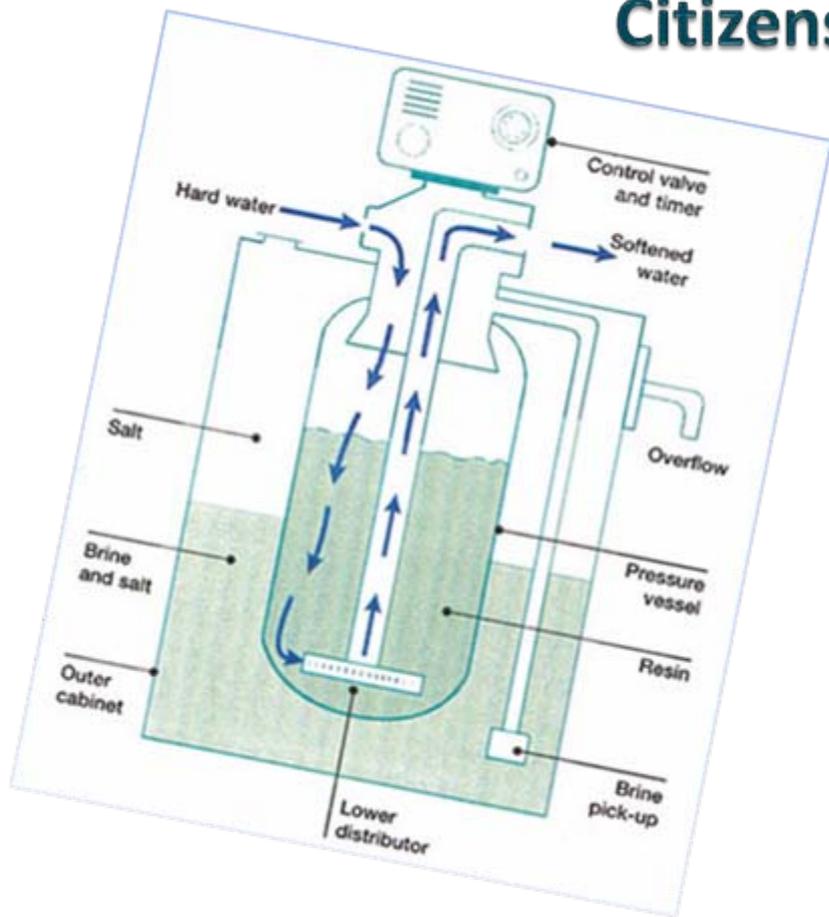


Industry Update

City of Tucson
Citizens' Water Advisory Committee



Presented by:
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Definitions: What is ...



- Universal Solvent

- Water is often called the universal solvent because of its ability to dissolve most compounds quickly or over time.
- Calcium and magnesium ions in water are rock dissolved by water trickling down through strata of rock and soil dissolving calcium and magnesium deposits as it goes. Water with these naturally occurring minerals is called hard water.
- In The Valley we see water hardness ranging from 8 to 55 grains per gallon.

- POE treatment (point-of-entry)

- Full service water treatment at the inlet to an entire building or facility.

- POU treatment (point-of-use)

- Water treatment at a single outlet or limited number of outlets in a building, but for less than the whole building or facility. POU treatment is often used to treat water for drinking and cooking only.



Definitions: What is ...

- **Water softening**
 - The reduction/removal of calcium and magnesium ions, which are the principal cause of hardness in water.
- **Water conditioning or treatment**
 - The treatment or processing of water, by any means, to modify, enhance, or improve its quality to a need, desire or standard.
- **Soft water**
 - Water which contains less than one grain per U.S. gallon (17.1 mg/L or ppm of total hardness expressed as calcium carbonate equivalent – a grain is a unit of weight)
- **Hard water**
 - A quality of water which contains dissolved compounds of calcium and magnesium and sometimes other metallic elements.
 - Hardness prevents soap from lathering by causing the development of an insoluble curdy precipitate in the water. Dissolved calcium and magnesium salts are primarily responsible for most scaling in pipes and water heaters and cause numerous problems in laundry, kitchen, bath and in commercial and industrial water uses.

Ways to soften water



There are only three technologies that can treat hard water to meet the definition of soft water:

- Ion exchange (a mechanical water softener)
 - Hard water is passed through a bed of cation exchange media for the purpose of exchanging calcium and magnesium ions for sodium or potassium ions, thus producing a softened water.
 - Eventually the media exchange sites are occupied by calcium and magnesium and no further exchange can take place. The media is then said to be exhausted and must be regenerated using either sodium or potassium.
- Reverse osmosis
 - Removes ionized salts, colloids, and organic molecules down to a molecular weight of 100 by using pressure to force water molecules through a semi-permeable membrane.



Ways to soften water



- Distillation

- Separates water from organic and inorganic contaminants through a combination of evaporation, cooling, and condensation.

Everyone treats hard water in some manner:

- Chemicals

- A compound which, when introduced into water used for cleaning or washing, will counteract the effects of the hard water minerals (calcium and magnesium) and produce the effect of softened water.
- For example, detergent additives and polyphosphates.

Regenerates

- **Sodium Chloride** (NaCl) is the chemical name for common table salt.
- **Potassium Chloride** (KCl) is the chemical name for potassium salt.
 - Benefits and drawbacks
 - Drawback with Potassium Chloride is that at least 25% more may be necessary to obtain a regeneration equivalent to Sodium Chloride thereby increasing the salt discharge into the sewer, and it costs three times more than Sodium Chloride.
 - The advantage is Potassium's vital role in plant life making it friendly to golf course turf irrigation and agriculture.

Regenerates

- Consumers treat hard water one way or another. Chemical alternatives to softening water challenge waste water treatment plants and find their way into waste streams and our environment, too.



Salt efficiency

- Salt efficiency (ion exchange water softener): The hardness removal capacity of a water softener unit calculated as grains of hardness removed divided by the weight of salt in pounds that is used to achieve that amount of hardness reduction.



Methods for delivering softened water:

- Automatic on site regeneration
 - Time clock
 - DIR (demand)
- Portable exchange

Regenerants: Sodium or potassium

Other considerations

- Salt and water savings with higher efficiency softeners
 - Old vs. new technology
- Installation:
 - Loops
 - Bypass outside sill cocks
 - Full line
 - Hot side only





Why homeowners and businesses soften water

- Energy savings
- Appliances last longer
- Pipes last longer
- Less detergent in laundry
- Less soap in dishwasher
- Clothes last longer
- Softeners help other appliances run more efficiently with up to 47% cost and energy savings.

Source: Battelle Study

Alternative technologies

- Descaling, other systems
- Standards and certification
 - Gold Seal, other programs
 - “Alternatives” do not offer independent standards and certification





Trends and Market Penetration

- The CASS estimates 26% of homes in Phoenix have SRWS
 - 51% of homes built after 2000 have SRWS
- City of Scottsdale estimates 46% of homes have SRWS
- TAC consensus is that newer homes have high penetration



Legislative Study Committee

- TAC created to propose objectives to reduce wastewater salinity derived from water softening
- Objectives to create an overarching strategy and action plan



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Salinity Sources

- TAC was mindful that water softener salinity includes many sources
 - Residential
 - Small Commercial
 - Large Commercial
 - Industry



Residential & Small Commercial

- Technology
 - Phase out sale of time clock SRWS
 - Efficiency standards for prospective sale
 - Adopt standards and certifications for new technologies
 - Brine diversion
- Plumbing
- Public education
- Training and certification



Large Commercial & Industrial

- Seminars for facility managers
- Encourage efficiency evaluations



Questions?