A MULTI-FAMILY WATER CONSERVATION STUDY IN CHATHAM COUNTY, GEORGIA

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REFERENCE: Proceedings of the 1999 Georgia Water Resources Conference, held March 30-31, 1999, at the University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, University of Georgia, Athens, Georgia.

Abstract. Due to saltwater intrusion into the Floridan Aquifer and State Environmental Protection Division (EPD) requirements to reduce Floridan Aquifer water usage by 10 million gallons a day (mgd) by the year 2005, Chatham County must implement water conservation programs which have measurable results. Conserving water, in effect, creates an additional source of water which will decrease dependence on developing additional surface and ground water resources.

This multi-family water conservation study demonstrates that by installing ultra low-flow toilets which use 1.6 gallons per flush (gpf) in 54 multi-family housing complexes, water usage in Chatham County can be reduced by 260,000 gallons per day (gpd). This measurable water reduction is one step towards reaching the 10 mgd reduction mandated by EPD.

Water efficient methods are solutions whereby Chatham County citizens can reduce water withdrawal from both ground and surface water sources. The EPD required reduction of 10 mgd can be partially achieved by implementing water efficient programs such as the multi-family retrofitting method outlined in this report.

INTRODUCTION

Water is an essential part of daily life and because there seems to be an abundance of it, we are negligent in its use. We have come to expect usable, potable water to come out of the faucet at the turn of the tap. Due to saltwater intrusion in several parts of the southeastern Coastal Plain, this inexpensive, free flowing resource may not always be so abundant. Chatham County's main source of water, The Floridan Aquifer, now has saltwater intrusion occurring in Hilton Head, South Carolina, and Brunswick, Georgia. Saltwater intrusion occurs when the pressure in the aquifer is reversed due to an excessive amount of pumping which causes saltwater to replace the freshwater (Krause and Randolph, 1989, p. D51).

In February of 1996, the Georgia Environmental Protection Division (EPD) proposed a draft Interim Strategy to protect the Floridan Aquifer. After holding several public meetings and revising the strategy, a plan of action has been put into place. The final *Interim Strategy for Managing Salt Water Intrusion in the Upper Floridan Aquifer of Southeast Georgia* was released on April 23, 1997. The Executive Summary of that document, states that "The Georgia Environmental Protection Division's objective is to STOP THE INTRUSION OF SALT WATER before municipal water supply wells on Hilton Head Island, South Carolina and Savannah, Georgia are contaminated, and to prevent an existing saltwater problem at Brunswick, Georgia, from worsening".

Under the *Interim Strategy for Managing Salt Water Intrusion in The Upper Floridan Aquifer of Southeast Georgia*, Chatham County is required to reduce ground water withdrawal by at least 10 million gallons per day (mgd) by December 31, 2005. Union Camp has agreed to provide at least 6.5 mgd of the 10 mgd required reduction. A more efficient use of water can help to achieve the remaining 3.5 mgd reduction required by Georgia's Environmental Protection Division.

One part of the water conservation strategy of the coastal plain has been that as dependence on ground water is decreased, usage of surface water is increased. Surface water usage and the correct balance of water sources and water uses has been an issue of great concern. The efficient use of water, or water conservation, regardless of the source, is one strategy to be employed in the development of water sources. Efficient use of water can help to reduce dependence on ground and surface water sources by delaying capital improvement projects such as building or expanding new treatment plants. It must be realized that conserving water, in effect, creates or maintains an additional source of water, thereby decreasing dependence on developing additional surface and ground water resources.

This study will show that by installing ultra low-flow toilets which use 1.6 gallons per flush (gpf) in multi-family housing complexes, water usage in Chatham

County can be significantly reduced. These savings can be a step in reaching the 10 mgd reduction required by the EPD. This study focuses on multi-family units that are on master meters (as opposed to units with individual meters) because most people do not pay attention to water usage when they are not paying the bill. In master metered multi-family complexes, the water bill is sent to the complex manager/owner. The apartment dweller never sees the water bill or the amount of water used and therefore tends to use more water on a daily basis.

A study conducted by Edward R. Osann, *Saving Water, Saving Dollars,* states that low-flow toilet fixtures will save the nation over 2 billion gallons per day by 2010 for residential customers alone. This effort to conserve water will also postpone or avoid billions of dollars in water and waste-water infrastructure costs in the next two decades. Poor performances of the 1.6 gpf toilets have been reported in the press along with attempts to repeal the national standard required by The Energy Policy Act of 1992. Osann's study contradicts these claims by showing several examples of customer satisfaction concerning 1.6 gpf toilets (Osann, 1998, p. iv-v).

DEFINITIONS

The following definitions, used throughout this study, will help in understanding the methods used.

Master Unit: More then one housing unit on one water meter.

Multi-family Unit: A dwelling designed to be used by several families, including five basic types: rental apartments, government subsidized apartments, condominiums, public housing, and retirement communities.

PURPOSE

This study will identify multi-family housing units that are on master meters and will show their present toilet water consumption using existing toilet fixtures. It then will compare the change in consumption rates if these units were retrofitted with ultra low-flow toilets.

METHODS

The 1995-1996 Multi-family Housing Summary prepared by the Chatham County - Savannah Metropolitan Planning Commission listed apartment complexes in Chatham County along with their location, number of units and date of construction. Where information was not complete, phone calls to the individual apartment complexes were used to collect more information. The City of Savannah's Information Services Department supplied information as to which multi-family units were on a master meter. Multi-family units not on the City of Savannah water system were called to find out if they were on master meters.

Once the information was verified, standards were established to calculate the number of gallons of water used per day. The first standard was for the number of bathrooms per unit. For this study, the standard of 1.2 bathrooms per unit was used based on information in the 1995 East Bay Municipal Utility District Water Conservation Baseline Study. The next standard concerned the number of flushes per unit per day. The standard based on a previous study conducted by Savannah State University for the Savannah-Chatham County Water Conservation Program was ten flushes per day (1996 Water Conservation Attitude Survey of Residential Customers). The final and most important standard was the number of gallons each toilet uses, which is based on construction dates. Previous laws on plumbing fixtures varied from state to state until Congress passed the 1992 Energy Policy Act requiring 1.6 gallon toilets to be installed in all new or remodeled construction. Prior to the 1992 Energy Policy Act, tank sizes varied from state to state. Based on a consensus of water conservation experts throughout the United States, the following standards are used in this study:

Date of Construction	Usage per Flush
Prior to 1960	7 gallons
1960 to 1986	5 gallons
1987 to 1991	3.5 gallons
1992 to present	1.6 gallons

RESULTS

The 54 multi-family units that are on master meters have a daily water usage of 427,000 gallons per day (gpd) and 156 million per year (gpy). If all multi-family units were retrofitted with new ultra low-flow toilets of 1.6 gallons per flush, the savings would be 259,262 gpd and a little over 94 million gpy. This study examined only 54 out of 196 multi-family complexes due to the stipulation that the chosen complexes had to be on a master meter. Some of the complexes already have ultra low-flow toilets and were used in the calculations.

Water efficiency methods are solutions for how

Chatham County can reduce its water withdrawal from both ground and surface water sources. The EPD required reduction of 10 mgd can be partially achieved with water efficient programs such as the multi-family retrofitting method outlined in this report. This study focused on retrofitting toilets in multi-family units due to the large amount of water used daily by this fixture. Plumbing retrofits would be a step in meeting the mandated EPD ground water reductions put in place by the April 23, 1997, *Interim Strategy for Managing Saltwater Intrusion in the Upper Floridan Aquifer of Southeast Georgia.*

IMPLEMENTATION

There are several techniques available for implementing multi-family water conservation programs depending upon the goals of the community. Because Savannah and Chatham County are concerned about over-use of The Floridan Aquifer, efforts will focus on plumbing retrofits in public housing and on educational audits in private housing. Both of these techniques are discussed in the next section.

This study will focus on multi-family units that are on master meters, as opposed to units with individual meters, because most people do not pay attention to water usage when they are not paying the bill. The apartment dweller never sees the bill or the amount of water used and therefore tends to use more water on a daily basis. The issue of whether an apartment complex developer chooses to install a master meter or individual single meters is an economic one. It is less expensive to install a master meter than single meters. No incentives have been found for installing single meters over master meters. This subject could be addressed by the City through a water conservation ordinance.

Implementation of the Multi-family Water Conservation Study will be accomplished two ways. The first way will be by working with the Housing Authority of Savannah to retrofit public housing developments. The second way will be by forming partnerships with the managers of private apartment complexes.

Public Housing Retrofit

In order to implement this study, the Water Conservation Office has formed a partnership with the Housing Authority of Savannah to retrofit public housing multifamily units. A Coastal Incentive Grant (CIG) has been submitted to the Georgia Department of Natural Resources (DNR) to assist with funding for the installation of low-flow plumbing fixtures in two public housing developments: Fellwood Homes and Annex, and Patterson Terrace. These public housing developments were chosen because they were among the top three water users of 11 public housing developments. Throughout the retrofit the residents will be educated about the effects of continued overuse of the Floridan Aquifer and how public housing residents can help accomplish the goal of water conservation. Representatives from the Water Conservation Office will continue to search for grant funds to conduct similar projects for other public housing developments listed in this study.

Partnerships with Private Multi-Family Complexes

For the privately owned master-metered apartment complexes identified in this study, representatives from the Water Conservation Office will form partnerships with the managers/owners to educate them about the need for water conservation. As part of the partnership program, water audits will be developed and a Water Conservation Kit will be designed. With the help of the managers/owners and their maintenance crews, installation of the Water Conservation Kits will be accomplished. Funding for this project will be requested in the Water Conservation Program budget for year 2000. The estimated cost for this project could range from $6 to $10 per Water Conservation Kit with a total range from $34,000 to $56,000 for all master-metered complexes not retrofitted.

CONCLUSIONS

The installation of ultra low-flow toilets can significantly reduce the amount of water used in Chatham County. This study focused on multi-family units which are on a master meter. Retrofitting the two public housing complexes selected in the implementation section will result in a reduction of 8,284 gallons per day reduction. This study shows a community wide reduction of 260,000 gallons per day reduction by retrofitting all master-metered multifamily complexes. Retrofitting efforts beyond these 54 multi-family complexes could reduce water consumption by an additional million gallons per day or more.

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ACKNOWLEDGMENTS

A special thanks to the following individuals for their technical assistance and advice:

Allyne Toscoa Owens - Chatham County-Savannah Metropolitan Planning Commission
Cam Mathis - City of Savannah, Information Services Department
Shaun Levi - Savannah Area Geographical Information Systems (SAGIS)
David Ramsey - Chatham County-Savannah Metropolitan Planning Commission
Dennis Hutton - Chatham County-Savannah Metropolitan Planning Commission
Anne Clayton - The Housing Authority of Savannah