GROUND WATER SAMPLING RESULTS

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Editor's Note: The following is an excerpt of testimony to N.C. Division of Water Quality hearing on proposed Animal Waste Management Regulations, December 12, 1996 at Kenansville, N.C. Although it focuses on problems in Eastern North Carolina, the comments should be of interest to everyone in the agricultural arena.

Introduction

Well-water surveys by the North Carolina Cooperative Extension Service over the past six years as part of a statewide Drinking Water Nitrate Screening Program have shown that about 3 percent of the wells in North Carolina have nitrate concentrations over the EPA drinking water standard of 10 mg/l nitrate. This has not significantly changed over the past six years, even though conditions have changed dramatically since the first testing in 1990. Although definite cause-and-effect relationships are difficult to determine, these samplings show that well construction, depth and maintenance are the most important risk factors for well-water contamination. Well characterization data from these surveys showed that the percent of wells under 50 feet is higher in eastern North Carolina than in the rest of the state.

North Carolina Cooperative Extension Well Water screening

The following is a direct quote from the American Society of Agricultural Engineers (ASAE) Paper No. 912107, "Nitrate and Pesticide Occurrence in North Carolina Wells," dated June 1991: "Over 9,000 domestic wells in North Carolina were sampled for nitrate, chloride, conductivity and pH over a one-year period as a part of the North Carolina Cooperative Extension Ground Water Education Program. Extension staff and volunteer sample collectors completed detailed questionnaires for each well sampled to provide information on well construction and protection and the proximity of potential contamination sources."

The following is from the Conclusions section of the same paper: "Of the 9,026 wells tested statewide for nitrate nitrogen, only 3.2% exceeded 10 mg/l NO_3-N. On a county basis, the percentages of high nitrate wells ranged from 0 to 12%, with most of the problem counties located in the Coastal Plain.

An effort was made to visit as many contaminated wells tested in this study as possible. These visits uncovered a wide variety of potential circumstances leading to contamination. A common factor seemed to be a lack of understanding that human activities on the land surface have a direct impact on the quality of drinking water. Some of the problems we found with contaminated wells include unsealed wellheads, wells cut off below ground, and wells located near gardens, septic systems, cropland, animal waste handling, animal mortality disposal sites and even cemeteries. Well users were encouraged to install new, better protected wells to reduce potential for contamination. Based on results of this study, we conclude that rural domestic well-water contamination due to agricultural practices is not a widespread and severe problem in North Carolina. However, this study points out the need for further education efforts to improve and maintain this valuable resource."

Following is information contained in a paper, Residential Well Contamination in the Herrings Marsh Run USDA Demonstration Watershed. The reported well water survey involved 189 wells in a 5,000-acre study watershed in Duplin County. Results for nitrates in 1990 indicated that 25 percent of the wells sampled contained nitrate nitrogen at levels above 10 mg/l. In 1991, 22 percent exceeded 10 mg/l nitrate nitrogen. Survey results showed that 87.1 percent of the wells sampled did not meet state well-construction standards. Survey results indicated that 54 percent of the wells were shallow, less than 100 feet in depth, with 5 percent greater than 100 feet in depth. The users of the remaining 41 percent of the wells were uncertain of the well depth. Results from 1990 showed that none of the deep wells exceeded 10 mg/l nitrate nitrogen, while 27 percent of the shallow wells exceeded 10 mg/l nitrate nitrogen. In 1991, none of the deep wells and 24 percent of the shallow wells exceeded 10 mg/l nitrate nitrogen. Comparisons of wells exceeding the 10 mg/l nitrate nitrogen concentration in 1991 showed that 25 percent of the wells close to septic systems exceeded, and 19 percent of the wells far from septic systems exceeded; 24 percent of the wells close to lawn or garden chemical application exceeded, and 22 percent of wells far from lawn or garden chemical application exceeded; and 22 percent of wells close to animal lots exceeded and 22 percent of wells far from animal lots exceeded.

Unpublished results from screening 3,163 private wells in North Carolina during 1995 and 1996 show 2.0 percent exceeded 10 mg/l nitrate. In eastern North Carolina, a survey of 1,137 wells found 3.5 percent exceeded 10 mg/l nitrate. For the current sampling period, all but three of the wells with at least 10 mg/l nitrate were less than 50 feet deep. No well over 100 feet deep had a ni-

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trate concentration greater than 10 mg/l. Well characterization data for the total state from this survey also showed a much larger number of wells under 50 feet in eastern North Carolina. Over 200 of the wells in Sampson County had been sampled in 1990 and the nitrate levels in 1996 were not significantly different.

Comparison of N.C. results with National Evaluations

Results of the North Carolina Cooperative Extension Drinking Water Screening Program showing 3.2 percent of wells statewide exceeded 10 mg/l nitrate compare favorably with results from national evaluations in the early 1990's. Percent of wells exceeding the 10 mg/l nitrate level were 2.4 for the EPA Rural Domestic Water Survey, 1.2 for the National EPA Community Water Supply Survey, 4.9 for the National Alachlor Well Water Survey and 4.8 for the USGS evaluation of 50 states and Puerto Rico, showing that the average nitrate concentrations of North Carolina well water is very similar to results for national evaluations.

Summary

Well-water surveys conducted by the North Carolina Cooperative Extension Service over the past six years have shown that about 2 to 3 percent of the wells statewide exceed 10 mg/l nitrate and about 3 to 5 percent of the wells in eastern North Carolina exceed 10 mg/l nitrate. Even though conditions have changed greatly since the first sampling in 1990, these samplings show that areawide nitrate concentrations have not significantly changed over the past six years. Although definite cause-and-effect relationships are difficult to determine, these samplings show that well construction, depth and maintenance are the most important risk factors for well water contamination. Well characterization data obtained from these surveys showed that the percentage of wells under 50 feet is greater in eastern North Carolina than in the rest of the state. The N. C. Cooperative Extension Service will continue surveys of well-water quality for at least the next year in response to public concerns and educational needs to protect well-water supplies.

In Memoriam

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TRIBUTE TO KEN SEXTON

Those associated with the Christmas tree industry were among many who were shocked and saddened at the untimely death of Ken Sexton in January. Since returning to Ashe County in 1976 to grow Christmas trees with his father, Ken became recognized as a leader in the development of the Christmas tree industry. His insight and ability to apply and share new techniques made him a mentor for many new growers seeking to get started.

Ken was a busy man, always on the go. His boundless energy kept him in demand to serve in various leadership roles within the County and State Christmas Tree Associations. But no matter how full his schedule, Ken always had time over the seventeen years I knew him, to help me and others out whenever he could. I will miss Ken's good humor, his vitality, and his enthusiasm for nurturing life; but mostly I will miss his friendship. His death leaves an irreplaceable emptiness within us.

Jim Carey
Ashe County Extension
Director