Instream Flow Issues

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Tennessee Code Annotated states: **68-221-702. Declaration of policy and purpose.** -- Recognizing that the waters of the state are the property of the state and are held in public trust for the benefit of its citizens, it is declared that the people of the state are beneficiaries of this trust and have a right to both an adequate quantity and quality of drinking water. [Acts 1983, ch. 324, § 3; T.C.A., § 68-13-702.]

T.C.A. 68-221-711(8) states, "The heavy pumping or other heavy withdrawal of water from a public water system or its water supply source in a manner that would either interfere with existing customers normal and reasonable needs or threatens existing customer' health and safety," is a prohibited act.

The United States Geological Survey estimates the major reservoirs in Tennessee contain about 2 trillion gallons of water. Ground water in the state is estimated to be about 200 trillion gallons. Public water systems in Tennessee withdraw about 890 million gallons per day or about 1 percent of the total supply. Sixty-four percent of the withdrawals are from surface water and 36 percent from ground water. Springs supply about 14 percent of the ground water. Gross per capita use in Tennessee has fallen from about 176 gallons per person in 1995 to 136 gallons per person in 2000.

Recently the Corps of Engineers estimated the storage capacity of the reservoirs feeding the Cumberland River would be only 22 percent of previous year's capacity due to the renovation of Wolf Creek and Center Hill Dams and that the Corps was having difficulty maintaining sufficient flow on the Cumberland to maintain water quality. The Corps indicated the situation will persist until 2013.

Conservation efforts during droughts focus primarily on customers served by public water systems and do not optimize wastewater treatment to reduce assimilative capacity needs or reducing instream flows that may have been established well above the natural drought flow of the stream for maintenance of biota. Loss of water supplies due to irrigation by farmers appears to be insignificant compared to the use of water for maintenance of assimilative capacity or biota habitat.

Historically towns in Tennessee developed where there was a protected source of water such as springs. Prior to modern disinfection and filtration techniques, people learned that cholera pandemics could be expected from drinking water from unprotected sources. Many communities therefore have declined to use available surface waters when spring water was available. The City of Elizabethton is on the Watauga River yet still uses three springs for their drinking water source. Hixson, a city near Chattanooga, is close to the Tennessee River and uses springs. Savannah Valley uses springs and wells. The vast majority of public systems in west Tennessee use wells. There are only 5 surface systems west of the Tennessee River. Middle and east Tennessee have a mix of surface and ground water supplied systems. Water obtained from wells and springs generally contains fewer biological organisms and costs less to treat to drinking water standards. Further, ground water poses fewer problems with chlorine demand and disinfection byproduct formation.

Public water systems obtain their water from in-state and out-of-state lakes, streams, springs, wells, caves, rock quarries, deep mines, strip mines, infiltration galleries, and sinkholes. Jefferson City and Dandridge use the old Jarnigan Zinc Mine as their source of drinking water. Jellico uses strip mines; Persia Utility District uses an abandoned rock quarry and only recently sought permission to construct an intake on the Holston River. The City of Rogersville uses Big Creek and drilled additional wells due to treatability problems on the Holston. Lincoln Memorial University and Cumberland Gap take water from Cudjo Cave in Virginia. Gladeville Utility District takes water from wells near a sinkhole in Wilson County. Scott's Hill has wells drilled near the Tennessee River which could be considered infiltration or Rainey wells.

One of the fundamental principles of water supply is to establish multiple barriers between consumers and potentially harmful agents in water. The first barrier is to obtain the best quality of an adequate source of untreated water as possible. The next barrier is to design treatment processes that remove or inactivate the harmful agents, require training and certification of water treatment plant operators, prescribe frequent testing of the water and alert the customers if anything is wrong with the water. The practice of using multiple barriers is important because sometimes barriers do fail to provide adequate public health protection such as was the case with the 1993 Milwaukee cryptosporidium outbreak. The Milwaukee outbreak was detected because pharmacists found they could not keep their store shelves stocked with antidiarrhea agents. The EPA and CDC estimate only about 30 percent of waterborne disease outbreaks are detected and reported.

Many people don't understand that drinking water is disinfected, but not sterilized. EPA considers waters with heterotropic plate counts (HPC) of less than 500 colony forming organisms per milliliter and the absence of total coliforms to be disinfected water. Most treatment plant's data show zero or near zero counts leaving the treatment plant. Most natural waters contain sufficient nutrients to allow regrowth of bacteria even after it has been disinfected.

Further most people don't know that many pathogenic organisms are disinfectant resistant. Cryptosporidium and mycobacterium avium complexes are two examples of disinfectant resistant organisms. Many nonpathogenic and pathogenic bacteria synergistically work to colonize water lines and bottled waters resulting in a 150 to 3000 fold increase in disinfection resistance by the formation of polysaccaride slimes. Shipping water long distances usually results in the loss of disinfectant residual, regrowth of bacteria, and formation of disinfection byproducts.

Even where public water systems have the technology to properly treat drinking water, the Division of Water Supply's enforcement files show failures of technology, failure on the part of the operator to properly employ the technology and operator attempts to hide the failures from enforcement agencies.

Thousands of new chemicals are introduced into commerce each year including pharmaceuticals and personal care products. No environmental fate studies are required on many of these chemicals. Many of these chemicals and pharmaceuticals are persistent, bioaccumulated and not removed by conventional wastewater or drinking water treatment processes. Many people believe that pharmaceuticals, personal care products and hormones in drinking water are at very low concentrations and do not negatively impact public health. There is evidence of negative impact on aquatic biota, however, few people want to contemplate they may be drinking water that has been used multiple times and passed through the digestive tract of many people and contain hormones, drugs and potential pathogens. One would expect to find many more contaminants in "big waters" below metropolitan areas than in headwaters. Analytical technology for many chemicals and pathogens is expensive and leaves much to be desired in regard to accuracy and precision. Further no maximum contaminant levels have been established by health authorities. Consistent with the practice of employing multiple barriers, good science recommends avoiding waters potentially containing undesirable substances rather than risking the public health consequences of supplying large numbers of people with a potpourri of chemicals.

Dr. Reed at the state lab indicates they need a high pressure liquid chromatograph (HPLC MS) that costs about $1,000,000.00 to detect the pharmaceuticals in drinking water. Currently very few laboratories reliably quantify haloacetic acids at the microgram level. The reliability of test methods for more exotic chemicals at low concentrations has not been established.

A significant portion of this county's energy use is from pumping and treating water and wastewater. Often it is suggested that cities use big waters for water supplies to avoid inadequate supply issues. Many communities are at a significant higher elevation and the energy needed to move water is a factor that must be considered. Further, moving water long distances costs large sums of money for constructing the infrastructure which the community may not have.

This country is at war. Over 4000 troops have been killed in the last 5 years. If everyone that needs water goes to big waters, the water system could be more easily sabotaged than more diverse sources of water. Nuclear power plants are located on "big waters." Loss of containment at one of these plants could virtually eliminate the driver as a source of supply and place large numbers of water consumers at risk.

The construction of headwater impoundments offers many benefits in terms of public health, security, recreation, water supply, lower treatment costs, water quality, flood control, energy conservation, maintenance of some instream flows even during droughts, and benefits navigation and power generation. The legislative intent of T.C.A. 68-221-702 is a noble and worthwhile goal and should be honored when attempting to deal with the issue of instream flows..