
AWRA 2007 SUMMER SPECIALTY CONFERENCE
Vail, Colorado

June 25-27, 2007

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EMERGING CONTAMINANTS IN THE DRINKING WATER CYCLE

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ABSTRACT: In the past decade, the scientific community and general public have become increasingly aware of the potential for the presence of unregulated, and generally unmonitored contaminants, found at low concentrations (sub-ug/L) in drinking water. The most common pathway for the introduction of these chemicals into drinking water is from an upstream direct discharge of wastewater effluent into drinking water source water. In the US, there are more than two dozen communities that draw their drinking water from streams that consist of more than 50 % wastewater during low flow conditions. Growing demands on potable water has resulted in select communities adopting water reuse, typically through groundwater recharge or reservoir augmentation, thus increasing the potential for the presence of these wastewater-derived chemicals in drinking water. The US Geological Survey (USGS) and US Environmental Protection Agency (USEPA) have been working on a series of collaborative research projects to determine the complex mixtures of chemicals that are commonly present in wastewater effluent, the persistence of these chemicals in surface and ground waters, the removal of these chemicals during drinking water treatment, the formation of by-products during chlorination and the presence of these chemicals in finished drinking water. In effluents collected at eleven wastewater treatment plants across the US, 72 out of 110 monitored chemicals were detected at least once, documenting incomplete removal during wastewater treatment. In the source water of one conventional drinking water facility, 45 out of 113 monitored chemicals were detected at least once, with 21 chemicals still detectable in the finished drinking water. This documents the incomplete removal of such chemicals during treatment. In companion laboratory studies on the effects of chlorination, eight of the 14 chemicals investigated in were oxidized by the disinfectant, two of which were at least partially chlorinated. Taken as a whole, these studies demonstrate that to understand the comprehensive environmental impact of emerging contaminants, their persistence, removal efficiencies during waste and drinking water treatment, as well as the potential for by-product formation must be known. Disclaimer: Although this work was reviewed and approved by the USEPA, it may not necessarily reflect official Agency policy.

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