



Salinity Management:

Realities and Approaches for
the Water Softener Industry

Ways to Manage Salinity Through Higher Efficiency and Technologies

Summary

Across the United States, many states and communities are grappling with the issue of salinity in wastewater. As a result, water softeners often make an easy target for public officials. We have seen serious attempts to ban or strictly regulate softeners in California and Arizona and expect more parts of the country to follow suit.

Below is a summary of some of key information that you may find useful if the salinity issue arises in your locality. We have also included some of the proposed solutions that the Water Quality Association (WQA) and others in the industry have put forward in the past. If your community takes steps to regulate self-regenerated water softeners, we urge you to contact WQA and your local association. Together, we can work to develop strategies and offer support.

What is the salinity issue?

The problem of salinity is not new, but it has been gaining more attention from policymakers. Salinity is a problem. It can affect some plant growth.

While many plants are salt tolerant, too much salt prevents some salt-sensitive plant roots from taking in water from surrounding soil. This lowers the amount of water available to the plant, even if there is sufficient water actually in the area.

Residential water softeners often make a convenient target for those trying to show they are fighting salinity. The devices are, after all, a very noticeable part of the home and a major component in millions of people's quality of life. What often gets lost is this simple fact: Residential softeners usually contribute only 10 to 15 percent to the salinity problem in some hard water areas, such as parts of southern California. In other areas, softeners are a much smaller source of salinity. The vast majority of wastewater salinity comes from other sources – the source water itself, commercial and industrial activity, road deicing, and other human uses.

When public officials consider softener regulations, it is important to understand the role softeners play in their area. If a local study demonstrates that there is truly a problem and that softeners are a significant source of salinity, then we certainly are committed to doing our part. Very little will be gained by merely pointing fingers without a pledge of cooperation.

What often gets lost is this simple fact: Residential softeners usually contribute only 10 to 15 percent to the salinity problem.

The replacement of 500,000 low efficient softeners could save as much as two billion gallons of water and 175,000 tons of salt annually.

Offering solutions

The state of California has been more aggressive than any other state in seeking to regulate and, in recent years, ban and remove existing softeners. An examination of the California experience may help others who anticipate confronting these issues.

WQA, on behalf of the industry, has always worked to be good corporate citizens. Beginning in the 1970s, on the local and statewide level, we have accepted and even supported proposals based on sound science and balanced strategies. This has allowed us to maintain credibility during policy debates and to provide time for the industry to adjust to new political realities.

During recent interaction with California officials, we put forward a major plan to aggressively reduce our industry's contribution to the problem. (A summary of this proposal is attached as an appendix here, page 11.) We endorsed mandatory removal of inefficient residential softeners at time of home sale, a trade-out program to encourage the purchase of high-efficiency replacements, and a commercial softener efficiency upgrade program. We explained that if these proposals were to be accepted, the amount of salinity coming from softeners could be cut by as much as half.

With a trade-out program, you can make the point that the effect on salinity will be immediate and significant. Modern efficiency-rated water softeners use significantly less salt than previous models. More study will be required, but one early estimate suggests that the replacement of 500,000 low efficient softeners could save as much as two billion gallons of water and 175,000 tons of salt annually.

Advantages of incentive and trade-out programs

There are a number of reasons why trade-out systems are superior to outright and immediate bans. Public officials pushing for bans should be fully informed of these benefits.

First, a trade-out system could be significantly less expensive than bans. With bans, consumers would almost certainly need to be offered considerable compensation for the removal of their appliances. Such compensation, probably around the order of approximately 75 percent of the device value, would be necessary as a matter of public policy and arguably of constitutional law. It would also be necessary to persuade consumers to come forward and acknowledge their ownership.

The enforcement mechanisms of a trade-out system would also probably be less costly to governmental bodies. A program based on outright bans would call for teams of inspectors with police powers to enter homes of those reasonably suspected of operating softeners. Additionally, plumbers and engineers would have to be hired or put on contract to ensure that pipes are being properly fitted during the removal.

Further, it can be expected that any blanket ban would lead to a black market in softeners. Particularly in areas of the state that suffer from very high levels of hardness, many consumers will ignore any bans. Without a costly and intrusive team of investigators, it will be difficult to find and remove such illegal equipment.

The enforcement mechanisms of a trade-out system would also probably be less costly to governmental bodies.

Soft water can extend the life of clothing by as much as 15 percent and linens can wear out at twice the normal rate.

What is water softening?

Water softening is the removal of calcium and a few other minerals that can cause water to damage household plumbing and appliances. When hardness deposits as scale (known as calcium carbonate or limestone), it is an abrasive rock-like mineral. Presently there is only one practical way for homeowners to soften their water, and that is through an ion exchange water softener.

Raising the benefits of softeners

It is also often helpful to remind policymakers that in banning or regulating softeners, they are causing other unintentional damage to different aspects of the environment. For example:

- Softened water is not merely a convenience. In many cases, softeners are an enabling technology, helping other appliances run more efficiently and with up to 47 percent cost and energy savings.
- Clothing and household linens are harmed by hard water. The deposit of hardness onto fibers makes them more brittle and subject to breaking. Further, soap curd deposits lead to grayed and yellowed clothing. According to a Purdue University study, soft water can extend the life of clothing by as much as 15 percent and linens can wear out at twice the normal rate, depending on how hard the water is.
- Appliances break down faster with hard water, meaning any ban would have the effect of creating more refuse for already crowded landfills. It would also obviate the benefits

that softeners have on the carbon footprint.

- Eliminating softeners would increase the TDS contribution of soaps and detergents to the waste stream, thus offsetting some of the salinity savings from using softeners.
- New, higher efficiency devices are expected to be on the market soon.

Some proponents of softener bans have suggested that homeowners can switch to alternatives to water softeners. Remember, water softening is the removal of calcium and a few other minerals that can cause water to damage pipes, appliances, and clothing. The only known way to soften water in the home is to use an ion exchange water softener;

- 1) One that generates onsite conventionally, or
- 2) One that regenerates onsite and brine is hauled, or
- 3) A portable exchange (PE) softener service

(please note that brine hauling or PE service is not available in every area of the country).

Evaluating Alternatives to Water Softeners

Other alternatives that do not remove the hardness minerals sometimes claim to be scale-control devices. No national third-party testing and certification system has been created by the manufacturers of these products, so it is difficult to verify and compare claims. Ion exchange softeners are independently tested and certified to American National Standards Institute standards.

It is important that they understand the only practical alternative to using a water softener is to use nonsoftened water.

Higher Efficiency Softeners: How much water and salt savings?

On the other hand, newer technology would regenerate only every five to six days.

Modern water softening devices have made significant efficiency improvements over the years. A recent analysis by Ecowater Systems demonstrates the potential benefits to California.

Assume a family of four, using an average of 70 gallons of water per person per day. They might be facing a hardness level of 20 grains per gallon of water. This means they would need to remove about 5600 grains of hardness every day.

Confronted with this challenge, an older device would need to regenerate once every three to five days. This would use 60 to 70 gallons of water and up to 15 pounds of salt each time. On the other hand, newer technology would regenerate only every five to six days, using around 30 to 40 gallons of water and five to seven pounds of salt each time.

Over the course of a year, the difference becomes clear:

Older Technology

- 5500-6500 gallons of water
- 900 to 1300 pounds of salt

New Technology

- 2300-2700 gallons of water
- 400 to 500 pounds of salt

For every older device that is replaced, up to 4000 gallons of water and 700 pounds of salt could be saved every year.

With an aggressive rebate program, it is not unrealistic to assume 500,000 older softeners could be replaced. That would lead to an estimated annual savings to the environment of:

- **1.6 to 2 billion gallons of water, and**
- **350,000,000 pounds of salt.**

Recent Refurbishment Projects in Southern California

Markland Industries – Metal Finisher

- They have 30 cu. ft. softeners with old timed regeneration valves.
- New 2" control valves with meters were installed.
- There was a 35% salt savings for a minimal investment.

Belmont Laundry

- Old Aquamatic diaphragm valves manually regenerated on a schedule.
- New 2" Hydrus valves and meters installed.
- Salt consumption dropped from 12,000 lbs. to 3,000 lbs a month.
- There was corresponding water usage savings.

Yee Yuan Laundry

- Aquamatic manual system was removed.
- Whole new system was installed.
- Salt consumption went from 300,000 lbs. a year to 145,000 lbs.
- And there was corresponding water usage savings.

Braun Laundry

- Aquamatic steel tank system was refurbished with new valves and meters only.
- Salt consumption went from 600,000 lbs. a year to 120,000 lbs. a year.

This one refurbishment project at this one laundry freed up enough "New Capacity" to allow a typical* California city of 16,000 to have residential softeners without affecting the TMDs.

**Typical family's of four with an average market penetration of 30%.
Source: Performance Water Products, Buena Park, CA*

Banning Softeners: The Santa Clarita Case Study

When officials and residents ask what would actually happen if a water softener ban is put in place in their community, we do not have to speculate or guess. In 2008, voters of Santa Clarita accepted a local ban.

The result has not been what anyone wanted.

“Bait and Switch.”

In fact, the state senator who originally supported the ban soon publically called it a “bait-and-switch.”

In November 2008, voters approved Measure S, which required homeowners to remove home water softening systems with the goal of lowering chloride levels in the Santa Clara River.

For years, sanitation officials had insisted that sewer rates would go up substantially unless this ban were put in place. They went so far as to suggest that property taxes could increase as much as \$400 annually.

Accepting this dire argument, local State Senator George Runner authored a bill that would let residents vote for a ban. The voters agreed.

A Giant Increase Anyway

Soon after the vote, though, the sanitation districts announced that the average sewer assessment rate would be increased from \$14.92 to \$47 per month. That would have been a tripling of the rate. District officials claimed that the rate hike would be necessary to install new microfiltration systems in Santa Clarita’s two treatment facilities. There had been a decrease in chlorides but not enough.

As Senator Runner pointed out, “That cost is \$385 a year, which looks remarkably similar to the cost voters were told they would be able to avoid by voting for Measure S.”

“One wonders if voters would have voted down Measure S had they been told the truth,” the senator wrote.

Under public pressure, the sanitation boards are backing off their threat to raise the rates so much. But the fact remains that a local ban did not solve the problem of salinity in this community.

Listening to the Santa Clarita Experience

It’s no wonder. Softeners are only a small contributor to salinity, and with higher efficiency devices continually becoming available, that percentage will get even smaller. There are many ways to effectively address this problem, but a simplistic ban is not one of them.

Before anyone considers a local softener ban, it may be a good idea to talk to officials and residents in Santa Clarita. It is a lesson that does not have to be repeated.

Appendix

California Salinity Proposal

In the face of aggressive softener ban attempts, WQA and other industry leaders put forward a comprehensive proposal to the State of California. Below is a summary:

Proposal. Residential water softening is nearly essential (and highly desirable to many homeowners) in many areas, particularly where the hardness is over seven grains, such as where Colorado River supplies are used. Additionally, commercial softening is necessary for many businesses and industrial processes.

The residential and commercial water treatment industry's goal is to address its contribution to the salinity problem through a bold two-point strategy:

- (1) Ban all older residential water softeners that operate with a salt efficiency less than 4,000 grains/lb and replace these with high efficiency devices.
- (2) Identify and upgrade commercial softeners through a mandatory upgrade order. We believe many of these softeners could be upgraded to save millions of pounds of salt annually. More data must be collected, however.

Method. To accomplish these strategies, the following steps will be necessary:

- (1) **Mandatory removal of inefficient residential softeners at time of home sale** – At-time-of-home-sale, legislation would require certification that there are no softeners in the house with an efficiency of less than 4,000 grains/lb, which is widely regarded as good efficiency.
- (2) **Incentive program** – A meaningful incentive and, perhaps, tax credit program to encourage homeowners to replace banned devices before they decide to sell their homes.
- (3) **Commercial softener efficiency upgrade program** – Create a “template” for communities to follow, to enforce an upgrade of commercial equipment.
Template to include:
 - Communication to permit holder
 - Data collection to assess current equipment performance and document potential salt and water savings
 - Coordinating with commercial dealers who can perform upgrades while protecting existing contractual agreements.
- (4) **Standards and certification** – To protect the consumer, all products that claim a water treatment benefit (conventional technology or “salt free”) must be certified by an ANSI-accredited certification organization.



Water Quality Association

International Headquarters and Laboratory

4151 Naperville Road

Lisle, Illinois 60532-3696 USA

Telephone: 630 505 0160

Facsimile: 630 505 9637

www.wqa.org

Email: info@wqa.org

A not-for-profit organization