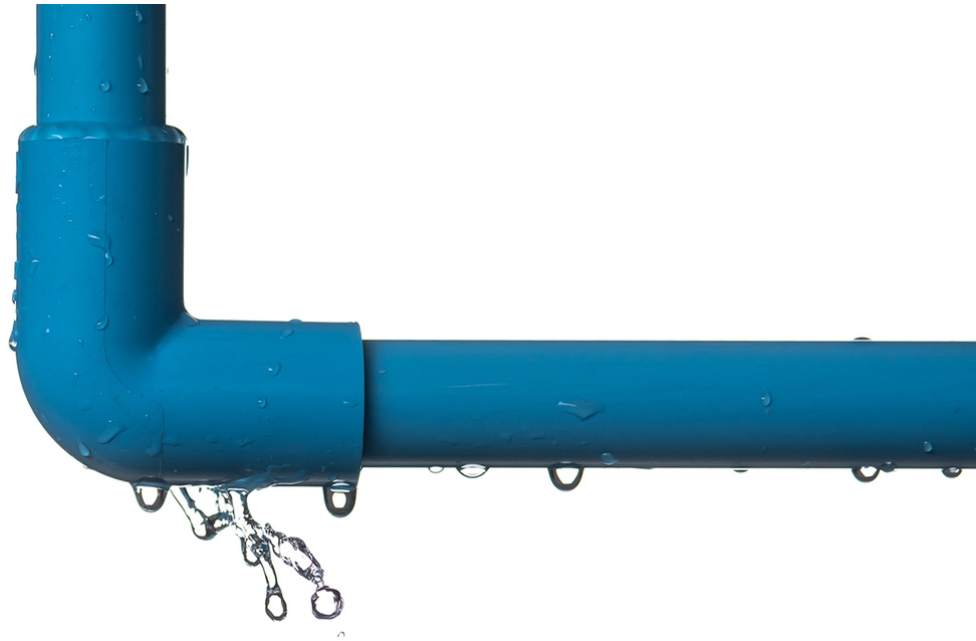


Persistent Contamination and Flushing Challenges in PVC Drinking Water Pipes

By PPN Editor



The excessive accumulation of particulate material and biofilms on the inner walls of PVC drinking water pipes poses a serious risk to water quality, leading to frequent discoloration events—one of the most widespread causes of customer complaints worldwide. Despite efforts by water utilities to mitigate these issues through flushing operations, the effectiveness of these interventions remains highly questionable, as they fail to fully remove contaminants from affected sections.

A fundamental limitation in addressing this issue stems from the poor understanding of material build-up processes and the unpredictable behaviour of resuspended particles during flushing.

A new study sought to examine the stubborn behaviour of insoluble iron oxide particles accumulating within PVC pipes under controlled conditions. A series of four experiments revealed the concerning tendency of particles to embed themselves along pipe surfaces, resisting removal even under high-velocity flushing conditions.

Flushing at velocities of 0.7 and 1.2 m/s demonstrated that not only do particles remain lodged along the pipe walls, but mobilized particles frequently reattach to downstream sections, effectively negating the intended cleaning process.

Alarming, even after repeated flushes in the same direction, reversing the flow at the same velocity dislodged previously immobile particles, revealing a hidden accumulation mechanism that resists standard cleaning procedures.

These findings expose a critical weakness in PVC-based drinking water distribution systems (DWDSs)—namely, their inability to prevent and manage persistent material build-up. The poor performance of flushing techniques in fully clearing deposits underscores the inherent flaws of PVC pipes in maintaining long-term water quality.

Without significant advancements in preventative maintenance strategies, utilities will continue to struggle with ineffective cleaning efforts, leaving consumers at risk of poor water quality and recurring contamination issues.

References and Further Reading

<https://pubs.rsc.org/en/content/articlehtml/2025/ew/d4ew00764f>

