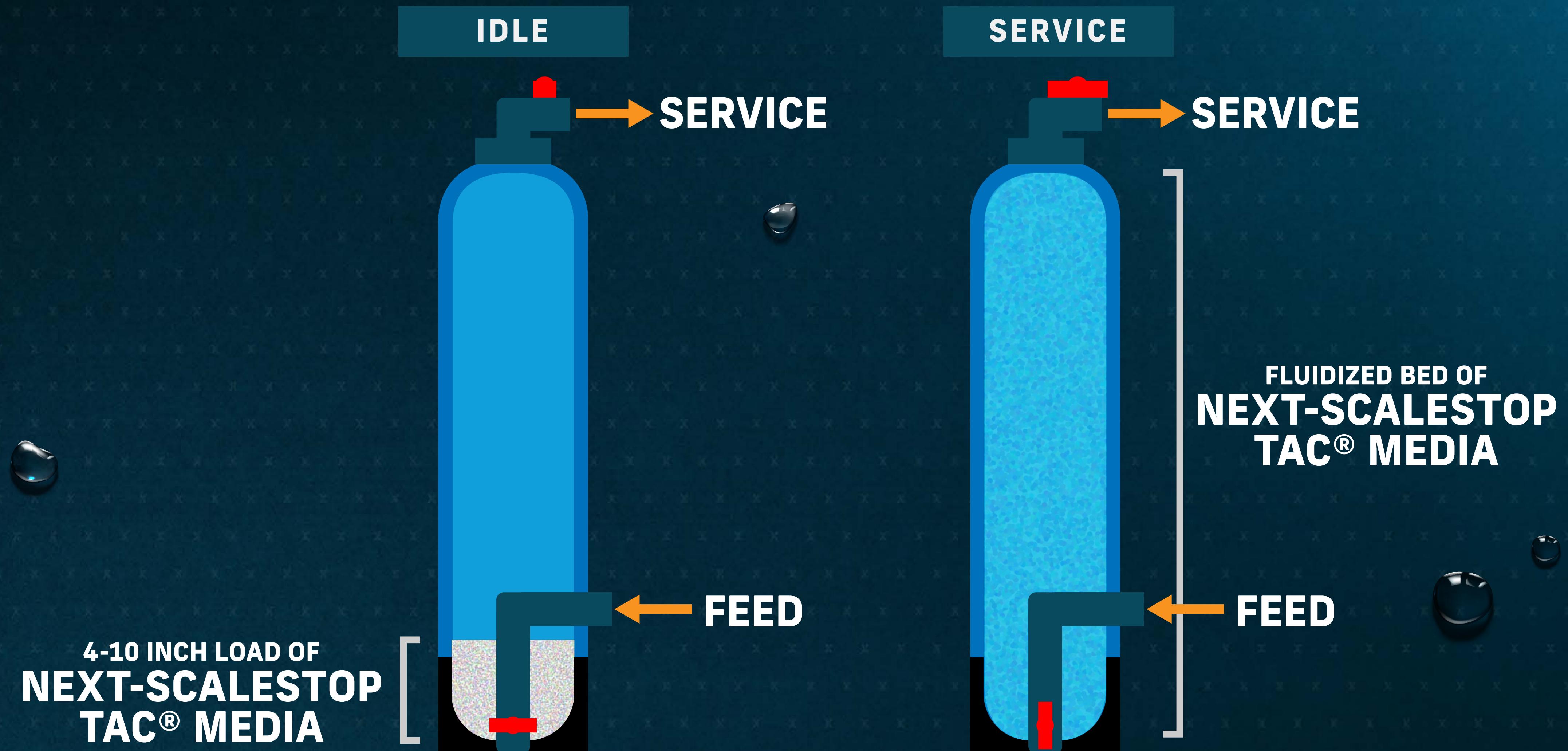
- Extremely efficient
  - 5 seconds contact time regardless of hardness level
  - Conventional ion exchange resin requires 90 seconds
- No salt or other chemical regenerants required
- No backwash waste
  - Can be used in areas where water softeners are banned
  - Protects the environment and reduces water usage
- Long-lasting media
  - Not consumed by the reactions
- No control valve or electricity required
- Media usable in both conventional mineral tanks or POU cartridge form
- Media operates in upflow condition

# NEXT-SCALESTOP ADVANTAGES

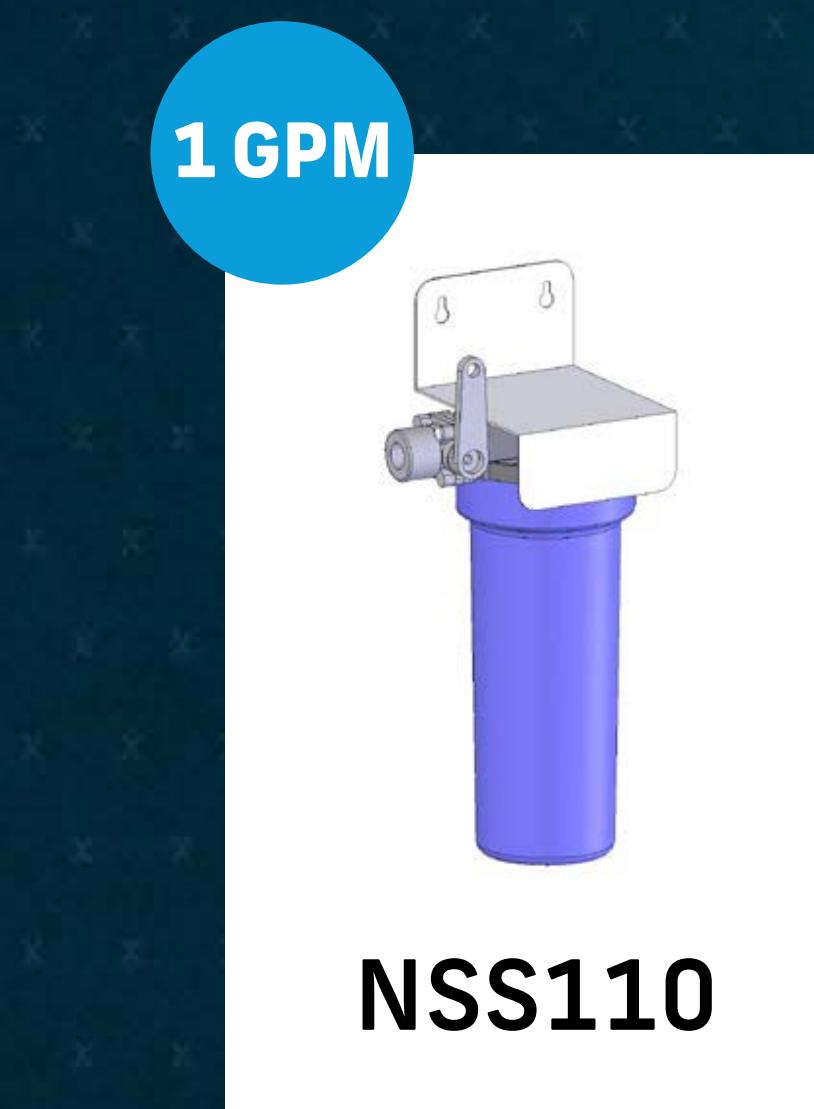
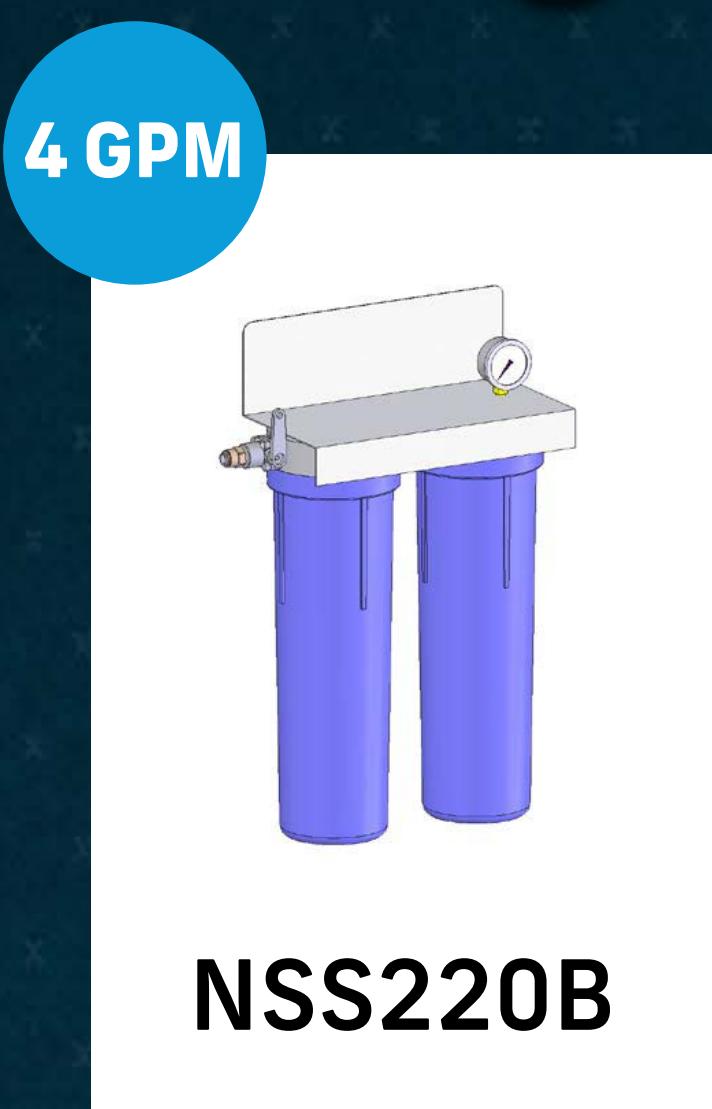
- Economical & Efficient
- Reduced Energy Expenses
- Environmentally Friendly
- Removes Existing Scale Deposits
- Longer Life Expectancy For Appliances & Pipes
- Increased Efficiency Of Hot Water Tanks
- No Salt
- No Corrosive Chemicals
- No Electrical Power Required
- No Drain Connection Required
- No Discharge
- No Slippery Feeling (Personal Preference & Elderly Safety)
- High Flow Capacity
- Virtually Maintenance Free
- Outstandingly Effective Treatment For Scale Prevention
- Various Supplemental Residential & Commercial Applications



# NEXT-SCALESTOP SYSTEM DESIGN



# NEXT-SCALESTOP CARTRIDGE DESIGN



NEXT-SCALESTOP & CARBON SYSTEMS

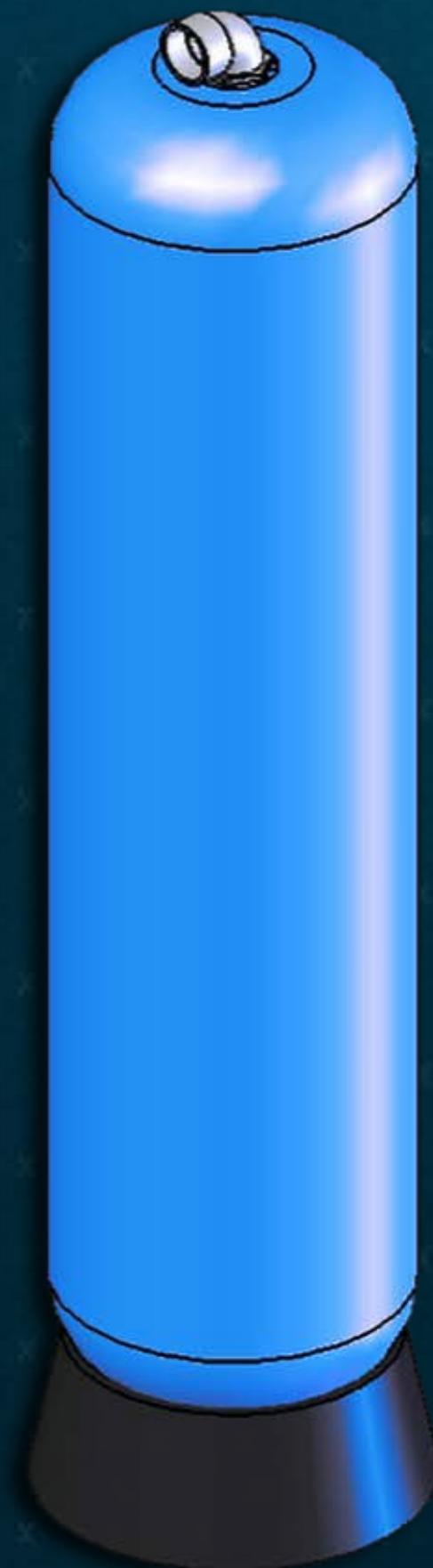
NEXT-SCALESTOP ONLY

# NEXT-SCALESTOP TANK TYPES [POE]

SIZE	SERVICE FLOW
NSS 744	10 GPM
NSS 844	12 GPM
NSS 948	16 GPM
NSS 1054	20 GPM
NSS 1252	30 GPM
NSS 1465	50 GPM
NSS 1665	75 GPM



**NSS 1054**



**NSS 1665**

# NEXT-SCALESTOP HIGH-FLOW SYSTEMS [POE]

SIZE	SERVICE FLOW
NSS 2x1465	100 GPM
NSS 2x1665	150 GPM
NSS 3x1665	225 GPM
NSS 5x1465	250 GPM
NSS 4x1665	300 GPM
NSS 5x1665	375 GPM
NSS 6x1665	450 GPM



**NSS 4x1665**

# NEXT-SCALESTOP vs CONVENTIONAL SOFTENING

## INSTALLATION ADVANTAGES



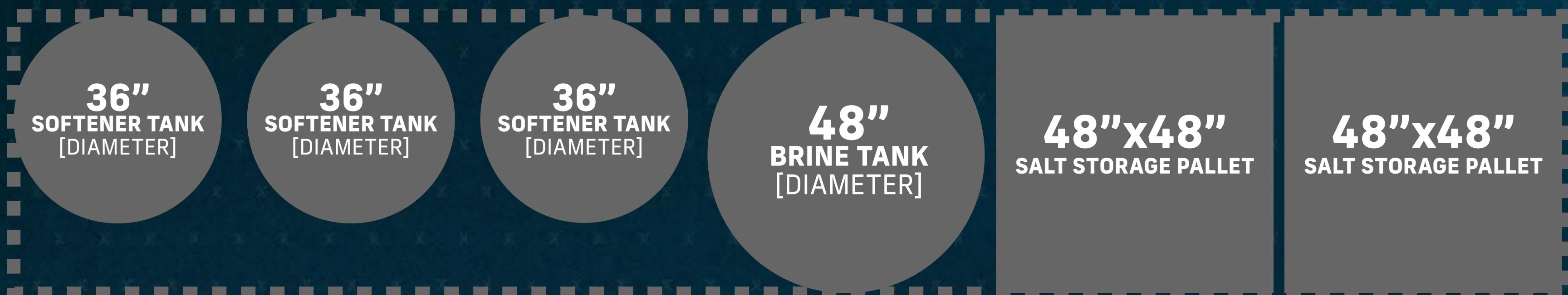
DID THEY FORGET TO TELL YOU  
THE SIZE OF THE SOFTENER?

# NEXT-SCALESTOP vs CONVENTIONAL SOFTENING

## COMPARISON : SPACE REQUIREMENTS

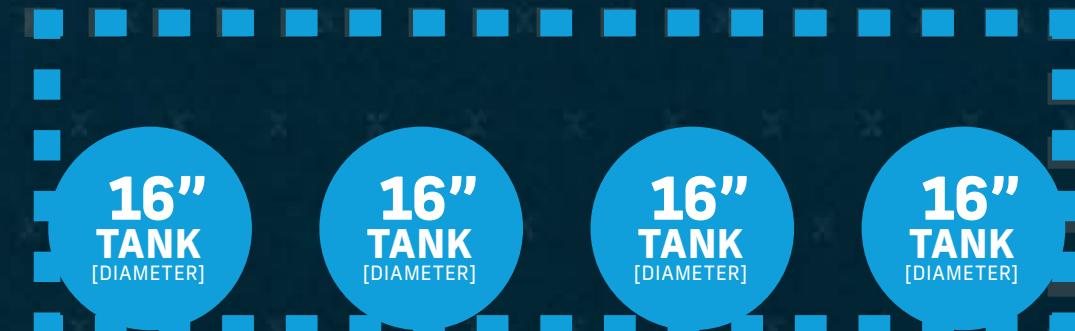
### CONVENTIONAL SOFTENER SYSTEM :

(3) 36"x72" TANKS + (1) 48" BRINE TANK + (2) 48"x48" SALT PALLETS



NEXT-SCALESTOP SYSTEM : (4) 16"x65" TANKS

**~85% LESS  
SPACE REQUIRED!**



# NEXT-SCALESTOP vs CONVENTIONAL SOFTENING

## USAGE & COST COMPARISONS : 300 GPM SYSTEMS

	TOTAL AREA	SALT USAGE*	SALT COST*	WASTEWATER VOLUME
NEXT-SCALESTOP	13.33 ft <sup>2</sup>	NONE	ZERO	NONE
SOFTENER	88.00 ft <sup>2</sup>	64,285 lbs	\$7713	EXCESSIVE

Usage and costs are annual. \*Assumes 15 grain water, 1 million gallons per month, 2800 grains/lb of salt, salt cost 0.12/lb delivered.

# NEXT-SCALESTOP FUNCTIONAL INSTALL SAMPLES



Systems utilizing Next-ScaleStop are easily installed and managed at most locations' point of entry as they only require a small footprint for a large amount of filtration efficiency.

# CASE STUDY #1

## RESTAURANT EQUIPMENT - CONCORDIA ESPRESSO MACHINES

BACKGROUND	
LOCATION	LOMBARD, IL & TUCSON, AZ
HARDNESS	HIGH
WATER USAGE	LOW
EQUIPMENT HISTORY	CUNO SYSTEMS WITH WAC (H FORM) RESIN PREVENTED SCALE BUT CAUSED CORROSION / PITTING OF SOLENOID VALVE

NEXT-SCALESTOP DATA	
INSPECTED AT 6 & 12 MONTHS	NO SCALE ACCUMULATION NO CORROSION



CONCORDIA IS NOW PRIVATE LABELING NEXT-SCALESTOP  
AND PROVIDING IT WITH ALL OF THEIR EQUIPMENT

# CASE STUDY #2

## RESTAURANT EQUIPMENT - GROEN COMBI OVEN [MODEL HY12YE]

BACKGROUND	
LOCATION	SHERATON-ALBUQUERQUE CONVENTION CENTER
HARDNESS	35 GRAIN/GAL
WATER USAGE	APPROX. 200 GPD
EQUIPMENT HISTORY	CHEMICAL DE-SCALING REQUIRED EVERY 3-4 WEEKS. ANNUAL BOILER REPLACEMENT.

NEXT-SCALESTOP DATA	
INSPECTED AT 9 MONTHS	NO SCALE ACCUMULATION, BOILER OPERATING PERFECTLY
INSPECTED AT 11 MONTHS	WATER LEVEL PROBE MALFUNCTION FROM CRYSTALS WERE REMOVED BY WIPING WITH RAG. <b>FIVE MINUTE SERVICE TIME, 5 YEARS CONSISTENT PERFORMANCE.</b>



THE SERVICE COMPANY INVOLVED CALLS NEXT-SCALESTOP THE "MIRACLE FILTER".  
THEY ARE NOW INSTALLING NEXT-SCALESTOP ON ALL OF THEIR EQUIPMENT.

# CASE STUDY #3

TANKLESS WATER HEATERS - RINNAI 199,000 BTU [COMMERCIAL]

BACKGROUND	
LOCATION	MIDDLEVILLE, MI
HARDNESS	28-31 GRAIN/GAL
WATER USAGE	APPROX. 200 GPD ASHRAE PROTOCOL - 4 PEOPLE
EQUIPMENT SETTINGS	2 SYSTEMS SET AT 190 DEGREES TO ACCELERATE TESTING, ONE TREATED, ONE CONTROL

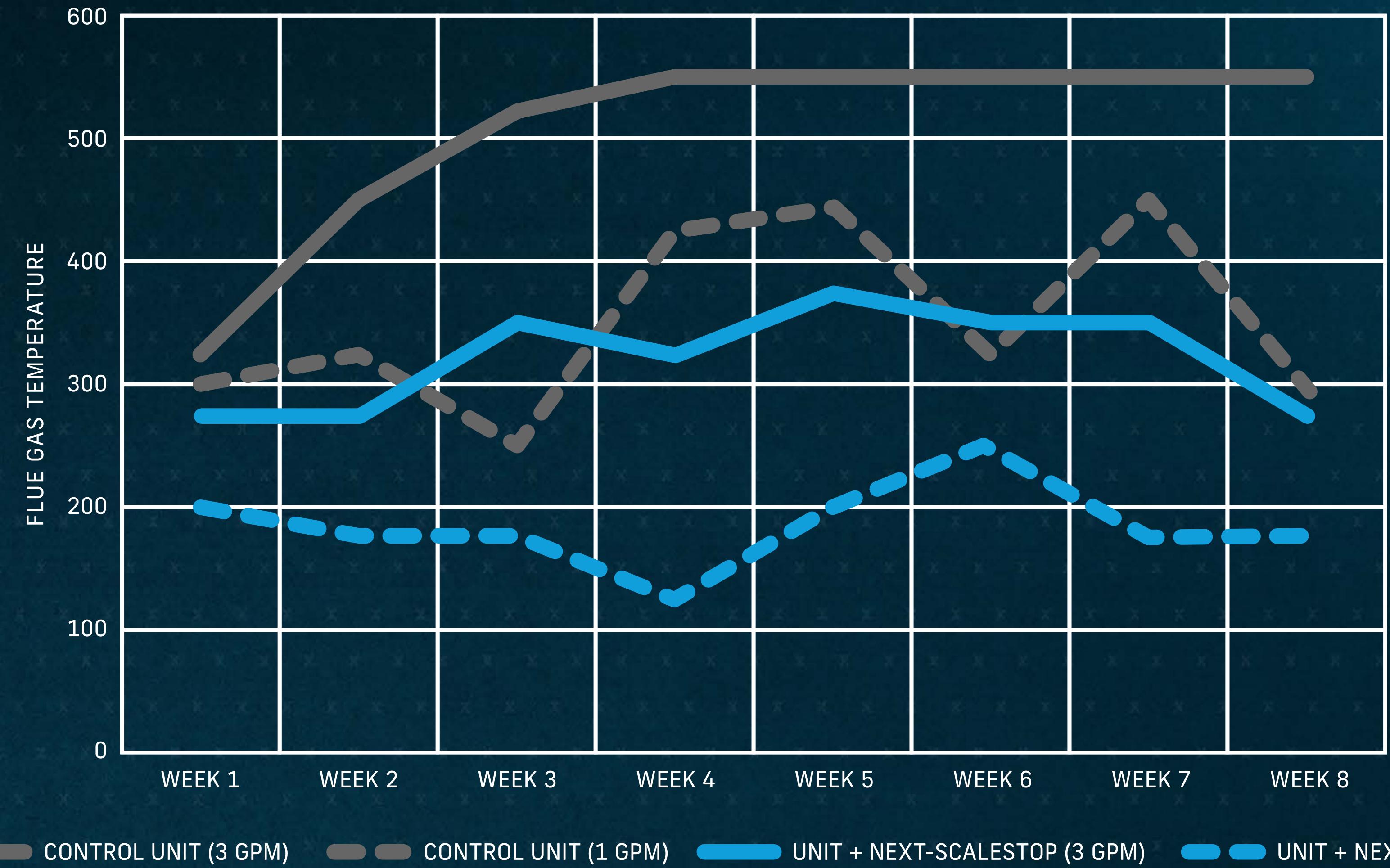
NEXT-SCALESTOP DATA	
CONTROL UNIT	DROP IN EFFICIENCY NOTICEABLE AFTER ONE WEEK. COMPLETE SYSTEM SHUT DOWN DUE TO SCALE AT 2 WEEKS.
INSPECTED AT 3 MONTHS	NEXT-SCALESTOP TREATED SYSTEM SHOWS NO MEASURABLE EFFICIENCY LOSS
INSPECTED AT 10 MONTHS	THE NEXT-SCALESTOP PROTECTED UNIT REMAINED OPERATING AND EFFICIENT FOR 10 FULL MONTHS IN THIS VERY DEMANDING TEST



NEXT-SCALESTOP  
MAINTAINS FUNCTIONALITY 22x LONGER  
THAN UNTREATED CONTROL UNITS

# CASE STUDY #4

## TANKLESS WATER HEATER vs TANKLESS HEATER + NEXT-SCALESTOP



The unit with Next-ScaleStop at 3 gpm consistently ran at lower flue gas temperatures than both control units and never exceeded 390 degrees.

Additionally, the unit with Next-ScaleStop at 1 gpm had the lowest flue gas temperatures, which stayed at approximately 200 degrees for the full 8 week observation period.

# CASE STUDY #5

## REVERSE OSMOSIS PRETREATMENT [MODEL#RO10800G-FL]

BACKGROUND	
LOCATION	EL CAJON, CA
HARDNESS   TDS LSI   STIFF DAVIS	15 GRAIN   485 mg/l   .33   .66
RO CONFIG.	6 - 4040 ELEMENTS (45% RECOVERY)
EQUIPMENT HISTORY	INSTALLED MAY '06. PRODUCES 5000 GALLONS OF PERMEATE PER DAY.

NEXT-SCALESTOP DATA	
PERMEATE TDS	6 PPM (98.7% REJECTION)
PERMEATE FLOW	6 GPM (UNCHANGED FROM START-UP)



# HOTEL CASE STUDY #1

EMBASSY SUITES HOTEL [224 ROOMS] - OVERVIEW

## BACKGROUND

LOCATION

TEMPE, AZ

HARDNESS

12 GRAINS

PROBLEM

CONSTANT SCALE BUILDUP LED TO REGULAR  
BOILER FAILURES, INCONVENIENT DOWNTIME  
AND EXPENSIVE SERVICE REQUIREMENTS.

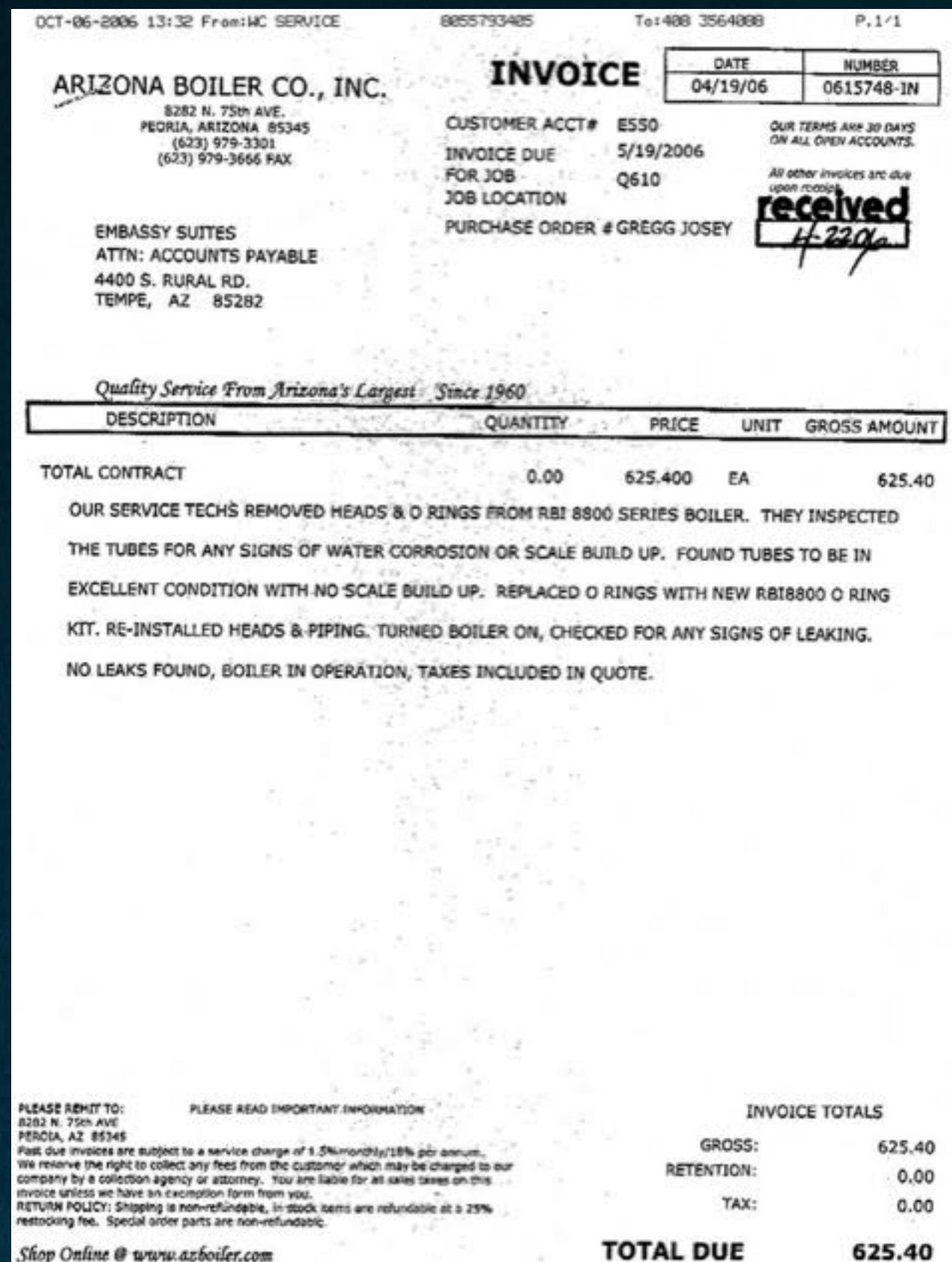
SOLUTION

THE DOMESTIC HOT WATER SUPPLY HAS  
BEEN TREATED WITH NEXT-SCALESTOP  
FOR THE PAST 6 YEARS



# HOTEL CASE STUDY #1

## EMBASSY SUITES HOTEL [224 ROOMS] - BOILER INSPECTION



After 9 months of continuous operation and no service, the chief engineer had the boiler tubes inspected.

Quote from service company :

“Boiler tubes were spotless, 100% free from any scale deposits.” The boiler inspector said, “it would not be possible for tubes to be this clean if not for a water softener...”

But, while Next-ScaleStop is not a softener, it effectively eliminated this scale problem.

# HOTEL CASE STUDY #2

## EMBASSY SUITES HOTEL [205 ROOMS] - OVERVIEW

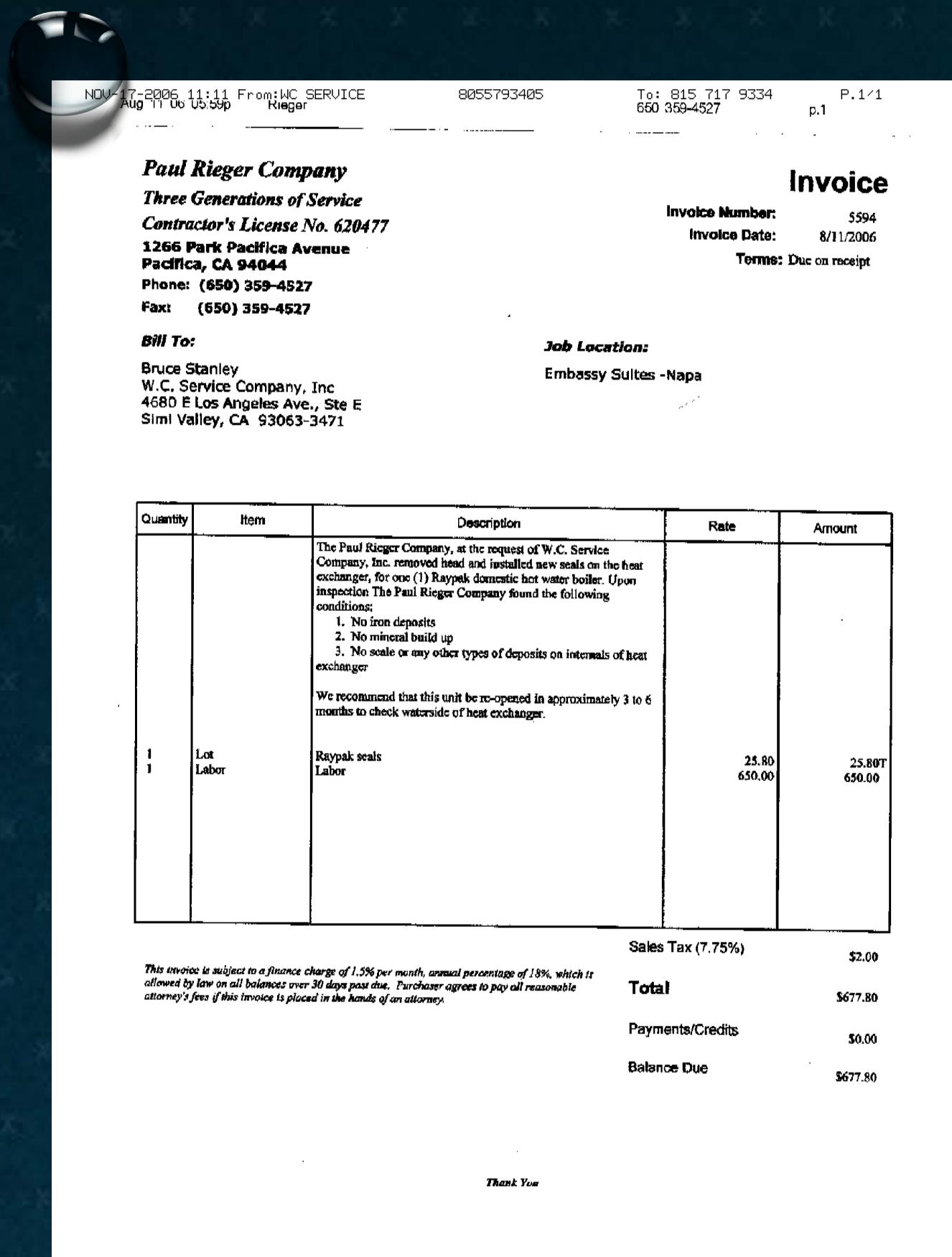
### BACKGROUND

LOCATION	NAPA, CA
HARDNESS	5 GRAINS
PROBLEM	WATER SOFTENER (HOT ONLY) FAILED, NEEDED REPLACEMENT
SOLUTION	INSTALLED NEXT-SCALESTOP ON DOMESTIC WATER SUPPLY. AFTER JUST 2 MONTHS, CHIEF ENGINEER SAID THAT OLD CALCIUM SCALE DEPOSITS IN GUEST ROOM SINKS AND FAUCETS WERE DISSOLVING AND REMAINING CLEAN FOR FIRST TIME.



# HOTEL CASE STUDY #2

## EMBASSY SUITES HOTEL [205 ROOMS] - INSPECTION RESULTS



After 1 month the chief engineer requested inspection of the 1.6 MBTU boiler.

Inspection results :

- No iron deposits
- No mineral build-up
- No scale or other types of deposits on internals of heat exchanger
- Recommend inspection in 3 to 6 months

System showed consistent performance for more than 5 years now.

# HOTEL CASE STUDY #3

## (NEW) EMBASSY SUITES HOTEL [146 ROOMS] - OVERVIEW

### BACKGROUND

LOCATION	LA QUINTA, CA
PROBLEM	COMMERCIAL SOFTENER BAN
BEFORE OPENING	22 EXCHANGE TANKS REQUIRED CHANGING 2x MONTH (\$1200+)
SOLUTION	ORDERED NEXT-SCALESTOP SYSTEM FOR ENTIRE WATER SUPPLY. SUBSTANTIAL SAVINGS AND REGULATORY COMPLIANCE



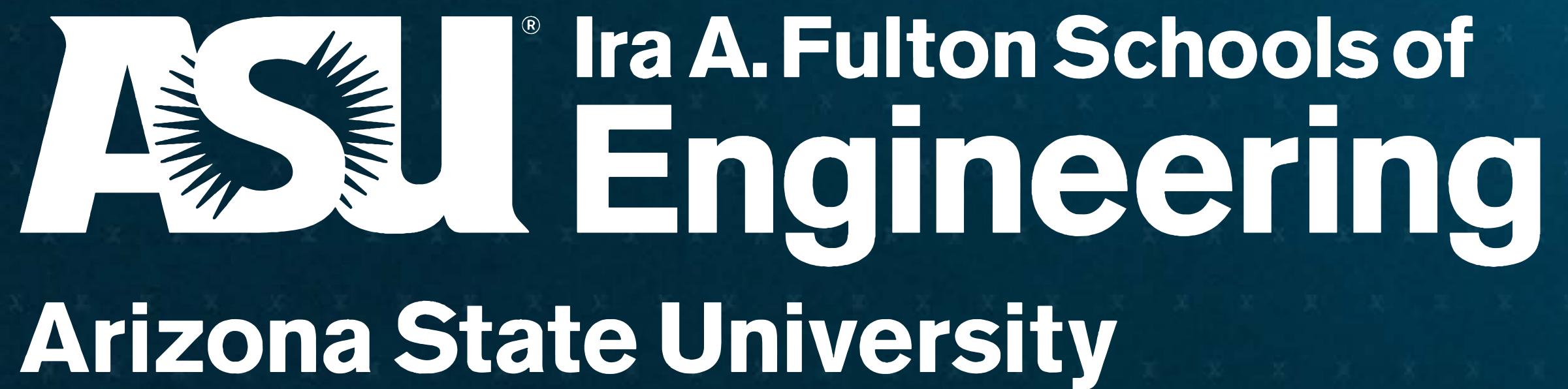
# NEXT-SCALESTOP TECH. VERIFICATION

THIRD PARTY TECHNOLOGY VERIFICATION : DVGW W-512

<img alt="Water droplets graphic" data-bbox="985

# NEXT-SCALESTOP COMPETITIVE EVALUATION

EVALUATION OF ALTERNATIVES TO DOMESTIC ION EXCHANGE WATER SOFTENERS



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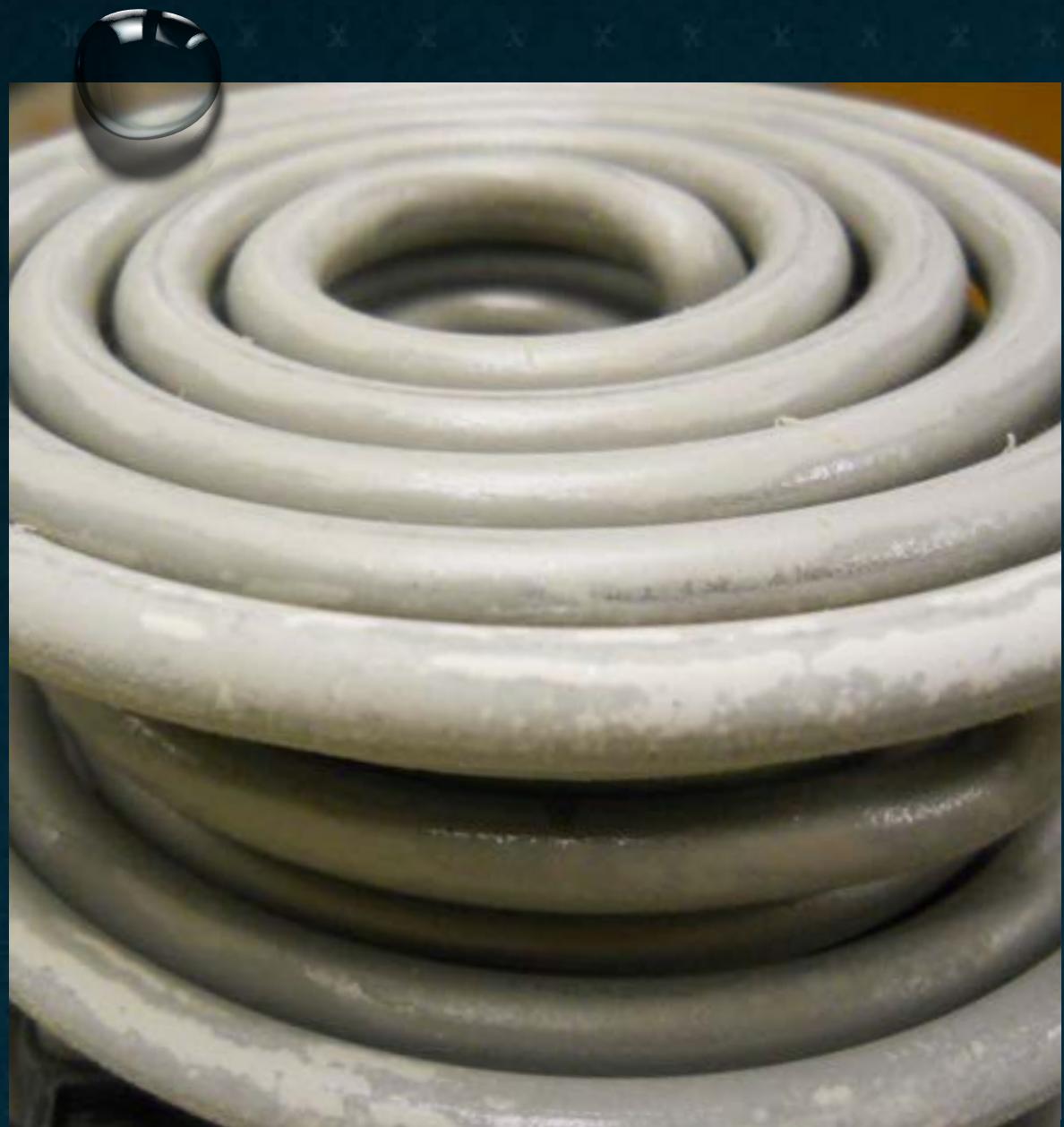
Dr. Peter Fox & Mara Ramos ASU  
Tim Thomure & Wontae Lee HDR

APRIL 2011

# NEXT-SCALESTOP COMPETITIVE EVALUATION

EVALUATION OF ALTERNATIVES TO DOMESTIC ION EXCHANGE WATER SOFTENERS

[ ALL TESTS UTILIZED THE SAME HARD TAP WATER FROM TEMPE, ARIZONA ]



UNTREATED



ELECTROMAGNETIC



ELECTRICALLY  
INDUCED  
PRECIPITATION



TEMPLATE  
ASSISTED  
CRYSTALLIZATION

# NEXT-SCALESTOP COMPETITIVE EVALUATION

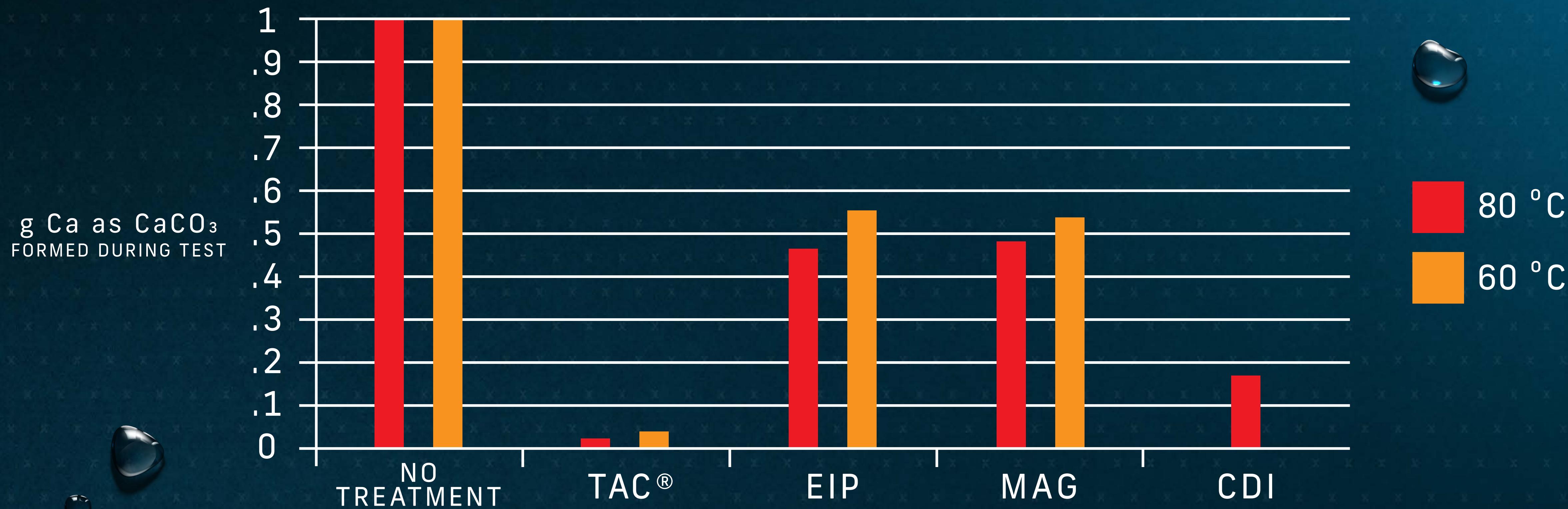
## TECHNICAL EVALUATION RESULTS OF WATER SOFTENER ALTERNATIVES

Treatment Used	Scale Scraped Off Of Heating Element (g)	% Ca In Scale Formed	Ca Formed In Solid Scale Precipitate (g Ca)	Scale From Bath & Heating Element Dissolved With HCl (G Ca as CaCO <sub>3</sub> )	Total Calcium Formed During Test (g Ca as CaCO <sub>3</sub> )
No Treatment	-	N/A	0.00	8.36	8.36
TAC®	0.00	N/A	0.00	0.12	0.12
EIP	0.68	34.88	0.24	3.60	3.84
MAG	1.44	34.88	0.50	3.47	3.97
CDI	0.00	N/A	0.00	1.41	1.41

[ ALL TESTS UTILIZED THE SAME HARD TAP WATER FROM TEMPE, ARIZONA ]

# NEXT-SCALESTOP COMPETITIVE EVALUATION

EVALUATION OF SCALE AMOUNTS COLLECTED FOR TEMPE TAP WATER TESTS



- Next-ScaleStop Template Assisted Crystallization worked best (97%+)
  - Capacitive deionization worked well enough to pass DVGW test
- Both electromagnetic treatment and electrically induced precipitation reduced scale formation, but not enough to pass any reasonable test

# WATER MARKET : REGULATORY PRESSURES



## LEGISLATION BANNING SOFTENERS CALIFORNIA - SB1006, AB334

“Local agencies may regulate water softeners by ordinance to limit or prohibit the use of a water softener if an independent study that shows such regulation is a “necessary means” of achieving compliance with the water reclamation requirements or the master reclamation permit issued by a California regional water quality control board.”

# WATER MARKET : REGULATORY PRESSURES



## WORLD HEALTH ORGANIZATION REPORT ON NUTRIENTS IN DRINKING WATER :

“We conclude that hard water is good because it contains nutrients valuable in themselves and because these nutrients can decrease impact of toxic elements in the environment. To minimize heart disease risk, the ideal water should contain sufficient calcium and magnesium to be moderately hard. No effort should be made to eliminate trace elements such as copper and iron where these elements are in short, dietary supply.”

“Lower cardiovascular death rates were found in populations where the water supply contained relatively high levels of water hardness or calcium and magnesium compared to populations in areas with low levels. This protective effect was found for populations throughout the world, especially when country-wide studies were conducted.”



WATER IS OUR  
WAY OF LIFE

NO WASTE • NO BACKWASHING • NO ELECTRICITY • NO CHEMICALS

## THE RIGHT MEDIA AT THE RIGHT TIME

This innovative technology provides superior scale reduction and has all the advantages of a water softener without the disadvantages.

For more info, visit [NextFiltration.com](http://NextFiltration.com) | Email: [sales@nextfiltration.com](mailto:sales@nextfiltration.com)