SECTION II

ARTESIAN'S RESIDENTIAL DEMAND-SIDE MANAGEMENT PROGRAMS

This Section briefly reviews the characteristics of Artesian's residential customers on the basis of data provided by the Company. Background on Artesian's residential DSM programs is then presented with an emphasis on the conservation rate structure put into effect in September 1992, along with the Company's conservation information campaigns and conservation device rebate program.

II - 1. General Characteristics of Artesian Residential Customers

The general characteristics of Artesian residential customers were reviewed from customer data provided by Artesian Water Company, Inc. The customers classified as "residential" represent more than 90 percent of total number of customers. Residential customers represent approximately 60% of the Company's current operating revenues and, if apartments and trailer parks were classified as residential, the percentage of revenues attributable to residential use would be 71% (Wang et al., 1994).

Three target subgroups, corresponding to three rate categories of Artesian's residential rate tariff put in effect on September 1, 1992, were used for the analysis. The grouping was based on residential water consumption during the third quarter:

- Large consumption group using more than 20,000 gallons of water
- Medium consumption group using 5,000 to 20,000 gallons of water
- Small consumption group using less than 5,000 gallons of water

On average, the medium consumption group includes around 63% of the residential customers served by Artesian whereas the small consumption group accounts for only 6%. In the case of the large consumption group, the number of customers in the 3rd quarter is 50% higher than the average quarter due to the fact that this quarter is the peak consumption period. The large consumption group constituted 70 percent of the residential peak demand. Even though the average number of customers in the large consumption group is only about half of the medium consumption group, its average water consumption per quarter is much greater than that of the medium group. Overall, peak water consumption (for the summer quarter) by Artesian residential customers is 30% higher than the average quarterly consumption.

The per customer water consumption during the summer indicates that, on average, the large consumption group consumed almost 2.5 times more water than the medium consumption group and 11 times more than the small consumption group. The large and medium consumption groups consumed more water per customer, while the small consumption group actually consumed less than the average consumption. Overall, residential water consumption per customer in the third quarter is about 24 percent higher than average quarterly per customer consumption. The third quarter covers the summer months from July through September, when a considerable amount of water is consumed for outdoor activities. This result is consistent with other studies indicating that outdoor water activities account for approximately 30% of residential water consumption (Karpiscak, Foster and Schmidt, 1990). The large consumption group is primarily responsible for Artesian's residential peak water demand in the summer.

II - 2. Artesian's Water DSM Programs

Since Artesian had filed its rate application on March 30, 1990 (PSC Docket No. 90-10), the Company has taken positive steps in improving management and operations to address specific concerns expressed by the Delaware Public Service Commission (DPSC).[6] Artesian has been restructured, having a new board of directors and putting in place new management to enhance greater efficiency and productivity. As part of long-range strategic planning, the Company's new management set a goal to become a leader in encouraging conservation. According to direct testimony before DPSC by Dian C. Taylor (1992), President of Artesian Water Company, Artesian has a three-part conservation plan (Artesian, 1992, Vol.1: 3):

> To enhance public awareness through education; to promote direct conservation measures such as the use of water-saving devices to give customers the knowledge and means to incorporate conservation and sensible water use in their routines; and to employ a conservation-oriented rate structure to allow pricing to encourage conservation.

II- 2 - 1. Information Campaigns

The Company launched a comprehensive campaign to publicize its active commitment to water conservation. Artesian used "a kick-off" meeting and various media messages to encourage its employees and customers to learn about the Company's conservation efforts. It reinforced its campaign by publishing water conservation-related information in an in-house newsletter and *The Artesian Pipeline*, a newsletter for customers. Subsequently, this issue of the newsletter has been frequently included as a bill stuffer. The Company also has made extensive use of a bill insert, "25 Things You Can Do To Prevent Water Waste," and a booklet, "Water Conservation at Home," which were given to all new customers and in response to customer request (Artesian, 1992, Vol.1: 17-18). Some examples of conservation tips appeared in the *Pipeline* include:

- An item on ultra low flush (ULF) toilets for which Artesian provides a rebate of $75 and which use just 1.6 gallons per flush, compared with 3 to 7 gallons for a standard toilet.
- A story that encourages customers to consider installing toilet dams that save water with each flush.
- An article on leaks that advises customers to make sure the outdoor faucet is off.

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[6] Artesian also made substantial capital investments to serve its customers, including new interconnections with the Chester Water Authority and the City of Wilmington. Substantial capital has also been required to relocate water mains due to major highway improvements undertaken by the State of Delaware.

- The publication of a special telephone service that provides hints on water conservation and information on water-saving devices.

In addition, water conservation was the theme of 1992's annual report, "designed so that a portion was printed in greater quantities and distributed to a wider audience" (Taylor's testimony, 1992, Artesian, Vol.1: 13-14). Artesian has been active in *Water Week* celebrations supporting employee participation, providing displays of conservation equipment and furnishing publicity for the event. Finally, Artesian promoted its conservation initiatives to the Customer Advisory Program (CAP) "to improve communication with customers, to keep them up to date on issues affecting them and to learn more of their needs and concerns" (Johnson's testimony, 1992, Artesian, Vol.1: 23). The members of CAP are delegates from active civic associations in Artesian's service territory.

II - 2 - 2. Delivery of Conservation Devices

With support from the State's Department of Natural Resources and Environmental Control (DNREC), Artesian has also launched a Customer Conservation Program (CCP) to encourage water conservation. An agreement was officially entered into by the two parties in September 1992. Certain technical and professional services in connection with CCP, as well as some or all of the costs of water conservation kits and ultra-low consumption toilets were financed by DNREC. The purpose of this program was to provide incentives to program participants to retrofit their homes with water conservation devices and to educate them on water conservation techniques for the purpose of promoting wise use of water.

Through this program, Artesian offers its customers conservation hints and strategies, installs water-saving fixtures, and checks for costly leaks to save them water and money. On request, Artesian's conservation team performed a water audit and installed conservation devices in homes of customers that include faucet aerators, low-flow shower heads and toilet dams.[7] Artesian has also sent its residential customers leaflets attached with a reply card, asking them to sign up for free conservation devices. The Company sought agreement from customers on the following by requesting their signatures on the reply card:

> I understand that if I have the water conservation kit installed free in my home, I agree to leave all devices intact for one year so that my water savings can be accurately tracked. I also verify that I am the homeowner.

[7] A member of the team has also visited elementary schools in the service territory of Artesian to educate youngsters on the importance of water conservation.

This service was free to the first 2,000 customers who returned the reply card. To the second 2,000 customers responding, the Company offered a customized conservation kit at a 50% discount and a free water audit. For other Artesian customers interested in saving water, a customized conservation kit could be ordered from Artesian at wholesale plus shipping costs. In cooperation with New Castle County's Water Resources Agency, Artesian also separately offered toilet dams and lawn sprinkler timers. This offer was included with 75,000 mailings and featured in an office display.[8] Customers could order the kits from Lewis Companies in New Hampshire or purchase them at the office of Artesian Water Company, Inc.

II - 2 - 3. Conservation Rates

On January 31, 1992, Artesian filed a petition with DPSC seeking to increase water sale revenues by 14.24%. On August 25, 1992, DPSC approved a rate increase, raising the Company's revenue requirement by 9.02%, and a new rate structure designed to encourage water conservation. Converting to an inclining block rate structure from a flat rate structure, the Company sought to send price signals to customers who have large discretionary demands for water to reduce water use through improved use-efficiency, especially during the summer. An inclining block structure can provide a strong conservation incentive: as consumers use more water, they pay more both because of higher use and because the cost per gallon increases. Compared to flat rates, inclining rates give customers clear incentives to improve use-efficiency with the promise of being able to directly manage their water costs. At the same time, reduced total residential water demand resulting from these rates can help the utility to postpone or avoid high-cost supply options.

Summer outdoor water use is a major contributor to total residential water supply costs and is also more responsive to price changes because of its discretionary nature (DPSC, 1992, Seidman, 1991). It is generally recognized that "the price of water should be set higher in the summer when demand is high relative to supply" (Seidman, 1991). Originally, the rate design submitted in January 1992 included an inclining rate block structure for both winter and summer use with a summer-winter differential. The testimony of Craig McDonnell, filed in connection with this proposed settlement on behalf of the DPSC staff, strongly urges that "monthly billing be adopted (in lieu of the current quarterly billing)" but states that "it is inadvisable to implement a seasonal differential in rates without also adopting monthly billing" (McDonnell, 1992). The revised Settlement Agreement adopted by DPSC established a modified conservation-oriented rate structure, including an inclining block design without a seasonal differential and without monthly billing.

Under the revised rate tariff in 1992, the minimum 5,000-gallon usage charge per quarter ($26.47)

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[8] According to Johnson's 1992 testimony, customer responses were less than expected. A total of 97 Artesian customers purchased kits and other devices over the past 18 months.

was eliminated. Instead, a basic charge for water service ($16.52) and a charge for every 1,000 gallons based on inclining block rates were implemented. The following inclining rates are applied for a residential customer with a 5/8" meter:

- For the first 5,000 gallons used per quarter for residential customers, the charge is $2.25 per 1,000 gallons.

- For all usage between 5,000 to 20,000 gallons per quarter, the charge is $2.38 per 1,000 gallons.

- For all usage in excess of 20,000 gallons per quarter, the charge is $2.74 per 1,000 gallons.

In May of 1995 and 1997, Artesian raised the rates again, enhancing the conservation signal of its inclining block structure. As shown in Table 1, the effect of these rate changes was to increase the bill of high-volume residential customers who typically use 30,000 gallons of water during the summer by a little over 20% between 1992 and 1995 (from $86.45 to $104.41).

Table 1
Comparison of Bill Amounts between Old and New Rates

Bill Item	Old Rates	New Rates (1997)
Minimum Charge (<5000)	$26.47	$17.90
Flat Rate:		
25,000 gallons @ $2.20	$55.00	—
Inclining Rate:		
5,000 gallons @ $2.45	—	$12.25
15,000 gallons @2.61	—	$39.15
10,000 gallons @3.04	—	$30.40
Public Fire Protection	$5.01	$4.71
Total Amount of Bill	$86.48	$104.41