Potential for iron release in drinking water distribution system: a case study of Hamedan city, Iran

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\textbf{ABSTRACT}

Blending of water from different sources into an urban drinking water distribution system can have unintended impacts, such as corrosion and/or release of corrosion by-products from pipe surfaces. Hamedan, a city in west Iran, receives water from four different sources that have different physical and chemical characteristics. The potential for iron release from iron distribution pipes due to \textit{in situ} blending of different sources was investigated in this study. A dedicated software was developed to calculate the corrosion indices of different blends expected in different zones of Hamedan’s water distribution system. The calculated corrosion indices, and iron release were verified and correlated to actual conditions through water sampling conducted in different zones of the city. The Langelier index (LI), Ryznar stability index (RSI or RI), Puckorius scaling index (PSI), and the calcium carbonate precipitation potential were found to be $-0.60 \pm 0.30$, $8.63 \pm 0.57$, $8.18 \pm 0.34$, and $-10.95 \pm 6.9$ mg CaCO$_3$/L, respectively. Alkalinity, pH, and carbonate ion were identified as the important parameters that have a role in the control of iron release. Significant linear correlations of LI, RI, and PSI to iron concentration were observed in samples collected from different zones of the distribution system. The spatial correlation between iron concentration and corrosion indices in different zones of the water distribution system was determined using ordinary Kriging interpolation. These indices indicated a wide variation of corrosive potential in different zones of the distribution system. Therefore, these corrosion indices can be used to estimate, monitor, and minimize the potential for iron release from distribution systems.

\textit{Keywords:} Corrosion index; Drinking water; Iron release; Water distribution system

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