

POINT-OF-USE

Water Quality Report for Consumers

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Study Finds Water Softeners Reduce Radioactivity in Drinking Water

One of the hardest working appliances in your home may be a life-saver as well as a time-saver.

Homeowners have known for years that ion exchange softened water works more effectively with soap and is gentler than hard water on clothes, people, and plumbing fixtures. Now, a recently published study shows that the resins used in ion exchange water softening also exchange out potentially harmful naturally-occurring radioactivity in the water. That gives the water softener a whole new image.

The softener/radium study was conducted by Lucius Cole, P.E., Technical Director of the Water Quality Association, headquartered near Chicago.

In formulating his study, Cole looked for the simplest and most cost-effective means of dealing with the potential danger of radioactivity in drinking water supplies. Armed with theories about resin absorption of radionuclides, Cole focused on ion exchange water softening as a likely solution to the problem.

The study was designed "to discern the effectiveness of point-of-entry (POE) acid cation exchange resin water softeners in reducing the radiological contamination of a water supply to a level at or below the Maximum Contaminant Level (MCL) of 5 pico-curie/litre (pCi/L) as stipulated in the Primary Drinking Water Regulations." The findings dramatically illustrate the effectiveness of water softeners for reducing radium in the water.

It has been known for many years that radiation can produce unusual and detrimental biological effects on humans. Radium's alpha particles can damage human tissue and, since radium is chemically similar to calcium, it seeks to replace calcium in bone. At concentrated levels, this can result in bone cancer.

The regulatory sector of the U.S.

Government established the maximum contaminant level for radionuclides, specifically Radium 226/228 at 5 pCi/L.

Radium 226 and 228 occur naturally in limestone and sandstone rock formations throughout the continental United States. Therefore, this is not a case of a single radioactive spill or an isolated incident of local contamination; radium 226/228 can surface in groundwater virtually anywhere.

For the radium-reduction study, Cole chose an ion exchange water softener since it is a familiar and proven product which reduces hardness in water supplies. As a solution, it offered added value because it is already in place in many homes. He was testing theories that water softener resins which reduce hardness could also reduce radioactivity in water.

A site in Aurora, Illinois with water obtained from the municipal groundwater supply was selected for the study. The hardness of the groundwater in Aurora was measured at approximately 15 grains per gallon (gpg) as calcium carbonate (CaCO_3) and has a natural occurring Radium 226/228 contamination of approximately 12 pCi/L, well above recommended levels.

Findings

Cole found that the effective reduction of both hardness and naturally occurring Radium 226/228 were graphically illustrated in the study. At the hardness breakthrough of 1.0 gpg, the radium level was less than 0.3 pCi/L. As the ion exchange water softener was allowed to continue to complete resin exhaustion, influent (incoming water) and effluent (outgoing water) hardness were equal. However, the radium concentration at that time was reduced by 84 percent to only $0.8 \pm$ pCi/L, which is well below the standard 5.0 pCi/L.

This study indicates a consumer could

operate his water softener for at least 133 percent of rated capacity and still obtain protection from this level of Radium 226/228, although hardness would not be effectively reduced. Thus, it was demonstrated that an ion exchange water softener has an excellent ability to reduce naturally-occurring radium contamination even when its resin bed has been exhausted, or has exceeded its recommended effective hardness reduction capabilities.

There is a tendency to look to government or municipal water purveyors to solve all of our drinking water problems. But for small communities, correcting the problem centrally may be cost prohibitive. For residents on private wells, there is no central authority to look to for help.

"My job is to look for solutions that can be applied by individuals right in their homes and that are cost effective as well as efficient for consumers and for metropolitan and municipal water suppliers. Using ion exchange water softeners for naturally-occurring radium 226 / 228 reduction fits the bill perfectly. It places the control in the hands of the individual consumer if they choose to take personal responsibility for their water," said Cole.

So while homeowners are softening their water for better performance and greater efficiencies, those with naturally occurring radium 226/228 can use that same technology to reduce contamination. As water quality problems become more complex, the proven ion exchange water softener continues to adapt effective solutions.

For area information about water quality, contact the county extension service or your local health department.

For POU/POE equipment, look for a WQA member in the yellow pages under water conditioning and drinking water. □

Consumers Ask...

Q. Is there anything I should know before purchasing a water treatment system?

A. If you are considering the purchase or rental of a point-of-use/point-of-entry water quality improvement system or device, here are a few consumer tips from the Water Quality Association:

- ▶ Have the quality of your water analyzed by a certified water specialist and/or a reputable laboratory.
- ▶ Research the water quality improvement products available before you buy. Check performance capabilities, warranty, maintenance provisions and general operation.
- ▶ Look for a WQA Gold Seal on the POU/POE equipment. It indicates the product meets voluntary industry standards.
- ▶ Research the reputation and legitimacy of the company you choose. Check references before you sign a contract.
- ▶ Beware of the salesperson who tries to sell you one product to solve many different water quality problems.
- ▶ Deal only with a professional, such as a WQA Certified Water Specialist. Check your telephone directory for the WQA Specialist nearest you.
- ▶ For a list of Certified Water Quality Association dealers in your area write: POU Dealers List, 4151 Naperville Road, Lisle, IL 60532. □

EPA Sets Drinking Water Standards For Contaminants

The U.S. Environmental Protection Agency (EPA) is responsible to set drinking water standards for contaminants that pose a health risk. The Safe Drinking Water Act, which was amended by Congress in 1986, grants EPA this authority.

EPA sets the standards and the states, except Indiana and Wyoming, are responsible for enforcing the standards for public water systems. A state may choose to have more stringent standards and regulate additional contaminants. Please note that homes served by private wells are not covered by these standards.

Presently, EPA regulates the following contaminants:

Contaminant	Maximum Contaminant Level (Milligrams per litre)
Arsenic.....	0.05 mg/1
Barium.....	1.0 mg/1
Cadmium.....	0.010 mg/1
Chromium.....	0.05 mg/1
Lead.....	0.05 mg/1
Mercury.....	0.002 mg/1
Nitrate (as N).....	10 mg/1

Selenium.....	0.01 mg/1
Silver.....	0.05 mg/1
Fluoride..	1.4-2/4 mg/1 (ambient temp)
Endrin.....	0.0002 mg/1
Lindane.....	0.004 mg/1
Methoxychlor.....	0.1 mg/1
Toxaphene.....	0.005 mg/1
2, 4 - D.....	0.1 mg/1
2, 4, 5 - TP Silvex.....	0.01 mg/1
Coliform bacteria... ◀	1/100 ml (mean)
Radium 226 / 228.....	5pCi/1
Gross alpha particle activity...	15 pCi/1
Beta particle and photon radioactivity..	4 mreem (annual dose equivalent)
Turbidity.....	1TU (up to 5 TU)
Trihalomethanes.....	0.10 mg/1

Additionally, public water systems are required to monitor for corrosivity and sodium.

The main thrust of the 1986 Amendments to the Safe Drinking Water Act requires EPA to set new standards for numerous contaminants in a more timely fashion, specifically for 83 contaminants, as listed by Congress, within the next three years. □

Did you know...

...To be palatable, water should be free of detectable tastes and odors. Odors can be traced to living organisms, organic matter and gases in water. Tastes can be traced generally to high total minerals in the water.

...The amount of sodium present in softened water is small when compared to the sodium present in foods.

...A private well may be inadvertently contaminated by its owner through improper handling of cleaning solvents and other man-made chemicals.

...Remember: Today's wastewater is tomorrow's drinking water.

...While man cannot affect the volume of naturally occurring water on Earth, its quality can be altered.

...The point-of-use/point-of-entry technology ranges from the high-tech applications within the space program, the computer industry, medicine and research to a variety of home devices, such as water

softening and drinking water systems.

... Besides the presence of nitrates or other contaminants sometimes present in the water, there is an added potential deterioration of the supply enroute from the treatment plant to the consumer through leaching of lead or asbestos.

... Hard water is tough on plumbing. Hard water can cause scale to build on water heaters and pipes, limiting the water flow, reducing the life of the product and increasing operating costs.

... In recent years, research indicates that contaminants may be absorbed by the human body in ways other than drinking, such as inhalation and absorption.

... You can control the quality of the water in your home. Water conditioning processes can soften, filter, chemically treat, reduce or eliminate substances from water to solve problems of hardness, color, taste, and odor, as well as reduce iron, sulfur, and acid in home water supplies. □

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