

**St. Petersburg
Ultra Low Flow Toilet
And Water Use Evaluation
Rebate Project (P-784)**

**Final Report
January 1999**

EXECUTIVE SUMMARY

The 1997 St. Petersburg Toilet Rebate and Water Use Evaluation Project began on June 2, 1997, with coordination of the project occurring through several local agencies. The project was promoted through area plumbers, plumbing wholesalers and retailers, local media outlets, and utility billing inserts. Customers were issued rebates based on their customer class (master metered, or individual metered residences) and the actual cost of the toilet or repair up to the rebate limit. Old toilets were picked up by project staff for disposal. Installations were inspected by project staff, and low flow showerheads and aerators were distributed to customers when appropriate.

While the toilet rebate goal was attained by August 6, 1997, the repairs resulting from the water use evaluation portion of the project were well below expectations. As a result, the remaining evaluation funds were redistributed to the toilet rebate portion of the project.

Installations resulting from the project are as follows:

Toilet Rebate Project	<i>Individual Metered</i>	<i>Master Metered</i>	<i>Total</i>
<i>Rebates Issued Units</i>	2,907	3,049	5,956
<i>Rebates Issued Toilets</i>	3,834	3,049	6,883
<i>Rebate Dollars Issued</i>	\$421,145.39	\$304,663.80	\$725,809.19

Water Use Evaluation Project

<i>Evaluations Completed</i>	600
<i>Rebates Issued</i>	47
<i>Rebate Dollars Issued</i>	\$1,332.07

I. PROJECT START-UP AND COORDINATION

The City of St. Petersburg Toilet Rebate and Water Use Evaluation Project began on June 2, 1997. Coordination meetings between Volt VIEWtech (the city's contractor for the project) and several City of St. Petersburg departments took place prior to the project opening. These departments included the City of St. Petersburg Public Utilities, Information and Communications Services, and Construction Services and Permitting. Contact was also made with the Pinellas County Consumer Protection office to set a process for customers who may have problems with their plumbers, and with members of the Pinellas County Plumbers Association to help develop rebate levels for the Water Use Evaluation component of the project.

The "Project Helpline" telephone number, (813) 894-2044 was activated May 29, 1997 and customers began to call almost immediately. All project forms were designed and produced by VIEWtech and approved by the City of St. Petersburg prior to the start of the project. Copies are provided at the end of this report.

II. PROMOTION AND ADVERTISING

Promotion of the project began before its opening date. A notification package was sent out to all members of the Pinellas County Plumbers Association as well as other interested plumbers who have been active in the region's other rebate projects. The package included an introductory letter, rebate applications, project guidelines, and materials outlining the plumber's role and responsibilities. Plumbers were encouraged to distribute applications to customers and to call the project helpline with any questions or suggestions. Since the package was sent, many plumbers have been involved in providing installations to customers who then file for the rebate. Two additional letters were sent to the plumbers to keep them apprised of progress in meeting the project's goals and to notify them of any related topics pertinent to their trade.

Discussions were held with employees of major home improvement stores in the area (Home Depot, and Scotty's) prior to project start-up, and continued during the project duration. The retailers were supplied with applications and project guidelines to give customers. Home Depot created and placed posters in their plumbing section to peak interest in the project. Even with prior notice of the project, retailers experienced some shortage of toilets. This slowed down the process for about 50 customers who had purchases on back order and required installation times extensions. At VIEWtech's suggestion, Home Depot began offering toilet installation workshops to their customers.

Many plumbers promoted the project to potential customers through newspaper inserts and ads, door to door sales, and telemarketing. While these plumbers provided valuable promotion and advertising for the project, many customers were confused. Some customers confused the plumbing company with the City of St. Petersburg. Some believe they are purchasing the toilet from the City, not realizing they were dealing with a

plumbing company. One plumbing company in particular (Florida Water Conservation) seemed to encourage this perception. Although they had all the required information for the project in the ad, the design and layout of the ad makes it look like an official notice from the Public Utilities Department or the Southwest Florida Water Management District (see Appendix for copies of advertisements).

Additional promotion of the project took several forms, including newspaper articles, billing inserts, news releases, public service announcements on the City's government access television channel, a taped 45 minute interview on WCOF radio's "Tampa Bay Politics" show and a taped 10 minute interview on Channel 35's "City Journal" program.

III. THE ULTRA LOW FLOW TOILET REBATE COMPONENT

Toilet Rebate Process

Customers interested in the project were urged to call the "Project Helpline". After speaking with the customer about the program, they were sent a rebate reservation application to complete and return to the rebate office for processing. Many customers had questions about the project and they were addressed at this point in the process. Customer addresses were checked against the database provided by the Public Utilities Department to confirm that the applicant was a water customer of the City of St. Petersburg and that their customer code was either single family residential (individual metered) or multifamily residential (master metered). This helped eliminate the possibility that non-qualifying customers would attempt to participate in the project by buying a toilet and then discovering they were ineligible for a rebate.

Once the customer completed and returned the application, the information was entered into the database and the application was assigned a reservation number. The customer was mailed a reservation confirmation guaranteeing a rebate, and provided 30 days to complete the installation and return the original receipts to the project office.

When the confirmation and receipts were returned to the project office, the information was entered into the database and an inspection work order was created. This work order was assigned to an inspector and then an on-site inspection was scheduled. All of installations received an on-site inspection.

After the on-site inspection was completed, the information was entered into the database and the rebate check was processed and printed. The rebate check was matched against the customer application in a two-part verification process before it was sent to the customer.

Toilet Rebate Comments

A few customers expressed confusion in trying to complete all the steps necessary to participate in the project. However most customers progressed through the process without any problems. Some customers have sent their original receipts to the project office with their rebate application. While this eliminated a step in the process for these

customers, it meant they had purchased toilets without a guarantee to receive a rebate. Although all of the customers who participated in this manner did receive a rebate, some customers had to be placed on a waiting list until an opening was available.

Master Metered Customers

On the first day of the toilet rebate project, all 1,500 multifamily (master metered) rebates were reserved and the additional master metered requests were placed on a waiting list. Multifamily building owners seem to be well aware of this type of project and its benefits since many had already participated in similar projects in Tampa and Hillsborough County. This awareness, combined with a local newspaper article appearing December 1996 and contact made by plumbers with building owners prior to start of the project, created a tremendous interest in the project.

Some condominium owners were upset that they were classified as multifamily under this project. Although most seemed to understand that the city had to make choices about which customers would be eligible for this phase and the meter type was a logical distinction for residential customers.

Individual Metered Customers

The pace of requests for single family (individual metered) toilet rebate reservations has far exceeded the City's and VIEWtech's expectations. The single family commitment goal was reached on August 6, 1997. At that time all new applications were placed on a waiting list to be served as existing reservations drop out of the project.

This overwhelming initial response caused scheduling and timeline delays from the start. Toilet installation inspections are to be scheduled within one week of receiving the customers receipt. The actual wait time has been closer to three weeks for an inspection. VIEWtech increased its inspection staff and the wait came down to one to two weeks for most customers.

The first batches of checks were printed by July 31 1997 but not mailed until August 9 1997. VIEWtech's delay in establishing a rebate checking account meant that rebate checks were sent late to about 25% of the project participants. (The contract requires that rebate checks be sent within two weeks of installation inspection.) The delays in receipt range from one week to seven weeks (less than 20 customers experienced the longest delay). All affected customers were sent a letter apologizing for the delay and advising customers their checks were being processed. VIEWtech successfully kept subsequent checks within the timeframe specified by contract, though occasionally, individual problems occurred.

Redistribution Of Funds

On September 4, 1997 a review meeting was held with the City of St. Petersburg Public Utilities Department and VIEWtech to plan a strategy for the remaining project funds. Recommendations for additional funds (\$105,000.00 available in the budget) and a redistribution of unreserved funds from the Water Use Evaluation Project were approved by the Pinellas-Anclote River Basin Board of the Southwest Florida Water Management District on August 15, 1997. These redistributed funds were approved by City Council on September 11, 1997. The new funding plan resulted in the inclusion of all single-family customers from the rebate project waiting list, and 819 new multifamily customers were issued reservation confirmations.

Toilet Pick-Up

Toilet pick-up has kept pace with requests. While the project requires toilet pick-up after the inspection, VIEWtech has been providing pick-up upon receipt of the notification of installation. To provide adequate toilet pick-up, up to 3 vehicles were used at one time. To date, 5,870 toilets have been picked up by VIEWtech and disposed of by the City's Sanitation Department.

Failed Inspections

Inspections performed on master metered customers were generally performed with a plumber present, so most adjustments were made during the inspection. These are not counted as a failed inspection.

Five individual metered installations failed inspection. Two toilets had problems with grout or the lack of grout, two toilets had a supply line leak, and one toilet would not stop running.

Distribution Of Showerheads And Aerators

During the toilet installation inspection, customers are offered low flow showerheads and faucet aerators. Many of the customers already had showerheads and faucet aerators that were distributed by the City of St. Petersburg in 1995. Many customers made it a point to say they like the showerheads.

Toilet Rebate Projections

All rebates have been issued for the 1997 toilet rebate project, and an evaluation was completed by Tate Research Associates to determine water savings that can be attributed to this toilet replacement program. The report revealed average savings of 739 gallons per month per toilet for single family homes, and an average of 1149 gallons per month savings for multi family homes. Additional information on the evaluation can be found in the report titled, *Ultra Low Flow Toilet Rebate Program Evaluation of Phase I (1997 Program)* (Tate, 1998)

Toilet Rebate Statistics

	Individual Metered	Master Metered	Project Total
Application Requests (Helpline calls)	unknown	unknown	3,415
*Reservations Received	3,064	174	3,238
**Inspections Completed	2,907	3,049	5,956
Inspections Failed	5	0	5
Rebates Issued Units (Households)	2,907	3,049	5,956
Rebates Issued Toilets	3,834	3,049	6,883
Rebate Dollars Issued	\$421,145.39	\$304,663.80	\$725,809.19
Showerheads Distributed	244	19	263
Kitchen Aerators Distributed	26	0	26
Bathroom Aerators Distributed	34	0	34

Staff Hours By Category

Administration	1,969
Inspection	1,479
Toilet Pick up	2,083
Supervisory	1,172

*Reservations received count applications. Applications may contain up to 30 living units each.

**Inspections completed count individual living units.

Follow-up Customer Satisfaction Survey

A customer satisfaction survey was sent to all customers participating in the FY97 toilet rebate project on 1/21/99. The purpose of the survey was to gauge customer acceptance and satisfaction with the new toilets installed in their homes and the project as a whole. The questions and the response totals are listed below. Not all customers answered all questions.

1) Compared to your old toilet:

Is your new toilet	<u>Better</u>	<u>Same</u>	<u>Worse</u>	<u>(Total)</u>
	855	216	138	1239
	71%	18%	11%	

89% of customers answered that their new toilets worked as well or better than their old toilets. While 11% of customers answered that the new toilet was worse than their old toilet, 71% answered that the new toilet was better.

2) Compared to your old toilet:

Do you double flush your new toilet:	<u>Less</u>	<u>Same</u>	<u>More</u>	<u>(Total)</u>
	627	314	312	1253
	50%	25%	25%	

75% of customers answered that their new toilet needed double flushing less or the same as their old toilet. While 25% of customers answered that their new toilet requires more double flushing, 50% answered that their new toilet required less.

3) Compared to your old toilet:

Does your new toilet clog	<u>Less</u>	<u>Same</u>	<u>More</u>	<u>Total</u>
	593	375	268	1236
	48%	30%	22%	

78% of customers answered that their new toilet clogged less or the same as their old toilet. While 22% of customers answered that their new toilet clogged more, 48% answered that their new toilet clogged less.

4) Since your new toilet was installed, have you had your sewer line "snaked" professionally

<u>No</u>	<u>Yes</u>	<u>#</u>	<u>(Total)</u>
1127	115	157	1242
91%	9%	1.36 (average each reported "yes")	

5) Overall, was participating in the Toilet Rebate Project	<u>Easy</u>	<u>OK</u>	<u>Hard</u>	<u>(Total)</u>
	903	317	19	1239
	73%	26%	1%	

99% of participants reported that participation was easy or OK.

6) Are you happy with your new toilet	<u>Yes</u>	<u>No</u>	<u>Total</u>
	1064	174	1238
	86%	14%	

While up to 25% of participants reported an increase of a specific problem only 14% reported that they were not satisfied with their new toilet.

IV. THE WATER USE EVALUATION COMPONENT

Water Use Evaluation Process.

Most customers who entered the Water Use Evaluation Project did so by indicating this on the toilet rebate application, which states: "I am interested in a free home water use evaluation from the city of St. Petersburg." Checking "yes" entered the customer into the water use evaluation database and reserved an evaluation in the customer's name. An evaluation work order was then produced and assigned to a technician.

The technician called the customer to explain the process and schedule the evaluation. The project experienced a 25% - 40% dropout rate at this point in the process. Many customers appear to have lost interest and some, after having the evaluation explained in more detail, decline the offer.

After the technician performed the evaluation, the customer's information was entered into the database and an evaluation report/rebate application was produced. This report/application was mailed to the customer with a letter stating that they had 30 days to complete the repairs and return the original receipt and rebate application to the project office. Rebates for repairs were offered at the rate of:

Site Visit Labor (total)	Up to \$25.00 or cost, whichever is less.
Materials (per Leak)	Up to \$5.00 or cost, whichever is less.
Maximum total rebate	Up to \$75.00

When the receipt was received the technician scheduled an inspection appointment with the customer. Once the inspection was completed, the information was entered into the database and a rebate check was printed. The rebate check was matched against the *customer application twice before it is sent to the customer.*

Water Use Evaluation Comments

Customer requests for Water Use Evaluations were "soft" requests. Initially, customers were expressing an interest in the project. When contacted to schedule an appointment for an evaluation, customers declined the offer in at least 25% of the cases. This may be due to the audience. The same customer that is looking to replace their toilet with a water conserving model, may not be the same customer that wants/needs to participate in a leak detection and repair program.

Findings indicate that most homes that participated had no leaks or minor leaks. In instances where leaks were identified, several customers called the project helpline to dispute the findings. It appears that these customers expect to get recognition for participating in the process, rather than a report detailing plumbing problems. The most common leak found is for the bath/shower diverter, which only leaks when the shower is running.

With 600 evaluations completed, fewer than 50 customers had implemented the recommendations and applied for the rebate. On September 9, 1997, 480 letters were sent to customers who expressed interest in the Water Use Evaluation. These customers were asked to call the rebate helpline if they still wished to receive a Water Use Evaluation. Twenty-two customers responded to the mailing by requesting the evaluation. The remaining customers were deleted from the project. All available funds were reallocated to the toilet rebate project.

Water Use Evaluation Statistics

	Project Total
Interested Customers	1097
Drop outs	497
Evaluations Completed	600
Rebate Applications Received	47
Inspections Completed	47
Failed Inspections	0
Rebates Processed	47
Rebate Dollars Issued	\$1,332.07
Showerheads Distributed	90
Kitchen Aerators Distributed	80
Bathroom Aerators Distributed	216
 Staff Hours By Category	
Administration	343
Evaluation/Inspection	538
Supervisory	280

V. CONCLUSION

The 1997 Ultra Low Flow Toilet Rebate Program was very popular with the residents of St. Petersburg, as indicated by the 6,883 toilets that were installed as part of the program. It was also a very effective method to conserve water. A water savings analysis was performed that showed an average water savings of 916 gallons per toilet per month during the first year after installation.

Although the water use evaluations had a lower participation rate than expected, this may be due to different audiences for the two programs. Future water use evaluations directed at residential customers should be operated and promoted independently from the toilet rebate program. This would allow for a more direct and focused marketing effort to the two customer groups.

VOLT VIEWTECH, INC.

**CITY OF SAINT PETERSBURG, FLORIDA
PUBLIC UTILITIES DEPARTMENT**

**WITH COOPERATIVE FUNDING FROM
PINELLAS-ANCLOTE RIVER BASIN BOARD,
SOUTHWEST FLORIDA WATER MANAGEMENT
DISTRICT**

**ULTRA LOW FLOW TOILET REBATE PROGRAM
EVALUATION OF PHASE I (1997 PROGRAM)**

DECEMBER 1998

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1.0 Introduction

The 1997 St. Petersburg Toilet Rebate and Water Use Evaluation Project began on June 2, 1997. The project was funded by the City of St. Petersburg in cooperation with the Pinellas-Anclote River Basin Board, Southwest Florida Water Management District. Coordination of the project occurred through several local agencies and was promoted through area plumbers, plumbing wholesalers and retailers, local media outlets, and utility billing inserts. Customers were issued rebates based on their customer class (master metered, or individual metered residences) and the actual cost of the toilet or repair up to the rebate limit. Old toilets were picked up by the project staff for disposal. Each installation was inspected by project staff and low flow showerheads and aerators were distributed to customers when appropriate. A total of 6,883 toilets were installed during 1997.

Volt ViewTech, Inc. contracted with Tate Research Associates, Inc. (TRA) to perform the evaluation of water savings as a result of the program. This report presents the evaluation results. The next section describes the evaluation methodology. Following the discussion of the methodology is discussion of the results. The appendix contains the detailed data tabulation by customer group and zipcode with statistical significance testing between groups.

The Water Use Evaluation component of the project did not receive participation from a large enough group of customers to measure statistically significant results and was not included in the evaluation. Only 47 customers received a rebate for repairing leaks identified during the water use evaluation.

2.0 Methodology

This section describes the step-by-step process of the evaluation methodology. The evaluation was conducted on a sample of the total 6,883 toilets installed and filtered based on having complete customer information and water usage data for toilets installed during the evaluation period. The program started in June 1997; therefore, the evaluation period started in July 1997 and included all units installed through September 1997.

2.1 Data Processing

TRA received the following data files from Volt Viewtech, Inc. and the City of St. Petersburg:

Volt Viewtech, Inc.

1. Eval 97 (1 diskette) Participant Data

City of St. Petersburg

2. UAVOLT03.zip (1 diskette) Information on Reclaimed Water Status
3. UAVOLT05.zip (9 diskettes) Monthly Water Usage Data for 5/96 to 10/98

In addition to the participant installation and water usage data, TRA also received hard copies of rainfall data, average cost of toilet installations, average dollar amount of rebates, and water billing rate information.

Steps for Analysis:

1. Eval 97 contained data by toilet installed by location ID. Number of toilets and dates installed were compressed by location ID. First installation date became the beginning date for analysis for that location ID.
2. Participant data (Eval 97) was matched with monthly usage (UAVOLT05.zip) by location ID. Only location IDs with initial dates of 6/97, 7/97, 8/97, and 9/97 were included in the analysis set to ensure data for 11 months prior and 11 months after installation. The month of installation was excluded from the comparisons due to many different installation dates during the month. The following summarizes the before and after comparison months by installation month.

<u>6/97</u>	<u>7/97</u>	<u>8/97</u>	<u>9/97</u>
7/96 to 7/97	8/96 to 8/97	9/96 to 9/97	10/96 to 10/97
8/96 to 8/97	9/96 to 9/97	10/96 to 10/97	11/96 to 11/97
9/96 to 9/97	10/96 to 10/97	11/96 to 11/97	12/96 to 12/97
.	.	.	.
6/97 to 6/98	7/97 to 7/98	8/97 to 8/98	9/97 to 9/98

3. Participants were matched with reclaimed water service status on file (UAVOLT03.zip) by location ID.
4. Exclusions: Based on this filtering and matching, the following participants were excluded from the analysis:
 - a. Didn't have 11 months of usage data prior to rebate month, n=8
 - b. Didn't have 11 months of usage data after rebate month, n=2
 - c. Rebate month missing, n=60
 - d. Rebate month not June, July, August or September 1997, n=97
 - e. Rebate year missing or not 1997, n=54

In total, this is 221 participants or about 7.5% of the 2,945 participants in the data base.

5. Analysis by participant (i.e., location ID): Differences were calculated in same monthly usage before and after toilet installation divided by number of new toilets installed, i.e., savings per participant per toilet. Monthly totals were adjusted where customers installed an additional toilet after the original rebate date.
6. Calculations: The following calculations were made on the final evaluation data set: number of participants, mean monthly savings in hundreds of gallons per toilet per participant (11 months prior compared to one month after installation, 10 months prior compared to two months after installation, etc.), and mean annual

savings in hundreds of gallons per toilet per customer. Statistical significance of differences between groups were tested at both a 99% and 95% confidence interval.

2.2 Data Tabulation

The detailed results of the calculations described in Step 6 above are shown in the data tabulation included in the Appendix of this report. To help assess the impact of outdoor watering on usage savings, the tabulation of results was broken out by the customer groups shown below. Also, the City of St. Petersburg expressed an interest in results by zip code. Therefore, in addition to breaking out the results by customer group, mean per month savings (over the 11-month period) is shown by zip code.

Participant Groups for Analysis¹:

- a. Single Family (Rate Class 10) – No outdoor watering
- b. Single Family (Rate Class 10) – Water lawn
 - With reclaimed water (active)²
 - Use irrigation system
 - Use irrigation with reclaimed water (active)²
 - Use hose
- c. Multifamily (Rate Class 11)
- d. Mobile Home (Rate Class 13)

3.0 Summary of Findings

The participant evaluation results are discussed below. The first subsection presents the analysis and findings of before and after installation usage and savings. The second subsection provides a cost-benefit analysis.

3.1 Usage Before and After Installation

Evaluation of the water savings from the ultra low flow toilet installations is difficult because of the limited data available on participant households. The ideal design would have control (non-participant) and participant households paired by like housing stock and demographics. Also, for participants who water their lawn, there is a concern about the impact of lawn watering usage on measuring differences. No metered data are available on the amount of lawn watering usage.

TRA took several steps to assess the impact of lawn watering on usage and to determine if adjustments were appropriate in calculating savings per toilet. First, single-family residences were segmented into the groups discussed above in Section 2.2. Table 1 summarizes the mean

¹ As reported by participants

² Some reclaimed water customers may water with a hose, but the vast majority use in-ground irrigation systems.

usage before and after installation and average monthly savings per toilet for each of these groups (mobile homes were excluded due to the small cell size). **Differences in usage before and after installation are statistically significant at a 99% confidence level for each of the single-family participant segments shown in Table 1.** The mean monthly savings per toilet ranges from 620 gallons per toilet for participants who water their lawn and are active reclaimed water customers to 820 gallons per toilet for participants who water their lawn with a hose. The “laboratory” estimates of savings per toilet range from 10 to 30 gallons per day or approximately 300 to 900 gallons per month in single-family residences. All of the measured differences by single-family participant group are within this range.

Table 1

Summary of Before and After Usage by Participant Groups

Participant Group	Number Of Locations	Mean 11 Months Usage (Hundreds of gallons per toilet per location)		Monthly Savings Per Toilet (Gallons)
		Before	After	
Single-Family: Total	2661	455.4*	374.1	739
Single-Family: Do not water lawn	577	448.2*	363.1	774
Single-Family: Water lawn	2,004	457.3*	376.6	734
Single-Family: Water lawn with reclaimed water	398	461.2*	393.0	620
Single-Family: Water lawn with an irrigation system	1252	451.6*	374.4	702
Single-Family: Water lawn with an irrigation system and Reclaimed water	365	464.0*	393.8	638
Single-Family: Water lawn with a with a hose	846	462.0*	373.8	809
Multi-Family: Total	63	8382.9**	8256.5	1149

* Before and after differences statistically significant at 99% level of confidence

** Before and after differences statistically significant at 90% level of confidence

The remaining question was, “To what extent did rainfall differences during peak lawn watering months before and after installation impact usage and estimates of savings?” For those participants who water their lawn, significantly more lawn watering after installation would reduce the estimates of savings as the reverse would inflate the estimates of savings.

Of course, one important variable affecting the level of lawn watering is rainfall. However, it is only one of a complex set of variables such as ground water level, ground and air temperature, and cloud cover that affect lawn conditions and consequently decisions about irrigation. A monthly comparison of “before” and “after” installation rainfall is shown in Table 2. While

Table 2

Rainfall Data Before and After Installations

Months Before Installation		Months After Installation	
Month	Rainfall (Inches)*	Month	Rainfall (Inches)*
Jul 96	3.23	Jul 97	8.25
Aug 96	5.17	Aug 97	5.97
Sep 96	3.72	Sep 97	11.49
Oct 96	4.30	Oct 97	4.24
Nov 96	2.96	Nov 97	4.05
Dec 96	2.62	Dec 97	14.91
Jan 97	0.97	Jan 98	4.88
Feb 97	0.34	Feb 98	12.05
Mar 97	2.04	Mar 98	6.17
Apr 97	10.41	Apr 98	0.22
May 97	2.15	May 98	2.22
Jun 97	2.77	Jun 98	4.56
Jul 97	8.24	Jul 98	6.68
Aug 97	5.97	Aug 98	3.96
Sep 97	11.50	Sep 98	10.27
Total	66.39	Total	99.92

* Average of measurements taken at four water reclamation treatment plants

there was a total of about 33 more inches of rainfall during the “after” installation period, much of this difference occurred during the Winter months (December 97 through February 98) when lawn watering is less prevalent due to record rainfall. The other two months with significant differences were September 97 vs. 96 and April 98 vs. 97. While the September 97 rainfall (after installation) was much higher than September 96 (before installation), the reverse was true for the other month with a large variance of before compared to after (i.e., April 97 rainfall was much higher than the April 98 rainfall). Any impacts were likely offsetting for these two comparison months. Furthermore, examination of the usage data did not provide any conclusive evidence that lawn watering usage was significantly different before and after installation. Therefore, no adjustments were made to the savings estimates due to rainfall differences.

With regard to multi-family participants, the estimated monthly savings per toilet is approximately 1149 gallons (see Table 1). **Differences in usage before and after installation are statistically significant at a 90% confidence level for multi-family participants.**

Table 3 summarizes the average monthly savings per toilet for single-family residences by zip code. Zip codes 33715 and 33716 are not shown because of the very small number of locations included in the analysis. Also, the results from zip codes 33701, 33709, 33711 and 33714 should

be used with caution due to small number of locations included in the analysis. The monthly savings per toilet range from 544 gallons to 1,536 gallons. However, the savings per toilet of 1,536 gallons in zip code 33701 is based on toilet installations at only 32 locations. Most of the monthly savings per toilet range from 600 to 850 gallons.

Table 3

Summary of Single-Family Residences Before and After Usage by Zip Code

Zip Code	Number Of Locations	Monthly Savings Per Toilet (Gallons)
33701	32*	1536
33702	243	649
33703	349	544
33704	174	658
33705	182	846
33707	100	619
33709	95*	810
33710	734	802
33711	85*	706
33712	118	830
33713	451	742
33714	83*	720

Note: zip codes 33715 and 33716 were excluded because of the very small number of locations included in the analysis

*Small base; use results with caution

3.2 Cost-Benefit Analysis

In addition to an analysis of usage savings, TRA conducted a cost-benefit analysis. Table 4 summarizes the cost-benefit analysis by the major participant groups discussed in Section 2.2. For single-family customers, the average savings on their monthly bill is estimated to be about \$1.72 per toilet. Single-family customers will recover their out-of-pocket costs (average installation costs less average rebate) in about 20 months. The simple payback period for recovering the total investment (i.e., average installation cost) is about 84 months.

For multi-family customers, the average savings on their monthly bill is estimated to be about \$2.68 per toilet. Multi-family customers will recover their out-of-pocket costs (average installation costs less average rebate) in about 7.7 months. The simple payback period for recovering the total investment (i.e., average installation cost) is about 45 months.

Table 4

Summary of Cost-Benefit Analysis by Participant Groups

Participant Group	Number Of Toilets Installed	Monthly Savings Per Toilet (Gallons)	Average Cost of Toilet and Installation ^a	Average Rebate Amount ^a	Average Monthly \$ Savings Per Toilet ^b	Simple-Pay Back Period Total Investment ^c (Months)	Simple Pay Back Period Customer Net Cost ^d (Months) (a)-(b) (c)
			(a)	(b)	(c)	(a)/(c)	(c)
Single-Family: Total	3829	739	\$144.31	\$109.84	\$1.72	83.9	20.0
Single-Family: Do not water lawn	895	774	\$144.31	\$109.84	\$1.80	80.2	19.2
Single-Family: Water lawn	2934	734	\$144.31	\$109.84	\$1.71	84.4	20.2
Single-Family: Water lawn with reclaimed water	589	620	\$144.31	\$109.84	\$1.44	100.2	23.9
Single-Family: Water lawn with an irrigation system	1765	702	\$144.31	\$109.84	\$1.64	88.0	21.0
Single-Family: Water lawn with an irrigation system and reclaimed water	540	638	\$144.31	\$109.84	\$1.49	96.9	23.1
Single-Family: Water lawn with a with a hose	1083	809	\$144.31	\$109.84	\$1.88	76.8	18.3
Multi-Family: Total	2906	1149	\$120.62	\$99.92	\$2.68	45.0	7.7
TOTAL	6735	916	\$134.09	\$105.56	\$2.13	67.1	14.7

^a Based on total single family installations or total multifamily installations as appropriate

^b Based on an average rate of \$2.33 per 1,000 gallons for single family and multi-family consumers

^c Based on number of months to recover the average installation cost (i.e., total investment per toilet)

^d Based on number of months to recover the average out-of-pocket costs per customer (i.e., difference between installation costs and rebate)

Table 5 summarizes the cost-benefit analysis for single-family residences by zip code. The number of toilets installed ranges from 61 to 1,038. Based on the number of toilets installed and average monthly savings in water usage per toilet, the total monthly savings per zip code ranges from approximately 79,000 gallons in zip code 33714 (or 950,000 gallons annually) to 832,400 gallons in zip code 33710 (or almost 10 million gallons annually). The average savings on the monthly bill is estimated to range from about \$1.27 per toilet (zip code 33703) to about \$3.58 in zip code 33701. However, average monthly bill savings for most zip codes ranges from \$1.40 to \$1.80. Figure 1 shows the average monthly dollars savings per toilet on a zip code map. Recovery of out-of-pocket costs (average installation costs less average rebate) ranges from 7 to 29 months. Similarly, the simple payback period for recovering the total investment (i.e., average installation cost) ranges from 35 to 114 months.

Based on a total of 3,829 single-family toilets installed (during the evaluation period) and a monthly savings per toilet of 739 gallons, the average monthly savings in water usage for single-family residences is approximately 2.9 million gallons or 34.8 million gallons annually. Similarly, based on a total of 2,906 multi-family toilets installed (during the evaluation period) and a monthly savings per toilet of 1,149 gallons, the average monthly savings in water usage for multi-family residences is approximately 3.3 million gallons or 39.6 million gallons annually. In total this represents a savings in water usage for the City of St. Petersburg of about 74.4 million

Table 5

Summary of Single-Family Residences Cost-Benefit Analysis by Zip Code

Zip Code	Number Of Toilets Installed	Monthly Savings Per Toilet (Gallons)	Average Cost of Toilet and Installation ^a	Average Rebate Amount ^a	Average Monthly \$ Savings Per Toilet ^b	Simple Pay Back Period Total Investment ^c (Months)	Simple Pay Back Period Customer Net Cost ^d (a)-(b) (c)
			(a)	(b)	(c)	(a)/(c)	(c)
33701	61*	1536	\$125.77	\$102.06	\$3.58	35.1	6.6
33702	343	647	\$149.18	\$110.44	\$1.51	99.8	25.7
33703	546	544	\$144.94	\$109.55	\$1.27	114.1	27.9
33704	283	658	\$146.03	\$109.78	\$1.53	95.4	23.7
33705	285	846	\$144.85	\$108.09	\$1.97	73.5	18.7
33707	146	619	\$151.27	\$109.59	\$1.44	105.0	28.9
33709	131*	810	\$137.87	\$109.17	\$1.89	73.0	15.2
33710	1,038	802	\$143.92	\$109.80	\$1.87	77.0	18.2
33711	119*	706	\$141.88	\$107.27	\$1.64	86.5	21.1
33712	175	830	\$144.40	\$108.01	\$1.93	74.8	18.9
33713	588	742	\$142.62	\$111.69	\$1.73	82.4	17.9
33714	110*	720	\$135.75	\$109.51	\$1.68	80.8	15.6

Note: zip codes 33715 and 33716 were excluded because of the very small number of locations included in the analysis

*Small base; use results with caution

^a Based on actual averages by zip code

^b Based on an average rate of \$2.33 per 1,000 gallons for single family and multi-family consumers

^c Based on number of months to recover the average installation cost (i.e., total investment per toilet)

^d Based on number of months to recover the average out-of-pocket costs per customer (i.e., difference between installation costs and rebate)

gallons annually. This compares to a total investment of approximately \$957,398, of which \$231,253 was for fees and \$726,145 was for rebates. This translates to approximately \$142.15 per toilet or about 1.2 cents per gallon of water saved in the first year after installation.

4.0 Conclusion

During Phase I of the Ultra Low Flow Toilet Rebate Program, a total of 6,883 toilets were installed. The evaluation results show very positive benefits for the customer and the City of St. Petersburg. For example, single-family customers save about \$1.72 per toilet on their monthly bill and get a pay back on their out-of-pocket costs in about 20 months. Multi-family customers save about \$2.68 per toilet and get a pay back on their out-of-pocket costs in about 7.7 months. While the City of St. Petersburg invested a total of \$977,398 in Phase I for fees and rebates, the investment per gallon for the first year's water usage savings is only about 1.2 cents. The investment per gallon is only a fraction of one cent for the water savings over a 15 to 20-year average life of the installed toilets.