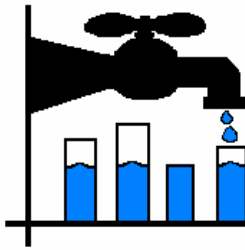


# TOILET DISTRIBUTION

## CASE NARRATIVES

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# Camrosa Water District

## Toilet Distribution Program

Camrosa Water District (CWD) provides potable, non-potable, and reclaimed water for communities in the southern portion of Ventura County, CA. The population of CWD's service area is 31,000. As of the 2000 Census, the median household income in Ventura County was \$59,666, which is higher than the statewide median of \$47,493<sup>1</sup>.

### UTILITY DEMOGRAPHICS

As of 2004, the District maintained 11,507 connections, 83.5% of which were residential. Of their total connections, 9,065 were single family residential, 544 were multifamily residential, 1,280 were commercial, 133 were industrial, 298 were irrigation, 108 were agricultural irrigation, and 79 consisted of fire suppression, line flushing, construction meters, and temporary meters. Camrosa Water District's total service area is 31 square miles. The average per capita water use for the utility as a whole was 290 gallons per capita per day (gpcd) as of 2004.

### UTILITY RATE STRUCTURE AND PRICES

Camrosa Water District employs an increasing block rate structure. As of February 2005, the monthly base rate for service is \$5.60 for ¾ inch meters (or \$0.19 per day), which includes zero gallons of water. Single family and multifamily residential usage charges are \$1.10 per HCF for the first 12 HCF of water and \$1.46 per HCF thereafter (\$1.47-\$1.95 per 1,000 gallons).

### CURRENT CAPACITY AND WATER SOURCES

The current sources of supply for the customers and properties within CWD's service area comprise a mix of public and private sources including purchasing imported water from Calleguas Municipal Water District (CMWD), groundwater from three groundwater basins, surface water diverted from Conejo Creek, and recycled water from CWD's Water Reclamation Facility. The utility's total capacity from these sources is 46.0 million gallons per day (MGD).

<b>TOILET DISTRIBUTION PROGRAM</b>	
<b>Eligible Customers:</b>	<b>SF</b>
<b>Customers Analyzed:</b>	<b>SF</b>
<b>Program Years:</b>	<b>February 1997-present</b>
<b>Years Analyzed:</b>	<b>1997</b>

### FUTURE PLANS TO MEET DEMAND

The population within CWD's service area is growing at a rate of 0.9% per year. Current sources, water conservation, water transfers, and water reuse are the main components of the District's future plans to meet demand.

### TOILET DISTRIBUTION PROGRAM - DESCRIPTION

The program under analysis is an ultra low flush toilet distribution program. The program is partly funded by the Metropolitan Water District of Southern California (MWDSC) and Calleguas Municipal Water District.

<sup>1</sup> U.S. Census Bureau. QuickFacts.

The distribution was held at a local high school. The toilets were distributed on a first come first served basis at the high school on February 8, 1997. The customers provided their photo ID and water bill to prove that they were a CWD customer. They then picked up one or more ultra low flush toilets to replace their less efficient models. They were required to return their old toilets to the same location on February 22, 1997.

CWD and Calleguas Municipal Water District paid the high school \$15 for each old toilet returned for recycling. If the old toilets were not returned by February 22, 1997 the participants would be charged up to \$100 per toilet. However, there was a 100% return rate for the program. Since all 800 old toilets were returned, the high school earned \$12,000.

The toilets distributed were Niagara 2202 toilets. Calleguas Municipal Water District provided 400 toilets and CWD provided 400. There were about 20 students and high school staff, 5 CWD staff, and 1 Calleguas Municipal Water District staff present at the distribution.

CWD held three additional distribution events in 1998 and 1999, and provided the free toilets on request through phone inquiries.

#### **OTHER CWD CONSERVATION PROGRAMS**

**Toilet Distribution, June 13, 1998, August 13, 1998, April 26, 1999**

**Ongoing Toilet Distribution, 1999-present**

*Free ULFTs were distributed on customer inquiry.*

**Washing Machine Rebate Program, March 25, 2003-June 2, 2003**

\$300 rebate to replace inefficient washers with qualifying high efficiency washing machines.

**Showerhead Giveaways, 1997-present**

**Home Water Survey (indoor/outdoor audits), 1994-present**

**Landscape Water Survey (outdoor audits), 1994-present**

**Protector del Agua, 1997-present**

Classes and seminars for residents and landscape professionals coordinated through Camrosa Water District by the Irrigation Training and Research Center at California Polytechnic University in San Luis Obispo.

**Public Education, on-going**

#### **METHODOLOGY**

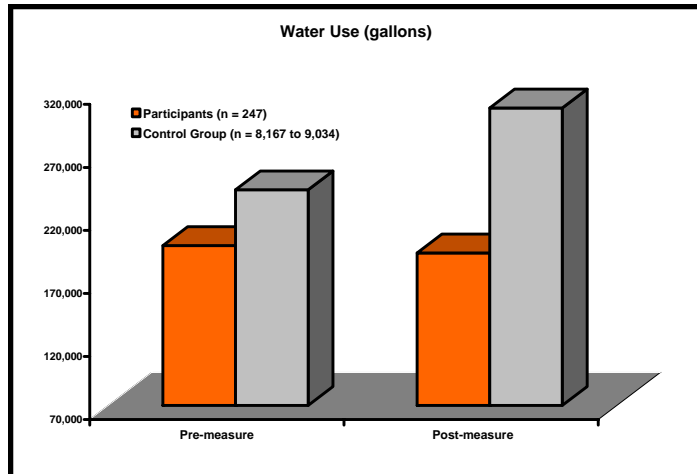
*Please see the General Methodology for the specific procedures and techniques used for all ECoBA analyses.*

The analysis includes only single family households that participated in the distribution occurring on February 8, 1997. The findings refer to this distribution only, not to the ongoing program. The lifespan of the toilets installed, which is used as the period of this analysis, was assumed to be twenty years.

All quantified costs and benefits have been discounted to the first year of the analysis (1997) and inflated to 2004 dollars. The discount rate

used in this analysis was 6.2%. The CPI values used in this analysis were the 2004 value of 188.9 and the 1997 value of 160.5.

The population studied for this analysis was comprised of participants who received a toilet during 1997. There were 247 usable participants out of a total of 415. One hundred sixty-eight, or 40%, of the participants were unusable because they moved during the period of analysis or there were periods of two or more months with no water use.



All Camrosa Water District residential customers that were not participants in this analysis were used as the control group. Participant pre-measure water consumption was 196,822 gallons per year while control group pre-measure water consumption was 241,020 gallons per year. For the 1997 toilet distribution program, the control group consisted of 8,167 households in 1995, 8,853 in 1996, 9,034 in 1997, 8,936 in 1998, and 9,004 in 1999.

## ASSUMPTIONS

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

The 1997 CPI value, 160.5, and the 2004 CPI value, 188.9, were used in this analysis.

The price paid by Calleguas MWD and MWDSC for each toilet was assumed to be \$62.

Assumed that 20% of participants paid for professional installation of their toilet at \$100 per participant.

The price of water used in determining the benefits to customers from reduced water bills is the variable portion of the City's price of water. We used the price from the first tier (0-12 ccf of water use per month) which was \$1.01 per ccf in 1998 and 1999, \$1.03 per ccf 2000 through 2004, and \$1.10 per ccf thereafter (for 2005 and assumed for the rest of the lifespan).

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

## RESULTS - WATER SAVINGS

In the first year after the 1997 distribution, the water savings amounted to 13,788,899 gallons, or 55,826 gallons per participant per year (gppy) (28.4% of pre-measure water use). The second year after, the water

savings amounted to 15,267,258 gallons or 61,811 gppy (31.4% of pre-measure water use). The average savings per year was 14,528,079 gallons, or 58,818 gppy (29.9% of pre-measure water use). **The total savings over the twenty year assumed lifespan was 290,561,570 gallons (891.7 AF), or 1,176,363 gallons per participant.**

Before the toilet distribution program, the participant group's water use was 81.7% of the control group's use, on average. After the program, their water use was 62.4% of the control group's use, on average. The participant group's water use decreased by 2.9% from pre-measure to post-measure, whereas the control group's use increased by 27.0%. **The resulting overall water savings attributed to this program was**

Quantified Costs and Benefits						
Utility			Participants			
Costs		Benefits	Costs		Benefits	
Cost of Toilets	\$18,352	Not Quantified	Installation Costs	\$11,840	Water Bill Savings	\$273,828
Materials	\$391			Total	\$11,840	Total
Advertising	\$330					
High School Payment	\$4,440					
Total	\$23,513					

Quantified Costs and Benefits			
CMWD, MWDSC, and High School			
Costs to CMWD & MWDSC		Benefits to High School	
Cost of Toilets	\$18,352	Receiving Incentive	\$8,880
Payment to High School	\$4,440		
Total	\$22,792	Total	\$8,880

29.9%.

### RESULTS - COST BENEFIT ANALYSIS

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

- The quantified cost to the utility was \$23,513 (\$95 per participant). This includes the cost of the toilets, \$18,352 (\$74 per participant) materials, \$391 (\$2 per participant), advertising, \$330 (\$1 per participant), and payment to the high school, \$4,440 (\$18 per participant).
- The quantified benefit to the utility was \$0.
- The quantified cost to the participants was \$11,840 (\$48 per participant) in installation costs.
- The quantified benefit to the participants was \$273,828 (\$1,109 per participant), which is the total amount that they saved on their water bills during the twenty year lifespan of the toilets.
- The total cost to others was \$22,792 (\$92 per participant). This includes the cost to CMWD and MWDSC of the toilets, \$18,352 (\$74 per participant) and incentive payment to the high school, \$4,440 (\$18 per participant).
- The total benefit to others was \$8,880. This includes the benefit to the high school of receiving incentive payments, \$8,880 (\$36 per participant).

**TD-1**

### UTILITY PERSPECTIVE

Results of the cost benefit analysis show a net benefit (net present

value) from the utility perspective of -\$23,513, or -\$95 per participant. The quantified benefits to the utility were less than the quantified costs to the utility. **The cost per acre-foot of water saved from the utility perspective was \$26.**

### PARTICIPANT PERSPECTIVE

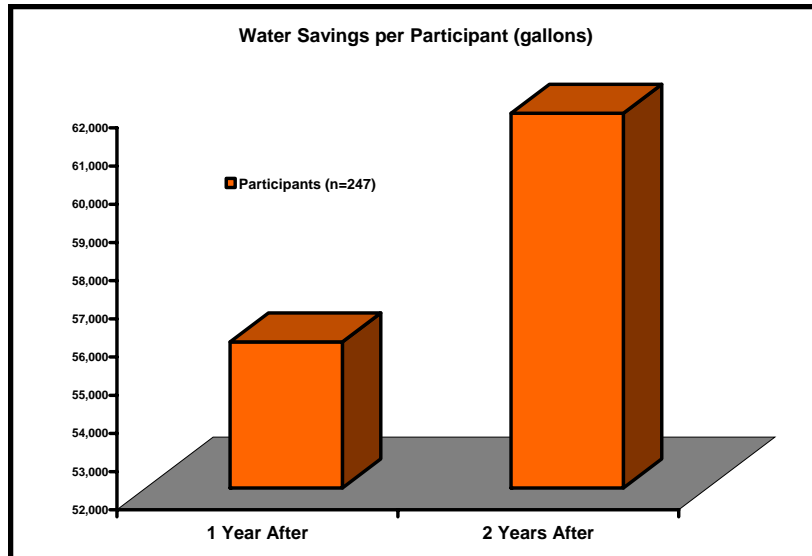
Results of the cost benefit analysis show a net benefit (net present value) of \$261,988 from the participant perspective, or \$1,061 per participant.

The quantified benefits to the participant were greater than the quantified costs to the participant. **The cost per acre-foot of water saved from the participant perspective was \$13.**

### OVERALL PERSPECTIVE

Results of the cost benefit analysis show a net benefit (net present value) from an overall perspective of \$224,564, or \$909 per participant. The quantified benefits to the utility, participant, and others were greater

than the quantified costs to the utility, participant, and others. **The cost per acre-foot of water saved from an overall perspective was \$65.**



### UNQUANTIFIED COSTS AND BENEFITS

#### Costs

- The customers' time spent during the pick-up and drop-off events.
- Customers' time spent installing toilets.

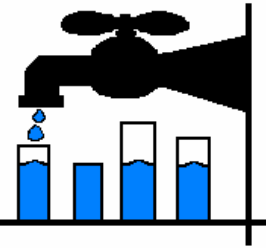
#### Benefits

- Financial savings on sewer bills for participants.
- Avoided cost of acquisition and distribution of water saved.
- Environmental benefits of reduced use of water.
- Increased public awareness about water conservation.
- Increased customer satisfaction.
- Reinforces need to conserve water and desirability of conserving.
- Water saved for future municipal use.
- Customers received new fixtures.

TD-1

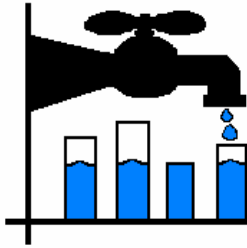
# Camrosa Water District

## Toilet Distribution Program



### Results of Cost Benefit Analysis-Lifespan (20 Years)

	UTILITY	PARTICIPANT	OVERALL
<b><u>Present Value Costs</u></b>			
Costs to Utility	23,513	NA	23,513
Costs to Participants	NA	11,840	11,840
Costs to Others (CMWD, MWDSC)	NA	NA	22,792
<b>Total Costs</b>	<b>\$23,523</b>	<b>\$11,840</b>	<b>\$58,144</b>
<b><u>Present Value Benefits</u></b>			
Total Water Savings	911.20 AF	911.20 AF	911.20 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	273,828	273,828
Benefits to Others (High School)	NA	NA	8,880
<b>Total Benefits</b>	<b>\$0</b>	<b>\$273,828</b>	<b>\$282,709</b>
<b><u>Cost-Benefit Calculations</u></b>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$23,513	\$261,988	\$224,564
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$26.37 /AF	\$13.28 /AF	\$65.21 /AF



# Walnut Valley Water District

## Toilet Distribution Program

Walnut Valley Water District (WVWD) is located in the San Gabriel Valley, approximately 20 miles east of Los Angeles, in Walnut, California. WVWD provides water to over 98,000 customers in six communities. As of the 2000 census, the median household income in Walnut was \$81,015, which is higher than the statewide median of \$47,493.<sup>1</sup>

### UTILITY DEMOGRAPHICS

As of 2005, WVWD had 26,005 connections, 95.2% of which were residential. Of their total connections, 23,777 were single family residential, 1,002 were multifamily residential, 820 were commercial, 149 were industrial, 257 were irrigation users.

WVWD's service area includes Diamond Bar, and parts of Walnut, Industry, Pomona, West Covina, and Rowland Heights. Their total service area is 29 square miles. Average annual water delivery is 22,621 acre-feet. WVWD's total water use was 215 gallons per capita per day (gpcd) as of 2005.

### TOILET DISTRIBUTION PROGRAM

<b>Eligible Customers:</b>	<b>SF, MF</b>
<b>Customers Analyzed:</b>	<b>SF</b>
<b>Program Years:</b>	<b>1998-present</b>
<b>Years Analyzed:</b>	<b>1998, 1999, 2000</b>

### UTILITY RATE STRUCTURE AND PRICES

WVWD has a flat block rate structure. As of 2004, the monthly base rate for service to a residence is \$11.01, which includes zero gallons of water. The charge per hundred cubic feet (ccf) of water is \$1.68 (\$2.25 per 1,000 gallons).

### CURRENT CAPACITY AND WATER SOURCES

Walnut Valley Water District is primarily dependent on surface water from the Metropolitan Water District of Southern California (MWDSC), which gets its water from the Colorado River and Northern California. WVWD has a storage capacity of 85.4 million gallons.

### FUTURE PLANS TO MEET DEMAND

The population within Walnut Valley Water District's service area is growing at a rate of approximately 1% per year. Utilization of its current capacity and water sources, continuation of water conservation programs, and the possibility of expanding its recycled water system are the main components of WVWD's plans to meet future demand.

### TOILET DISTRIBUTION PROGRAM - DESCRIPTION

Since 1998, Walnut Valley Water District has held an annual ultra low-flush toilet (ULFT) distribution event. WVWD has offered ULFTs (1.6 gallons per flush) at no cost to residential customers who will replace their high water use toilets. Homes built prior to 1980 are targeted by sending postcards to those residences. Local high school students and teachers assist in the distribution program.

<sup>1</sup> US Census Bureau. QuickFacts

The distributions are held at the Walnut Valley Water District Office. Toilets are distributed by students from 3 or 4 local high schools, school staff and Water District staff members. Water District staff verify the customers' account, and the students assist with traffic control, loading the toilets into vehicles, and registration paperwork.

#### **OTHER WALNUT VALLEY CONSERVATION PROGRAMS**

**Washing Machine Rebate Program, 2002-present**  
Eligible customers can receive a \$100 rebate on the purchase of a qualifying high-efficiency clothes washer.

Two weeks later, there is a return day, where the old toilet is brought to the District office. The Water District pays the schools \$5 for each

toilet returned for recycling. If the toilet is not delivered on the return day, the participant is charged \$120 on their next water bill.

### **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 participated in the ULFT distribution program during the years of 1998, 1999, and 2000. The water savings were calculated and a cost benefit analysis was performed for this time period. The findings refer to these three years only, not to the ongoing program. The lifespan of the toilets installed was assumed to be twenty years.

All quantified costs and benefits have been discounted to the first year of the analysis (1998) and inflated to 2004 dollars. The discount rate used for this analysis was 6.0%. The Consumer Price Index values used in this analysis were the 2004 value of 188.9 and the 1998 value of 163.0.

The population studied for this analysis was comprised of participants who received toilets during the program years 1998, 1999, and 2000. There were 196 usable participants out of 280 total participants in 1998, 222 out of 347 in 1999, and 194 out of 306 in 2000, for a total of 612 usable participants out of 933. Thirty-four percent, or 321, of the possible participants were unusable because there was not sufficient pre- and post-measure data to perform the analysis or the participant moved during the period of analysis.

A random sample of all WVWD single family residential households, not including ULFT participants, was used as the control group for each program year. The average annual pre-measure water use of the participants (164,796 gallons) was lower than the weighted annual pre-measure average of the control group (222,555 gallons). The control group consisted of 810 households for the 1998 program year, 797 households for the 1999 program year, and 781 households for the 2000 program year.

## ASSUMPTIONS

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

The value of the water saved was calculated by multiplying the amount of water saved by the average price of water for the year (\$1.97 per 1,000 gallons in 1999, \$2.01 per 1,000 gallons in 2000, \$2.04 per 1,000 gallons in 2001, \$2.10 per 1,000 gallons in 2002, \$2.18 per 1,000 gallons in 2003, \$2.23 per 1,000 gallons in 2004, and \$2.25 per 1,000 gallons in 2005 and beyond).

The toilets were paid for by the Metropolitan Water District of Southern California (\$60 per toilet each year) and WWD (\$55 per toilet in 1998 and 1999, \$58.80 per toilet in 2000).

The control group is a random sample of all single family residential connections.

Assumed 30% of participants paid for professional installation of their toilets at \$100 per participant.

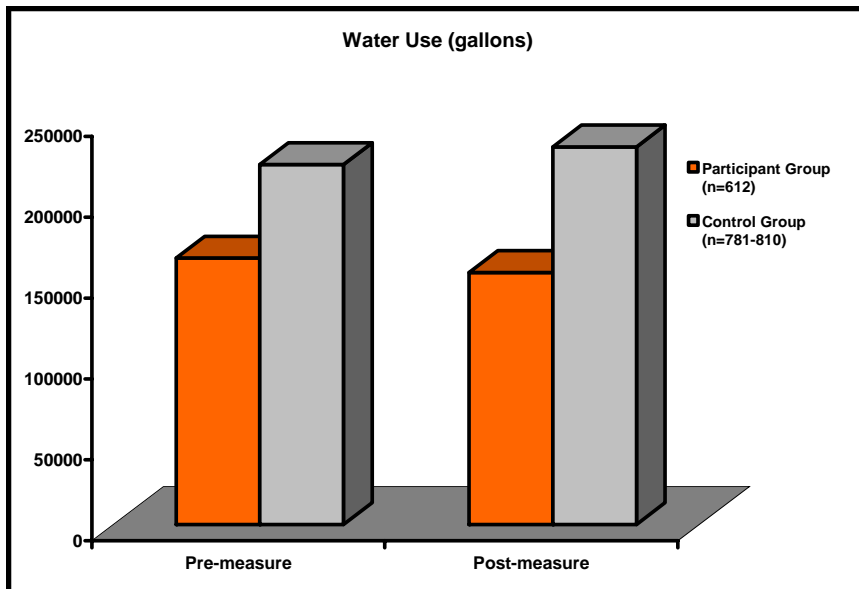
Participants who had two or more consecutive months of no water use were not included in the study.

Participants who had less than 11 months of water use data in a calendar year, or less than 6 months during period of bi-monthly billing, were not included in the study.

Assumed \$10 per toilet in labor costs to the utility.

The discount rate used in this analysis was 6.0%.

The CPI values that were used in this analysis were the 2004 value of 188.9 and the 1998 value of 163.0.

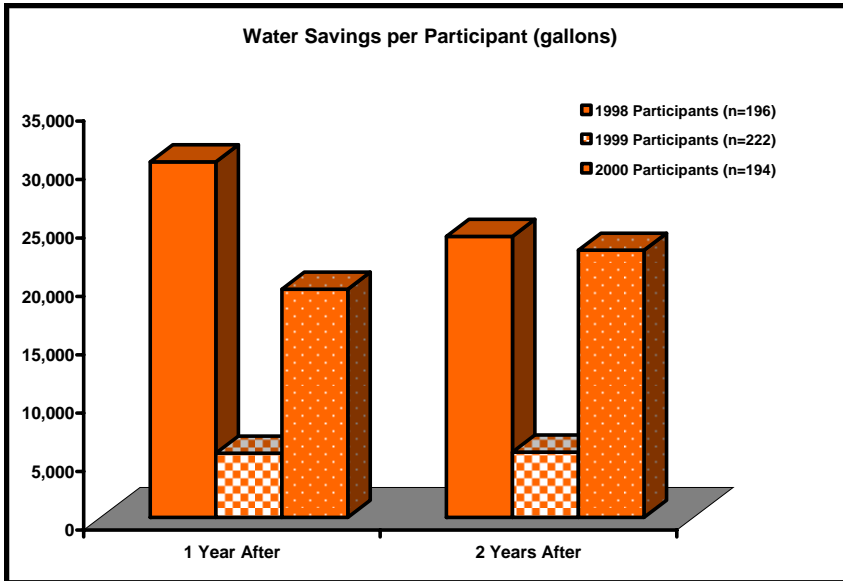


## RESULTS - WATER SAVINGS

In the first year after the 1998 ULFT distribution program, the water savings amounted to 5,961,844 gallons, or 30,418 gallons per participant per year (gppy) (19.1% of pre-measure water use). The second year after, the water savings amounted to 4,707,916 gallons, or 24,020 gppy (15.1% of pre-measure water use). The average water savings per year was 5,334,880 gallons, or 27,219 gppy (17.1% of pre-measure water use). **The total water savings over the twenty year assumed lifespan of the toilets was 106,697,600 gallons (327.4 AF), or 544,376 gallons per participant.**

The first year after the 1999 ULFT distribution program, the water savings amounted to 1,219,018 gallons, or 5,491 gppy (3.6% of pre-measure water use). The second year after, the water savings amounted to 1,237,249 gallons, or 5,573 gppy (3.7% of pre-measure water use). The average water savings per year was 1,228,133 gallons, or 5,532 gppy (3.6% of pre-measure water use). **The total water savings over the twenty year assumed lifespan of the toilets was 24,562,667 gallons (75.4 AF), or 110,643 gallons per participant.**

The first year after the 2000 ULFT distribution program, the water savings amounted to 3,784,896 gallons, or 19,510 gppy (10.6% of pre-measure water use).



The second year after, the water savings amounted to 4,433,729 gallons, or 22,854 gppy (12.4% of pre-measure water use). The average water savings per year was 4,109,313 gallons, or 21,182 gppy (11.5% of pre-measure water use). **The total water savings over the twenty year assumed lifespan of the toilets was 82,186,253 gallons (252.2 AF), or 423,640 gallons per**

**participant.**

Total water savings for the three years studied amounted to 10,965,758 gallons or 17,918 gppy (10.9% of weighted pre-measure water use) during the first year after and 10,378,894 gallons, or 16,959 gppy (10.3% of weighted pre-measure water use) during the second year after the program. **The total water savings over the twenty year assumed lifespan of the toilets was 213,446,520 gallons (655.0 AF), or 348,769 gallons per participant.**

During the two years before participating in the ULFT distribution program, participants' water use was 75.8% of the control group's use, on average. During the two years after, their water use was 68.3% of the control group's use, on average. The participants' water use decreased by 5.4% from pre-measure to post-measure, whereas the control group's use increased by 4.9%. **The resulting overall water savings attributed to this program was 10.3%.**

## RESULTS - COST BENEFIT ANALYSIS

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

### 1998 PROGRAM

- ◆ The quantified cost to the utility was \$29,772 (\$152 per participant). This includes half of the cost of the toilets, \$23,392 (\$119 per participant), the cost of labor, \$4,253 (\$22 per participant), and payment to the high schools, \$2,127 (\$11 per participant).
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$6,814 (\$35 per participant).
- ◆ The quantified benefit to the participants was \$154,417 (\$788 per participant), which includes water bill savings.
- ◆ The quantified cost to MWDSC, a funding source for the program, was \$25,519 (\$130 per participant), which includes half of the cost of the toilets.
- ◆ The quantified benefit to the high schools was \$2,127 (\$11 per participant).

1998 Quantified Costs and Benefits							
Utility			Participants				
Costs		Benefits	Costs		Benefits		
Toilets	\$23,392	Not Quantified	Installation	\$6,814	Water Bill Savings	\$154,417	
Labor	\$4,253						
Payment to High Schools	\$2,127						
<b>Total</b>	<b>\$29,772</b>	<b>Total</b>	<b>\$0</b>	<b>Total</b>	<b>\$6,814</b>	<b>Total</b>	<b>\$154,417</b>

### UTILITY PERSPECTIVE - 1998

Results of cost benefit analysis show a net benefit (net present value) of -\$29,772 from the utility perspective. This is a net benefit of \$152 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 \$91.**

1998 Quantified Costs and Benefits			
MWDSC & High Schools			
Costs – MWDSC		Benefits – High Schools	
Toilets	\$25,519	Incentive Payments	\$2,127
<b>Total</b>	<b>\$25,519</b>	<b>Total</b>	<b>\$2,127</b>

### PARTICIPANT PERSPECTIVE - 1998

Results of cost benefit analysis show a net benefit (net present value) of \$147,603 from the participant perspective. This is a net benefit of \$753 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$21.**

**OVERALL PERSPECTIVE - 1998**

Results of cost benefit analysis show a net benefit (net present value) of \$94,439 from an overall perspective. This is a net benefit of \$482 per participant. The quantified costs to the participants, utility, and others were less than the quantified benefits to the participants, utility, and others. **The cost per acre-foot of water saved from an overall perspective was \$190.**

**1999 PROGRAM**

- ◆ The quantified cost to the utility was \$32,526 (\$147 per participant). This includes half of the cost of the toilets, \$25,556 (\$115 per participant), the cost of labor, \$4,647 (\$21 per participant), and payment to the high schools, \$2,323 (\$11 per participant).
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$6,429 (\$29 per participant).
- ◆ The quantified benefit to the participants was \$33,833 (\$152 per participant), which includes water bill savings.
- ◆ The quantified cost to MWDSC, a funding source for the program, was \$27,879 (\$126 per participant), which includes half of the cost of the toilets.
- ◆ The quantified benefit to the high schools was \$2,323 (\$11 per participant).

1999 Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Toilets	\$25,556	Not Quantified		Installation	\$6,429	Water Bill Savings	\$33,833
Labor	\$4,647						
Payment to High Schools	\$2,323						
<b>Total</b>	<b>\$32,526</b>			<b>Total</b>	<b>\$6,429</b>	<b>Total</b>	<b>\$33,833</b>

1999 Quantified Costs and Benefits			
MWDSC & High Schools			
Costs – MWDSC		Benefits – Schools	
Toilets	\$27,879	Incentive Payments	\$2,323
<b>Total</b>	<b>\$27,879</b>	<b>Total</b>	<b>\$2,323</b>

**UTILITY PERSPECTIVE - 1999**

Results of cost benefit analysis show a net benefit (net present value) of -\$32,526 from the utility perspective. This is a net benefit of \$147 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 \$431.**

**PARTICIPANT PERSPECTIVE - 1999**

Results of cost benefit analysis show a net benefit (net present value) of \$27,404 from the participant perspective. This is a net benefit of \$123 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$85.**

**OVERALL PERSPECTIVE - 1999**

Results of cost benefit analysis show a net benefit (net present value) of -\$30,678 from an overall perspective. This is a net benefit of -\$138 per participant. The quantified costs to the participants, utility, and others were greater than the quantified benefits to the participants,

utility, and others. **The cost per acre-foot of water saved from an overall perspective was \$887.**

**2000 PROGRAM**

- ◆ The quantified cost to the utility was \$28,544 (\$147 per participant). This includes half of the cost of the toilets, \$22,742 (\$117 per participant), the cost of labor, \$3,868 (\$20 per participant), and payment to the high schools, \$1,934 (\$10 per participant).
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$6,003 (\$31 per participant).
- ◆ The quantified benefit to the participants was \$107,641 (\$555 per participant), which includes water bill savings.
- ◆ The quantified cost to MWDSC, a funding source for the program, was \$23,207 (\$120 per participant), which includes half of the cost of the toilets.
- ◆ The quantified benefit to the high schools was \$1,934 (\$10 per participant).

2000 Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Toilets	\$22,742	Not Quantified		Installation	\$6,003	Water Bill Savings	\$107,641
Labor	\$3,868						
Payment to High Schools	\$1,934						
Total	\$28,544			Total	\$6,003	Total	\$107,641

**UTILITY PERSPECTIVE - 2000**

Results of cost benefit analysis show a net benefit (net present value) of -\$28,544 from the utility perspective. This is a net benefit of -\$147 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 \$113.**

2000 Quantified Costs and Benefits			
MWDSC & High Schools			
Costs – MWDSC		Benefits – High Schools	
Toilets	\$23,207	Incentive Payments	\$1,934
Total	\$23,207	Total	\$1,934

**PARTICIPANT PERSPECTIVE - 2000**

Results of cost benefit analysis show a net benefit (net present value) of \$101,639 from the participant perspective. This is a net benefit of \$524 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$24.**

**OVERALL PERSPECTIVE - 2000**

Results of cost benefit analysis show a net benefit (net present value) of \$51,821 from an overall perspective. This is a net benefit of \$267 per participant. The quantified costs to the participants, utility, and others were less than the quantified benefits to the participants, utility, and others. **The cost per acre-foot of water saved from an overall perspective was \$229.**

**ALL YEARS**

- ◆ The quantified cost to the utility was \$90,842 (\$148 per participant). This includes half of the cost of the toilets, \$71,691 (\$117 per participant), the cost of labor, \$12,767 (\$21 per participant), and payment to the high schools, \$6,384 (\$11 per participant).
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$19,246 (\$31 per participant).
- ◆ The quantified benefit to the participants was \$295,891 (\$483 per participant), which includes water bill savings.
- ◆ The quantified cost to MWDSC, a funding source for the program, was \$76,605 (\$125 per participant), which includes half of the cost of the toilets.
- ◆ The quantified benefit to the high schools was \$6,384 (\$11 per participant).

**UTILITY PERSPECTIVE - ALL YEARS**

Results of cost benefit analysis show a net benefit (net present value) of -\$90,842 from the utility perspective. This is a net benefit of -\$148 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 \$139.**

**PARTICIPANT PERSPECTIVE - ALL YEARS**

Results of cost benefit analysis show a net benefit (net present value) of \$276,645 from the participant perspective. This is a net benefit of \$452 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$29.**

ALL YEARS Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Toilets	\$71,691	Not Quantified		Installation	\$19,246	Water Bill Savings	\$295,891
Labor	\$12,767						
Payment to Schools	\$6,384						
Total	\$90,842			Total	\$19,246	Total	\$295,891

ALL YRS Quantified Costs and Benefits			
MWDSC & High Schools			
Costs – MWDSC		Benefits – Schools	
Toilets	\$76,605	Incentive Payments	\$6,384
Total	\$76,605	Total	\$6,384

**OVERALL PERSPECTIVE - ALL YEARS**

Results of cost benefit analysis show a net benefit (net present value) of \$115,582 from an overall perspective. This is a net benefit of \$189 per participant. The quantified costs to the participants, utility, and others were less than the quantified benefits to the participants, utility, and others. **The cost per acre-foot of water saved from an overall perspective was \$285.**

## **UNQUANTIFIED COSTS AND BENEFITS**

### **Costs**

- **The customers' time spent during the distribution and installation.**
- **Landfill disposal of old toilets.**

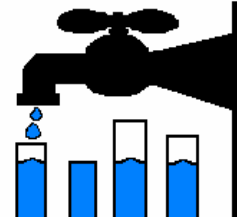
### **Benefits**

- **Financial savings on sewer bills for participants.**
- **Avoided costs of acquisition and distribution of water saved.**
- **Environmental benefits of reduced use of water.**
- **Increased public awareness about water conservation.**
- **Increased customer satisfaction with the utility.**
- **Involves youth in community conservation efforts.**
- **Water saved for future municipal use.**
- **Customers received new fixtures.**

**TD-2**

# Walnut Valley Water District

## Toilet Distribution Program



### 1998

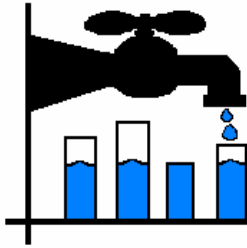
#### Results of Cost Benefit Analysis-Lifespan (20 Years)

	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	29,772	NA	29,772
Costs to Participants	NA	6,814	6,814
Costs to MWDSC	NA	NA	25,519
Total Costs	\$29,772	\$6,814	\$62,105
<u>Present Value Benefits</u>			
Total Water Savings	327.44 AF	327.44 AF	327.44 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	154,417	154,417
Benefits to MWDSC	NA	NA	2,127
Total Benefits	\$0	\$154,417	\$156,544
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$29,772	\$147,603	\$94,439
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$91 /AF	\$21 /AF	\$190 /AF

### 1999

#### Results of Cost Benefit Analysis-Lifespan (20 Years)

	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	32,526	NA	32,526
Costs to Participants	NA	6,429	6,429
Costs to MWDSC	NA	NA	27,879
Total Costs	\$32,526	\$6,429	\$66,833
<u>Present Value Benefits</u>			
Total Water Savings	75.38 AF	75.38 AF	75.38 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	33,833	33,833
Benefits to MWDSC	NA	NA	2,323
Total Benefits	\$0	\$33,833	\$36,156
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$32,526	\$27,404	-\$30,678
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$431 /AF	\$85 /AF	\$887 /AF



# Walnut Valley Water District

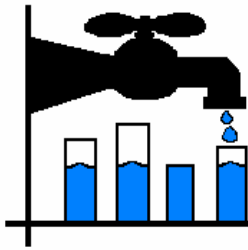
## Toilet Distribution Program

<b>Results of Cost Benefit Analysis-Lifespan (20 Years)</b>		<b>2000</b>	
	UTILITY	PARTICIPANT	OVERALL
<b><u>Present Value Costs</u></b>			
Costs to Utility	28,544	NA	28,544
Costs to Participants	NA	6,003	6,003
Costs to MWDSC	NA	NA	23,207
<b>Total Costs</b>	<b>\$28,544</b>	<b>\$6,003</b>	<b>\$57,754</b>
<b><u>Present Value Benefits</u></b>			
Total Water Savings	252.22 AF	252.22 AF	252.22 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	107,641	107,641
Benefits to MWDSC	NA	NA	1,934
<b>Total Benefits</b>	<b>\$0</b>	<b>\$107,641</b>	<b>\$109,575</b>
<b><u>Cost Benefit Calculations</u></b>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$28,544</b>	<b>\$101,639</b>	<b>\$51,821</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$113 /AF</b>	<b>\$24 /AF</b>	<b>\$229 /AF</b>

<b>Results of Cost Benefit Analysis-Lifespan (20 Years)</b>		<b>ALL YEARS</b>	
	UTILITY	PARTICIPANT	OVERALL
<b><u>Present Value Costs</u></b>			
Costs to Utility	90,842	NA	90,842
Costs to Participants	NA	19,246	19,246
Costs to MWDSC	NA	NA	76,605
<b>Total Costs</b>	<b>\$90,842</b>	<b>\$19,246</b>	<b>\$186,692</b>
<b><u>Present Value Benefits</u></b>			
Total Water Savings	655.04 AF	655.04 AF	655.04 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	295,891	295,891
<b>Total Benefits</b>	<b>\$0</b>	<b>\$295,891</b>	<b>\$302,275</b>
<b><u>Cost Benefit Calculations</u></b>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$90,842</b>	<b>\$276,645</b>	<b>\$115,582</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$139 /AF</b>	<b>\$29 /AF</b>	<b>\$285 /AF</b>

**TD-2**





# Phoenix Water Services Dept.

## Toilet Distribution Program

The City of Phoenix Water Services Department (WSD) serves the city of Phoenix, AZ, a city of approximately 1.3 million people located in central Arizona. As of the 2000 Census the median household income for the City of Phoenix was \$41,207, which is higher than the statewide median of \$40,558.<sup>1</sup>

### UTILITY DEMOGRAPHICS

As of 2005, the City of Phoenix Water Services Department maintained 377,072 connections. Of these connections, 331,458 were single family residential users, 16,290 were multifamily residential, 23,735 were commercial, 185 were industrial, 2,893 were government, and 2,511 were other users. The City of Phoenix covers an area of 514 square miles, but the utility provides service beyond those borders, servicing 546 square miles. The population of this service area is approximately 1.4 million. As of 2004, the Phoenix WSD produced 103.1 billion gallons annually. Their average per capita water use was 208 gallons per capita per day (gpcd), with a residential per capita water use of 170 gpcd.

### TOILET DISTRIBUTION PROGRAM

<b>Eligible Customers:</b>	<b>SF, MF</b>
<b>Customers Analyzed:</b>	<b>SF</b>
<b>Program Years:</b>	<b>1994-present</b>
<b>Years Analyzed:</b>	<b>1994-2001</b>

### UTILITY RATE STRUCTURE AND PRICES

The City of Phoenix has a seasonal rate structure. The monthly base rate for service, as of March 2, 2005, is \$5.16 for 5/8" meters inside the city and \$7.74 outside the city, which includes zero gallons of water. An environmental charge of \$0.24 per 1,000 gallons is applied to all usage. The fee structure for water consumption is as follows:

Usage	Price	
	Inside City	Outside City
Low Months (Dec – Mar)	\$1.84/1,000 gal.	\$2.77/1,000 gal.
Med Months (Apr – May, Oct – Nov)	\$2.18/1,000 gal.	\$3.28/1,000 gal.
High Months (Jun – Sep)	\$2.75/1,000 gal.	\$4.13/1,000 gal.

### CURRENT CAPACITY AND WATER SOURCES

About 95 percent of the water used by Phoenix WSD comes from surface sources, including the Salt, Verde and Colorado Rivers; the remaining 5 percent comes from wells. Surface water is delivered to the city by the Central Arizona Project (CAP) and the Salt River Project (SRP). The water is treated at five water treatment plants with a combined capacity of about 630 million gallons per day.

### FUTURE PLANS TO MEET DEMAND

Phoenix WSD will meet future demand by continuing to use their allotment of CAP water, through water conservation, water reuse, and expanding facilities.

<sup>1</sup> US Census Bureau. CenStats Databases.

## **NEIGHBORS HELPING NEIGHBORS PROGRAM - DESCRIPTION**

In 1994 the City of Phoenix Water Services Department, in a partnership with Metro Tech High School and the Phoenix Revitalization Corporation (PRC), initiated the Neighbors Helping Neighbors program in which plumbing students helped install conservation devices in low-income homes at no direct cost to customers. Targeted neighborhoods were also undergoing blight cleanup and crime prevention programs.

The program was designed to conserve water by replacing high capacity toilets with 1.6 gallon per flush toilets as well as replacing other

fixtures as needed, such as faucets and showerheads. Students benefited from the training experience while providing the community a service. Initial funding for the program was provided by the Arizona Department of Water Resources. However, the

### **OTHER PHOENIX CONSERVATION PROGRAMS**

**Public Education, *various start dates***

**Water Conservation Ordinances, *various start dates***

exact amount and timing of support could not be determined, so all costs were considered costs to the utility.

In 2001, the program began providing a small number of retrofits throughout the city in cooperation with the Southwest Gas program called Seniors-Helping-Seniors. In addition, a part time worker was hired specifically for the program. The program also began targeting city council designated neighborhoods. In 2003, WSD staff began placing door hangers on all residences of targeted neighborhoods, which increased response rates to 20%.

## **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 participated in the program during the years 1994 through 2001. The water savings were calculated and a cost benefit analysis was performed for the years 1994, 1995, 1996, 1997, 1998, 1999, 2000, and 2001. Our findings refer to these eight years only, not to the ongoing program. The lifespan program was assumed to be twenty years.<sup>2</sup>

All quantified costs and benefits have been discounted to the first year of the analysis (1994) and inflated to 2004 dollars. The discount rate used in this analysis was 5.75%. The CPI values that were used in this analysis were the 2004 value of 188.9 and the 1994 value of 148.2.

Approximately 1,500 households participated in the program between 1994 and 2001. Of these, 310 are included in this analysis. Those not included in the analysis either were multifamily residences or moved during the period of analysis. Included in the analysis are 19 participants in 1994, 93 participants in 1995, 54 participants in 1996, 17 participants in 1997, 33 participants in 1998, 20 participants in 1999, 29 participants in 2000, and 45 participants in 2001.

**TD-3**

<sup>2</sup> Pekelney, D.M., et al. *Guidelines to Conduct Cost-Effectiveness Analysis of Best Management Practices for Urban Water Conservation*. California, 1996.

The control group consists of 548 single family residential households from the participant groups' neighborhoods. However, the average pre-measure water use of the participants (203,379 gallons) was higher than that of the control group (149,022 gallons).

## ASSUMPTIONS

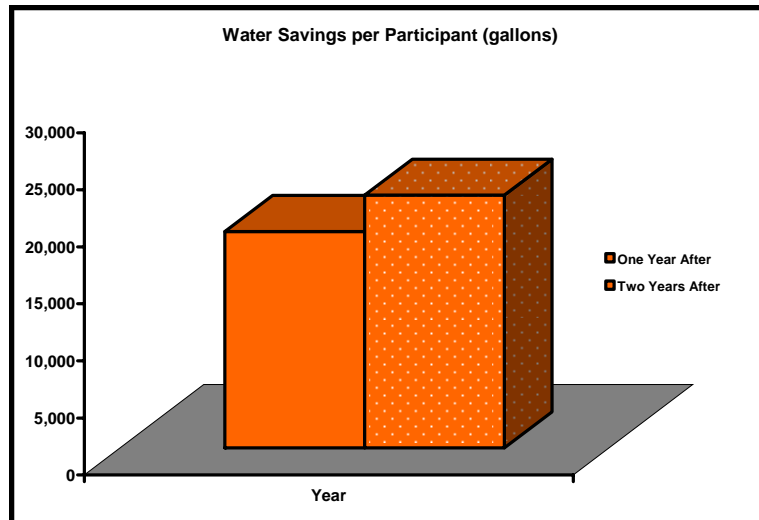
*Please see the General Assumptions for the specific conditions and rules underlying all ECoBA analyses.*

One hundred percent of participating households received a toilet, 5% received a handicap toilet, 50% received kitchen faucets, 50% received bathroom faucets, and 100% received showerheads.

Assumed the water savings occur equally throughout the year because the program addresses indoor water use. As a result, the value of the water saved was calculated by multiplying the amount of water saved by the average price of water from throughout the year (\$1.05 per ccf in 1994, \$1.11 per ccf in 1995, \$1.17 per ccf in 1996, \$1.24 per ccf in 1997, \$1.29 per ccf in 1998, \$1.29 per ccf in 1999, \$1.37 per ccf in 2000, \$1.44 per ccf in 2001, \$1.53 per ccf in 2002, \$1.53 per ccf in 2003, \$1.59 per ccf in 2004, and \$1.69 per ccf in 2005 and beyond). The City's environmental charge of \$0.18 per ccf was also included in the value of water saved.

Assumed that each site visit cost \$175 to the City of Phoenix in labor.

Participants and control group members who had two or more consecutive months of no water use were included in the study.



The discount rate used in this analysis was 5.75%.

The CPI values that were used in this analysis were the 2004 value of 188.9 and the 1994 value of 148.2.

Each toilet cost \$102.22, each handicap toilet cost \$141.22, each kitchen faucet cost \$65.67, each bathroom faucet cost \$41.67, and each showerhead cost \$2.00.

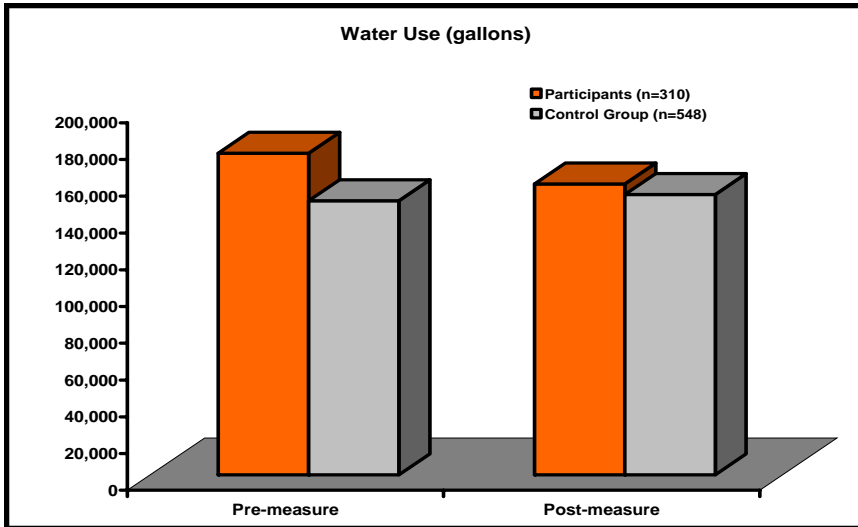
## RESULTS - WATER SAVINGS

In the first year after the 1994 Neighbors Helping Neighbors program, the water savings amounted to 744,531 gallons, or 39,186 gallons per participant per year (gppy) (21.2% of pre-measure water use). The second year after the retrofits, the water savings amounted to 1,057,987 gallons, or 55,684 gppy (30.1% of pre-measure water use). The average savings per year was 901,259 gallons, or 47,435 gppy (25.6% of pre-measure water use). **The total savings over the twenty**

year assumed lifespan was 18,025,181 gallons (55.3 AF), or 948,694 gallons per participant.

The first year after the 1995 Neighbors Helping Neighbors program, the water savings amounted to 2,408,743 gallons, or 25,900 gppy (15.5% of pre-measure water use). The second year after the retrofits, the water savings amounted to 2,247,361 gallons, or 24,165 gppy (14.4%

of pre-measure water use). The average savings per year was 2,328,052 gallons, or 25,033 gppy (14.9% of pre-measure water use). **The total savings over the twenty year assumed lifespan was 46,561,040 gallons (142.9 AF), or 500,656 gallons per participant.**



The first year after the 1996 Neighbors Helping Neighbors program, the water savings amounted to

1,087,719 gallons or 20,143 gppy (11.9% of pre-measure water use). The second year after the retrofits, the water savings amounted to 966,224 gallons, or 17,893 gppy (10.5% of pre-measure water use). The average savings per year was 1,026,972 gallons, or 19,018 gppy (11.2% of pre-measure water use). **The total savings over the twenty year assumed lifespan was 20,539,434 gallons (63.0 AF), or 380,360 gallons per participant.**

The first year after the 1997 Neighbors Helping Neighbors program, the water savings amounted to 89,516 gallons, or 5,266 gppy (3.3% of pre-measure water use). The second year after the retrofits, the water savings amounted to 209,827 gallons, or 12,343 gppy (7.8% of pre-measure water use). The average savings per year was 149,671 gallons or 8,804 gppy (5.6% of pre-measure water use). **The total savings over the twenty year assumed lifespan was 2,993,429 gallons (9.2 AF), or 176,084 gallons per participant.**

The first year after the 1998 Neighbors Helping Neighbors program, the water savings amounted to 470,535 gallons, or 14,259 gppy (7.2% of pre-measure water use). The second year after the retrofits, the water savings amounted to 1,234,758 gallons, or 37,417 gppy (18.8% of pre-measure water use). The average savings per year was 852,647 gallons, or 25,838 gppy (13.0% of pre-measure water use). **The total savings over the twenty year assumed lifespan was 17,052,937 gallons (52.3 AF), or 516,756 gallons per participant.**

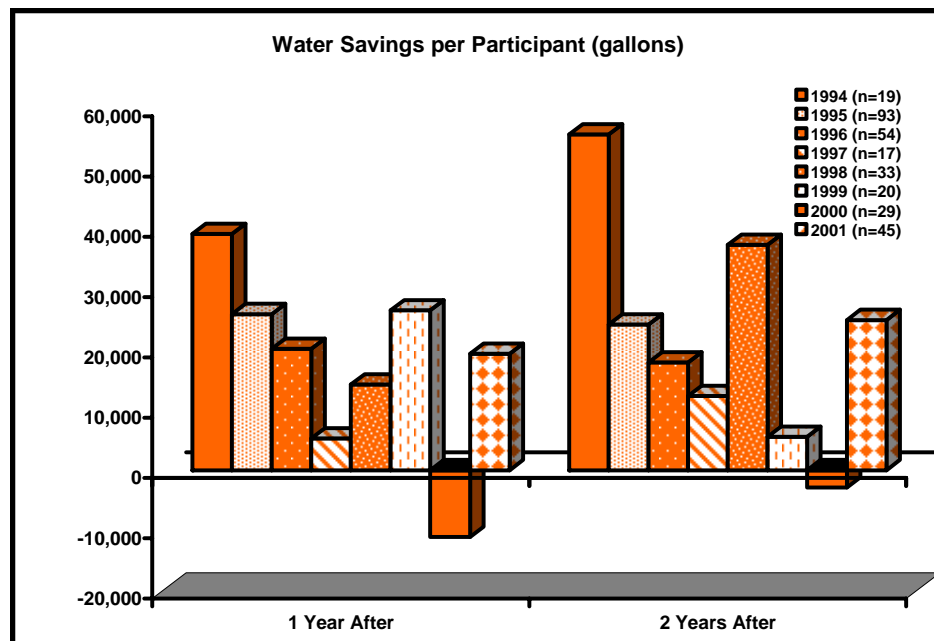
The first year after the 1999 Neighbors Helping Neighbors program, the water savings amounted to 530,402 gallons, or 26,520 gppy (16.1% of

pre-measure water use). The second year after the retrofits, the water savings amounted to 110,856 gallons, or 5,543 gppy (3.4% of pre-measure water use). The average savings per year was 320,629 gallons, or 16,031 gppy (9.7% of pre-measure water use). **The total savings over the twenty year assumed lifespan was 6,412,575 gallons (19.7 AF), or 320,629 gallons per participant.**

The first year after the 2000 Neighbors Helping Neighbors program, there was an increase in participant water use, relative to control group water use, of 321,270 gallons, or 11,078 gppy (6.7% of pre-measure water use). The second year after the retrofits, there was an increase in participant water use, relative to control group water use, of 82,854 gallons, or 2,857 gppy (1.7% of pre-measure water use). On average, relative water use increased by 202,062 gallons, or 6,968 gppy (4.2% of pre-measure water use). **Over the twenty year assumed lifespan of the program, relative water use increased by 4,041,236 gallons (12.4 AF), or 139,353 gallons per participant.**

The first year after the 2001 Neighbors Helping Neighbors program, the water savings amounted to 870,035 gallons, or 19,334 gppy (10.1% of pre-measure water use). The second year after the retrofits, the water savings amounted to 1,121,387 gallons, or 24,920 gppy (13.0% of pre-measure water use). The average savings per year was 995,711 gallons, or 22,127 gppy (11.6% of pre-measure water use). **The total savings over the twenty year assumed lifespan was 19,914,217 gallons (61.1 AF), or 442,538 gallons per participant.**

Total water savings for the eight years studied was 5,880,211 gallons, or 18,968 gppy (10.9% of weighted pre-measure water use) during the first year after and 6,865,546 gallons, or 22,147 gppy (12.7% of weighted pre-measure water



use) during the second year after the retrofits. **The total savings over the twenty year assumed lifespan was 127,457,578 gallons (391.2 AF), or 411,153 gallons per participant.**

Before the Neighbors Helping Neighbors program, the participant group's water use was 117.3% of the control group's use, on average.

After the Neighbors Helping Neighbors program, their water use was 103.8% of the control group's use, on average. The participant group's water use decreased by 9.5%, whereas the control group's use increased by 2.3%. **The resulting overall water savings attributed to this program was 11.8%.**

## RESULTS - COST BENEFIT ANALYSIS

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

### 1994 PROGRAM

- ◆ The quantified cost to the utility was \$8,437. This includes the cost of conservation devices, \$4,199 and the cost of labor, \$4,238. This is a cost of \$ 444 per participant, including \$221 for devices and \$223 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was \$29,552, which includes the value of water bill savings. This is a water bill savings of \$1,555 per participant.

1994 Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$4,199	Not Quantified	Not Quantified	Water Bill Savings	\$29,552
Labor	\$4,238			Total	\$29,552
Total	\$8,437				

### UTILITY PERSPECTIVE - 1994

Results of the cost benefit analysis show a net benefit (net present value) of -\$8,437 from the utility perspective. This is a net benefit of -\$444 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 \$153.**

### PARTICIPANT PERSPECTIVE - 1994

Results of the cost benefit analysis show a net benefit (net present value) of \$29,552 from the participant perspective. This is a net benefit of \$1,555 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$0.**

### OVERALL PERSPECTIVE - 1994

Results of cost benefit analysis show a net benefit (net present value) of \$21,115 from an overall perspective. This is a net benefit of \$1,111 per participant. The quantified costs to the participants and utility were less than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from an overall perspective was \$153.**

**1995 PROGRAM**

- ◆ The quantified cost to the utility was \$39,053. This includes the cost of conservation devices, \$19,436 and the cost of labor, \$19,616. This is a cost of \$420 per participant, including \$209 for devices and \$211 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was \$73,808, which includes the value of water bill savings. This is a water bill savings of \$793 Per participant.

1995 Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$19,436	Not Quantified	Not Quantified	Water Bill Savings	\$73,808
Labor	\$19,616			Total	\$73,808
Total	\$39,053				

**UTILITY PERSPECTIVE - 1995**

Results of the cost benefit analysis show a net benefit (net present value) of -\$39,053 from the utility perspective. This is a net benefit of -\$420 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 \$273.**

**PARTICIPANT PERSPECTIVE - 1995**

Results of the cost benefit analysis show a net benefit (net present value) of \$73,808 from the participant perspective. This is a net benefit of \$793 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$0.**

**OVERALL PERSPECTIVE - 1995**

Results of cost benefit analysis show a net benefit (net present value) of \$34,755 from an overall perspective. This is a net benefit of \$374 per participant. The quantified costs to the participants and utility were less than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from an overall perspective was \$273.**

**1996 PROGRAM**

- ◆ The quantified cost to the utility was \$21,443. This includes the cost of conservation devices, \$10,762 and the cost of labor, \$10,771. This is a cost of \$397 per participant, including \$199 for devices and \$198 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was \$31,399, which includes the value of water bill savings. This is a water bill savings of \$581 per participant.

1996 Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$10,762	Not Quantified	Not Quantified	Water Bill Savings	\$31,399
Labor	\$10,771			Total	\$31,399
Total	\$21,443				

#### UTILITY PERSPECTIVE - 1996

Results of the cost benefit analysis show a net benefit (net present value) of -\$21,443 from the utility perspective. This is a net benefit of -\$397 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 \$340.**

#### PARTICIPANT PERSPECTIVE - 1996

Results of the cost benefit analysis show a net benefit (net present value) of \$31,399 from the participant perspective. This is a net benefit of \$581 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$0.**

#### OVERALL PERSPECTIVE - 1996

Results of cost benefit analysis show a net benefit (net present value) of \$9,956 from an overall perspective. This is a net benefit of \$184 per participant. The quantified costs to the participants and utility were less than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from an overall perspective was \$340.**

#### 1997 PROGRAM

- ◆ The quantified cost to the utility was \$6,384. This includes the cost of conservation devices, \$3,177 and the cost of labor, \$3,207. This is a cost of \$376 per participant, including \$187 for devices and \$189 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was \$4,394, which includes the value of water bill savings. This is a water bill savings of \$258 per participant.

#### UTILITY PERSPECTIVE - 1997

Results of the cost benefit analysis show a net benefit (net present value) of -\$6,384 from the utility perspective. This is a net benefit of -\$376 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 \$695.**

#### PARTICIPANT PERSPECTIVE - 1997

Results of the cost benefit analysis show a net benefit (net present value) of \$4,394 from the participant perspective. This is a net benefit of \$258 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$0.**

1997 Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$3,177	Not Quantified	Not Quantified	Water Bill Savings	\$4,394
Labor	\$3,207			Total	\$4,394
Total	\$6,384				

**OVERALL PERSPECTIVE - 1997**

Results of cost benefit analysis show a net benefit (net present value) of -\$1,989 from an overall perspective. This is a net benefit of -\$117 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 \$695.**

**1998 PROGRAM**

- ◆ The quantified cost to the utility was \$11,718. This includes the cost of conservation devices, \$5,832 and the cost of labor, \$5,886. This is a cost of \$355 per participant, including \$177 for devices and \$178 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was \$24,069, which includes the value of water bill savings. This is a water bill savings of \$729 per participant.

**UTILITY PERSPECTIVE - 1998**

Results of the cost benefit analysis show a net benefit (net present value) of -\$11,718 from the utility perspective. This is a net benefit of -\$355 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 \$224.**

**PARTICIPANT PERSPECTIVE - 1998**

Results of the cost benefit analysis show a net benefit (net present value) of \$24,069 from the participant perspective. This is a net benefit of \$729 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$0.**

**OVERALL PERSPECTIVE - 1998**

Results of cost benefit analysis show a net benefit (net present value) of \$12,351 from an overall perspective. This is a net benefit of \$374 per participant. The quantified costs to the participants and utility were

1998 Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$5,832	Not Quantified	Not Quantified	Water Bill Savings	\$24,069
Labor	\$5,886			Total	\$24,069
Total	\$11,718				

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less than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from an overall perspective was \$224.**

**1999 PROGRAM**

- ◆ The quantified cost to the utility was \$6,715. This includes the cost of conservation devices, \$3,342 and the cost of labor, \$3,373. This is a cost of \$336 per participant, including \$167 for devices and \$169 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was \$8,843, which includes the value of water bill savings. This is a water bill savings of \$442 per participant.

1999 Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$3,342	Not Quantified	Not Quantified	Water Bill Savings	\$8,843
Labor	\$3,373			Total	\$8,843
Total	\$6,715				

**UTILITY PERSPECTIVE - 1999**

Results of the cost benefit analysis show a net benefit (net present value) of -\$6,715 from the utility perspective. This is a net benefit of -\$336 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 \$341.**

**PARTICIPANT PERSPECTIVE - 1999**

Results of the cost benefit analysis show a net benefit (net present value) of \$8,843 from the participant perspective. This is a net benefit of \$442 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$0.**

**OVERALL PERSPECTIVE - 1999**

Results of cost benefit analysis show a net benefit (net present value) of \$2,127 from an overall perspective. This is a net benefit of \$106 per participant. The quantified costs to the participants and utility were less than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from an overall perspective was \$341.**

**2000 Program**

- ◆ The quantified cost to the utility was \$9,208. This includes the cost of conservation devices, \$4,583 and the cost of labor, \$4,625. This is a cost of \$318 per participant, including \$158 for devices and \$160 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was -\$5,249, which includes the value of water bill savings. This is a water bill savings of \$181 per participant.

2000 Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$4,583	Not Quantified	Not Quantified	Water Bill Savings	-\$5,249
Labor	\$4,625			Total	-\$5,249
Total	\$9,208				

#### UTILITY PERSPECTIVE - 2000

Results of the cost benefit analysis show a net benefit (net present value) of -\$9,208 from the utility perspective. This is a net benefit of -\$318 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 -\$742.**

#### PARTICIPANT PERSPECTIVE - 2000

Results of the cost benefit analysis show a net benefit (net present value) of -\$5,249 from the participant perspective. This is a net benefit of -\$181 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 \$0.**

#### OVERALL PERSPECTIVE - 2000

Results of cost benefit analysis show a net benefit (net present value) of -\$14,457 from an overall perspective. This is a net benefit of -\$499 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 -\$742.**

#### 2001 PROGRAM

- ◆ The quantified cost to the utility was \$13,511. This includes the cost of conservation devices, \$6,725 and the cost of labor, \$6,787. This is a cost of \$300 per participant, including \$149 for devices and \$151 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was \$24,686, which includes the value of water bill savings. This is a water bill savings of \$495 per participant.

#### UTILITY PERSPECTIVE - 2001

Results of the cost benefit analysis show a net benefit (net present value) of -\$13,511 from the utility perspective. This is a net benefit of \$300 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 \$221.**

#### PARTICIPANT PERSPECTIVE - 2001

Results of the cost benefit analysis show a net benefit (net present value) of \$24,686 from the participant perspective. This is a net benefit of \$495 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$0.**

2001 Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$6,725	Not Quantified	Not Quantified	Water Bill Savings	\$24,686
Labor	\$6,787			Total	\$24,686
Total	\$13,511				

#### OVERALL PERSPECTIVE - 2001

Results of cost benefit analysis show a net benefit (net present value) of \$11,174 from an overall perspective. This is a net benefit of \$195 per participant. The quantified costs to the participants and utility were less than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from an overall perspective was \$221.**

#### ALL YEARS

- ◆ The quantified cost to the utility was \$116,469. This includes the cost of conservation devices, \$57,965 and the cost of labor, \$58,504. This is a cost of \$376 per participant, including \$187 for devices and \$189 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$0.
- ◆ The quantified benefit to the participants was \$191,363, which includes the value of water bill savings. This is a water bill savings of \$617 per participant.

ALL YEARS Quantified Costs and Benefits					
Utility			Participants		
Costs		Benefits	Costs	Benefits	
Cost of Devices	\$57,965	Not Quantified	Not Quantified	Water Bill Savings	\$191,363
Labor	\$58,504			Total	\$191,363
Total	\$116,469				

#### UTILITY PERSPECTIVE - ALL YEARS

Results of the cost benefit analysis show a net benefit (net present value) of -\$116,469 from the utility perspective. This is a net benefit of -\$376 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 \$298.**

#### PARTICIPANT PERSPECTIVE - ALL YEARS

Results of the cost benefit analysis show a net benefit (net present value) of \$191,363 from the participant perspective. This is a net benefit of \$617 per participant. The quantified costs to the participants were less than the quantified benefit to the participants. **The cost per acre-foot of water saved from the participant perspective was \$0.**

#### OVERALL PERSPECTIVE - ALL YEARS

Results of cost benefit analysis from an overall perspective show a net benefit (net present value) of \$74,894 from an overall perspective. This is a net benefit of \$242 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 \$298.**

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

##### **Costs**

- Landfill disposal of replaced equipment.
- Energy and water consumed to manufacture new equipment.

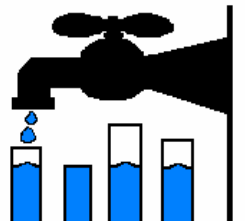
##### **Benefits**

- Financial savings on sewer bills for participants.
- Avoided cost of acquisition and distribution of water saved.
- Environmental benefits of reduced use of water.
- Increased public awareness for conservation programs.
- Improved public relations for the utility.
- Reinforces desirability and need for water conservation.
- Customers received new fixtures.
- Plumbing apprentices gain plumbing experience.

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# Phoenix Water Services Dept.

## Toilet Distribution Program



### 1994

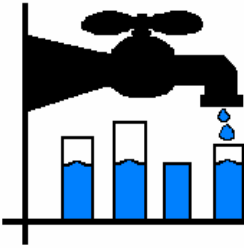
#### Results of Cost Benefit Analysis-Lifespan (20 Years)

	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	8,437	NA	8,437
Costs to Participants	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$8,437</b>	<b>\$0</b>	<b>\$8,437</b>
<u>Present Value Benefits</u>			
<b>Total Water Savings</b>	<b>55.32 AF</b>	<b>55.32 AF</b>	<b>55.32 AF</b>
Benefits to Utility	0	NA	0
Benefits to Participants	NA	29,552	29,552
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$29,552</b>	<b>\$29,552</b>
<u>Cost Benefit Calculations</u>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$8,437</b>	<b>\$29,552</b>	<b>\$21,115</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$153 /AF</b>	<b>\$0 /AF</b>	<b>\$153 /AF</b>

### 1995

#### Results of Cost Benefit Analysis-Lifespan (20Years)

	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	39,053	NA	39,053
Costs to Participants	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$39,053</b>	<b>\$0</b>	<b>\$39,053</b>
<u>Present Value Benefits</u>			
<b>Total Water Savings</b>	<b>142.89 AF</b>	<b>142.89 AF</b>	<b>142.89 AF</b>
Benefits to Utility	0	NA	0
Benefits to Participants	NA	73,808	73,808
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$73,808</b>	<b>\$73,808</b>
<u>Cost Benefit Calculations</u>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$39,053</b>	<b>\$73,808</b>	<b>\$34,755</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$273 /AF</b>	<b>\$0 /AF</b>	<b>\$273 /AF</b>



# Phoenix Water Services Dept.

## Toilet Distribution Program

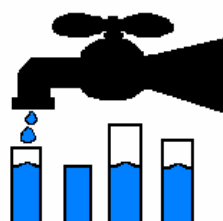
<b>1996</b>			
<b>Results of Cost Benefit Analysis-Lifespan (20 Years)</b>			
	UTILITY	PARTICIPANT	OVERALL
<i><u>Present Value Costs</u></i>			
Costs to Utility	21,443	NA	21,443
Costs to Participants	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$21,443</b>	<b>\$0</b>	<b>\$21,443</b>
<i><u>Present Value Benefits</u></i>			
<b>Total Water Savings</b>	<b>63.03 AF</b>	<b>63.03 AF</b>	<b>63.03 AF</b>
Benefits to Utility	0	NA	0
Benefits to Participants	NA	31,399	31,399
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$31,399</b>	<b>\$31,399</b>
<i><u>Cost Benefit Calculations</u></i>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$21,443</b>	<b>\$31,399</b>	<b>\$9,956</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$340 /AF</b>	<b>\$0 /AF</b>	<b>\$340 /AF</b>

<b>1997</b>			
<b>Results of Cost Benefit Analysis-Lifespan (20 Years)</b>			
	UTILITY	PARTICIPANT	OVERALL
<i><u>Present Value Costs</u></i>			
Costs to Utility	6,383	NA	6,383
Costs to Participants	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$6,383</b>	<b>\$0</b>	<b>\$6,383</b>
<i><u>Present Value Benefits</u></i>			
<b>Total Water Savings</b>	<b>9.19 AF</b>	<b>9.19 AF</b>	<b>9.19 AF</b>
Benefits to Utility	0	NA	0
Benefits to Participants	NA	4,394	4,394
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$4,394</b>	<b>\$4,394</b>
<i><u>Cost-Benefit Calculations</u></i>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$6,383</b>	<b>\$4,394</b>	<b>-\$1,989</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$695 /AF</b>	<b>\$0 /AF</b>	<b>\$695 /AF</b>

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# Phoenix Water Services Dept.

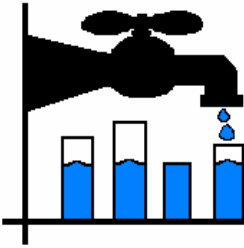
## Toilet Distribution Program



1998	Results of Cost Benefit Analysis-Lifespan (20Years)		
	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	11,718	NA	11,718
Costs to Participants	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$11,718</b>	<b>\$0</b>	<b>\$11,718</b>
<u>Present Value Benefits</u>			
Total Water Savings	52.33 AF	52.33 AF	52.33 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	24,069	24,069
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$24,069</b>	<b>\$24,069</b>
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$11,718	\$24,069	\$12,351
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$224 /AF	\$0 /AF	\$224 /AF

1999	Results of Cost Benefit Analysis-Lifespan (20Years)		
	OVERALL	UTILITY	PARTICIPANT
<u>Present Value Costs</u>			
Costs to Utility	6,715	NA	6,715
Costs to Participants	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$6,715</b>	<b>\$0</b>	<b>\$6,715</b>
<u>Present Value Benefits</u>			
Total Water Savings	19.68 AF	19.68 AF	19.68 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	8,843	8,843
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$8,843</b>	<b>\$8,843</b>
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$6,715	\$8,843	\$2,127
Cost Effectiveness Analysis (CEA)	\$341 /AF	\$0 /AF	\$341 /AF

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# Phoenix Water Services Dept.

## Toilet Distribution Program

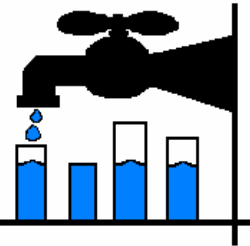
<b>2000</b>			
<b>Results of Cost Benefit Analysis-Lifespan (20 Years)</b>			
	UTILITY	PARTICIPANT	OVERALL
<u><i>Present Value Costs</i></u>			
Costs to Utility	9,208	NA	9,208
Costs to Participants	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$9,208</b>	<b>\$0</b>	<b>\$9,208</b>
<u><i>Present Value Benefits</i></u>			
<b>Total Water Savings</b>	<b>-12.40 AF</b>	<b>-12.40 AF</b>	<b>-12.40 AF</b>
Benefits to Utility	0	NA	0
Benefits to Participants	NA	-5,249	-5,249
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>-\$5,249</b>	<b>-\$5,249</b>
<u><i>Cost Benefit Calculations</i></u>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$9,208</b>	<b>-\$5,249</b>	<b>-\$14,457</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>-\$742 /AF</b>	<b>\$0 /AF</b>	<b>-\$742 /AF</b>

<b>2001</b>			
<b>Results of Cost Benefit Analysis-Lifespan (20 Years)</b>			
OVERALL	UTILITY	PARTICIPANT	
<u><i>Present Value Costs</i></u>			
Costs to Utility	13,511	NA	13,511
Costs to Participants	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$13,511</b>	<b>\$0</b>	<b>\$13,511</b>
<u><i>Present Value Benefits</i></u>			
<b>Total Water Savings</b>	<b>61.11 AF</b>	<b>61.11 AF</b>	<b>61.11 AF</b>
Benefits to Utility	0	NA	0
Benefits to Participants	NA	24,686	24,686
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$24,686</b>	<b>\$24,686</b>
<u><i>Cost Benefit Calculations</i></u>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$13,511</b>	<b>\$24,686</b>	<b>\$11,174</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$221 /AF</b>	<b>\$0 /AF</b>	<b>\$221 /AF</b>

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# Phoenix Water Services Dept.

## Toilet Distribution Program



<b>ALL YEARS</b>	<b>Results of Cost Benefit Analysis-Lifespan (20Years)</b>		
	<b>UTILITY</b>	<b>PARTICIPANT</b>	<b>OVERALL</b>
<b><u>Present Value Costs</u></b>			
Costs to Utility	116,469	NA	116,469
Costs to Customers	NA	0	0
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$116,469</b>	<b>\$0</b>	<b>\$116,469</b>
<b><u>Present Value Benefits</u></b>			
<b>Total Water Savings</b>	<b>391.15 AF</b>	<b>391.15 AF</b>	<b>391.15 AF</b>
Benefits to Utility	0	NA	0
Benefits to Customers	NA	191,363	191,363
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$191,363</b>	<b>\$191,363</b>
<b><u>Cost Benefit Calculations</u></b>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$116,469</b>	<b>\$191,363</b>	<b>\$74,894</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$298 /AF</b>	<b>\$0 /AF</b>	<b>\$298 /AF</b>