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HOME WATER FILTRATION FOR PUBLIC HEALTH PROTECTION

Exposure to lead is a complex public health issue. Even with much progress made over the last few decades, there is still valid concern for high-risk situations associated with exposure from drinking water. Understanding what makes a situation high-risk is pertinent to implementing methods that can protect the public.

What are examples of situation at risk for lead exposure?

Lead has historically been a material used in plumbing pipes that deliver drinking water. One way it can release from the pipes into the tap water is if the water is corrosive and there is not adequate corrosion control.[1] Lead can also settle in sediments in the distribution system and release when sediments are dislodged from events such as earthquakes or nearby roadway construction.[10]

The solution to the issue is as complex as the problem. Even replacing the lead pipe with a new non-leaded one, if it is a partial lead service line replacement (the portion of the pipe past the property line is the homeowner's responsibility), it can actually increase lead release for up to 6 months until water chemistries stabilize.[4]

What is the cost of lead exposure?

The most vulnerable population at risk of health effects from lead exposure are unborn children via their pregnant mothers and young children. The health effects to children include reduced IQ, cognitive functioning, impaired hearing and decreased growth. There can also be kidney and nervous system damage in both adults and children. The financial cost related to lead exposure include the loss of productivity to society, lost earnings, the costs of special education, and the costs of juvenile delinquency.[5] A recent cost–benefit analysis undertaken in the United States found that for every $1 spent to reduce lead hazards, there is a savings of $17–220 to society.[6]

Is there a financial benefit of using Point-of-Use as a prevention method for high-risk situations?

The University of Arizona examined this concept as it would have applied to the case of the water emergency in Flint, Michigan. The study assumed all of the 98,310 Flint residents were exposed to lead levels of 25 µg/L in drinking water and 20% of lead in drinking water is manifested in the body as blood lead levels. This corresponded to an average blood lead level of 0.5 µg/dL and a loss of 0.257 IQ points. Using the blood lead level to lifetime economic impact model, this corresponds to a lifetime loss of $5,381 per person and a total community cost of $435,000,000.[8]

The average household size in Flint is 2.42 persons which equates to 40,064 houses.[7] A five-year community wide intervention using one activated carbon filter with lead adsorption capabilities per household would have cost $11,100,000.[8]

Technology	Initial Cost	Annual Operation & Maintenance Cost	5- Year Total Cost	Certification Standard
Reverse Osmosis	$318	$83	$648	NSF/ANSI 58
Activated Carbon	$32	$61	$275	NSF/ANSI 53

Table adapted from University of Arizona report.

How do I know what POU products to recommend to the public?

Filters certified by an ANSI-accredited program and approved for lead removal were distributed to Flint residents and were shown to remove 99.85% of lead.3 Products certified for a lead reduction claim by an ANSI-accredited program can be found on the websites of the following organizations:

- Water Quality Association: https://www.wqa.org/find-products#/
- NSF International: http://www.nsf.org/
- Underwriters Laboratories: https://www.ul.com/
- IAPMO: http://www.iapmo.org/Pages/IAPMOgroup.aspx
- CSA: https://www.csagroup.org/

Call your local certified water professional if you have additional questions about maintenance of products or installation. These professionals are eager to share their knowledge with the public and public health professionals.

References

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