HPC Bacteria in Drinking Water: Public Health Implications


Abstract

The goal of this project was to quantify the concentration of heterotrophic plate count (HPC) bacteria within water reaching consumer's taps, and from the sources used by a major utility serving the City of Tucson, AZ. With this information, the amounts and sources of HPC bacteria consumed at the tap could be determined. Samples of water were collected on a monthly basis from two well fields, the CAVSARP recovery well field and Southern Avra Valley well field which serves as one of the groundwater sources for Tucson, AZ, and the distribution system which serves the same homes from which tap water was also tested. The average concentration of HPC in source waters within Southern Avra Valley Wells was 56 CFU/ml (range 1–1995/ml). From the CAVSARP

Tracking the concentration of heterotrophic plate count bacteria from the source to the consumer's tap


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recovery well field, corresponding values were 38 CFU/ml (1 to 502 CFU/ml). Unblended groundwater in the chlorinated distribution system averaged 22 CFU/ml (range 1–794). Blended water at the chlorinated distribution site averaged 47 CFU/ml (range 10–158). There was a major shift in the percentage of gram negative to gram-positive bacteria from the wells to the distribution system, to the tap. In the surface CAP source water, 76% of the bacteria were gram-negative compared to 27% gram-negative in the CAVSARP recovery wells. In contrast, Avra Valley wells contained 17% gram-negative bacteria. In both the Tucson groundwater distribution sites and blended distribution sites, the corresponding number of gram negative bacteria was 12%. Finally at the tap, only 0.2% of the bacteria were gram-negative. The average number of bacteria in household taps averaged 3072 HPC/ml and was equal or greater than 500 ml 68% of the time. This study shows that the number of HPC bacteria increases dramatically from the distribution system to the consumers tap. Thus, the major source of bacteria ingested by the average consumer in Tucson originates from bacteria within the household distribution system or the household tap, rather than from source waters or the distribution system. It is also clear that consumers' regularly consume more than 500 HPC/ml from drinking water taken from the household tap.

Author Keywords: HPC in source waters; HPC in water utility lines; HPC in household utility lines

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