Silver

Recognized Treatment Techniques For Meeting Drinking Water Regulations For The Reduction Of Silver From Drinking Water Supplies Using Point-of-Use/Point-of-Entry Devices And Systems
Recognized treatment techniques for meeting
drinking water regulations for the reduction of silver
using point-of-use and point-of-entry (POU/POE)
devices and systems.

Chemistry & Health Effects

Biologically, silver is a nonessential, nonbeneficial element to humans. It has never been found
to cause a problem to any one in United States due to its presence in drinking water from natural
sources. However because of its bactericidal abilities, silver is used as a water bacteriostat in
carbon containing water filters. The silver is deposited onto the carbon granules to potentially
inhibit the growth of bacteria on the surfaces of these carbon particles. Such filters tend to leach
out trace levels of silver into the effluent water. At these concentrations, the ingestion of silver
has no detrimental effect on humans. When ingested and absorbed, silver is held indefinitely
within tissue, particularly skin, eyes, and mucous membranes. Skin discoloration is a cosmetic
effect related to silver ingestion. This effect, called argyria, does not impair body function.

A standard has been set, however, because silver is used as indicated above as an antibacterial
agent in many home water treatment devices, and so USEPA believes it presents a potential
problem which deserves attention. The U.S. Environmental Protection Agency has set a
nonenforceable secondary standard for silver because of its ability to cause aesthetic
discolorations of the skin or argyria. The Secondary Maximum Contaminant Level (SMCL) for
silver is 0.10 (milligrams per liter) mg/L.

Treatment Alternatives.

Current technology suggests that several techniques may be used for removing the silver ion
from drinking water including reverse osmosis, distillation, and cation exchange.

Reverse osmosis is capable of reducing the silver cation concentration by up to 90 percent of the
influent water levels.

Distillation is capable of reducing the silver concentration by greater than 98 percent.

The treatment methods listed herein are generally recognized as techniques that can effectively
reduce the listed contaminants sufficiently to meet or exceed the relevant MCL. However, this
list does not reflect the fact that point-of-use/point-of-entry (POU/POE) devices and systems
currently on the market may differ widely in their effectiveness in treating specific contaminants,
and performance may vary from application to application. Therefore, selection of a particular
device or system for health contaminant reduction should be made only after careful
investigation of its’ performance capabilities based on results from competent equipment validation testing for the specific contaminant to be reduced.

As part of point-of-entry treatment system installation procedures, system performance characteristics should be verified by tests conducted under established test procedures and water analysis. Thereafter, the resulting water should be monitored periodically to verify continued performance. The application of the water treatment equipment must be controlled diligently to ensure that acceptable feed water conditions and equipment capacity are not exceeded.

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>SMCL*, mg/L</th>
<th>Treatment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver Cation 0.10</td>
<td>0.10 (total silver)</td>
<td>Reverse Osmosis, Distillation, Strong Acid Cation Exchange (Na(^+) form).</td>
</tr>
</tbody>
</table>

*The U.S. EPA has now established only a recommended Secondary Maximum Contaminant Level (SMCL) for silver because its effects are aesthetic rather than of health significance.

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