



Wastewater Impacts on Cape Cod Public Drinking Water are Increasing

Well Monitoring Data Now Available On-Line

Silent Spring Institute research results published in the *Journal of Exposure Assessment and Environmental Epidemiology* show dramatic increases in human impact on Cape Cod public drinking water supplies, based on an analysis of two water quality indicators: nitrate levels in public supply wells (an indicator of wastewater impact) and the extent of developed land in drinking water recharge zones.

The average nitrate level in Cape Cod public water supplies was more than 15 times higher than the natural background level (0.05 mg/l) identified by the US Geological Survey and more than double the average nitrate impact in 1972 when routine nitrate monitoring began. Sixty percent of the operating wells had nitrate levels indicative of human impact for at least 2 years. Levels in some wells approached the Cape Cod regional planning guideline of 5 mg/l. Results are consistent with a recent report on groundwater degradation by the Cape Cod Commission.

Public water quality varied across the Cape. For example, nitrate levels in the Brewster water supply were near natural background, indicating little human impact; while the four water supplies in Barnstable, a relatively developed area of the Cape, showed some of the highest nitrate levels.

The study's painstaking well-by-well analysis revealed that some districts are supplied by both clean and impacted wells. In these districts, tap water at homes closer to the impacted wells may have contaminant levels higher than the district-wide average. Cape residents can check water quality in individual wells and water districts on the Silent Spring Institute web site – www.SilentSpring.org -- where study data are now readily accessible for the first time.

Because nitrate levels are an established measure of wastewater impact and have been routinely monitored in public wells, they can be used in health studies as an indicator of exposure to the myriad of wastewater contaminants that are not measured on a regular basis. Earlier research by Silent Spring Institute supports this strategy by documenting that Cape Cod wastewater and wastewater-contaminated groundwater contain high levels of many endocrine disrupting compounds (EDCs), including estrogen mimics that are of particular interest in breast cancer research. The new results allowed researchers to estimate exposures to EDCs from wastewater over the past 30 years as part of the Cape Cod Breast Cancer and Environment Study.

Nitrate levels in Cape Cod drinking water supplies are well below the maximum contaminant level (10 mg/l) allowed under the Safe Drinking Water Act. However, the federal standard does not take into account the possible health effects of EDCs found in wastewater.

The Silent Spring Institute Cape Cod Study also used geographic information system technology to assess effects of increasing development in land areas that replenish groundwater. The greatest change in land use in these areas, called “zones of contribution,” was from residential development, which impacts groundwater and drinking water via wastewater from septic systems. The median percentage of residential land in Cape Cod’s public drinking water recharge zones increased more than 10-fold from 2% in 1950 to 23% in 1990, with a maximum of 80% residential land in one recharge zone. Commercial development also increased in recharge zones. The fraction of land where pesticides are typically used for cranberry cultivation, other agriculture, golf courses, and rights of way remained about the same.

Cape Cod’s 18 public water supply districts are served by 132 groundwater wells and one surface water supply. The study was funded by an appropriation of the Massachusetts legislature administered by the Massachusetts Department of Public Health and by foundation grants and private donations. Silent Spring Institute is a nonprofit scientific research organization dedicated to studying the environment and women’s health, especially breast cancer.

The scientific journal article on wastewater impacts to Cape Cod public water supplies is referenced as follows: Swartz, C.H., R.A. Rudel, J.R. Kachajian, J.G. Brody. 2003. Historical reconstruction of wastewater and land use impacts to groundwater used for public drinking water: exposure assessment using chemical data and GIS. *Journal of Exposure Analysis and Environmental Epidemiology*, 13(5): 403-416.

Our previous research on impacts of alkylphenols and other EDCs from wastewater were published as: Rudel, R.A., P. Geno, S.J. Melly, G. Sun, and J.G. Brody. 1998. Identification of alkylphenols and other estrogenic phenolic compounds in wastewater, septage, and groundwater on Cape Cod, Massachusetts. *Environmental Science & Technology* 32(7): 861-869.

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