

Bioelectromagnetics Volume 18, Issue 4

Article

Study of magnetic fields from power-frequency current on water lines

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First published: 06 December 1998

[https://doi.org/10.1002/\(SICI\)1521-186X\(1997\)18:4<307::AID-BEM3>3.0.CO;2-6](https://doi.org/10.1002/(SICI)1521-186X(1997)18:4<307::AID-BEM3>3.0.CO;2-6)

Citations: 4

Abstract

The magnetic fields from power-frequency current flowing on water lines were investigated in a new approach that involved an area-wide survey in a small town. Magnetic fields were measured outside the residence under power cables and over water lines, and each residence was characterized as to whether it received water from a private well or the municipal water system. The magnetic field data revealed two statistical modes when they were related to water supply type. The data also showed that in the case of the high mode, the magnetic field remained constant along the line formed by power drop wires, at the back of the house, and the water hookup service, in front of the house, all the way to the street. The patterns are explained by the coincidence of measurement points and the presence of net current flowing on power mains, power drop conductors, residential plumbing, water service hookups, and water mains. These patterns, together with other characteristics of this magnetic field source, such as the gradual spatial fall-off of this field and the presence of a constant component in the time sequence, portray a magnetic field more uniform and constant in the residential environment than has been thought to exist. Such characteristics make up for the weakness of the source and make net current a significant source of exposure in the lives of individuals around the house, when human exposure to magnetic fields is assumed to be a cumulative effect over time. This, together with the bimodal statistical distribution of the residential magnetic field (related to water supply type), presents opportunities for retrospective epidemiological analysis. Water line type and its ability to conduct power-frequency current can be used as the historical marker for a bimodal exposure inference, as Wertheimer et al. have shown. *Bioelectromagnetics* 18:307–316, 1997. © 1997 Wiley-Liss, Inc.