



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Assessing the Effects of a Small Community Using On-site Waste Water Treatment Systems on Ground and Surface Water Quality

Duration: (month/year to month/year):

September 1, 1996 to August 31, 1997

Federal Funds: \$19,051

Non-Federal Funds: \$44,726

Principal investigator's name(s) and university:

Nichols, Terry W. Univ. of Arkansas-Fayetteville Nelson, Marc A. Univ. of Arkansas-Fayetteville Davis, Ralph K. Univ. of Arkansas-Fayetteville Vendrell, Paul F. Univ. of Arkansas-Fayetteville

Congressional district of university where the research is to be conducted: Third

Statement of critical regional water problem:

In Arkansas, as in other states, many streams (ADPC&E, 1992) and lakes (Moore, 1992) have been impacted by nonpoint source pollution. The predominate nonpoint source cited is agricultural runoff but in some cases domestic waste may also be a factor. The Upper White River Basin, a major source of water for the Beaver Lake Water District, has a very high concentration of confined poultry and swine production. These operations have the potential to cause major degradation of White River water quality. In addition, the population of Northwest Arkansas is growing very rapidly. Large numbers of people are locating in the relatively pristine Ozark mountain areas outside of the larger population centers. Much of this population is being provided potable water through an expanding network of rural water distribution lines. But, there is no concurrent network of waste water disposal lines and most, if not all, households treat their waste water on-site using septic tanks followed by leaching fields. Septic systems have been researched extensively and have been documented as a source of degradation of ground water (Padar, 1985; Petersen, 1989; Ritter, 1985) and surface water quality (Sham, 1995). If, as in the case of the Upper White River watershed, there is significant flow from ground water to surface water, the surface water quality may be degraded by contaminants originating from the on-site disposal of wastewater.

Throughout the Beaver Lake watershed there are non-sewered communities, both old and new, with others being planned. Similar situations exist throughout the southeast where some 35 to 40% of the homes utilize septic systems to dispose of their wastewater. Many

of these non-sewered communities are located on alluvial flood plains similar to the study area. Population in the region is growing rapidly as is the waste load handled by onsite treatment systems. A better understanding of flood plain geology and hydrogeology will help when intelligent decisions regarding the siting of non-sewered housing are needed.

Statement of results or benefits:

This project will identify and quantify the contribution from domestic septic systems in a small town to nonpoint source contamination in the White River. After gaining an understanding of the hydrogeology of the aquifer, ground water and surface water above and below St. Paul will be sampled and analyzed for contamination. The impact of St. Paul's waste will be separated from contamination coming from upstream. The project will provide a model for studying other areas in the watershed of the Beaver Lake Water District impacted by septic system effluent. Information on the relative inputs from confined animals and domestic waste will help insure a continued high-quality water supply. Additionally, northwestern Arkansas derives significant economic benefit from recreational use of Beaver Lake which will decline if eutrophication of the lake continues. This research will provide information for all parties interested in the quality of water in Beaver Lake.

Inclusion of a hydrogeology component with the water quality study will make it possible to generalize from project results in various ways. The results may be applied immediately to areas in our region with similar climatic and topographic conditions where rapid growth is occurring in rural areas. Further, the research will provide insight on the best methods for evaluating the water quality impacts in situations similar to the studied area. Results of this project may also be useful in understanding the water quality problems of other similar but more complex areas such as Bella Vista, Holiday Island and Hot Springs Village in Arkansas; or Branson, Missouri or Dollywood, Tennessee.