Health Consultation

MONROE TOWNSHIP GROUNDWATER

MONROE TOWNSHIP, NEW JERSEY

JULY 11, 2000

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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PETITIONED HEALTH CONSULTATION

MONROE TOWNSHIP GROUNDWATER

MONROE TOWNSHIP, NEW JERSEY

Prepared by:

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Agency for Toxic Substances and Disease Registry

Background and Statement of Issues

The Agency for Toxic Substances and Diseases Registry (ATSDR) was requested by the Environmental Protection Agency (EPA) Region II to determine if home-grown fruits and vegetables could uptake mercury if irrigated with mercury-contaminated groundwater. Although EPA has provided a treatment unit for the potable water supply at a residence in Monroe Township, untreated groundwater with mercury levels up to 18 milligrams per liter is used to irrigate a garden.

After reviewing available scientific literature and conferring with a agronomist from the U.S. Department of Agriculture, ATSDR concludes that the mercuric ion in contaminated groundwater that is used to irrigate home gardens would strongly adsorb to organic and clay materials within the soil and become bound in the fibrous root system of the plant [1]. A small amount of mercury uptake could potentially occur in leafy garden produce (i.e., lettuce, spinach, kale, mustard greens) irrigated with mercury contaminated water via volatilization into the plants' stomata, or leaf openings [2]. However, the amount of mercury uptake in home-grown garden produce irrigated with this groundwater and consumed is insignificant to human exposure because of the poor absorption in the gastrointestinal tract.

Discussion

The *maximum* concentration of mercury detected in the private well used for garden irrigation was 18 µg/L; approximately nine times the Maximum Contaminant Level for mercury in drinking water. Garden produce consumption is not a significant human exposure route to mercury [1]. Data from most garden plants studies indicate that virtually no mercury is taken up from the soil into the shoots of plants such as peas, although mercury concentrations in roots may be significantly elevated and reflect mercury concentrations of the surrounding soil [1, 3]. One study showed the accumulated mercury in the edible portion of assorted vegetables was 100-1000 times *less* than the amount of mercury in the wastewater that was applied over a long period of time [4]. Another study confirmed low mercury accumulation in several vegetable species grown in mercury-treated soil [3]. Because of the low accumulation and the poor mercury absorption from the gastrointestinal tract, short-term consumption of these vegetables would not produce adverse health effects [1, 3]. The depth of the plant's root system is also an important factor in mercury uptake since most mercury resides in the top 15 centimeters of soil by adsorbing to the organic and clay content [1].

Conclusions

ATSDR concludes that the expected amount of accumulated mercury in home-grown garden produce irrigated with this groundwater is low and may not accumulate at all. Consumption of garden produce with low levels of accumulated mercury is insignificant to human exposure because of the poor absorption in the gastrointestinal tract.

Recommendations

None.

References

1. US Department of Health and Human Services. March 1999. Toxicological Profile for Mercury. Atlanta, GA.

2. Personal communication between Kimberly Chapman, ATSDR and Rufus Chaney, USDA. July 3, 2000.

3. Shariatpanahi, M.. and A.C. Anderson. 1986. Accumulation of cadmium, mercury, and lead by vegetables following long-term land application of wastewater. *Sci. Total Environ.* Vol. 52, 1-2:41-7.

4. Bache, C.A., W.H. Gutenmann, L.E. St. John, R.D. Sweet, H.H. Hatfield, and D.J. Lisk. 1973. Mercury and methylmercury content of agricultural crops grown on soils treated with various mercury compounds. *J. Agr. Food Chem.* Vol 21, 4:607-13.

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