

# Thornton Water Res. Div.

## Washing Machine Rebate Program

The City of Thornton Water Resources Division (TWRD) is located in Thornton, Colorado, approximately 10 miles north of downtown Denver. As of March 31, 2005, the population served by TWRD was 127,832, where 111,002 reside inside the city and 16,830 reside outside the city. Median household income was \$54,445 as of the 2000 census, which was higher than the statewide average of \$47,203.<sup>1</sup>

### UTILITY DEMOGRAPHICS

As of May 2005, TWRD maintained 34,259 connections of which 94.3% were residential. Of their total connections, 30,377 were single family residential, 1,937 were multifamily residential, 628 were ICI, and 1,317 were irrigation accounts, including city parks. In addition to providing water to individual retail customers, TWRD provides 2.0 million gallons per day (mgd) of treated water to the City of Westminster. TWRD's total service area is 19 square miles. As of 2004, average customer water use in gallons per capita per day (gpcd) was 142 for all customers and 129 for residential customers.

| <b>WASHING MACHINE REBATE</b> |                       |
|-------------------------------|-----------------------|
| <b>Eligible Customers:</b>    | <b>SF</b>             |
| <b>Customers Analyzed:</b>    | <b>SF</b>             |
| <b>Program Years:</b>         | <b>2003 – present</b> |
| <b>Years Analyzed:</b>        | <b>2003</b>           |

### UTILITY RATE STRUCTURE AND PRICES

As of 2004, the domestic inside-city monthly service charge is \$2.46 for a 5/8 x 3/4 inch meter and the outside-city charge is \$3.69 per month. TWRD has an increasing block rate structure. The four-tier structure categorizes rates by determining how much a customer uses relative to their Average Winter Consumption (AWC) and their Monthly Outdoor Allowance (MOA):

| <b>USAGE</b>                   | <b>PRICE</b>       |                     |
|--------------------------------|--------------------|---------------------|
|                                | <b>INSIDE CITY</b> | <b>OUTSIDE CITY</b> |
| 0 gallons - AWC                | \$3.00/1,000g      | \$4.50/1,000g       |
| > AWC, up to AWC + MOA         | \$3.00/1,000g      | \$4.50/1,000g       |
| > AWC + MOA, up to AWC + 2xMOA | \$4.50/1,000g      | \$6.75/1,000g       |
| > AWC + 2xMOA                  | \$9.00/1,000g      | \$13.50/1,000g      |

### CURRENT CAPACITY AND WATER SOURCES

Currently, the capacity of existing raw water storage from reservoirs is 26,594 acre-feet. Their treated water storage capacity is 27 mgd. TWRD has two water treatment plants that have a combined capacity of 65 mgd. TWRD's primary water sources are Clear Creek and the South Platte River.

### FUTURE PLANS TO MEET DEMAND

The City of Thornton's growth rate has decreased from 5.0% in 2002 to 3.8% in 2004. The city's plans to meet future demand through a

<sup>1</sup> U.S. Census Bureau, American FactFinder.

number of different actions. They plan to continue use of current capacity and sources, implement a planned surface water supply project from the Cache la Poudre River basin, expand storage and treatment facilities, continue conservation efforts, purchase and exchange additional water rights, and develop water reuse projects.

### **REBATE PROGRAM - DESCRIPTION**

On May 1, 2003, the Washing Machine Rebate program began, which offers single family customers a \$125 credit on their water bill for the purchase of a new high-efficiency washing machine. The rebate is limited to one per household. Washing machines must be on a list of qualifying models to be eligible. Participants must take a picture of the new, installed washing machine and attach it to the rebate application. Participants can

**OTHER THORNTON CONSERVATION PROGRAMS**

**Toilet Rebates, May 1, 2003 - present**  
**Tiered Conservation Rates, effective May 15, 2003**  
**Public Education, May 2002-present**  
**Water Conservation Ordinances, various start dates**

also be selected for inspection of their new washing machine and their original sales receipt. The program is advertised in billing inserts, on TWRD's website, on television ads, at festivals, and in TWRD's quarterly magazine.

During the time of the washing machine rebate program, especially from 2002 to 2004, the area was experiencing a drought and there were ongoing water conservation campaigns to mitigate the effects of the drought. However, a major snowstorm in March 2003 improved TWRD's water supply situation. Another important measure taking place during the period of the washing machine rebate program was the utility-wide transition from a flat rate structure to a conservation rate structure in May 2003.

### **METHODOLOGY**

*Please see the General Methodology for the specific procedures and techniques used for all ECoBA analyses.*

The analysis includes only single family households that received a washing machine rebate between May 1 and December 31, 2003. The water savings were calculated and a cost benefit analysis was performed for this time period. Results refer to this time period, not to the ongoing program. The lifespan of the washing machines, which is used as the period of analysis, was assumed to be 12 years.

All quantified costs and benefits have been discounted to the first year of the analysis (2003) and inflated to 2004 dollars. The discount rate used in this analysis was 4.38%. The CPI values that were used in this analysis were the 2004 value of 188.9 and the 2003 value of 184.0.

Since two complete years of pre- and post-measure water use could not be acquired for this analysis, water use data for the participants was acquired from 18 months before the program and 18 months after the program for all households that were residing there for that full period. The pre-measure period includes January 2002 to June 2003, and the

post-measure period includes January 2004 to June 2005. The population studied for this analysis was comprised of all participants who received washing machine rebates between May 1 and December 31, 2003. There were 85 usable participants out of 174 total participants during the period under analysis.

All TWRD single family households, including the participants, were used as the control group. The average annual pre-measure water use of the participants (122,976 gallons) was higher than that of the control group (107,839 gallons). The number of control group connections varied by month, from a minimum of 20,148 to a maximum of 24,532.

### ASSUMPTIONS

*Please see the General Assumptions for the specific conditions and rules underlying all ECoBA analyses.*

The 2003 CPI value, 184.0, and the 2004 CPI value, 188.9, were used in this analysis.

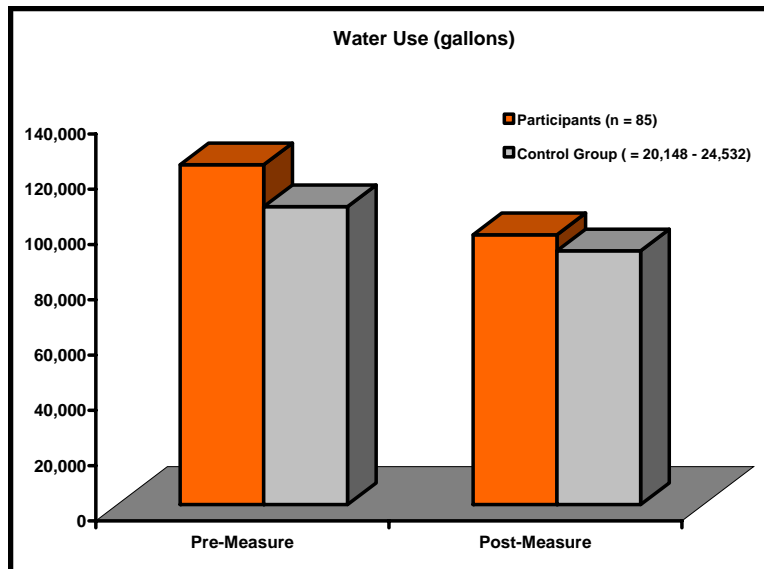
Participants who participated in any other water conservation program during the period of analysis were not included in the study.

Participants who had two or more consecutive months of no water use were not included in the study.

Any participants that had 11 to 13 months of usage per year were included in the study.

The control group consisted of all single family residential connections, including participants.

The percentage of washing machine rebate program participants who lived inside the city was 97%. However, it was assumed that 100% of participants lived inside the city, thus Inside-City rates apply for all cost benefit analysis calculations.



Since all participants were assumed to reside inside the city, Outside-City connections were not included in the control group.

It was assumed that average participant water use falls into tier 1 or 2 of the increasing block rate structure implemented in 2003.

The average cost of installation of a washing machine was assumed to be \$0. This is because many appliance stores offer free installation with the purchase of a new washing machine.

The estimated average cost of high efficiency washers was \$1000 each and high water use washers were \$400 each. The difference between

the two costs (\$600) is used as the cost to the participant, as it is assumed that they would have purchased a high water use washer had they not received the rebate.

### RESULTS - WATER SAVINGS

During the 18 months after receiving the washing machine rebates, water savings amounted to 895,796 gallons or 10,539 gallons per participant (5.7% of pre-measure water use). The average savings per year was 597,197 gallons, or 7,026 gallons per participant per year (gppy) (5.7% of pre-measure water use). **The total savings over the twelve year assumed lifespan was 7,166,367 gallons (22.0 AF), or 84,310 gallons per participant.**

During the 18 months before participating in the washing machine rebate program, the participant group's water use was, on average, 114.0% of the control group's use. During the 18 months after, the participant group's water use was 106.4% of the control group's use, on average. The participant group's water use decreased by 20.6%, whereas the control group's use decreased by 14.9%. **The resulting overall water savings attributed to this program was 5.7%.**

### RESULTS - COST BENEFIT ANALYSIS

*Costs and benefits listed below represent the entire lifespan of the program (twelve years).*

- ◆ The quantified cost to the utility was \$13,659 (\$161 per participant). This cost includes the cost of financial incentives, \$10,908 (\$128 per participant), labor, \$2,659 (\$31 per participant), and advertising, \$91 (\$1 per participant).
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$52,358 (\$616 per participant), which includes the cost of the washing machines.
- ◆ The quantified benefit to the participants was \$27,796 (\$327 per participant). This includes the benefits of water bills savings, \$16,888 (\$199 per participant), and financial incentives, \$10,908 (\$128 per participant).

| Quantified Costs and Benefits |                 |                |  |                  |          |                      |                 |
|-------------------------------|-----------------|----------------|--|------------------|----------|----------------------|-----------------|
| Utility                       |                 |                |  | Participants     |          |                      |                 |
| Costs                         |                 | Benefits       |  | Costs            |          | Benefits             |                 |
| Financial Incentives          | \$10,908        | Not Quantified |  | Washing Machines | \$52,358 | Water bill savings   | \$16,888        |
| Labor                         | \$2,659         |                |  |                  |          | Financial Incentives | \$10,908        |
| Advertising                   | \$91            |                |  |                  |          |                      |                 |
| <b>Total</b>                  | <b>\$13,659</b> |                |  |                  |          | <b>Total</b>         | <b>\$27,796</b> |

### UTILITY PERSPECTIVE

Results of the cost benefit analysis show a net benefit (net present value) of -\$13,659 from the utility perspective over the twelve year assumed lifespan of the washing machines. This is a net benefit of -\$161 per participant. The quantified costs to the utility were greater than the quantified benefits to the utility. **The cost per acre-foot of water saved from the utility perspective was \$621.**

### **PARTICIPANT PERSPECTIVE**

Results of the cost benefit analysis show a net benefit (net present value) of -\$24,563 from the perspective of the participant. This is a net benefit of -\$289 per participant. The quantified costs to the participants were greater than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$2,381.**

### **OVERALL PERSPECTIVE**

Results of the cost benefit analysis show a net benefit (net present value) of -\$38,221 from an overall perspective. This is a net benefit of -\$450 per participant. The quantified costs to the participants and utility were greater than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from an overall perspective was \$3,002.**

#### **UNQUANTIFIED COSTS AND BENEFITS**

##### **Costs**

- Possible landfill disposal of old washing machines.

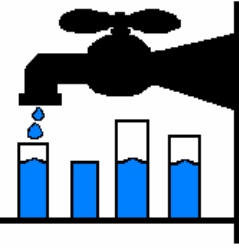
##### **Benefits**

- Financial savings on sewer bill for participants.
- Utility avoids the cost of acquiring and distributing the water saved.
- Reduced energy bills for participants.
- Environmental benefits of reduced use of water.
- Increased public awareness about water conservation.
- Reinforces need to conserve water and desirability of conserving.
- Improved public relations for the utility.
- Water saved for future municipal use.
- Participants received new washing machines.
- Possible income from the sale of old machines.
- Participants have decreased energy and sewer bills.
- High-efficiency machines use less detergent.

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# Thornton Water Res. Div.

## Washing Machine Rebate Program



### Results of Cost Benefit Analysis-Lifespan (12 Years)

|   | UTILITY          | PARTICIPANT        | OVERALL            |
|---|------------------|--------------------|--------------------|
| <u>Present Value Costs</u>  |                  |                    |                    |
| Costs to Utility  | 13,659           | NA                 | 13,659             |
| Costs to Participants   | NA               | 52,358             | 52,358             |
| Costs to Others   | NA               | NA                 | 0                  |
| <b>Total Costs</b>  | <b>\$13,659</b>  | <b>\$52,358</b>    | <b>\$67,139</b>    |
| <u>Present Value Benefits</u>   |                  |                    |                    |
| <b>Total Water Savings</b>  | <b>21.99 AF</b>  | <b>21.99 AF</b>    | <b>21.99 AF</b>    |
| Benefits to Utility   | 0                | NA                 | 0                  |
| Benefits to Participants  | NA               | 27,796             | 27,796             |
| Benefits to Others  | NA               | NA                 | 0                  |
| <b>Total Benefits</b>   | <b>\$0</b>       | <b>\$27,796</b>    | <b>\$27,796</b>    |
| <u>Cost Benefit Calculations</u>  |                  |                    |                    |
| <b>Net Present Value (NPV)</b><br>(Total Benefits - Total Costs)                | <b>-\$13,659</b> | <b>-\$24,563</b>   | <b>-\$38,221</b>   |
| <b>Cost Effectiveness Analysis (CEA)</b><br>(Total Costs ÷ Total Water Savings) | <b>\$621 /AF</b> | <b>\$2,381 /AF</b> | <b>\$3,002 /AF</b> |