Water Efficiency Grant Report

Pagosa Water and Sanitation District

February 2011

GREAT WESTERN INSTITUTE
Littleton, Colorado 80126

Introduction

This Report summarizes the implementation of the Water Efficiency Grant provided to the Pagosa Area Water & Sanitation District (hereafter the "District" or PAWSD) by the Office of Water Conservation and Drought Planning (hereafter the "Office") of the Colorado Water Conservation Board (CWCB) in 2010. The Grant was provided to the District for the specific purpose of supporting local efforts to implement the PAWSD Water Conservation Plan, created in 2008 and reviewed and approved by the Office in early 2009. For this particular project, the Grant funding was used to support the following local efforts:

- Focused Community Outreach
- Selected Commercial and Institutional Facility Audits
- Replacement of Inefficient Fixtures in Audited Facilities
- Data Collection and Reporting

Each of these specific activities is discussed in the report; as is a presentation of key findings and recommendations.

Please note that it is the intention of both the District and the CWCB to support the implementation of meaningful water conservation in the PAWSD service area. To this point, the project was focused on creating sustainable water demand reductions in those customer facilities targeted by this effort. Audits, fixture replacements and data collection tasks were therefore executed to achieve and verify permanent water savings in commercial and institutional facilities to the extent practical.

Given that the conditions for some portion of the PAWSD customer base changed between the time that the grant application was submitted to the Office for consideration and the time that grant funding was awarded to the District, some modifications to the scope of work were warranted to complete implementation efforts. All modifications to the scope that occurred as a result of changing conditions in the PAWSD are identified and discussed in the Report. Noteworthy is that none of the changes in the conditions encountered during execution of the grant funded project compromised the ability of PAWSD to stimulate improved water use efficiency with its targeted customer basis.

Acknowledgements

PAWSD and the project team wish to acknowledge the contributions of the owners and staff of all the businesses and institutions that allowed the audit and fixture replacement teams to visit, collect data and install new fixtures in each of the targeted buildings. Without the support and cooperation of these individuals, none of the permanent water savings associated with this project could be realized. Those organizations and institutions that supported this project include the following:

- Town of Pagosa – Chamber of Commerce, Library, and Clerk's Office
- Pagosa Lakes Property Owners Association (PLPOA) Recreation Center
- Lodging- Best Western Oak Ridge Lodge and Restaurant, First Inn of Pagosa, Pagosa Inn and Suites, Pinewood Inn and The Spa Motel
- Restaurants- Boss Hogg's, Higher Grounds, JJ's, Kip's, Ramon's and Tequila's

Specific Tasks Performed

Community Outreach

The community outreach efforts conducted as a portion of this project included only about 6% of the grant funds; however this task was vital in communicating with the customers and community serviced by PAWSD. The District utilized funding from the Grant supplemented by matching funds from PAWSD to do the following:

- Upgrade and expand the scope of the District's website;
- Obtain and distribute Project Planet information to local hotels; and
- Design, print and distribute "Catch the Wave" decals, stickers and stamps.

In the performance of the project, the following metrics were achieved.

Table 1 Summary of Community Outreach Efforts

Task	Metric	Number
Update and Expand Website	Number of Visits	293
Obtain and Distribute Project Planet Materials	Number of Establishments	8
Print and Distribute Catch a Wave Materials		
Stickers for Children	Number	200
Decals for Businesses	Number of Establishments	14

The PAWSD website was expanded to include the "Catch a Wave" website.[1] This website is used to promote local water conservation measures and programs, provide information regarding other District conservation programs (e.g., rebates), and generally provide information to interested individuals. Since the site was established in April 2010, it has been visited on a daily basis. The District tracks the number of hits, the length of the visits, and the origin of the connection as a means of identifying new content needs, linkages (see Appendix A), and the overall value of the website to the PAWSD water conservation efforts .

The District's Project Planet distribution efforts, which consists chiefly of printed materials that encourage responsible use of room linens, were incorporated into the operations of 8 local hotels, including 4 of those that received fixture replacements[2]. The 8 local hotels represent about 75% of the hotel lodging capacity in the PAWSD service area.

Another printed messaging campaign that was funded by or in association with this project included creating, producing, distributing and installing signage in every room in each facility that received replacement fixtures. These signs (examples of which are provided in Appendix B) were developed to

[1] http://www.catchthewaveandsave.com

[2] The fifth hotel that received fixture replacements under this project already had Project Planet in place from previous PAWSD efforts.

educate and make guests and other facility users aware of the water-saving fixtures and their impact on reducing water use and creating energy savings, specific to each facility.

The District's award-winning "Catch the Wave" messaging program[3] is also publicized through the effective distribution of stickers and decals. The stickers are popular with school aged children who receive them at various local cultural events. The decals and stickers are also provided to those businesses and organizations that participate in the Smart Water Audits.

Finally, the District published three articles in the local newspaper (the Pagosa Sun) describing the Smart Water Audit program, extolling its benefits and describing its successes.

Audits and Fixture Replacements

The intent of the project, as described in the Grant application, was to utilize audits conducted prior to the Grant to target the replacement of fixtures in those previously audited establishments, and to use audits conducted during performance of this Grant to target the replacement of fixtures in newly audited facilities. For this reason, the exact number of replacement fixtures (i.e., toilets, urinals, showerheads and faucet aerators) to be installed were only estimated in the grant application. It was only after the all of the audits were completed, and business and facility owners were consulted to receive their approval, were the final counts of replacement fixtures firmly established.

Table 2 summarizes the audits conducted prior to and during execution of this project.

Table 2 Summary of Water Audits Conducted by the District

Prior to the Grant	• Boss Hogg's • First Inn of Pagosa • Junction Restaurant • JJ's • San Juan Motel
During Execution of the Grant	• Best Western Hotel and Restaurant • Chamber of Commerce • Higher Grounds • Kip's • Town Library • Pagosa Inn and Suites • Pinewood Inn • Ramon's • PLPOA Recreation Center • The Spa • Tequila's

[3] The District received the Pagosa Chamber of Commerce 2011 Leadership in Green Business Award for its Catch the Wave and Smart Water Audit Programs.

As indicated in the Grant Scope of Work, the Smart Water Audits were used to identify opportunities for improving facility-based water use efficiency. The audit involved reviewing past and current water use data for each audited facility, and collecting site-specific data characterizing facility-specific water use. Data that was collected during the audits included:

- Number, use and flow rate from each sink faucet
- Number and flow rate from each showerhead
- Number and estimated flush volume for each toilet and urinal
- Number and serial number of all kitchen and laundry facility appliances that use water (e.g., washing machines, laundry extractors, ice machines, steam tables, dish washing machines, etc.)
- Swimming pool, hot tub and Jacuzzi use and water replacement rates
- Outdoor irrigation uses (e.g., irrigated area, sprinkler system timing)
- Other water uses

The data collected from each facility was compared and contrasted with monthly, seasonal and annual water rates to configure and calibrate a facility-specific water model which was used to estimate water use for each subject fixture that may be a candidate for replacement. In this way, an estimate of water savings and costs for each candidate fixture could be developed to support decision-making by the District in the allocation of Grant supported replacement fixtures.

Appendix C contains the results of the individual facility audits conducted as part of the Grant funding, including the location, the data collected, and the water model developed to evaluate site-specific water use and identify candidates for fixture replacement.

Based on the observed need, owner acceptance and interest, the availability fixtures, and the coordination of facility needs with local installation teams, replacement fixtures were installed in a total of 14 facilities – including hotels/motels, restaurants, and other institutions. A summary of the installed fixtures by facility is provided in Table 3.

The specific fixtures that were used to replace the inefficient old fixtures are as follows:

- Showerheads- A total of 254 Caroma 1.5 gallon per minute (gpm) stainless steel, vacuum assisted low-flow showerhead fixtures were installed.
- Faucet aerators- A total of 304 USA Landlords dual-threaded 0.5 gallon per minute (gpm) stainless steel, low-flow faucet aerator were installed in bathroom and kitchen hand-wash sinks. These faucet aerators were not deemed appropriate for other applications (e.g., pot and pan sinks, kitchen gallery sinks, etc.).
- Toilets- A total of 32 Caroma SyndeySmart dual-flush, EPA WaterSense approved 1.28/0.7 gallon per flush (gpf) toilets were installed. About one half of these toilets were handicapped (meaning that the base porcelain unit was 30-inches high) and one-half were regular toilets; all used the same dual-flush device. It is anticipated from experience that these toilets would average about 0.9 gpf accounting for the mixture of 0.7 and 1.28 flushes.
- Urinals- A total of 13 Caroma H2ZeroFlush, EPA WaterSense approved, waterless urinals were installed.

Table 3 - Water Fixture Retrofits per Facility

Location	Equipment					Dates of Installations in 2010			
	Shower*	Faucet*	Toilets	Toilets	Urinals	Shower	Faucet	Toilets	Urinals
Motels			(handicap)	(regular)					
Best Western	78	80	2	2	1	30-Mar	30-Mar	12-Apr	12-Apr
First Inn	32	33	0	0	0	29-Mar	29-Mar		
Pagosa Inn and Suites	87	110	0	0	0	31-Mar	31-Mar		
Pinewood Inn	25	25	0	0	0	29-Mar	29-Mar		
The Spa	20	20	2	2	1	30-Mar	30-Mar	16-Mar	16-Mar
Other									
Boss Hogg's	0	5	3	2	3		30-Mar	28-Apr	28-Apr
Chamber of Commerce	0	3	2	1	0		30-Mar	23-Mar	
Higher Grounds	0	2	2	0	1		31-Mar	22-Apr	22-Apr
JJ's	0	1	2	2	2		30-Mar	23-Apr	23-Apr
Kip's	0	3	0	2	1		30-Mar	6-Apr	6-Apr
Town Library	0	3	0	0	1		30-Mar		13-Apr
Ramon's	0	4	2	2	1		30-Mar	8-Apr	8-Apr
PLPOA Rec Center	12	9	0	0	2	30-Mar	30-Mar		26-Apr
Tequila's	0	6	2	2	0		30-Mar	16-Apr	

*Each facility received 2 to 3 replacement faucet aerators and showerheads for maintenance purposes.

Water Savings

The installation of the high-efficiency fixtures in the 14 facilities listed in Table 3 have unquestionably reduced current water use demand for those uses impacted by the retrofitting. In other words, every new dual-flush toilet uses less water per flush than its predecessor. Similarly, all new showerheads allow less water to flow in a minute than the older, less efficient showerhead. Therefore, real savings are occurring assuming that the same water use behaviors are taking place.

Unfortunately, measuring the actual water use reduction is not as simple as might otherwise be expected, for at each facility the replacement fixtures represent only a fraction of current water use. In addition, there may be other water uses at each facility that were not reported or captured within the audit framework. In addition, water use behaviors may not be truly constant, therefore, a comparison of expected water saved (based on the facility-specific water models developed) and the actual measured water savings is not necessarily congruent. Nonetheless, it is clear that water use reductions have occurred at every facility with installed retrofits. It is also clear that the water savings are generally consistent with those predicted with a few exceptions.

Table 4 presents the water-model based estimated water savings for each of the facilities that received replacement fixtures and the actual change in monthly water use prior to and after the fixtures were replaced based on comparing May through December water use for the years 2009 and 2010, respectively. The data used to calculate the actual water savings is presented in Appendix D.

Table 4 - Estimated and Measured Average Monthly Water Savings per Facility

Facility	Estimated Average Indoor Monthly Water Savings (gallons)	Measured Average Indoor Monthly Water Savings (gallons)
Lodging Facilities		
Best Western	37,990	47,250
First Inn	40,683	28,625
Pagosa Inn and Suites	28,624	5,125
Pinewood Inn	16,044	6,875
The Spa	57,367	32,625
Restaurants and Other Facilities		
Boss Hogg's	11,315	12,875
Chamber of Commerce	No meters in place prior to 2010, so no comparison could be made	
Higher Grounds	4,905	-4,000
JJ's	5,659	45,250
Kip's	5,879	8,375
Town Library	1,260	19,000
Ramon's	6,207	-1,625
PLPOA Rec Center	15,063	3,250
Tequila's	4,736	4,125
Total	**235,732**	**207,750**

The expected water savings, based on the results of the audits and the related water models, were about 8.7 acre-feet; whereas the actual savings measured were about 7.7 acre-feet[4], or about 90% of the initial estimate.

The reasons for the differences between the estimated and measured water savings may be influenced by many different factors including:

- Differences in the number of lodgers and/or facility users.[5]
- Differences in the normal uses of water within a facility.[6]
- Differences in the estimated and actual number of uses and/or length of use of each replaced fixture in the facility.

[4] The replacement value of 7.5 acre-feet of water for PAWSD is about $150,000 (at $20,000 per acre-foot). The cost of this saved water was about $9,000 per acre-foot using the combination of the Water Efficiency Grant and PAWSD funds and resources.

[5] Information on Lodger Tax Revenue was collected from the Town to characterize trends in tourism visits and therefore facility use. Generally these data indicate that for the area, tourist visits have increased each year by about 5% since 2007. These data are included in Appendix E.

[6] A leak was discovered in Pagosa Inn and Suites in November 2010 and is suspected in Higher Grounds. Removing the influence of the suspected leak in Pagosa Inn and Suites would show a measured water savings of 12,000 to 15,000 gallons per month more than is indicated in Table 4. Other changes to fixture use or water use could include such occurrences as increased kitchen and/or laundry use, for example. Note that outdoor water use at the Town Library decreased from 2009 to 2010 contributing to the measured volume of reduced water use at that location.

Other noteworthy observations are as follows:

- Lodger use at the various hotels is impacted by tourist visits. Lodger tax information provided by the Town of Pagosa Springs for the period from 2007 through 2010 indicates that tourism visits were up about 5% per year over this time period. Pagosa Inn and Suites and Pinewood Inn appear to have been significantly impacted by higher occupancy rates in 2010 versus 2009; whereas the Best Western may have had somewhat fewer lodgers in 2010 compared to 2009.
- By the same line of reasoning, Boss Hogg's did not have a substantial increase of customer visits in 2010 as compared to 2009; whereas, customer visits to Higher Grounds, Ramon's, JJ's and the PLPOA Recreation Center were likely higher in 2010 as compared to 2009.
- JJ's was found to have a leak in 2009 associated with its water cooled ice machine which appears to have been repaired based on the 2010 follow-up audit. Repairing this leak would create a savings of about 40,000 gallons per month.
- As indicated earlier, the Town Library reduced outdoor water use from 2009 to 2010 after a portion of the facility's Xeriscape landscaping had been established.
- No specific amount of saved water was estimated associated with the distribution of the Project Planet information which helps to educate lodgers and influence housekeeping staff at motels and hotels regarding not laundering towels and other linens unless needed.[7]

Each business keeps records of customer visits for monthly reporting of revenue and sales records; however this data was not collected in association with this project. It may be of value to collect this data at some point in the future if needed to better characterize current and future water demand.

Modifications to the Scope

As previously indicated, the scope of work contained in the grant application included estimates on the number of audits, and the number of replacement fixtures that would be installed as a result of those audits. However, between the time of the grant application submittal and the grant award some circumstances changed (for example, one of the hotels audited prior to the grant application withdrew from participation in the fixture replacement program). In addition, conditions predicted at the time of the application were not entirely consistent with the conditions found during project execution. For these reasons, some of the original scope was revised to account for conditions encountered during execution of the project.

The key differences between the proposed scope and the executed scope are listed below:

- The original scope called for retrofitting 5 facilities that were previously audited and 10 new facilities. During execution of the projects, two of the facilities audited prior to the grant

[7] One outcome of the audits related to learning that housekeeping staff may collect unspoiled towels and other linens to create or "make-up" full loads for the 50 pound washing machines operated by many of the local motels and hotels, especially at times of low room occupancy. For this reason, it is suspected that the effectiveness of the Project Planet campaign is greater when room occupancy rates increase and laundry "make-up" loads are unnecessary.

withdrew from the program. Therefore only 3 facilities that were audited prior to the grant remained to participate in the fixture replacement portion of the project.

- The original scope called for auditing 10 new facilities; including 5 hotels and 5 restaurants. To make up for the missing participants identified in the preceding bullet, and a lack of involvement from some expected hotels, additional project participants were sought and engaged. In the end, 4 new hotels, 4 new restaurants, and 3 institutional facilities were audited and chose to participate in the fixture replacement program. Therefore, one additional audit was performed beyond those that were contained in the original scope.
- The changes also occurred with regard to the number of fixtures that were replaced as shown in Table 5.

Table 5 – Summary of Modifications to the Number of Replacement Fixtures Installed

Fixture	Original Scope	Modified Due to Field Conditions
Showerhead	313	254
Faucet Aerators	393	304
Toilets	33	32
Urinals	19	13

The ramifications of these changes were not significant in the performance of the project. The intent of the project was successfully completed in that large water users were assisted in reducing their water demand and permanent water savings are being realized by the District. The reduced number of installations did reduce the cost of the project to the District; however, other costs related to coordinating and conducting additional Smart Water Audits and related tasks increased project costs. In addition, the data collection and analysis tasks were more intensive than originally expected. Therefore, overall project costs remain essentially the same between the original grant application and execution of this project.

Conclusions and Recommendations

The Water Efficiency Grant awarded to PAWSD was put to use to implement components of the District's approved Water Conservation Plan. As a result of the Grant funded project, the District was able to increase outreach to the community that it serves and measurably decrease water use in 14 businesses and institutions in the PAWSD service area including numerous local tourist related businesses (e.g., restaurants and motels/hotels).

Total measured water savings over a single year associated with the installed replacement fixtures are expected to be in the range of 7.5 acre-feet, with a value of about $150,000 to the District (in replacement water costs). Water savings were expected to be greater than this; however, local influences including a greater influx of tourists into the PAWSD service areas in 2010, as compared to 2009, impacted the actual savings. Nonetheless, water savings were measured at 12 of the 14 facilities that received replacement fixtures. It is suspected that the observed higher water use at the two facilities that did not have measurable reductions were in response to higher customer visits and/or use of the facilities (one is a restaurant and one is a coffee shop).

The cost of the water savings varied dependant on a number of factors; however, it was generally found that placing showerheads and faucet aerators were by far the most cost-effective means to creating permanent water use reductions. For this reason, the cost per acre-foot of water savings achieved at the hotels was substantially less than the cost per acre-foot realized at restaurants and other facilities. The most cost effective fixture replacement efforts were at four of the five hotels[8] as indicated in Table 6.

Table 6 – Estimated Cost per Acre-Foot to Replace Inefficient Fixtures by Facility

Location	Cost per AF
Hotels	
Best Western[8]	$ 14,600
First Inn	1,154
Pagosa Inn and Suites	690
Pinewood Inn	2,099
The Spa	1,336
Other	
Boss Hogg's	6,006
Higher Grounds	5,744
JJ's	15,076
Kip's	5,404
Town Library	8,962
Ramon's	8,445
PLPOA Rec Center	2,465
Tequila's	8,873

[8] Costs to reduce water demand at the Best Western were skewed in comparison to the other hotels, since the Best Western has a restaurant and bar on the premises. The costs for fixture replacement in the Best Western hotel was estimated to be about $3,000 per AF; versus about $17,000 per AF in the restaurant and bar area.

Based on the results of this project, there are a number of possible improvements that may be valuable to other organizations working to install water efficient fixtures into public and/or commercial facilities. These recommendations include the following:

- Establish an agreement with the business owner and/or facility administrator that allows for the explicit tracking of customer and/or site use over time, such that water use can be correlated to site use; and therefore, changes in site use can be incorporated in verifying the impact and effectiveness of implemented water conservation measures and programs.
- Audits are critical tools in evaluating and characterizing water use in facilities that receive fixture upgrades. Without audits, water use patterns and particulars involving characterizing future savings is substantially compromised.
- Involving the facility owner and/or manager in the audit process enhances the value and use of the audit now and into the future (as water use patterns change).

Appendix A

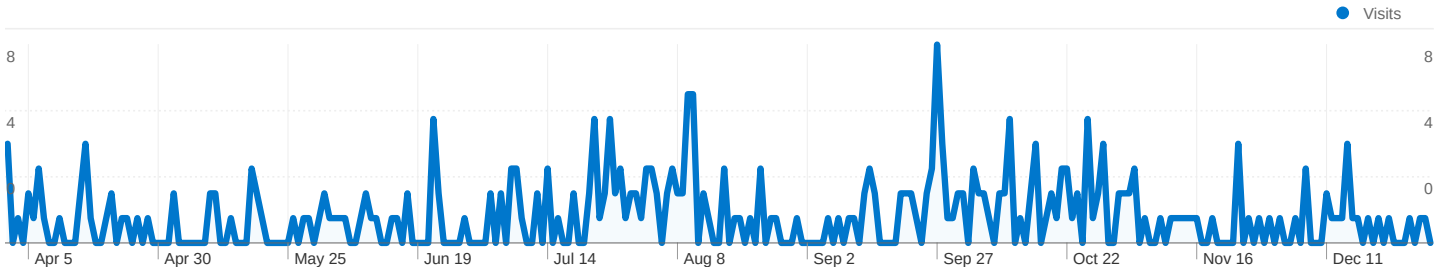
Catch the Wave Website Traffic Information

www.catchthewaveandsave.com

Site Visitation

Apr 1, 2010 - Dec 31, 2010

Comparing to: Site



This custom dimension resulted in 293 Visits via 154 days

New tab

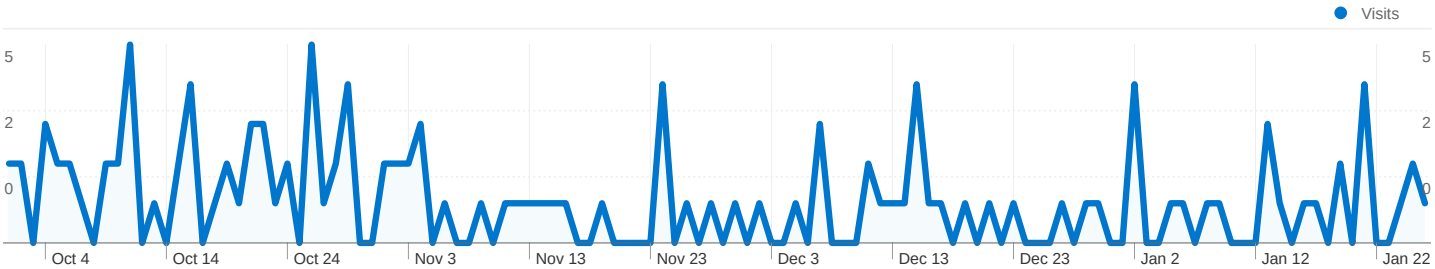
Visits	Avg. Time on Page
293	00:01:45
% of Site Total: 100.00%	Site Avg: 00:01:45 (0.00%)

Day	Visits	Avg. Time on Page
Monday, September 27, 2010	8	00:03:06
Tuesday, August 10, 2010	6	00:00:00
Wednesday, August 11, 2010	6	00:00:26
Tuesday, June 22, 2010	5	00:00:36
Friday, July 23, 2010	5	00:01:24
Monday, July 26, 2010	5	00:02:15
Monday, October 11, 2010	5	00:00:50
Tuesday, October 26, 2010	5	00:00:26
Thursday, April 1, 2010	4	00:00:24
Friday, April 16, 2010	4	00:00:00
		1 - 10 of 154

www.catchthewaveandsave.com

Traffic Sources Overview

Oct 1, 2010 - Jan 26, 2011
Comparing to: Site



All traffic sources sent a total of 124 visits

 18.55% Direct Traffic

 44.35% Referring Sites

 37.10% Search Engines

- **Referring Sites** 55.00 (44.35%)
- **Search Engines** 46.00 (37.10%)
- **Direct Traffic** 23.00 (18.55%)

Top Traffic Sources

Sources	Visits	% visits
google (organic)	40	32.26%
google.it (referral)	26	20.97%
(direct) ((none))	23	18.55%
pawsd.org (referral)	17	13.71%
bing (organic)	4	3.23%

Keywords	Visits	% visits
save the colorado	4	8.70%
unquenchable glennon	3	6.52%
math sprinkler	2	4.35%
sprinkler mat	2	4.35%
2030 technology that will	1	2.17%

Appendix B

Example Signage Used to Highlight Fixture Replacements

Together... Making a Difference

By using the High-Efficiency Water Fixtures in this room, together we are helping our community.

HELPING TO SAVE

12,000 gallons of water

(every year, or enough water to fill 3 swimming pools)

AND TO REDUCE

CO_2 emmisions by $^3/_4$ tons

(every year)

Thank You

catch the wave
CONSERVE WATER
catchthewaveandsave.com

EPA WaterSense PARTNER

Brought to this business through a partnership between the Pagosa Area Water and Sanitation District and the Colorado Water Conservation Board

Together...
Making a Difference

By using the High-Efficiency Water Fixtures in this facility, together we are helping our community.

HELPING TO SAVE

60,000 gallons of water

(every year, or enough water to fill 15 swimming pools)

AND TO REDUCE

CO_2 emmisions by 10 tons

(every year)

Thank You

catch the wave
CONSERVE WATER
catchthewaveandsave.com

EPA WaterSense PARTNER

Brought to this business through a partnership between the Pagosa Area Water and Sanitation District and the Colorado Water Conservation Board

Appendix C

Smart Water Audit Reports for Each Facility

This Appendix contains the results of the Smart Water Audits for each of the facilities that received fixture replacements, except the Chamber of Commerce. The Chamber was excluded from this appendix since an analysis of the Chamber's past water use was not possible given that the facility was not metered until the early part of 2010. Therefore, a water model could not be prepared and water savings could not be estimated for the Chamber. The results of the Smart Water Audit for each facility are presented herein. To this point, this appendix includes the following for each facility:

- A one page summary about the audit and its findings;
- A spreadsheet model of the water use in the facility including an estimate of water and related energy savings associated with potential fixture and appliance replacements;
- A graph of monthly water use in the facility prior to the audit (these data were used to configure and calibrate the water use model); and
- A graph of the monthly water use in the facility prior to and after the fixture retrofits.

Smart Water Audits which are documented in this appendix include the following facilities:

Lodging

- Best Western
- First Inn of Pagosa Springs[1]
- Pagosa Inn and Suites
- Pinewood Inn
- The Spa

Other

- Boss Hogg's[1]
- Higher Grounds
- JJ's[1]
- Kip's
- Town Library
- Ramon's
- PLPOA Recreation Center
- Tequila's

[1] All audits were completed in April 2010 except those identified by this footnote, which were completed in December 2008 as part of the pre-grant application data collection effort.

SMART WATER Audit Report

Best Western Hotel

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 158 Hot Springs Blvd in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

The Best Western Hotel uses water in a manner consistent with motels throughout Colorado. Similar to many hotels built before 1993, Best Western Hotel has sinks, showers, and toilets that have not been updated with water efficient fixtures that are currently available in the marketplace. . However, The Best Western does utilize air cooled ice makers which help to reduce water use.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for Best Western included the following assumptions:

- Best Western indicated that they use a hose for minimal outdoor irrigation; therefore, outdoor irrigation was assumed to be 20 gallons per maximum day and 6 gallons per day on average.
- The pool uses 300 gallons on a maximum water demand day and 100 gallons on an average water demand day.

The Best Western Restaurant has two areas that were retrofit with new high-efficiency fixtures – the rooms and the restaurant area. In the restaurant area, two sink faucet aerators located in the men's and women's bathrooms were replaced along with toilets and a urinal in the same restrooms. The faucet aerators in these locations used about 3.25 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $67 dollars per year per sink. The four restaurant toilets used, on average, about 2 gallons per flush. New Water Sense approved high efficiency dual-flush toilets, which use on average 0.90 gallons per flush, were installed at a cost of $1,508 with an estimated total water savings of 17,000 gallons annually. One urinal was also replaced with a Water Sense approved waterless urinal at a cost of $396 and is estimated to have a total water savings of 3,650 gallons annually.

In the Best Western Hotel, each room was equipped with a showerhead that averaged three gallons per minute. 78 new low flow showerheads, which use 1.5 gallons per minute, were installed at a cost of $3,354. It is estimated that a total water and energy savings of approximately $95 per year per shower should be realized from this replacement, resulting in a payback period of about 6 months. In addition, 78 three gallon per minute sink faucet aerators were replaced with 0.5 gpm aerators, at an initial cost of about $516. It is estimated that the Hotel will realize a total cost savings of approximately $539 per year from these updated faucets, resulting in a payback period of just under a year.

In total, 80 sink faucet aerators, 78 showers, four toilets and one urinal in Best Western Hotel and Restaurant were updated at a cost of $5,787. From the water demand model, it is estimated that a total annual water and energy cost savings of about $8,400 will result from these changes, saving about 450,000 gallons of water and 71,000 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
Best Western Audit Summary

Maximum Use Calculation

	number	per use hot	per use cold	per use total			uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Typical Room (1 king, 2 Queen)	78											
Toilet (Rebuild 30/yr)	78		1.6	1.6	gpf	2	flushes		-	250	250	
Shower	78	2.4	0.6	3	gpm	12	minutes		2,246	562	2,808	
Sink	78	1.5	1.5	3	gpm	0.3	minutes		35	35	70	
Kitchenette - Managers Apartment	1											
Toilet	1		1.6	1.6	gpf	3	flushes		-	5	5	
Shower	1	2.4	0.6	3	gpm	10	minutes		24	6	30	
Sink	1	1.5	1.5	3	gpm	0.5	minutes		1	1	1	
Pool Bathroom (1985)	1											
Toilet	1		1.6	1.6	gpf	6	flushes		-	10	10	
Shower	1	2.4	0.6	3	gpm	3	minutes		7	2	9	
Sink	1	1.5	1.5	3	gpm	0.9	minutes		1	1	3	
Bar Bathroom												
Mens	2		1.6	1.6	gpf	15	flushes		-	48	48	
Womens	2		2.5	2.5	gpf	15	flushes		-	75	75	
Urinal	1		1	1	gpf	15	flushes		-	15	15	
Sink Women	1	1.5	1.5	3	gpm	2.3	minutes		3	3	7	
Sink Men	1	1.75	1.75	3.5	gpm	4.5	minutes		8	8	16	
Bar Sink	2	1.75	1.75	3.5	gpm	10	minutes		35	35	70	
Kitchen Sink	1	1.75	1.75	3.5	gpm	12	minutes		21	21	42	
Kitchen Sink	1	3.25	3.25	6.5	gpm	90	minutes		293	293	585	
Kitchen Sink	1	2.5	2.5	5	gpm	45	minutes		113	113	225	
Other												
Washing Machine (Unimac)UC30BNZOU600030 Restauran	1	9	9	18	g/use	2	use		18	18	36	
Washing Machine (Unimac)VW50PVQUZ Restaurant	1	9	9	18	g/use	2	use		18	18	36	
Washing Machine (Maytag, Commercial) Customer use	2	12	12	24	g/use	5	use		120	120	240	
Ice Machine (Ice of Matic) Bar Use	1		17.8	17.8	gp100#	1	100# Ice		-	18	18	
Ice Machine (Scottsmen) CM250AE-IE	1		17.8	17.8	gp100#	1	100# Ice		-	18	18	
Ice Machine (Monitowoc) 0y0604A	1		17.8	17.8	gp100#	1	100# Ice		-	18	18	
Pool (Fill manual) Heavy Use Days (3days/wk max)	1		300	300.0	g/use	0.4	use		-	129	129	
SPA Hot Tub (Friday:Saturday)	1	24	6	30	g/use	0.3	use		6	2	8	
DishWashing Machine (Eco lab) E52000	4	0	20	20	g/use	3	use		-	240	240	
Steam Table	1		7.79	7.79	gpuse	1	daily		-	8	8	
Steam Table	1		13.09	13.09	gpuse	1	daily		-	13	13	
Outdoor Irrigation	1		20	20	g/use	1	use		-	20	20	
									2,949	**2,101**	**5,051**	**max day**
								observed			151,000	max month
											30	days at max
								observed			5,033	max day

Table 2 - Summary of Current Water Use and Potential Water Savings
Best Western Audit Summary

Average Use Calculation

	number	per use hot	per use cold	per use total			uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Typical Room (1 king, 2 Queen)	78											
Toilet (Rebuild 30/yr)	78		1.6	1.6	gpf	1	flushes		-	125	125	
Shower	78	2.4	0.6	3	gpm	9.0	minutes		1,685	421	2,106	
Sink	78	1.5	1.5	3	gpm	0.5	minutes		59	59	117	
Kitchenette - Managers Apartment	1											
Toilet	1		1.6	1.6	gpf	3	flushes		-	5	5	
Shower	1	2.4	0.6	3	gpm	8	minutes		19	5	24	
Sink	1	1.5	1.5	3	gpm	1.0	minutes		2	2	3	
Pool Bathroom (1985)	1											
Toilet	1		1.6	1.6	gpf	3	flushes		-	5	5	
Shower	1	2.4	0.6	3	gpm	6	minutes		14	4	18	
Sink	1	1.5	1.5	3	gpm	1.5	minutes		2	2	5	
Bar Bathroom												
Mens	2		1.6	1.6	gpf	10	flushes		-	32	32	
Womens	2		2.5	2.5	gpf	10	flushes		-	50	50	
Urinal	1		1	1	gpf	10	flushes		-	10	10	
Sink Women	1	1.5	1.5	3	gpm	5.0	minutes		8	8	15	
Sink Men	1	1.75	1.75	3.5	gpm	10.0	minutes		18	18	35	
Bar Sink	2	1.75	1.75	3.5	gpm	8	minutes		28	28	56	
Kitchen Sink	1	1.75	1.75	3.5	gpm	8	minutes		14	14	28	
Kitchen Sink	1	3.25	3.25	6.5	gpm	65	minutes		211	211	423	
Kitchen Sink	1	2.5	2.5	5	gpm	65	minutes		163	163	325	
Other												
Washing Machine (Unimac)UC30BNZOU600030 Restauran	1	9	9	18	g/use	1	use		9	9	18	
Washing Machine (Unimac)VW50PVQUZ Restaurant	1	9	9	18	g/use	1	use		9	9	18	
Washing Machine (Maytag, Commercial) Customer use	2	12	12	24	g/use	3	use		72	72	144	
Ice Machine (Ice of Matic) Bar Use	1		17.8	17.8	gp100#	1	100# Ice		-	18	18	
Ice Machine (Scottsmen) CM250AE-IE	1		17.8	17.8	gp100#	1	100# Ice		-	18	18	
Ice Machine (Monitowoc) 0y0604A	1		17.8	17.8	gp100#	1	100# Ice		-	18	18	
Pool (Fill manual) Off Days	1		100	100	g/use	0.4	use		-	43	43	
SPA Hot Tub (Friday:Saturday)	1	24	6	30	g/use	0.3	use		6	2	8	
DishWashing Machine (Eco lab) E52000	4	0	20	20	g/use	3	use		-	240	240	
Steam Table	1		7.79	7.7921875	gpuse	1	daily		-	8	8	
Steam Table	1		13.09	13.0908875	gpuse	1	daily		-	13	13	
Outdoor Irrigation	1		20	20	g/use	0.3	use		-	7	7	
									2,318	**1,614**	**3,932**	**avg day**
								observed			102,875	avg month
											26	days at avg
								observed			3,429	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
Best Western Audit Summary

Maximum Use Water Savings

		per use						subtotal gpd				Savings		
	number	hot	cold	total		uses/day		hot	cold	total		hot	cold	total
Typical Room (1 king, 2 Queen)	78													
Toilet (Rebuild 30/yr)	78		1.6	1.6	gpf	2	flushes	-	250	250		-	-	-
Shower	78	1.2	0.3	1.5	gpm	12	minutes	1,123	281	1,404		1,123	281	1,404
Sink	78	0.25	0.25	0.5	gpm	0.3	minutes	6	6	12		29	29	59
												-	-	-
Kitchenette - Managers Apartment	1											-	-	-
Toilet	1		1.6	1.6	gpf	3	flushes	-	5	5		-	-	-
Shower	1	2.4	0.6	3	gpm	10	minutes	24	6	30		-	-	-
Sink	1	1.5	1.5	3	gpm	0.5	minutes	1	1	1		-	-	-
												-	-	-
Pool Bathroom (1985)	1											-	-	-
Toilet	1		1.6	1.6	gpf	6	flushes	-	10	10		-	-	-
Shower	1	2.4	0.6	3	gpm	3	minutes	7	2	9		-	-	-
Sink	1	1.5	1.5	3	gpm	0.9	minutes	1	1	3		-	-	-
												-	-	-
Bar Bathroom												-	-	-
Mens	2		0.9	0.9	gpf	15	flushes	-	27	27		-	21	21
Womens	2		0.9	0.9	gpf	15	flushes	-	27	27		-	48	48
Urinal	1		0	0	gpf	15	flushes	-	-	-		-	15	15
Sink Women	1	0.25	0.25	0.5	gpm	2.3	minutes	1	1	1		3	3	6
Sink Men	1	0.25	0.25	0.5	gpm	4.5	minutes	1	1	2		7	7	14
												-	-	-
Bar Sink	2	1.75	1.75	3.5	gpm	10	minutes	35	35	70		-	-	-
												-	-	-
Kitchen Sink	1	1.75	1.75	3.5	gpm	12	minutes	21	21	42		-	-	-
Kitchen Sink	1	3.25	3.25	6.5	gpm	90	minutes	293	293	585		-	-	-
Kitchen Sink	1	2.5	2.5	5	gpm	45	minutes	113	113	225		-	-	-
												-	-	-
												-	-	-
Other												-	-	-
Washing Machine (Unimac)UC30BNZOU600030 Restauran	1	9	9	18	g/use	2	use	18	18	36		-	-	-
Washing Machine (Unimac)VW50PVQUZ Restaurant	1	9	9	18	g/use	2	use	18	18	36		-	-	-
Washing Machine (Maytag, Commercial) Customer use	2	12	12	24	g/use	5	use	120	120	240		-	-	-
Ice Machine (Ice of Matic) Bar Use	1		17.8	17.8	gp100#	1	100# Ice	-	18	18		-	-	-
Ice Machine (Scottsmen) CM250AE-IE	1		17.8	17.8	gp100#	1	100# Ice	-	18	18		-	-	-
Ice Machine (Monitowoc) 0y0604A	1		17.8	17.8	gp100#	1	100# Ice	-	18	18		-	-	-
Pool (Fill manual) Heavy Use Days (3days/wk max)	1		300	300.0	g/use	0.4	use	-	129	129		-	-	-
SPA Hot Tub (Friday:Saturday)	1	24	6	30	g/use	0.3	use	6	2	8		-	-	-
DishWashing Machine (Eco lab) E52000	4	0	20	20	g/use	3	use	-	240	240		-	-	-
Steam Table	1		7.79	7.79	gpuse	1	daily	-	8	8		-	-	-
Steam Table	1		13.09	13.09	gpuse	1	daily	-	13	13		-	-	-
Outdoor Irrigation	1		20	20	g/use	1	use	-	20	20		-	-	-
								1,787	**1,698**	**3,485**	**max day**	1,162	404	1,566
									observed	151,000	max month			
										43	days at max			
									observed	5,033	max day			

Table 2 - Summary of Current Water Use and Potential Water Savings
Best Western Audit Summary

Average Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Typical Room (1 king, 2 Queen)	78													
Toilet (Rebuild 30/yr)	78			1.6	gpf	1.0	flushes	-	125	125		-	-	-
Shower	78	1.2	0.3	1.5	gpm	9.0	minutes	842	211	1,053		842	211	1,053
Sink	78	0.25	0.25	0.5	gpm	0.5	minutes	10	10	20		49	49	98
												-	-	-
Kitchenette - Managers Apartment	1											-	-	-
Toilet	1			1.6	gpf	3.0	flushes	-	5	5		-	-	-
Shower	1	2.4	0.6	3	gpm	8.0	minutes	19	5	24		-	-	-
Sink	1	1.5	1.5	3	gpm	1.0	minutes	2	2	3		-	-	-
												-	-	-
Pool Bathroom (1985)	1											-	-	-
Toilet	1			1.6	gpf	3.0	flushes	-	5	5		-	-	-
Shower	1	2.4	0.6	3	gpm	6.0	minutes	14	4	18		-	-	-
Sink	1	1.5	1.5	3	gpm	1.5	minutes	2	2	5		-	-	-
												-	-	-
Bar Bathroom												-	-	-
Mens	2		0.9	0.9	gpf	10.0	flushes	-	18	18		-	14	14
Womens	2		0.9	0.9	gpf	10.0	flushes	-	18	18		-	32	32
Urinal	1		0	0	gpf	10.0	flushes	-	-	-		-	10	10
Sink Women	1	0.25	0.25	0.5	gpm	5.0	minutes	1	1	3		6	6	13
Sink Men	1	0.25	0.25	0.5	gpm	10.0	minutes	3	3	5		15	15	30
												-	-	-
Bar Sink	2	1.75	1.75	3.5	gpm	8.0	minutes	28	28	56		-	-	-
												-	-	-
Kitchen Sink	1	1.75	1.75	3.5	gpm	8.0	minutes	14	14	28		-	-	-
Kitchen Sink	1	3.25	3.25	6.5	gpm	65.0	minutes	211	211	423		-	-	-
Kitchen Sink	1	2.5	2.5	5	gpm	65.0	minutes	163	163	325		-	-	-
												-	-	-
												-	-	-
Other												-	-	-
Washing Machine (Unimac)UC30BNZOU600030 Restauran	1	9	9	18	g/use	1.0	use	9	9	18		-	-	-
Washing Machine (Unimac)VW50PVQUZ Restaurant	1	9	9	18	g/use	1.0	use	9	9	18		-	-	-
Washing Machine (Maytag, Commercial) Customer use	2	12	12	24	g/use	3.0	use	72	72	144		-	-	-
Ice Machine (Ice of Matic) Bar Use	1		17.8	17.8	gp100#	1.0	100# Ice	-	18	18		-	-	-
Ice Machine (Scottsmen) CM250AE-IE	1		17.8	17.8	gp100#	1.0	100# Ice	-	18	18		-	-	-
Ice Machine (Monitowoc) 0y0604A	1		17.8	17.8	gp100#	1.0	100# Ice	-	18	18		-	-	-
Pool (Fill manual) Off Days	1		100	100	g/use	0.4	use	-	43	43		-	-	-
SPA Hot Tub (Friday:Saturday)	1	24	6	30	g/use	0.3	use	6	2	8		-	-	-
DishWashing Machine (Eco lab) E52000	4	0	20	20	g/use	3.0	use	-	240	240		-	-	-
Steam Table	1		7.79	7.7921875	gpuse	1.0	daily	-	8	8		-	-	-
Steam Table	1		13.09	13.090875	gpuse	1.0	daily	-	13	13		-	-	-
Outdoor Irrigation	1		20	20	g/use	0.3	use	-	7	7		-	-	-
								1,405	**1,278**	**2,683**	**avg day**	912	337	1,249
								observed		102,875	avg month			
										38	days at avg			
								observed		3,429	avg day			

Costs to Implement

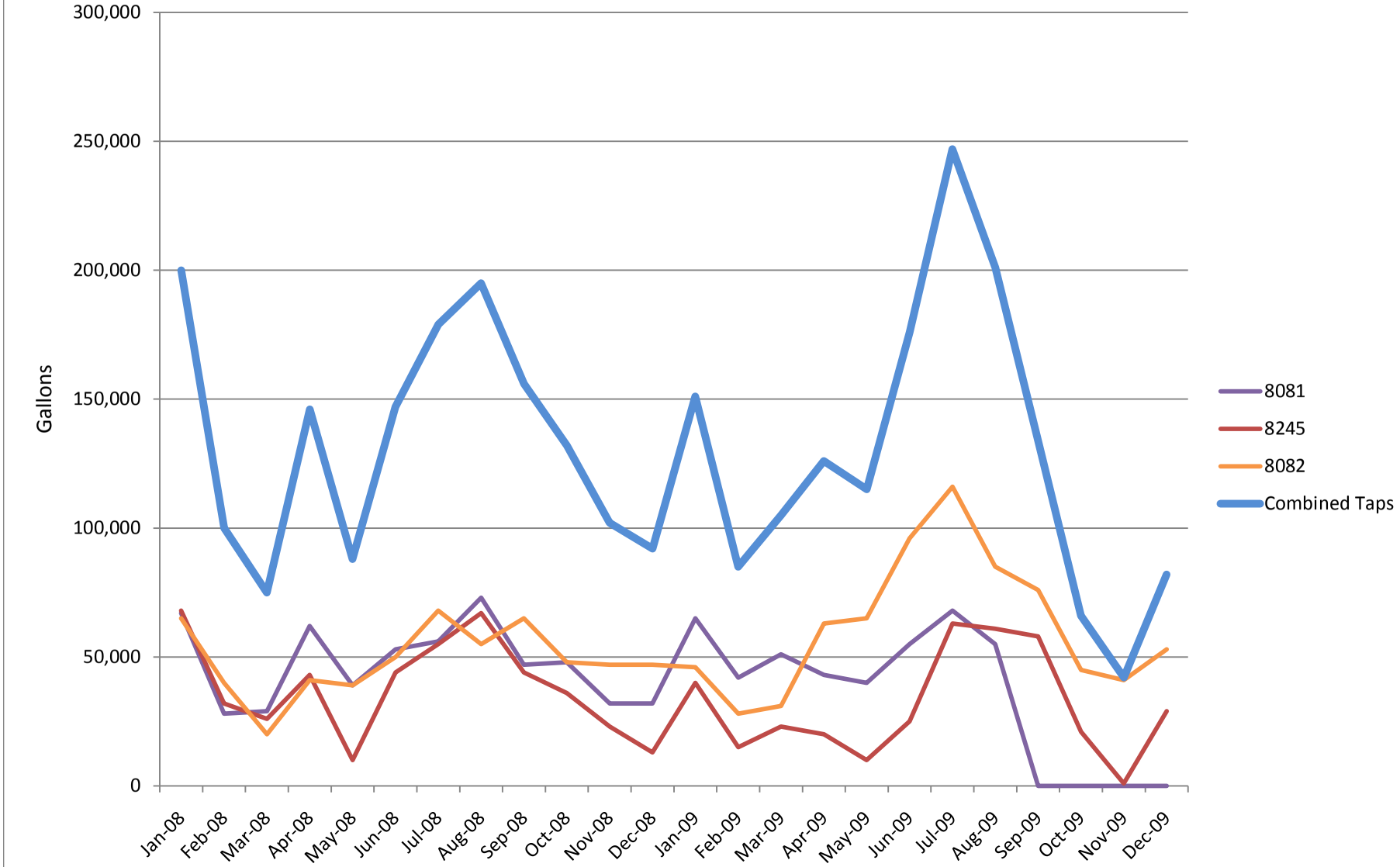
	number	Hardware	Installation	Total	Payback	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Hotel:									
Shower	78	$ 33	$ 10	$ 3,354	0.45 yrs	384,345	65,758	$ 7,426	$ 95
Sink	78	$ 2	$ 5	$ 516	0.96 yrs	35,588	3,805	$ 539	$ 7
				$ 3,870				$ 7,965	
	AF Savings:	1.29		$/AF:	$ 3,003	Replacement Water Cost*:	$ 38,662	Avoided Cost** :	$ 3,989
Restaurant:									
Sink	2	$ 2	$ 5	$ 13	0.06 yrs	15,513	1,659	$ 235	$ 118
Toilet	4	$ 282	$ 95	$ 1,508	10.95 yrs	16,790	-	$ 138	$ 34
Urinal	1	$ 311	$ 85	$ 396	13.23 yrs	3,650	-	$ 30	$ 30
				$ 1,917				$ 403	
				$ 5,787		455,885	71,222	$ 8,368	
	AF Savings:	0.11		$/AF:	$ 17,376	Replacement Water Cost*:	$ 3,310	Avoided Cost** :	$ 342

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

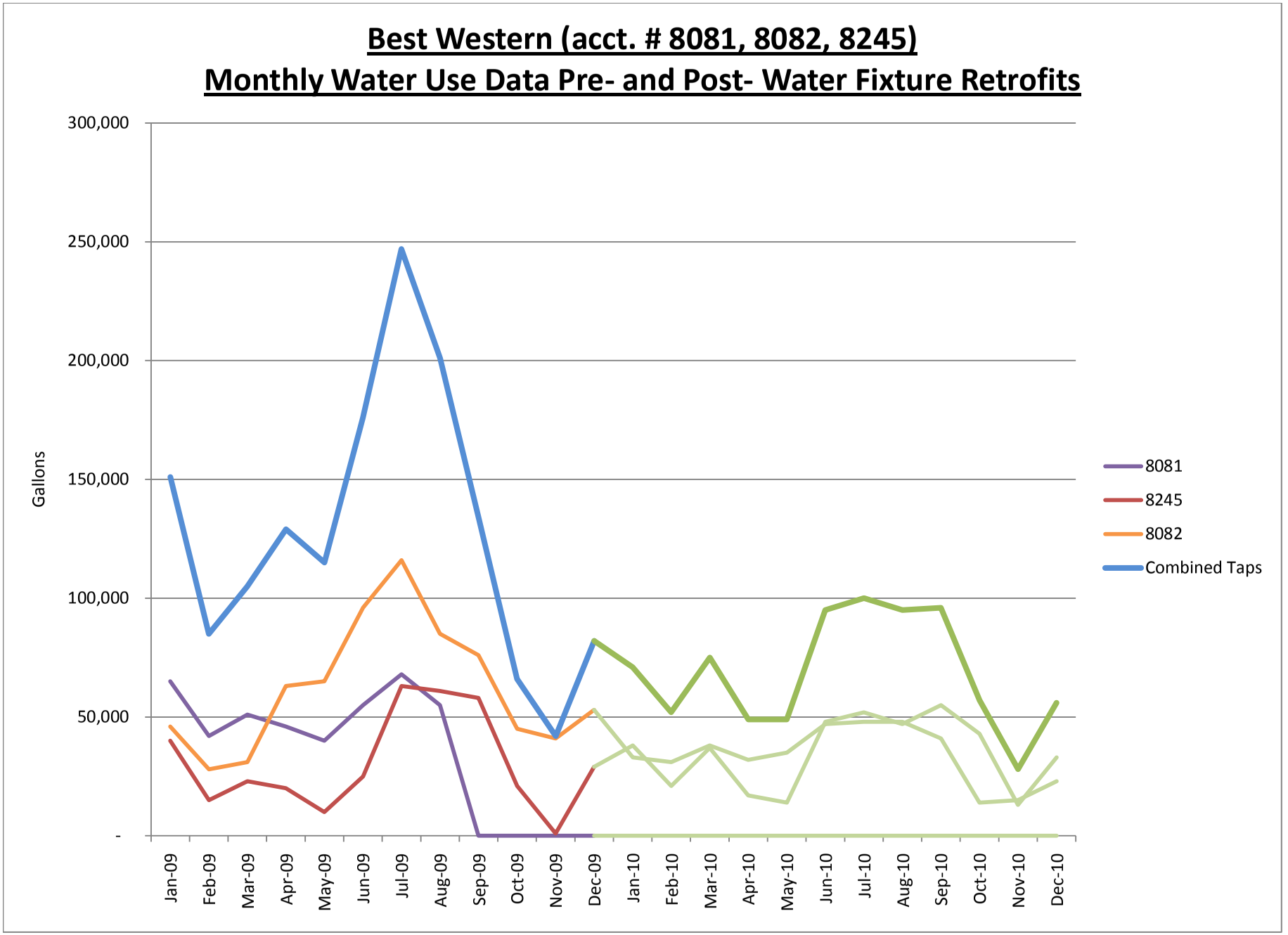
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

Best Western (acct. # 8081, 8082, 8245)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Best Western (acct. # 8081, 8082, 8245)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



* Water fixture retrofits were installed March 30, 2010 and April 12, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

First Inn of Pagosa

Overview

PAWSD working with Great Western Institute and Environmental Dimensions, conducted a SMART WATER Audit of this facility at **260 East Pagosa** in Pagosa Springs on December 8, 2008. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

First Inn uses water in a manner consistent with motels throughout Colorado, especially those with indoor pools and hot tubs. Similar to many motels built before 1993, First Inn had sinks, showers, and toilets that had not been updated with water efficient fixtures that are currently available in the marketplace.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for First Inn included the following assumption:

- First Inn indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property

Based on the 2008 audit, the following fixture replacements occurred in 2010. The 33 sink faucet aerators found in each of the motel suites and the main floor restroom, used about 2.2 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $8 dollars per year per sink. This savings results in a payback period of just over ten months.

The 32 motel showers, on average, used about four gallons of water per minute. New low flow showerheads, which use 1.5 gallons per minute, were installed at a total cost of $1,376 with an estimated total water savings of 476,000 gallons annually. With these savings, the payback period for the installation of the shower heads should be about two months

In total, 33 sink faucet aerators and 32 showerheads in First Inn Motel were updated at a cost of $1,594. From the water demand model, it is estimated that a total annual water and energy cost savings of about $11,000 will result from these changes, saving about 488,000 gallons of water and 104,000 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
First Inn Motel Audit

Maximum Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Rooms											
Toilets	32	0	2.5	2.5	gpf	9	flushes	-	720	720	
Showers	32	3.2	0.8	4	gpm	30	minutes	3,072	768	3,840	
Sinks	32	1.1	1.1	2.2	gpm	1.35	minutes	48	48	95	
								-	-	-	
Lobby								-	-	-	
Toilet	1	0	1.6	1.6	gpf	10	flushes	-	16	16	
Sink	1	0.835	0.835	1.67	gpm	1.5	minutes	1	1	3	
								-	-	-	
Kitchen Sink	1	1.1	1.1	2.2	gpm	30	minutes	33	33	66	
								-	-	-	
Other								-	-	-	
Washer/Extractor Commercial	1	57	26	83	gpl	5	loads	285	130	415	
Laundry Customer	1	20	20	40	gpl	8	loads	160	160	320	
Ice Machine	1		17.8	17.8	gp100#	5	100#	-	89	89	
Pool	1		1.5	1.50	gpd	1	daily	-	2	2	
Hot Tub	1		60	60	gpd	1	daily	-	60	60	
Sauna	1		10	10	gpd	1	daily	-	10	10	
								3,599	**2,036**	**5,635**	**max day**
								observed		169,000	max month
										30	days at max
								observed		5,633	aver day

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Rooms											
Toilets	32	0	2.5	2.5	gpf	3	flushes	0	240	240	
Showers	32	3.2	0.8	4	gpm	18	minutes	1843.2	460.8	2304	
Sinks	32	1.1	1.1	2.2	gpm	0.45	minutes	16	16	32	
Lobby											
Toilet	1	0	1.6	1.6	gpf	5	flushes	0	8	8	
Sink	1	0.835	0.835	1.67	gpm	0.75	minutes	0.63	0.63	1.25	
		0									
Kitchen Sink	1	1.1	1.1	2.2	gpm	10	minutes	11	11	22	
Other											
Washer/Extractor Commercial	1	57	26	83	gpl	3	loads	171	78	249	
Laundry Customer	1	20	20	40	gpl	4	loads	80	80	160	
Ice Machine	1	0	17.8	17.8	gp100#	2	100#	0	35.6	35.6	
Pool	1	0	1.5	1.5	gpd	1	daily	0	1.5	1.5	
Hot Tub	1	0	60	60	gpd	1	daily	0	60	60	
Sauna	1	0	10	10	gpd	1	daily	0	10	10	
								2,122	**1,001**	**3,123**	**avg day**
								observed		93,167	avg month
										30	days at avg
								observed		3,106	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
First Inn Motel Audit

Maximum Use Savings Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Rooms														
Toilets	32	0	2.5	2.5	gpf	9	flushes	-	720	720		-	-	-
Showers	32	1.2	0.3	1.5	gpm	30	minutes	1,152	288	1,440		1,920	480	2,400
Sinks	32	0.25	0.25	0.5	gpm	1.35	minutes	11	11	22		37	37	73
Lobby														
Toilet	1	0	1.6	1.6	gpf	10	flushes	-	16	16		-	-	-
Sink	1	0.25	0.25	0.5	gpm	1.5	minutes	0	0	1		1	1	2
Kitchen Sink	1	1.1	1.1	2.2	gpm	30	minutes	33	33	66		-	-	-
Other														
Washer/Extractor Commercial	1	57	26	83	gpl	5	loads	285	130	415		-	-	-
Laundry Customer	1	20	20	40	gpl	8	loads	160	160	320		-	-	-
Ice Machine	1	0	17.8	17.8	gp100#	5	100#	-	89	89		-	-	-
Pool	1	0	1.5	1.5	gpd	1	daily	-	2	2		-	-	-
Hot Tub	1	0	60	60	gpd	1	daily	-	60	60		-	-	-
Sauna	1	0	10	10	gpd	1	daily	-	10	10		-	-	-
								1,641	**1,519**	**3,160**	**max day**			
									observed	169,000	max month			
										53	days at max			
									observed	5,633	aver day			

Average Use Savings Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Rooms														
Toilets	32	0	2.5	2.5	gpf	3	flushes	-	240	240		-	-	-
Showers	32	1.2	0.3	1.5	gpm	18	minutes	691	173	864		1,152	288	1,440
Sinks	32	0.25	0.25	0.5	gpm	0.45	minutes	4	4	7		12	12	24
Lobby														
Toilet	1	0	1.6	1.6	gpf	5	flushes	-	8	8		-	-	-
Sink	1	0.25	0.25	0.5	gpm	0.75	minutes	0	0	0		0	0	1
Kitchen Sink	1	1.1	1.1	2.2	gpm	10	minutes	11	11	22		-	-	-
Other														
Washer/Extractor Commercial	1	57	26	83	gpl	3	loads	171	78	249		-	-	-
Laundry Customer	1	20	20	40	gpl	4	loads	80	80	160		-	-	-
Ice Machine	1	0	17.8	17.8	gp100#	2	100#	-	36	36		-	-	-
Pool	1	0	1.5	1.5	gpd	1	daily	-	2	2		-	-	-
Hot Tub	1	0	60	60	gpd	1	daily	-	60	60		-	-	-
Sauna	1	0	10	10	gpd	1	daily	-	10	10		-	-	-
								957	**701**	**1,658**	avg day			
									observed	93,167	avg month			
										56	days at avg			
									observed	3,106	avg day			

Table 2 - Summary of Current Water Use and Potential Water Savings
First Inn Motel Audit

Costs to Implement

	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Shower	32	$ 33	$ 10	$ 1,376	0.12 yrs	525,600	112,407	$ 11,616	$ 363
Sinks	33	$ 1.61	$ 5	$ 218	1.07 yrs	9,255	1,979	$ 205	$ 6
				$ 1,594		534,855	114,386	$ 11,821	

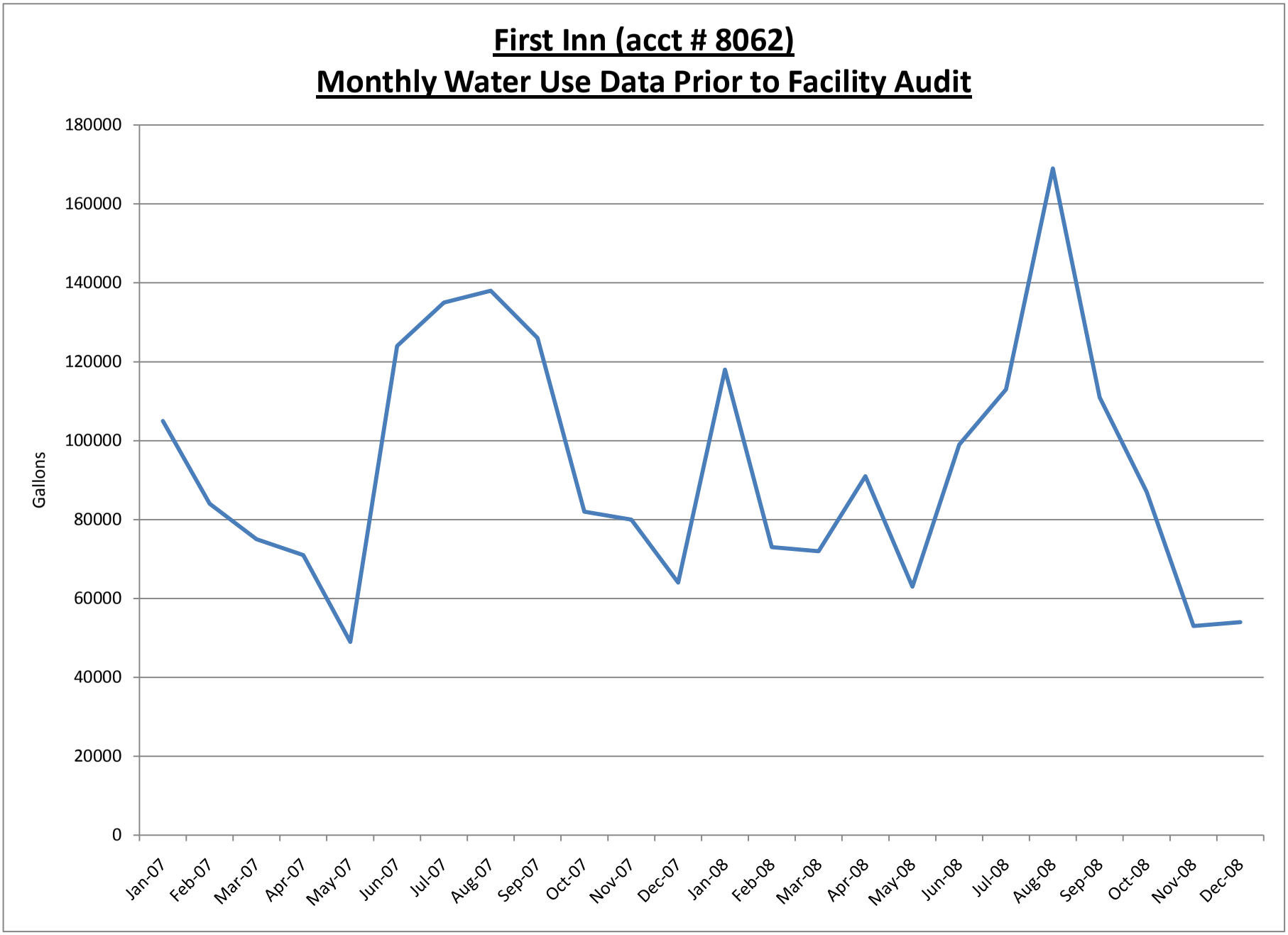
AF Savings: 1.64 $/ AF: $ 971 Replacement Water Cost* : $ 49,242 Avoided Cost** : $ 5,081

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

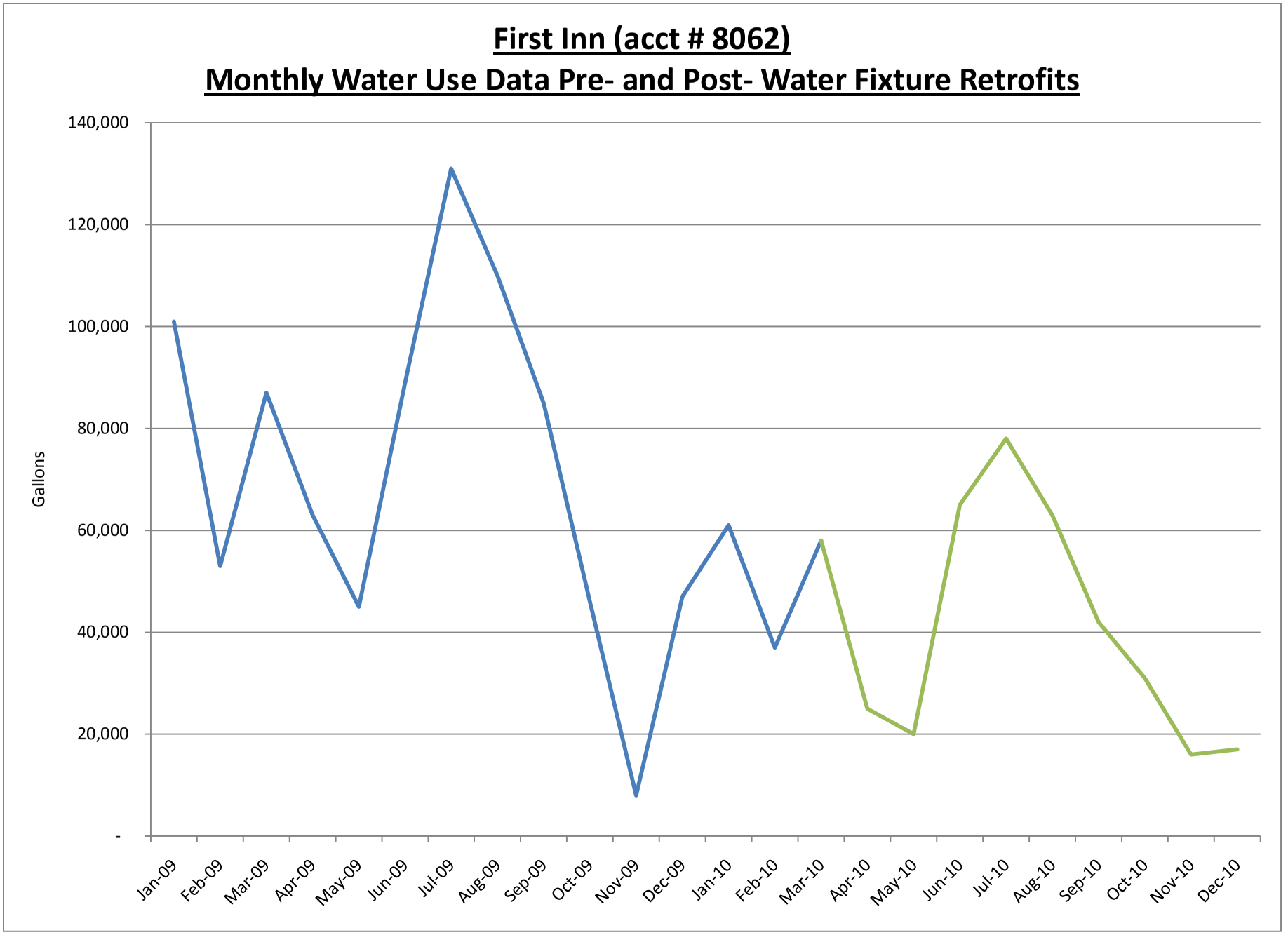
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

First Inn (acct # 8062)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

First Inn (acct # 8062)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



* Water fixture retrofits were installed March 29, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

Pagosa Inn and Suites

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 519 Village Dr in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

Pagosa Inn and Suites uses water in a manner consistent with hotels throughout Colorado, especially those with indoor pools and hot tubs. Similar to many hotels built before 1993, Pagosa Inn and Suites had sinks, showers, and toilets that had not been updated with water efficient fixtures that are currently available in the marketplace.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for Pagosa Inn and Suites included the following assumption:

- Pagosa Inn and Suites indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property

The 110 sink faucet aerators found in each of the hotel suites and the public restroom, used about 2.2 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $244 dollars per year. This savings results in a payback period of about three years.

The 87 hotel showers, on average, used about three gallons of water per minute. New low flow showerheads, which use 1.5 gallons per minute, were installed at a total cost of $3,741 with an estimated total water savings of about 327,000 gallons annually. With these savings, the payback period for the installation of the shower heads should be just over six months

In total, 110 sink faucet aerators and 87 showerheads in Pagosa Inn and Suites were updated at a cost of $4,468. From the water demand model, it is estimated that a total annual water and energy cost savings of about $10,000 will result from these changes, saving about 343,500 gallons of water and 58,000 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
Pagosa Inn Audit Summary

Maximum Use Calculation

		per use						subtotal gpd			
	number	hot	cold	total		uses/day		hot	cold	total	
Handicap Room	7										
Toilet	7			3.5	3.5 gpf	2	flushes	-	49	49	
Shower	7	2.4	0.6	3	gpm	15	minutes	252	63	315	
Sink	7	1.1	1.1	2.2	gpm	0.30	minutes	2	2	5	
Typical Room (2 Queen/ 1 King)	59										
Toilet	59			1.6	1.6 gpf	2	flushes	-	189	189	
Shower	59	2.4	0.6	3	gpm	10	minutes	1,416	354	#####	###
Sink	59	1.1	1.1	2.2	gpm	0.30	minutes	19	19	39	
Suites (King Bed)	9										
Toilet	9			1.6	1.6 gpf	2	flushes	-	29	29	
Shower	9	2.4	0.6	3	gpm	10	minutes	216	54	270	
Sink	18	1.1	1.1	2.2	gpm	0.30	minutes	6	6	12	
Kitchen Sink	9	1.5	1.5	3	gpm	5	minutes	68	68	135	
Jacuzzi	9	72	18	90	g/use	0.8	use	518	130	648	
Suites (Queen)	6										
Toilet	6			1.6	1.6 gpf	2	flushes	-	19	19	
Shower	6	2.4	0.6	3	gpm	10	minutes	144	36	180	
Sink	12	1.1	1.1	2.2	gpm	0.30	minutes	4	4	8	
Kitchen Sink	6	1.5	1.5	3	gpm	5	minutes	45	45	90	
Jacuzzi	6	72	18	90	g/use	0.8	use	346	86	432	
Family Suite (2 Queen, 1 King)	5										
Toilet	5			1.6	1.6 gpf	2	flushes	-	16	16	
Shower	5	2.4	0.6	3	gpm	15	minutes	180	45	225	
Sink	10	1.1	1.1	2.2	gpm	0.30	minutes	3	3	7	
Kitchen Sink	5	1.5	1.5	3	gpm	5	minutes	38	38	75	
Jacuzzi	5	72	18	90	g/use	0.8	use	288	72	360	
Family Suite (2 Queen, 1 King)	1										
Toilet	2			1.6	1.6 gpf	2	flushes	-	6	6	
Shower	1	2.4	0.6	3	gpm	15	minutes	36	9	45	
Sink	2	1.1	1.1	2.2	gpm	0.30	minutes	1	1	1	
Kitchen Sink	5	1.5	1.5	3	gpm	5	minutes	38	38	75	
Jacuzzi	1	72	18	90	g/use	0.8	use	58	14	72	
Public Bathroom											
Mens	1			3.5	3.5 gpf	10	flushes	-	35	35	
Womens	1			3.5	3.5 gpf	15	flushes	-	53	53	
Urinal	1			1	1 gpf	10	flushes	-	10	10	
Mens Sink	1	1.75	1.75	3.5	gpm	3	minutes	5	5	11	
Womens Sink	1	1.75	1.75	3.5	gpm	2	minutes	4	4	8	
Kitchen Sink	1	1	1	2	gpm	15	minutes	15	15	30	
Other											
Dishwasher	1		16	16.0	g/use	4	use	-	64	64	
Ice Machine (Hoshizaki) KM 320 MAH	2		17.8	17.8	gp100#	4	100# Ice	-	142	142	
Pool (Fill w/ Hose 15 min/day)	1		5	5.0	gpm	15	minutes	-	75	75	
SPA	1	2.4	0.6	3	gpm		minutes	-	-	-	
Washing Machine (Commercial) Kenmore Model 11	2	28.5	28.5	57	g/use	3	use	171	171	342	
Outdoor Irrigation			20	20	g/use	-	use	-	-	-	
								3,872	**1,969**	**5,841**	**max day**
								observed		176,000	max month
										30	days at max
								observed		5,867	max day

Table 2 - Summary of Current Water Use and Potential Water Savings
Pagosa Inn Audit Summary

Average Use Calculation

		number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Handicap Room		7										
	Toilet	7		3.5	3.5	gpf	1.2	flushes	-	29	29	
	Shower	7	2.4	0.6	3	gpm	9	minutes	151	38	189	
	Sink	7	1.1	1.1	2.2	gpm	0.18	minutes	1	1	3	
Typical Room (2 Queen/ 1 King)		59										
	Toilet	59		1.6	1.6	gpf	1.2	flushes	-	113	113	
	Shower	59	2.4	0.6	3	gpm	6.5	minutes	920	230	#####	###
	Sink	59	1.1	1.1	2.2	gpm	0.18	minutes	12	12	23	
Suites (King Bed)		9										
	Toilet	9		1.6	1.6	gpf	1.2	flushes	-	17	17	
	Shower	9	2.4	0.6	3	gpm	6.5	minutes	140	35	176	
	Sink	18	1.1	1.1	2.2	gpm	0.18	minutes	4	4	7	
	Kitchen Sink	9	1.5	1.5	3	gpm	2	minutes	27	27	54	
	Jacuzzi	9	72	18	90	g/use	0.25	use	162	41	203	
Suites (Queen)		6										
	Toilet	6		1.6	1.6	gpf	1.2	flushes	-	12	12	
	Shower	6	2.4	0.6	3	gpm	6.5	minutes	94	23	117	
	Sink	12	1.1	1.1	2.2	gpm	0.18	minutes	2	2	5	
	Kitchen Sink	6	1.5	1.5	3	gpm	2	minutes	18	18	36	
	Jacuzzi	6	72	18	90	g/use	0.25	use	108	27	135	
Family Suite (2 Queen, 1 King)		5										
	Toilet	5		1.6	1.6	gpf	1.2	flushes	-	10	10	
	Shower	5	2.4	0.6	3	gpm	9	minutes	108	27	135	
	Sink	10	1.1	1.1	2.2	gpm	0.18	minutes	2	2	4	
	Kitchen Sink	5	1.5	1.5	3	gpm	2	minutes	15	15	30	
	Jacuzzi	5	72	18	90	g/use	0.25	use	90	23	113	
Family Suite (2 Queen, 1 King)		1										
	Toilet	2		1.6	1.6	gpf	1.2	flushes	-	4	4	
	Shower	1	2.4	0.6	3	gpm	9	minutes	22	5	27	
	Sink	2	1.1	1.1	2.2	gpm	0.18	minutes	0	0	1	
	Kitchen Sink	5	1.5	1.5	3	gpm	2	minutes	15	15	30	
	Jacuzzi	1	72	18	90	g/use	0.25	use	18	5	23	
Public Bathroom												
	Mens	1		3.5	3.5	gpf	5	flushes	-	18	18	
	Womens	1		3.5	3.5	gpf	8	flushes	-	28	28	
	Urinal	1		1	1	gpf	8	flushes	-	8	8	
	Mens Sink	1	1.75	1.75	3.5	gpm	2	minutes	3	3	7	
	Womens Sink	1	1.75	1.75	3.5	gpm	1	minutes	2	2	4	
Kitchen Sink		1	1	1	2	gpm	15	minutes	15	15	30	
Other												
Dishwasher		1		16	16	g/use	3	use	-	48	48	
Ice Machine (Hoshizaki) KM 320 MAH		2		17.8	17.8	gp100#	2	100# Ice	-	71	71	
Pool (Fill w/ Hose 15 min/day)		1		5	5	gpm	15	minutes	-	75	75	
SPA		1	2.4	0.6	3	gpm		minutes	-	-	-	
Washing Machine (Commercial) Kenmore Model 11		2	28.5	28.5	57	g/use	2.7	use	154	154	308	
Outdoor Irrigation				20	20	g/use	-	use	-	-	-	
									2,084	**1,157**	**3,241**	**avg day**
									observed		96,960	avg month
											30	days at avg
									observed		3,232	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
Pagosa Inn Audit Summary

Maximum Use Water Savings

		number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Handicap Room		7													
	Toilet	7	0	3.5	3.5	gpf	2	flushes	-	49	49		-	-	-
	Shower	7	1.2	0.3	1.5	gpm	15	minutes	126	32	158		126	32	158
	Sink	7	0.25	0.25	0.5	gpm	0.3	minutes	1	1	1		2	2	4
Typical Room (2 Queen/ 1 King)		59													
	Toilet	59	0	1.6	1.6	gpf	2	flushes	-	189	189		-	-	-
	Shower	59	1.2	0.3	1.5	gpm	10	minutes	708	177	885		708	177	885
	Sink	59	0.25	0.25	0.5	gpm	0.3	minutes	4	4	9		15	15	30
Suites (King Bed)		9													
	Toilet	9	0	1.6	1.6	gpf	2	flushes	-	29	29		-	-	-
	Shower	9	1.2	0.3	1.5	gpm	10	minutes	108	27	135		108	27	135
	Sink	18	0.25	0.25	0.5	gpm	0.3	minutes	1	1	3		5	5	9
	Kitchen Sink	9	1.5	1.5	3	gpm	5	minutes	68	68	135		-	-	-
	Jacuzzi	9	72	18	90	g/use	0.8	use	518	130	648		-	-	-
Suites (Queen)		6													
	Toilet	6	0	1.6	1.6	gpf	2	flushes	-	19	19		-	-	-
	Shower	6	1.2	0.3	1.5	gpm	10	minutes	72	18	90		72	18	90
	Sink	12	0.25	0.25	0.5	gpm	0.3	minutes	1	1	2		3	3	6
	Kitchen Sink	6	1.5	1.5	3	gpm	5	minutes	45	45	90		-	-	-
	Jacuzzi	6	72	18	90	g/use	0.8	use	346	86	432		-	-	-
Family Suite (2 Queen, 1 King)		5													
	Toilet	5	0	1.6	1.6	gpf	2	flushes	-	16	16		-	-	-
	Shower	5	1.2	0.3	1.5	gpm	15	minutes	90	23	113		90	23	113
	Sink	10	0.25	0.25	0.5	gpm	0.3	minutes	1	1	2		3	3	5
	Kitchen Sink	5	1.5	1.5	3	gpm	5	minutes	38	38	75		-	-	-
	Jacuzzi	5	72	18	90	g/use	0.8	use	288	72	360		-	-	-
Family Suite (2 Queen, 1 King)		1													
	Toilet	2	0	1.6	1.6	gpf	2	flushes	-	6	6		-	-	-
	Shower	1	1.2	0.3	1.5	gpm	15	minutes	18	5	23		18	5	23
	Sink	2	0.25	0.25	0.5	gpm	0.3	minutes	0	0	0		1	1	1
	Kitchen Sink	5	1.5	1.5	3	gpm	5	minutes	38	38	75		-	-	-
	Jacuzzi	1	72	18	90	g/use	0.8	use	58	14	72		-	-	-
Public Bathroom															
	Mens	1	0	3.5	3.5	gpf	10	flushes	-	35	35		-	-	-
	Womens	1	0	3.5	3.5	gpf	15	flushes	-	53	53		-	-	-
	Urinal	1	0	1	1	gpf	10	flushes	-	10	10		-	-	-
	Mens Sink	1	0.25	0.25	0.5	gpm	3	minutes	1	1	2		5	5	9
	Womens Sink	1	0.25	0.25	0.5	gpm	2.25	minutes	1	1	1		3	3	7
Kitchen Sink		1	1	1	2	gpm	15	minutes	15	15	30		-	-	-
Other															
Dishwasher		1	0	16	16	g/use	4	use	-	64	64		-	-	-
Ice Machine (Hoshizaki) KM 320 MAH		2	0	17.8	17.8	gp100#	4	100# Ice	-	142	142		-	-	-
Pool (Fill w/ Hose 15 min/day)		1	0	5	5	gpm	15	minutes	-	75	75		-	-	-
SPA		1	2.4	0.6	3	gpm	0	minutes	-	-	-		-	-	-
Washing Machine (Commercial) Kenmore Model 11		2	28.5	28.5	57	g/use	3	use	171	171	342		-	-	-
Outdoor Irrigation		0	0	20	20	g/use	0	use	-	-	-		-	-	-
									2,715	**1,653**	**4,367**	**max day**			
									observed		176,000	max month			
											40	days at max			
									observed		5,867	max day			

Table 2 - Summary of Current Water Use and Potential Water Savings
Pagosa Inn Audit Summary

Average Use Water Savings

		number	per use hot	per use cold	per use total		uses/day	subtotal gpd hot	subtotal gpd cold	subtotal gpd total	Savings hot	Savings cold	Savings total
Handicap Room		7											
	Toilet	7	0	3.5	3.5	gpf	1.2 flushes	0	29.4	29	-	-	-
	Shower	7	1.2	0.3	1.5	gpm	9 minutes	75.6	18.9	95	76	19	95
	Sink	7	0.25	0.25	0.5	gpm	0.18 minutes	0.315	0.315	1	1	1	2
Typical Room (2 Queen/ 1 King)		59											
	Toilet	59	0	1.6	1.6	gpf	1.2 flushes	0	113.28	113	-	-	-
	Shower	59	1.2	0.3	1.5	gpm	6.5 minutes	460.2	115.05	575	460	115	575
	Sink	59	0.25	0.25	0.5	gpm	0.18 minutes	2.655	2.655	5	9	9	18
Suites (King Bed)		9											
	Toilet	9	0	1.6	1.6	gpf	1.2 flushes	0	17.28	17	-	-	-
	Shower	9	1.2	0.3	1.5	gpm	6.5 minutes	70.2	17.55	88	70	18	88
	Sink	18	0.25	0.25	0.5	gpm	0.18 minutes	0.81	0.81	2	3	3	6
	Kitchen Sink	9	1.5	1.5	3	gpm	2 minutes	27	27	54	-	-	-
	Jacuzzi	9	72	18	90	g/use	0.25 use	162	40.5	203	-	-	-
Suites (Queen)		6											
	Toilet	6	0	1.6	1.6	gpf	1.2 flushes	0	11.52	12	-	-	-
	Shower	6	1.2	0.3	1.5	gpm	6.5 minutes	46.8	11.7	59	47	12	59
	Sink	12	0.25	0.25	0.5	gpm	0.18 minutes	0.54	0.54	1	2	2	4
	Kitchen Sink	6	1.5	1.5	3	gpm	2 minutes	18	18	36	-	-	-
	Jacuzzi	6	72	18	90	g/use	0.25 use	108	27	135	-	-	-
Family Suite (2 Queen, 1 King)		5											
	Toilet	5	0	1.6	1.6	gpf	1.2 flushes	0	9.6	10	-	-	-
	Shower	5	1.2	0.3	1.5	gpm	9 minutes	54	13.5	68	54	14	68
	Sink	10	0.25	0.25	0.5	gpm	0.18 minutes	0.45	0.45	1	2	2	3
	Kitchen Sink	5	1.5	1.5	3	gpm	2 minutes	15	15	30	-	-	-
	Jacuzzi	5	72	18	90	g/use	0.25 use	90	22.5	113	-	-	-
Family Suite (2 Queen, 1 King)		1											
	Toilet	2	0	1.6	1.6	gpf	1.2 flushes	0	3.84	4	-	-	-
	Shower	1	1.2	0.3	1.5	gpm	9 minutes	10.8	2.7	14	11	3	14
	Sink	2	0.25	0.25	0.5	gpm	0.18 minutes	0.09	0.09	0	0	0	1
	Kitchen Sink	5	1.5	1.5	3	gpm	2 minutes	15	15	30	-	-	-
	Jacuzzi	1	72	18	90	g/use	0.25 use	18	4.5	23	-	-	-
Public Bathroom													
	Mens	1	0	3.5	3.5	gpf	5 flushes	0	17.5	18	-	-	-
	Womens	1	0	3.5	3.5	gpf	8 flushes	0	28	28	-	-	-
	Urinal	1	0	1	1	gpf	8 flushes	0	8	8	-	-	-
	Mens Sink	1	0.25	0.25	0.5	gpm	2 minutes				3	3	7
	Womens Sink	1	0.25	0.25	0.5	gpm	1 minutes				2	2	4
Kitchen Sink		1	1	1	2	gpm	15 minutes	15	15	30	-	-	-
Other													
Dishwasher		1	0	16	16	g/use	3 use	0	48	48			
Ice Machine (Hoshizaki) KM 320 MAH		2	0	17.8	17.8	gp100#	2 100# Ice	0	71.2	71			
Pool (Fill w/ Hose 15 min/day)		1	0	5	5	gpm	15 minutes	0	75	75			
SPA		1	2.4	0.6	3	gpm	0 minutes	0	0	0			
Washing Machine (Commercial) Kenmore Model 11		2	28.5	28.5	57	g/use	2.7 use	153.9	153.9	308			
Outdoor Irrigation		0	0	20	20	g/use	0 use	0	0	0			
								1,344		**955**	**2,300**	**avg day**	
								observed			96,960	avg month	
											42	days at avg	
								observed			3,232	avg day	

Costs to Implement

	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Shower	87	$ 33.00	$ 10.00	$ 3,741	0.59	327,405	56,016	$ 6,326	$ 73
Bathroom Sink	110	$ 1.61	$ 5.00	$ 727	2.98	16,087	1,720	$ 244	$ 2
				$ 4,468		343,492	57,736	$ 6,569	

AF Savings: 1.05 $/AF: $ 690

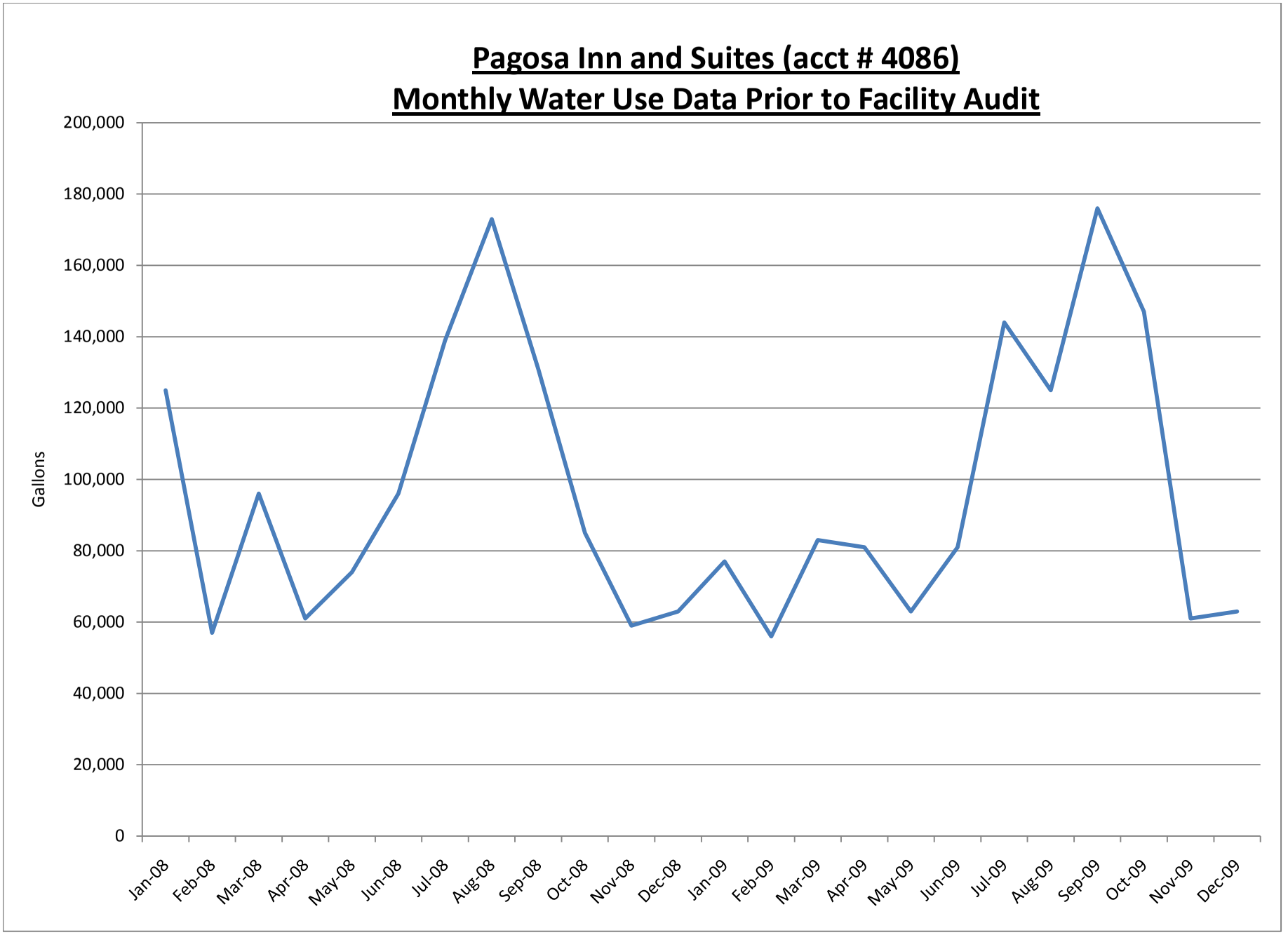
Replacement Water Cost* : $ 31,624

Avoided Cost** : $ 3,263

* Calculation based on $30,000 per AF

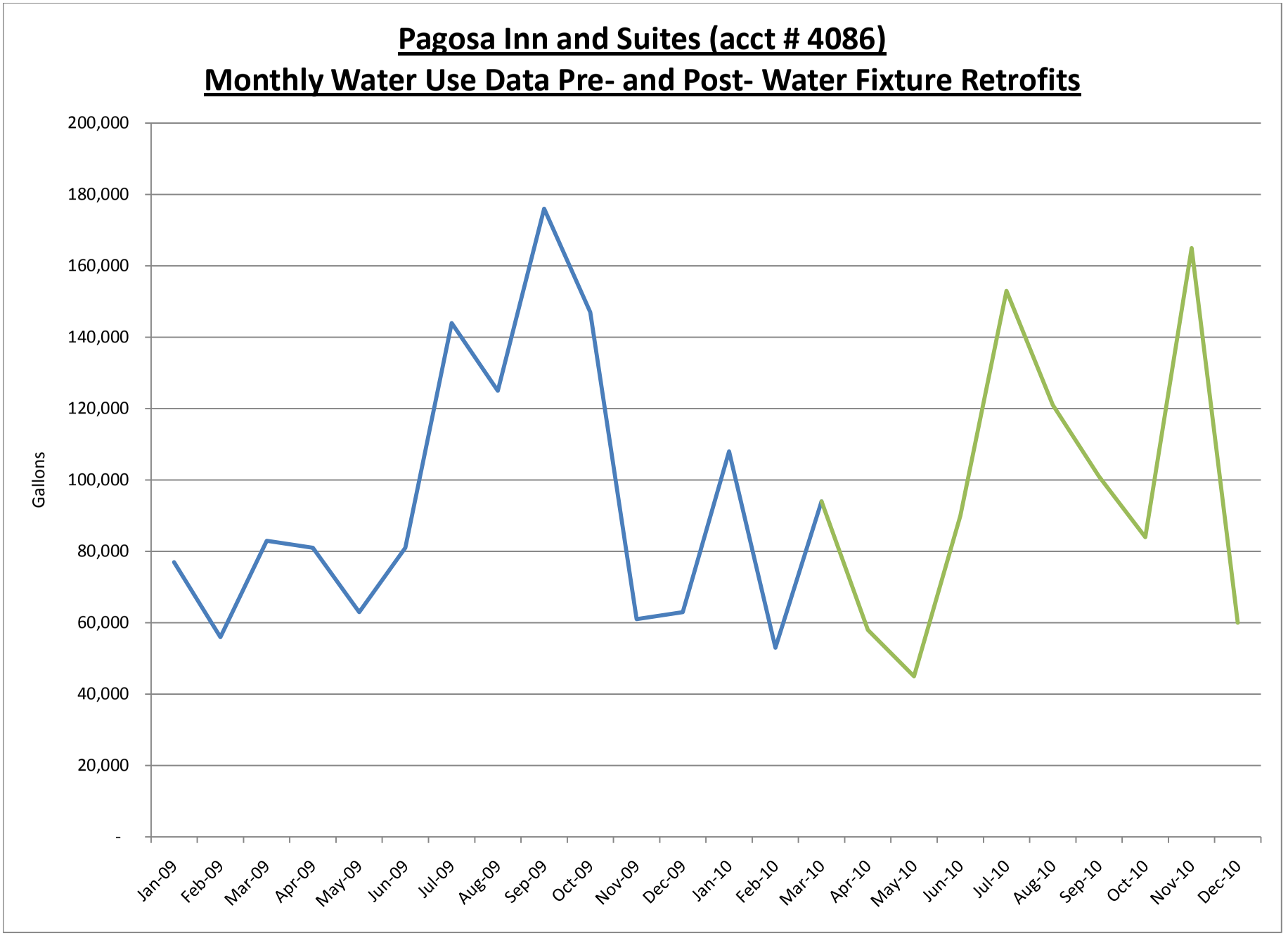
** Calculation based on $9.50/ 1000 gal

Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Pagosa Inn and Suites (acct # 4086)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 31, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

Pinewood Inn

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 157 Pagosa St in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

Pinewood Inn uses water in a manner consistent with hotels throughout Colorado. Similar to many hotels built before 1993, Pinewood Inn had sinks, showers, and toilets that had not been updated with water efficient fixtures that are currently available in the marketplace.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for Pinewood Inn included the following assumption:

- Pinewood Inn indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property
- Pinewood Inn also indicated that the rooms including a kitchen unit are usually the first rooms to be filled, therefore, the water demand table shows those rooms with a high average volume

The 25 sink faucet aerators found in each of the hotel suites used about 2.7 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $50 dollars per year per sink. This savings results in a payback period of about two months.

The 25 hotel showers, on average, used about 4.2 gallons of water per minute. New low flow showerheads, which use 1.5 gallons per minute, were installed at a total cost of $1,075 with an estimated total water savings of about 140,000 gallons annually. With these savings, the payback period for the installation of the shower heads should be about four months

In total, 25 sink faucet aerators and 25 showerheads in Pinewood Inn were updated at a cost of $1,240. From the water demand model, it is estimated that a total annual water and energy cost savings of about $4,300 will result from these changes, saving about 192,000 gallons of water and 41,000 kilowatt hours of energy.

Table 2- Summary of Current Water Use and Potential Water Savings
Pinewood Inn Audit Summary

Maximum Use Calculation

		per use					subtotal gpd			
	number	hot	cold	total		uses/day	hot	cold	total	
Single Unit	12									
toilet	12	0	1.6	1.6	gpf	1.5 flushes	0	28.8	28.8	
shower	12	4.8	1.2	6	gpm	7 minutes	403.2	100.8	504	
sink	12	1.5	1.5	3	gpm	2.225 minutes	40.05	40.05	80.1	
Double Unit	8									
toilet	8	0	1.6	1.6	gpf	3 flushes	0	38.4	38.4	
shower	8	2	0.5	2.5	gpm	20 minutes	320	80	400	
sink	8	1.25	1.25	2.5	gpm	4.45 minutes	44.5	44.5	89	
Kitchen Unit	5									
toilet	5	0	1.6	1.6	gpf	4 flushes	0	32	32	
shower	5	2	0.5	2.5	gpm	20 minutes	200	50	250	
sink	5	1.25	1.25	2.5	gpm	4.6 minutes	28.75	28.75	57.5	
kitchen sink	5	2	0.5	2.5	gpm	10 minutes	100	25	125	
Residence										
toilet	3	0	2.5	2.5	gpf	5 flushes	0	37.5	37.5	
shower	3	3.2	0.8	4	gpm	30 minutes	288	72	360	
sink	3	1.1	1.1	2.2	gpm	6.75 minutes	22.275	22.275	44.55	
kitchen sink	1	1.2	0.3	1.5	gpm	35 minutes	42	10.5	52.5	
Other										
Ice Machine	1	0	17.8	17.8	gp100#	2 100#	0	35.6	35.6	
Laundry (motel)	1	21	21	42	gpc	3 cycles	63	63	126	
Laundry (residence)	1	21	21	42	gpc	1.5 cycles	31.5	31.5	63	
Dishwasher (residence)	1	0	1.2	1.2	gpc	1 cycles	0	1.2	1.2	
							1,583	**742**	**2,325**	**max day**
							observed		70,000	max month
									30	days at max
							observed		2,333	max day

Average Use Calculation

		per use					subtotal gpd			
	number	hot	cold	total		uses/day	hot	cold	total	
Single Unit	12									
toilet	12	0	1.6	1.6	gpf	1.2 flushes	0	23.04	23.04	
shower	12	4.8	1.2	6	gpm	4.5 minutes	259.2	64.8	324	
sink	12	1.5	1.5	3	gpm	2.18 minutes	39.24	39.24	78.48	
Double Unit	8									
toilet	8	0	1.6	1.6	gpf	1.5 flushes	0	19.2	19.2	
shower	8	2	0.5	2.5	gpm	8 minutes	128	32	160	
sink	8	1.25	1.25	2.5	gpm	2.225 minutes	22.25	22.25	44.5	
Kitchen Unit	5									
toilet	5	0	1.6	1.6	gpf	3 flushes	0	24	24	
shower	5	2	0.5	2.5	gpm	15 minutes	150	37.5	187.5	
sink	5	1.25	1.25	2.5	gpm	4.45 minutes	27.8125	27.8125	55.625	
kitchen sink	5	2	0.5	2.5	gpm	5 minutes	50	12.5	62.5	
Residence										
toilet	3	0	2.5	2.5	gpf	2.5 flushes	0	18.75	18.75	
shower	3	3.2	0.8	4	gpm	21 minutes	201.6	50.4	252	
sink	3	1.1	1.1	2.2	gpm	6.375 minutes	21.0375	21.0375	42.075	
kitchen sink	1	1.2	0.3	1.5	gpm	25 minutes	30	7.5	37.5	
Other										
Ice Machine	1	0	17.8	17.8	gp100#	1 100#	0	17.8	17.8	
Laundry (motel)	1	21	21	42	gpc	2 cycles	42	42	84	
Laundry (residence)	1	21	21	42	gpc	1 cycles	21	21	42	
Dishwasher (residence)	1	0	1.2	1.2	gpc	1 cycles	0	1.2	1.2	
							992	**482**	**1,474**	**avg day**
							observed		44,364	avg month
									30	days at avg
							observed		1,479	avg day

Table 2- Summary of Current Water Use and Potential Water Savings
Pinewood Inn Audit Summary

Maximum Use Calculation

		per use					subtotal gpd			Savings		
	number	hot	cold	total		uses/day	hot	cold	total	hot	cold	total
Single Unit	12											
toilet	12	0	1.6	1.6	gpf	1.5 flushes	0	28.8	28.8	0	0	0
shower	12	1.2	0.3	1.5	gpm	7 minutes	100.8	25.2	126	302.4	75.6	378
sink	12	0.25	0.25	0.5	gpm	2.225 minutes	6.675	6.675	13.35	33.375	33.375	66.75
Double Unit	8											
toilet	8	0	1.6	1.6	gpf	3 flushes	0	38.4	38.4	0	0	0
shower	8	1.2	0.3	1.5	gpm	20 minutes	192	48	240	128	32	160
sink	8	0.25	0.25	0.5	gpm	4.45 minutes	8.9	8.9	17.8	35.6	35.6	71.2
Kitchen Unit	5											
toilet	5	0	1.6	1.6	gpf	4 flushes	0	32	32	0	0	0
shower	5	1.2	0.3	1.5	gpm	20 minutes	120	30	150	80	20	100
sink	5	0.25	0.25	0.5	gpm	4.6 minutes	5.75	5.75	11.5	23	23	46
kitchen sink	5	2	0.5	2.5	gpm	10 minutes	100	25	125	0	0	0
Residence												
toilet	3	0	2.5	2.5	gpf	5 flushes	0	37.5	37.5	0	0	0
shower	3	3.2	0.8	4	gpm	30 minutes	288	72	360	0	0	0
sink	3	1.1	1.1	2.2	gpm	6.75 minutes	22.275	22.275	44.55	0	0	0
kitchen sink	1	1.2	0.3	1.5	gpm	35 minutes	42	10.5	52.5	0	0	0
Other												
Ice Machine	1	0	17.8	17.8	gp100#	2 100#	0	35.6	35.6	0	0	0
Laundry (motel)	1	21	21	42	gpc	3 cycles	63	63	126	0	0	0
Laundry (residence)	1	21	21	42	gpc	1.5 cycles	31.5	31.5	63	0	0	0
Dishwasher (residence)	1	0	1.2	1.2	gpc	1 cycles	0	1.2	1.2	0	0	0
							981	**522**	**1,503**	**max day**		
							observed		70,000	max month		
									47	days at max		
							observed		2,333	max day		

Average Use Calculation

		per use					subtotal gpd			Savings		
	number	hot	cold	total		uses/day	hot	cold	total	hot	cold	total
Single Unit	12											
toilet	12	0	1.6	1.6	gpf	1.2 flushes	0	23.04	23.04	0	0	0
shower	12	1.2	0.3	1.5	gpm	4.5 minutes	64.8	16.2	81	194.4	48.6	243
sink	12	0.25	0.25	0.5	gpm	2.18 minutes	6.54	6.54	13.08	32.7	32.7	65.4
Double Unit	8											
toilet	8	0	1.6	1.6	gpf	1.5 flushes	0	19.2	19.2	0	0	0
shower	8	1.2	0.3	1.5	gpm	8 minutes	76.8	19.2	96	51.2	12.8	64
sink	8	0.25	0.25	0.5	gpm	2.225 minutes	4.45	4.45	8.9	17.8	17.8	35.6
Kitchen Unit	5											
toilet	5	0	1.6	1.6	gpf	3 flushes	0	24	24	0	0	0
shower	5	1.2	0.3	1.5	gpm	15 minutes	90	22.5	112.5	60	15	75
sink	5	0.25	0.25	0.5	gpm	4.45 minutes	5.5625	5.5625	11.125	22.25	22.25	44.5
kitchen sink	5	2	0.5	2.5	gpm	5 minutes	50	12.5	62.5	0	0	0
Residence												
toilet	3	0	2.5	2.5	gpf	2.5 flushes	0	18.75	18.75	0	0	0
shower	3	3.2	0.8	4	gpm	21 minutes	201.6	50.4	252	0	0	0
sink	3	1.1	1.1	2.2	gpm	6.375 minutes	21.0375	21.0375	42.075	0	0	0
kitchen sink	1	1.2	0.3	1.5	gpm	25 minutes	30	7.5	37.5	0	0	0
Other												
Ice Machine	1	0	17.8	17.8	gp100#	1 100#	0	17.8	17.8	0	0	0
Laundry (motel)	1	21	21	42	gpc	2 cycles	42	42	84	0	0	0
Laundry (residence)	1	21	21	42	gpc	1 cycles	21	21	42	0	0	0
Dishwasher (residence)	1	0	1.2	1.2	gpc	1 cycles	0	1.2	1.2	0	0	0
							614	**333**	**947**	**avg day**		
							observed		44,364	avg month		
									47	days at avg		
							observed		1,479	avg day		

Table 2- Summary of Current Water Use and Potential Water Savings
Pinewood Inn Audit Summary

Costs to Implement

	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Shower	25	$ 33	$ 10	$ 1,075	0.35 yrs	139,430	29,819	$ 3,082	$ 123
Sinks	25	$ 1.61	$ 5	$ 165	0.14 yrs	53,108	11,358	$ 1,174	$ 47
				$ 1,240		192,538	41,177	$ 4,255	

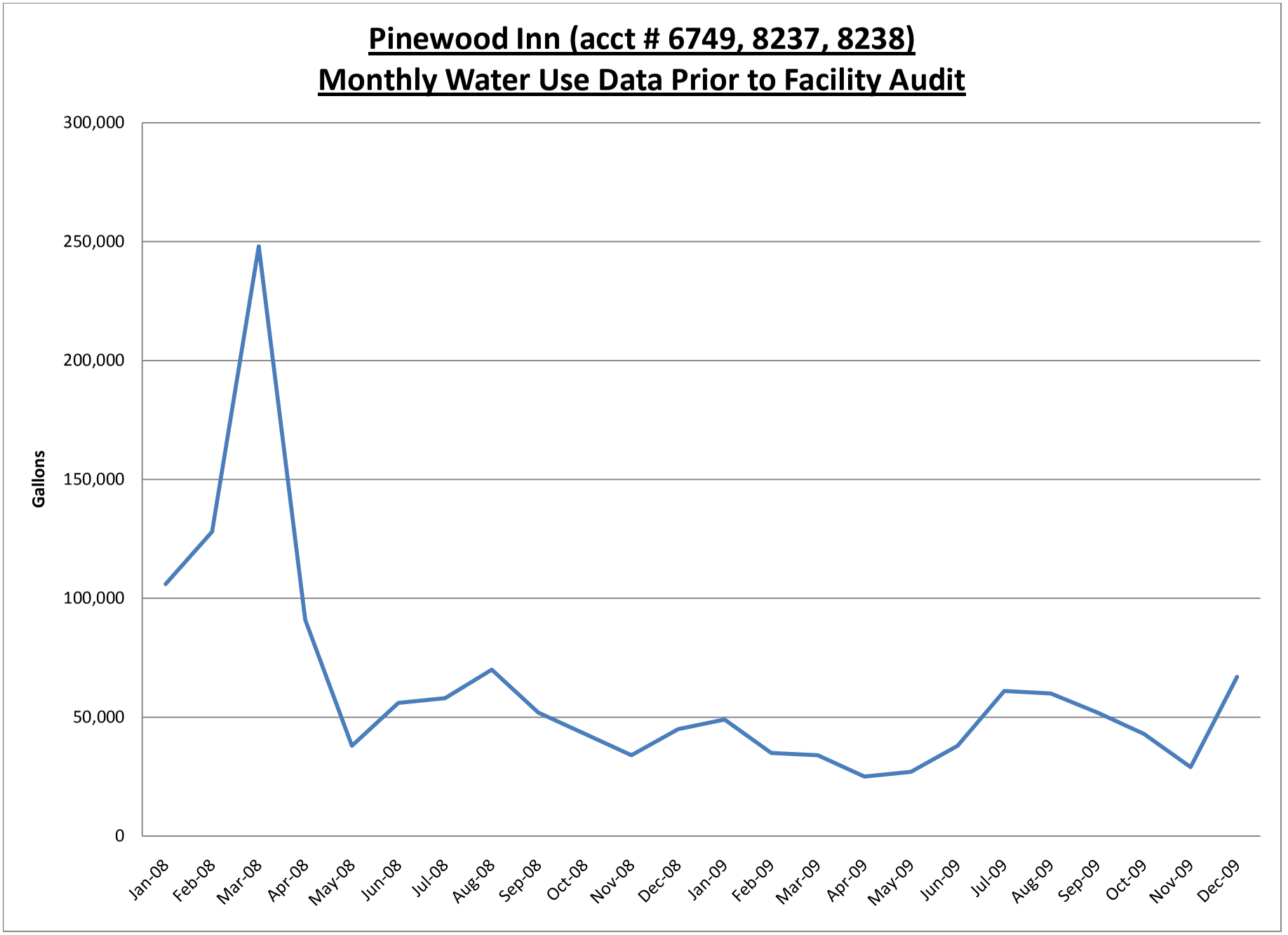
AF Savings:	0.59	$/ AF:	$ 2,099	Replacement Water Cost* :	$ 17,726	Avoided Cost** :	$ 1,829

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

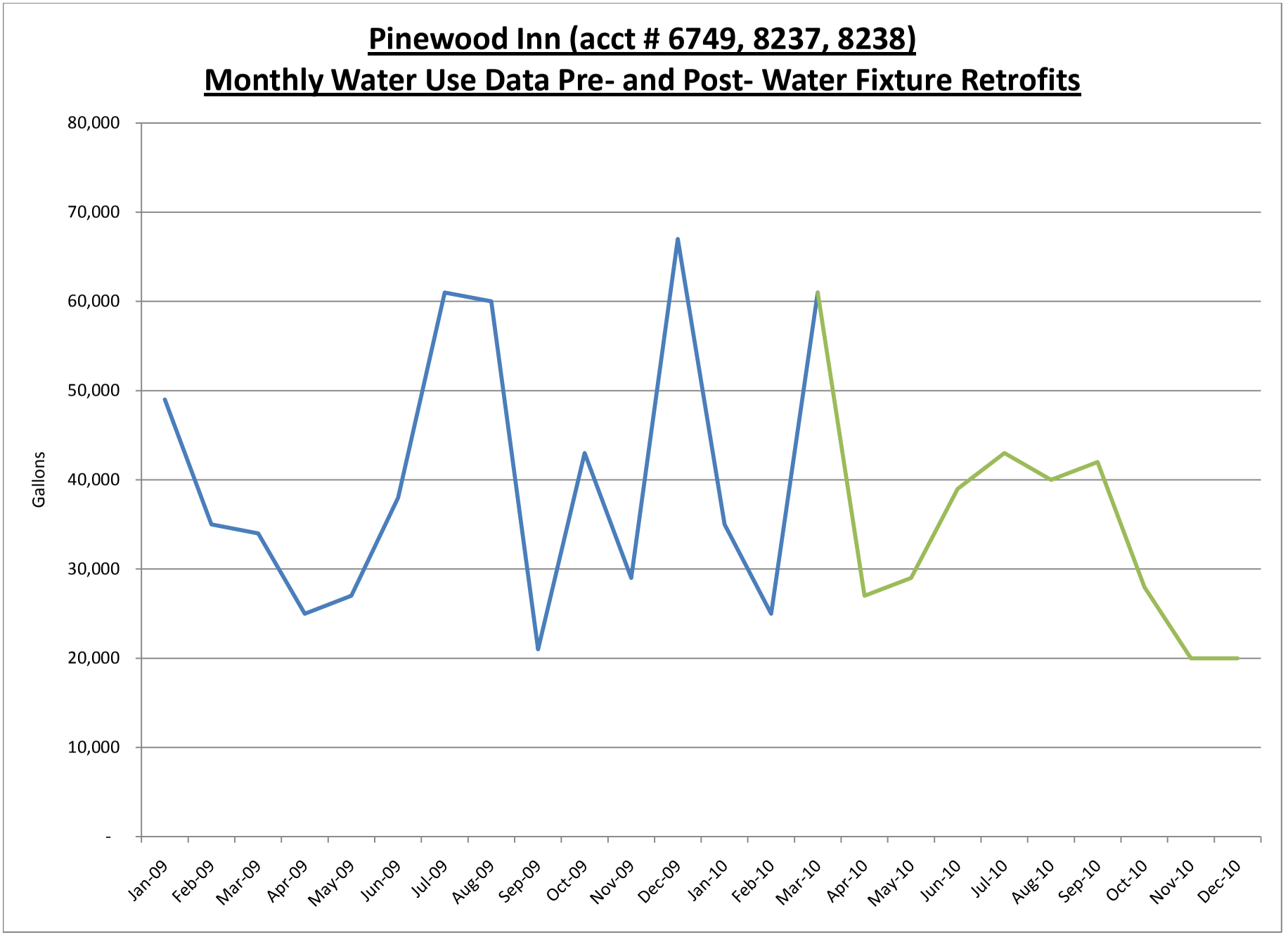
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

Pinewood Inn (acct # 6749, 8237, 8238)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Pinewood Inn (acct # 6749, 8237, 8238)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed on March 29, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

The Spa

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 317 Hot Springs Blvd. in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

The Spa uses water in a manner consistent with resorts throughout Colorado. Similar to many facilities built before 1993, the Spa had sinks, showers, and toilets that had not been updated with water efficient fixtures that are currently available in the marketplace.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for the Spa included the following assumption:

- The Spa indicated that they do have some outdoor irrigation by hose during summer months. In order to account for account for indoor water use only, an expected average monthly outdoor water use was estimated based off of the irrigation area, and deducted from the average monthly water use
- The maximum monthly water demand value was not adjusted since it occurred during a winter month, excluding any outdoor water use

The 20 sink faucet aerators found in each of the hotel suites, the Spa bathroom, Salon and Laundry room used, on average, about 2.55 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $143 dollars per year per sink. This savings results in a payback period of about 3 weeks.

The 20 hotel showers, on average, used about three gallons of water per minute. New low flow showerheads, which use 1.5 gallons per minute, were installed at a total cost of $860 with an estimated total water savings of about 524,000 gallons annually. With these savings, the payback period for the installation of the shower heads should be about 4 weeks.

The four toilets replaced in the Spa, on average, used 1.6 gallons per flush. New Water Sense approved high efficiency dual-flush toilets, which use on average 0.9 gallons per flush, were installed at a total cost of $1,508 with an estimated total water savings of about 33,000 gallons annually. With these savings, the payback period for the installation of the toilets is estimated to be about 6 years. Additionally, one urinal was replaced with a Water Sense approved waterless urinal at a cost of $396 with a payback period estimated to be about 2.5 years. It is estimated that the urinal replacements will have a total water savings of about 20,000 gallons annually.

In total, 20 sink faucet aerators, 20 showerheads, four toilets and one urinal in The Spa were updated at a cost of $2,896. From the water demand model, it is estimated that a total annual water and energy cost savings of about $15,000 will result from these changes, saving about 700,000 gallons of water and 140,000 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
The Spa Audit Summary

Maximum Use Calculation

		per use					subtotal gpd			
	number	hot	cold	total		uses/day	hot	cold	total	
Room (1 Queen)	4									
Toilet	4	0	1.6	1.6	gpf	8.0 flushes	-	51	51	
Shower	4	2	0.5	2.5	gpm	30.0 minutes	240	60	300	
Sink	4	1	1	2	gpm	9.2 minutes	37	37	74	
Kitchen Sink	4	2.4	0.6	3	gpm	20.0 minutes	192	48	240	
							-	-	-	
Room (1 Queen w/ pull out couch)	2						-	-	-	
Toilet	2	0	1.6	1.6	gpf	12.0 flushes	-	38	38	
Shower	2	2	0.5	2.5	gpm	45.0 minutes	180	45	225	
Sink	2	1	1	2	gpm	13.8 minutes	28	28	55	
Kitchen Sink	2	2.4	0.6	3	gpm	20.0 minutes	96	24	120	
							-	-	-	
Room (2 Queen)	8						-	-	-	
Toilet	8	0	1.6	1.6	gpf	16.0 flushes	-	205	205	
Shower	8	3.2	0.8	4	gpm	60.0 minutes	1,536	384	1,920	
Sink	8	1.5	1.5	3	gpm	18.4 minutes	221	221	442	
							-	-	-	
Salon							-	-	-	
toilet	1	0	1.6	1.6	gpf	20.0 flushes	-	32	32	
shower	1	2	0.5	2.5	gpm	25.0 minutes	50	13	63	
sink	1	1	1	2	gpm	10.0 minutes	10	10	20	
							-	-	-	
SPA Bathroom							-	-	-	
Men	2	0	1.6	1.6	gpf	37.0 flushes	-	118	118	
Women	3	0	1.6	1.6	gpf	50.0 flushes	-	240	240	
urinal	1	0	1	1	gpf	75.0 flushes	-	75	75	
Shower Men	3	1.2	0.3	1.5	gpm	300.0 minutes	1,080	270	1,350	
Shower Women	2	1.8	0.45	2.25	gpm	300.0 minutes	1,080	270	1,350	
Sink Men	2	1.25	1.25	2.5	gpm	16.8 minutes	42	42	84	
Sink Women	2	1.25	1.25	2.5	gpm	7.5 minutes	19	19	38	
							-	-	-	
Laundry							-	-	-	
toilet	1	0	1.6	1.6	gpf	20.0 flushes	-	32	32	
Sink	1	1.5	1.5	3	gpm	3.0 minutes	5	5	9	
Home (3 People full time)							-	-	-	
Full Bath							-	-	-	
Toilet	1	0	1.6	1.6	gpf	12.0 flushes	-	19	19	
Sink	1	1.5	1.5	3	gpm	13.8 minutes	21	21	41	
Shower	1	2	0.5	2.5	gpm	45.0 minutes	90	23	113	
							-	-	-	
Half Bath							-	-	-	
Toilet	1	0	1.6	1.6	gpf	5.0 flushes	-	8	8	
Sink	1	0.75	0.75	1.5	gpm	0.8 minutes	1	1	1	
							-	-	-	
Half Bath							-	-	-	
Toilet	1	0	3.5	3.5	gpf	2.0 flushes	-	7	7	
Sink (Drips, cant turn on)	1	0	0	0	gpm	- minutes	-	-	-	
							-	-	-	
Kitchen Sink	1	1.6	0.4	2	gpm	15.0 minutes	24	6	30	
							-	-	-	
							-	-	-	
Other							-	-	-	
Washing Machine (HE Kenmore)	1	12	12	24	g/use	1.0 use	12	12	24	
Washing Machine (Unimac)UC40MNZYU60001	1	20	20	40	g/use	5.0 use	100	100	200	
Washing Machine (Speed Queeza) SC40MNZYU40001	1	20	20	40	g/use	5.0 use	100	100	200	
DishWashing Machine Maytag (home)	1	0	14	14	g/use	1.0 use	-	14	14	
							-	-	-	
Outdoor Irrigation w/ hose	1	0	320	320	gpd	- day	-	-	-	
RV 8 Spaces w Yard Spigots	8	0	5	5	gpm	- minutes	-	-	-	
							5,162	**2,576**	**7,737**	**max day**
							observed		232,000	max month
									30	days at max
							observed		7,733	max day

Table 2 - Summary of Current Water Use and Potential Water Savings
The Spa Audit Summary

Average Use Calculation

	number	per use hot	per use cold	total		uses/day		hot	subtotal gpd cold	total		
Room (1 Queen)		4										
	Toilet	4	0	1.6	1.6 gpf	6.0	flushes		-	38	38	
	Shower	4	2	0.5	2.5 gpm	30.0	minutes		240	60	300	
	Sink	4	1	1	2 gpm	8.5	minutes		34	34	68	
	Kitchen Sink	4	2.4	0.6	3 gpm	10.0	minutes		96	24	120	
Room (1 Queen w/ pull out couch)		2										
	Toilet	2	0	1.6	1.6 gpf	9.0	flushes		-	29	29	
	Shower	2	2	0.5	2.5 gpm	36.0	minutes		144	36	180	
	Sink	2	1	1	2 gpm	7.4	minutes		15	15	29	
	Kitchen Sink	2	2.4	0.6	3 gpm	10.0	minutes		48	12	60	
Room (2 Queen)		8										
	Toilet	8	0	1.6	1.6 gpf	12.0	flushes		-	154	154	
	Shower	8	3.2	0.8	4 gpm	48.0	minutes		1,229	307	1,536	
	Sink	8	1.5	1.5	3 gpm	9.8	minutes		118	118	235	
Salon												
	toilet	1	0	1.6	1.6 gpf	15.0	flushes		-	24	24	
	shower	1	2	0.5	2.5 gpm	20.0	minutes		40	10	50	
	sink	1	1	1	2 gpm	7.5	minutes		8	8	15	
									-	-	-	
SPA Bathroom									-	-	-	
	Men	2	0	1.6	1.6 gpf	25.0	flushes		-	80	80	
	Women	3	0	1.6	1.6 gpf	35.0	flushes		-	168	168	
	urinal	1	0	1	1 gpf	55.0	flushes		-	55	55	
	Shower Men	3	1.2	0.3	1.5 gpm	175.0	minutes		630	158	788	
	Shower Women	2	1.8	0.45	2.25 gpm	175.0	minutes		630	158	788	
	Sink Men	2	1.25	1.25	2.5 gpm	12.0	minutes		30	30	60	
	Sink Women	2	1.25	1.25	2.5 gpm	5.3	minutes		13	13	26	
									-	-	-	
Laundry									-	-	-	
	toilet	1	0	1.6	1.6 gpf	15.0	flushes		-	24	24	
	Sink	1	1.5	1.5	3 gpm	2.3	minutes		3	3	7	
Home (3 People full time)									-	-	-	
Full Bath									-	-	-	
	Toilet	1	0	1.6	1.6 gpf	9.0	flushes		-	14	14	
	Sink	1	1.5	1.5	3 gpm	7.4	minutes		11	11	22	
	Shower	1	2	0.5	2.5 gpm	45.0	minutes		90	23	113	
									-	-	-	
Half Bath									-	-	-	
	Toilet	1	0	1.6	1.6 gpf	4.0	flushes		-	6	6	
	Sink	1	0.75	0.75	1.5 gpm	0.6	minutes		0	0	1	
									-	-	-	
Half Bath									-	-	-	
	Toilet	1	0	3.5	3.5 gpf	2.0	flushes		-	7	7	
	Sink (Drips, cant turn on)	1	0	0	0 gpm	-	minutes		-	-	-	
									-	-	-	
	Kitchen Sink	1	1.6	0.4	2 gpm	10.0	minutes		16	4	20	
									-	-	-	
									-	-	-	
Other									-	-	-	
Washing Machine (HE Kenmore)		1	12	12	24 g/use	1.0	use		12	12	24	
Washing Machine (Unimac)UC40MNZYU60001		1	20	20	40 g/use	4.0	use		80	80	160	
Washing Machine (Speed Queeza) SC40MNZYU40001		1	20	20	40 g/use	4.0	use		80	80	160	
DishWashing Machine Maytag (home)		1	0	14	14 g/use	0.5	use		-	7	7	
									-	-	-	
Outdoor Irrigation w/ hose		1	0	319.79138	319.7914 gpd	-	day		-	-	-	
RV 8 Spaces w Yard Spigots		8	0	5	5 gpm	-	minutes		-	-	-	
									3,567	1,801	5,368	**avg day**
									observed		161,225	avg month
											30	days at avg
									observed		5,374	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
The Spa Audit Summary

Maximum Use Water Savings

		per use					subtotal gpd			Savings		
	number	hot	cold	total		uses/day	hot	cold	total	hot	cold	total
Room (1 Queen)	4											
Toilet	4	0	1.6	1.6	gpf	8.0 flushes	0	51.2	51.2	-	-	-
Shower	4	1.2	0.3	1.5	gpm	30.0 minutes	144	36	180	96	24	120
Sink	4	0.25	0.25	0.5	gpm	9.2 minutes	9.2	9.2	18.4	28	28	55
Kitchen Sink	4	2.4	0.6	3	gpm	20.0 minutes	192	48	240	-	-	-
Room (1 Queen w/ pull out couch)	2											
Toilet	2	0	1.6	1.6	gpf	12.0 flushes	0	38.4	38.4	-	-	-
Shower	2	1.2	0.3	1.5	gpm	45.0 minutes	108	27	135	72	18	90
Sink	2	0.25	0.25	0.5	gpm	13.8 minutes	6.9	6.9	13.8	21	21	41
Kitchen Sink	2	2.4	0.6	3	gpm	20.0 minutes	96	24	120	-	-	-
Room (2 Queen)												
Toilet	8	0	1.6	1.6	gpf	16.0 flushes	0	204.8	204.8	-	-	-
Shower	8	1.2	0.3	1.5	gpm	60.0 minutes	576	144	720	960	240	1,200
Sink	8	0.25	0.25	0.5	gpm	18.4 minutes	36.8	36.8	73.6	184	184	368
Salon												
toilet	1	0	1.6	1.6	gpf	20.0 flushes	0	32	32	-	-	-
shower	1	1.2	0.3	1.5	gpm	25.0 minutes	30	7.5	37.5	20	5	25
sink	1	0.25	0.25	0.5	gpm	10.0 minutes	2.5	2.5	5	8	8	15
SPA Bathroom												
Men	2	0	1.25	1.25	gpf	37.0 flushes	0	92.5	92.5	-	26	26
Women	3	0	0.9	0.9	gpf	50.0 flushes	0	135	135	-	105	105
urinal	1	0	0	0	gpf	75.0 flushes	0	0	0	-	75	75
Shower Men	3	1.2	0.3	1.5	gpm	300.0 minutes	1080	270	1350	-	-	-
Shower Women	2	1.2	0.3	1.5	gpm	300.0 minutes	720	180	900	360	90	450
Sink Men	2	0.25	0.25	0.5	gpm	16.8 minutes	8.4	8.4	16.8	34	34	67
Sink Women	2	0.25	0.25	0.5	gpm	7.5 minutes	3.75	3.75	7.5	15	15	30
Laundry												
toilet	1	0	1.6	1.6	gpf	20.0 flushes	0	32	32	-	-	-
Sink	1	0.25	0.25	0.5	gpm	3.0 minutes	0.75	0.75	1.5	4	4	8
Home (3 People full time)												
Full Bath												
Toilet	1	0	1.6	1.6	gpf	12.0 flushes	0	19.2	19.2	-	-	-
Sink	1	1.5	1.5	3	gpm	13.8 minutes	20.7	20.7	41.4	-	-	-
Shower	1	2	0.5	2.5	gpm	45.0 minutes	90	22.5	112.5	-	-	-
Half Bath												
Toilet	1	0	1.6	1.6	gpf	5.0 flushes	0	8	8	-	-	-
Sink	1	0.75	0.75	1.5	gpm	0.8 minutes	0.5625	0.5625	1.125	-	-	-
Half Bath												
Toilet	1	0	3.5	3.5	gpf	2.0 flushes	0	7	7	-	-	-
Sink (Drips, cant turn on)	1	0	0	0	gpm	- minutes	0	0	0	-	-	-
Kitchen Sink	1	1.6	0.4	2	gpm	15.0 minutes	24	6	30	-	-	-
Other												
Washing Machine (HE Kenmore)	1	12	12	24	g/use	1.0 use	12	12	24	-	-	-
Washing Machine (Unimac)UC40MNZYU60001	1	20	20	40	g/use	5.0 use	100	100	200	-	-	-
Washing Machine (Speed Queeza) SC40MNZYU40001	1	20	20	40	g/use	5.0 use	100	100	200	-	-	-
DishWashing Machine Maytag (home)	1	0	14	14	g/use	1.0 use	0	14	14	-	-	-
				0								
Outdoor Irrigation w/ hose	1	0	319.79138	319.7914	gpd	- day	0	0	0	-	-	-
RV 8 Spaces w Yard Spigots	8	0	5	5	gpm	- minutes	0	0	0	-	-	-
							3,362	**1,701**	**5,062**	**max day**		
							observed		232,000	max month		
									46	days at max		
							observed		7,733	max day		

Table 2 - Summary of Current Water Use and Potential Water Savings
The Spa Audit Summary

Average Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Room (1 Queen)	4													
Toilet	4	0	1.6	1.6	gpf	6.0	flushes	0	38.4	38.4		-	-	-
Shower	4	1.2	0.3	1.5	gpm	30.0	minutes	144	36	180		96	24	120
Sink	4	0.25	0.25	0.5	gpm	8.5	minutes	8.5	8.5	17		26	26	51
Kitchen Sink	4	2.4	0.6	3	gpm	10.0	minutes	96	24	120		-	-	-
Room (1 Queen w/ pull out couch)	2													
Toilet	2	0	1.6	1.6	gpf	9.0	flushes	0	28.8	28.8		-	-	-
Shower	2	1.2	0.3	1.5	gpm	36.0	minutes	86.4	21.6	108		58	14	72
Sink	2	0.25	0.25	0.5	gpm	7.4	minutes	3.675	3.675	7.35		11	11	22
Kitchen Sink	2	2.4	0.6	3	gpm	10.0	minutes	48	12	60		-	-	-
Room (2 Queen)	8													
Toilet	8	0	1.6	1.6	gpf	12.0	flushes	0	153.6	153.6		-	-	-
Shower	8	1.2	0.3	1.5	gpm	48.0	minutes	460.8	115.2	576		768	192	960
Sink	8	0.25	0.25	0.5	gpm	9.8	minutes	19.6	19.6	39.2		98	98	196
Salon														
toilet	1	0	1.6	1.6	gpf	15.0	flushes	0	24	24		-	-	-
shower	1	1.2	0.3	1.5	gpm	20.0	minutes	24	6	30		16	4	20
sink	1	0.25	0.25	0.5	gpm	7.5	minutes	1.875	1.875	3.75		6	6	11
SPA Bathroom														
Men	2	0	1.25	1.25	gpf	25.0	flushes	0	62.5	62.5		-	18	18
Women	3	0	0.9	0.9	gpf	35.0	flushes	0	94.5	94.5		-	74	74
urinal	1	0	0	0	gpf	55.0	flushes	0	0	0		-	55	55
Shower Men	3	1.2	0.3	1.5	gpm	175.0	minutes	630	157.5	787.5		-	-	-
Shower Women	2	1.2	0.3	1.5	gpm	175.0	minutes	420	105	525		210	53	263
Sink Men	2	0.25	0.25	0.5	gpm	12.0	minutes	6	6	12		24	24	48
Sink Women	2	0.25	0.25	0.5	gpm	5.3	minutes	2.625	2.625	5.25		11	11	21
Laundry														
toilet	1	0	1.6	1.6	gpf	15.0	flushes	0	24	24		-	-	-
Sink	1	0.25	0.25	0.5	gpm	2.3	minutes	0.5625	0.5625	1.125		3	3	6
Home (3 People full time)														
Full Bath														
Toilet	1	0	1.6	1.6	gpf	9.0	flushes	0	14.4	14.4		-	-	-
Sink	1	1.5	1.5	3	gpm	7.4	minutes	11.025	11.025	22.05		-	-	-
Shower	1	2	0.5	2.5	gpm	45.0	minutes	90	22.5	112.5		-	-	-
Half Bath														
Toilet	1	0	1.6	1.6	gpf	4.0	flushes	0	6.4	6.4		-	-	-
Sink	1	0.75	0.75	1.5	gpm	0.6	minutes	0.45	0.45	0.9		-	-	-
Half Bath														
Toilet	1	0	3.5	3.5	gpf	2.0	flushes	0	7	7		-	-	-
Sink (Drips, cant turn on)	1	0	0	0	gpm	-	minutes	0	0	0		-	-	-
Kitchen Sink	1	1.6	0.4	2	gpm	10.0	minutes	16	4	20		-	-	-
Other														
Washing Machine (HE Kenmore)	1	12	12	24	g/use	1.0	use	12	12	24		-	-	-
Washing Machine (Unimac)UC40MNZYU60001	1	20	20	40	g/use	4.0	use	80	80	160		-	-	-
Washing Machine (Speed Queeza) SC40MNZYU40001	1	20	20	40	g/use	4.0	use	80	80	160		-	-	-
DishWashing Machine Maytag (home)	1	0	14	14	g/use	0.5	use	0	7	7		-	-	-
Outdoor Irrigation w/ hose	1	0	319.79138	319.7914	gpd	-	day	0	0	0		-	-	-
RV 8 Spaces w Yard Spigots	8	0	5	5	gpm	-	minutes	0	0	0		-	-	-
								2,242	**1,191**	**3,432**	**avg day**			
								observed		161,225	avg month			
										47	days at avg			
								observed		5,374	avg day			

Costs to Implement

	number	Hardware	Installation	Total	Pay Back		Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Toilet	4	$ 282	$ 95	$ 1,508	5.54	yrs	33,215	-	$ 272	$ 68
Urinal	1	$ 311	$ 85	$ 396	2.41	yrs	20,075	-	$ 165	$ 165
Shower	20	$ 33	$ 10	$ 860	0.07	yrs	523,593	111,978	$ 11,572	$ 579
Bathrom Sink	20	$ 1.61	$ 5	$ 132	0.05	yrs	129,548	27,706	$ 2,863	$ 143
				$ 2,896			706,430	139,683	$ 14,872	

AF Savings: 2.17 $/AF: $ 1,336

Replacement Water Cost* : $ 65,039

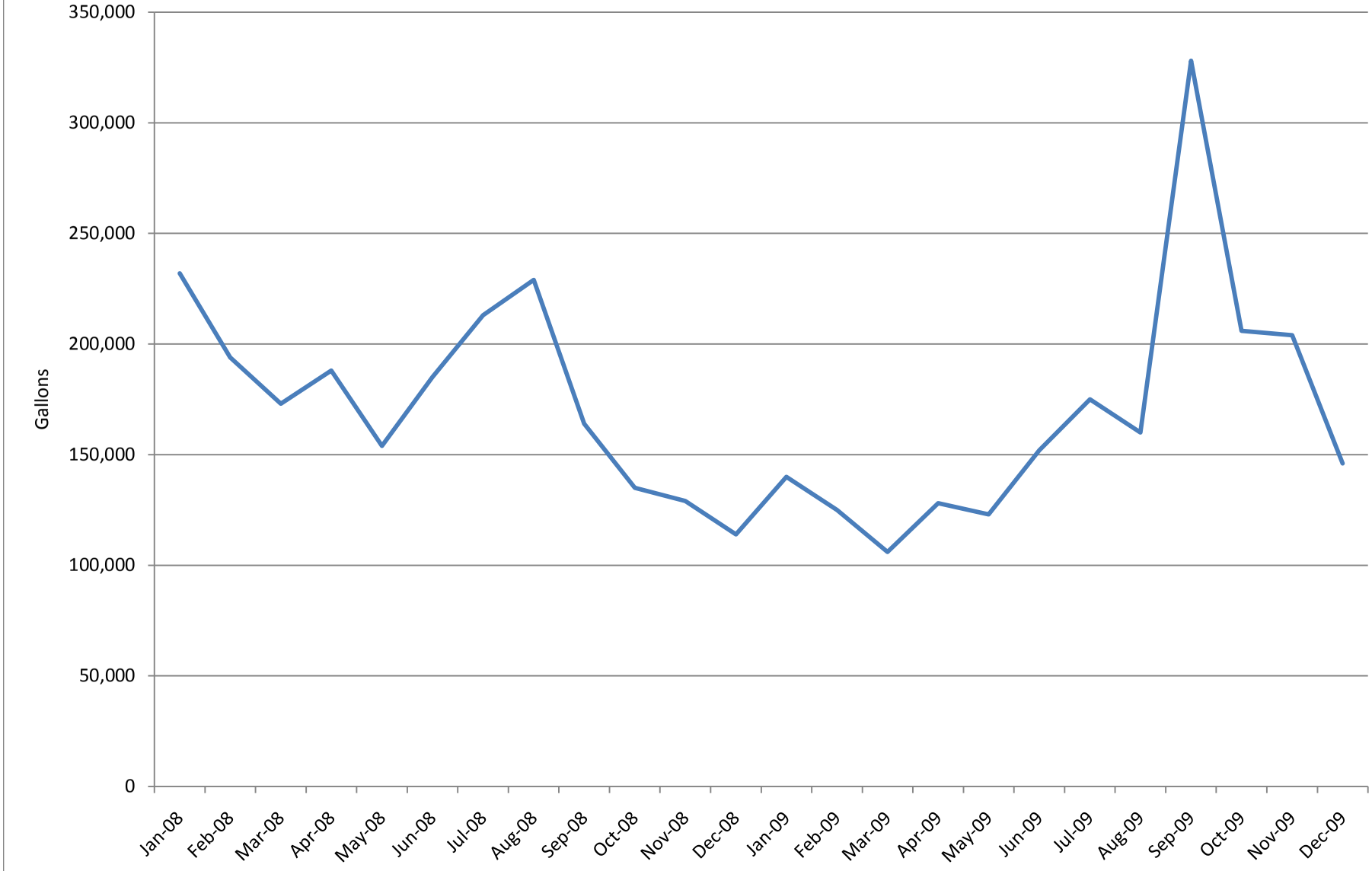
Avoided Cost** : $ 6,711

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

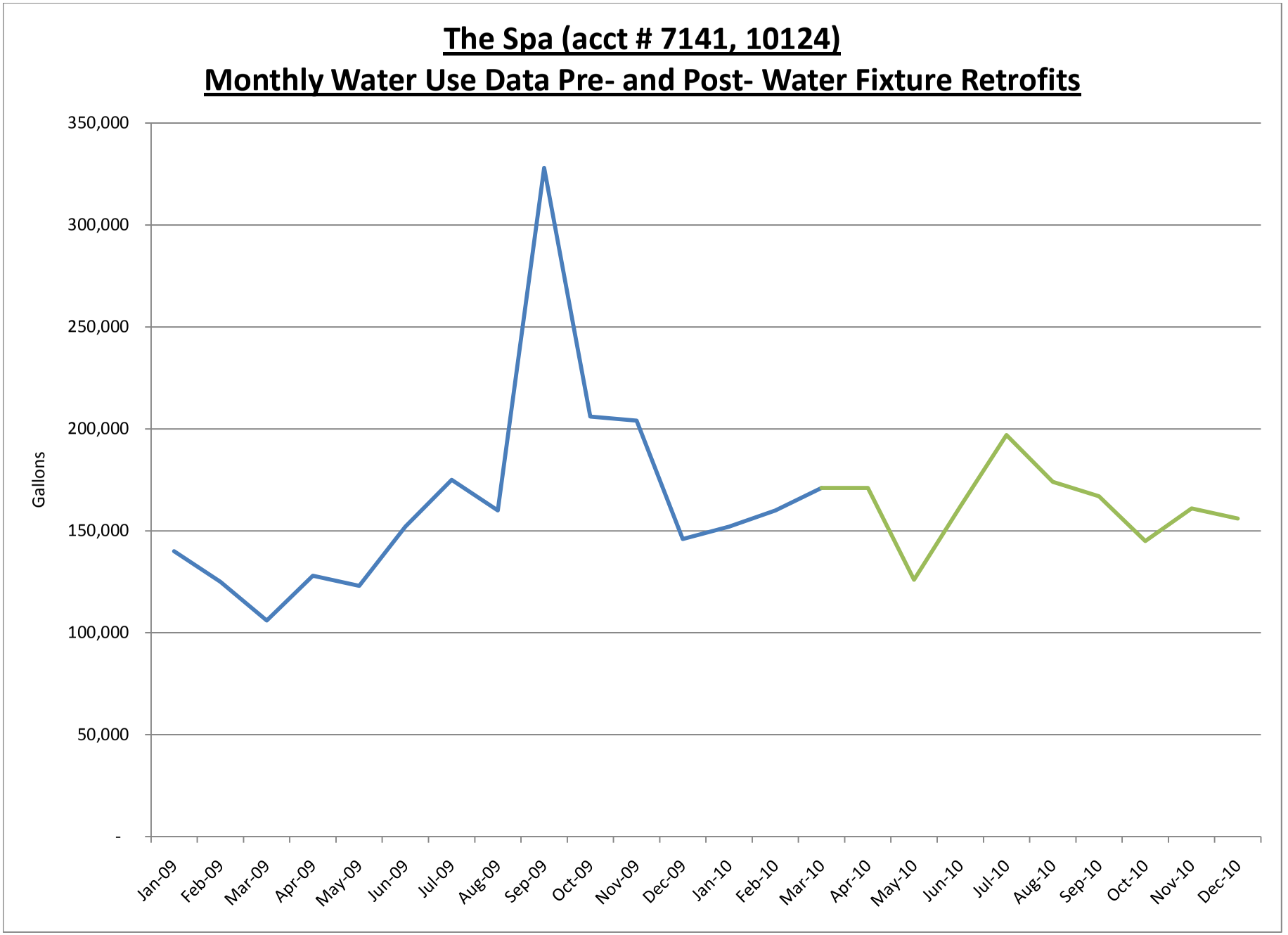
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

The Spa (acct # 7141, 10124)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

The Spa (acct # 7141, 10124)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 16, 2010 and March 30, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

Boss Hogg's Restaurant

Overview

PAWSD working with Great Western Institute and Environmental Dimensions, conducted a SMART WATER Audit of this facility at 157 Navajo Trail in Pagosa Springs on December 9, 2008. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

Boss Hogg's Restaurant uses water in a manner consistent with restaurants throughout Colorado. Similar to many restaurants built before 1993, Boss Hogg's Restaurant had sinks and toilets that had not been updated with EPA WaterSense certified water efficient fixtures that are currently available in the marketplace. Boss Hogg's Restaurant does, however, utilize a pre-rinse spray nozzle that was provided by PAWSD 3 to 4 years ago. In addition, the Boss Hogg's Restaurant also utilizes air cooled ice makers (versus water cooled) which help to reduce water use.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for Boss Hogg's Restaurant included the following assumptions:

- Boss Hogg's Restaurant indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property
- The five swamp coolers on average use about 88 gallons of water per maximum water use day, and 14 gallons of water on an average water use day.

Based on the 2008 audit, the following fixture replacements occurred in 2010. The five sink faucet aerators in the men's and women's bathrooms used about 2.5 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $65 dollars per year per sink. This savings results in a payback period of about one month.

The five restaurant toilets, on average, used about 2.4 gallons per flush. New Water Sense approved high efficiency dual-flush toilets, which use on average 0.9 gallons per flush, were installed at a total cost of $1,885 with an estimated total water savings of about 87,000 gallons annually. With these savings, the payback period for the installation of the toilets is estimated to be about 3 years. Additionally, three urinals were replaced with Water Sense approved waterless urinals at a cost of $1,188 with a payback period of five years. It is estimated that the urinal replacements will have a total water savings of 28,000 gallons annually.

In total, five sink faucet aerators, five toilets and three urinals in Boss Hogg's Restaurant were updated at a cost of $3,106. From the water demand model, it is estimated that a total annual water and energy cost savings of about $1,300 will result from these changes, saving about 135,000 gallons of water and 1,300 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
Boss Hoggs Restaurant Audit Summary

Maximum Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
men	2	0	1.6	1.6	gpf	17	flushes		-	54	54
women	2	0	3.5	3.5	gpf	50	flushes		-	350	350
unisex	1	0	1.6	1.6	gpf	25	flushes		-	40	40
									-	-	-
Urinals	3	0	1.33	1.33	gpf	25	flushes		-	100	100
									-	-	-
Bathroom Sinks									-	-	-
men	2	1.125	1.125	2.25	gpm	6.3	minutes		14	14	28
women	3	1.25	1.25	2.5	gpm	7.5	minutes		28	28	56
unisex	1	1	1	2	gpm	3.75	minutes		4	4	8
									-	-	-
Kitchen Sink	2	4	1	5	gpm	90	minutes		720	180	900
									-	-	-
Kitchen Handwash Sink	3	1.736	0.434	2.17	gpm	10	minutes		52	13	65
Bar Sink	1	4	1	5	gpm	45	minutes		180	45	225
									-	-	-
Other									-	-	-
Laundry In-House	1	21	21	42	gpl	2	loads		42	42	84
Ice Machine	2	0	17.8	17.8	gp100#	3	100#		-	107	107
Dishwasher	1	0	1.2	1.2	gpcycle	150	cycles		-	180	180
Swamp Cooler	5	0	88	88	gpd	1	daily		-	440	440
									1,040	**1,597**	**2,637** **max day**
									observed		79,000 max month
											30 days at max
									observed		2,633 max day

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
men	2	0	1.6	1.6	gpf	15	flushes		0	48	48
women	2	0	3.5	3.5	gpf	40	flushes		0	280	280
unisex	1	0	1.6	1.6	gpf	20	flushes		0	32	32
Urinals	3	0	1.33	1.33	gpf	20	flushes		0	80	80
Bathroom Sinks											
men	2	1.125	1.125	2.25	gpm	5.25	minutes		12	12	24
women	3	1.25	1.25	2.5	gpm	6	minutes		23	23	45
unisex	1	1	1	2	gpm	3	minutes		3	3	6
				0							
Kitchen Sink	2	4	1	5	gpm	75	minutes		600	150	750
Kitchen Handwash Sink	3	1.736	0.434	2.17	gpm	10	minutes		52	13	65
Bar Sink	1	4	1	5	gpm	30	minutes		120	30	150
				0							
Other											
Laundry In-House	1	21	21	42	gpl	2	loads		42	42	84
Ice Machine	2	0	17.8	17.8	gp100#	2	100#		0	71	71
Dishwasher	1	0	1.2	1.2	gpcycle	150	cycles		0	180	180
Swamp Cooler	5	0	14	14	gpd	1	daily		0	70	70
									851	**1,033**	**1,885** avg day
									observed		56,583 avg month
											30 days at avg
									observed		1,886 avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
Boss Hoggs Restaurant Audit Summary

Maximum Use Savings Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets														
men	2	0	0.9	0.9	gpf	17	flushes	0	30.6	30.6		-	**24**	**24**
women	2	0	0.9	0.9	gpf	50	flushes	0	90	90		-	**260**	**260**
unisex	1	0	0.9	0.9	gpf	25	flushes	0	22.5	22.5		-	**18**	**18**
Urinals	3	0	0	0	gpf	25	flushes	0	0	0		-	**100**	**100**
Bathroom Sinks														
men	2	0.25	0.25	0.5	gpm	6.3	minutes	3.15	3.15	6.3		**11**	**11**	**22**
women	3	0.25	0.25	0.5	gpm	7.5	minutes	5.625	5.625	11.25		**23**	**23**	**45**
unisex	1	1	1	2	gpm	3.75	minutes	3.75	3.75	7.5		-	-	-
Kitchen Sink	2	4	1	5	gpm	90	minutes	720	180	900		-	-	-
Kitchen Handwash Sink	3	1.736	0.434	2.17	gpm	10	minutes	52.08	13.02	65.1		-	-	-
Bar Sink	1	4	1	5	gpm	45	minutes	180	45	225		-	-	-
Other														
Laundry In-House	1	21	21	42	gpl	2	loads	42	42	84		-	-	-
Ice Machine	2	0	17.8	17.8	gp100#	3	100#	0	106.8	106.8		-	-	-
Dishwasher	1	0	1.2	1.2	gpcycle	150	cycles	0	180	180		-	-	-
Swamp Cooler	5	0	88	88	gpd	1	daily	0	440	440		-	-	-
								1007	**1162**	**2169**	**max day**	**34**	**435**	**468**
									observed	79,000	max month			
										36	days at max			
									observed	2,633	max day			

Average Use Savings Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets														
men	2	0	0.9	0.9	gpf	15	flushes	0	27	27		-	21	21
women	2	0	0.9	0.9	gpf	40	flushes	0	72	72		-	208	208
unisex	1	0	0.9	0.9	gpf	20	flushes	0	18	18		-	14	14
Urinals	3	0	0	0	gpf	20	flushes	0	0	0		-	80	80
Bathroom Sinks														
men	2	0.25	0.25	0.5	gpm	5.25	minutes	2.625	2.625	5.25		9	9	18
women	3	0.25	0.25	0.5	gpm	6	minutes	4.5	4.5	9		18	18	36
unisex	1	1	1	2	gpm	3	minutes	3	3	6		-	-	-
Kitchen Sink	2	4	1	5	gpm	75	minutes	600	150	750		-	-	-
Kitchen Handwash Sink	3	1.736	0.434	2.17	gpm	10	minutes	52.08	13.02	65.1		-	-	-
Bar Sink	1	4	1	5	gpm	30	minutes	120	30	150		-	-	-
Other														
Laundry In-House	1	21	21	42	gpl	2	loads	42	42	84		-	-	-
Ice Machine	2	0	17.8	17.8	gp100#	2	100#	0	71.2	71.2		-	-	-
Dishwasher	1	0	1.2	1.2	gpcycle	150	cycles	0	180	180		-	-	-
Swamp Cooler	5	0	14	14	gpd	1	daily	0	70	70		-	-	-
								824	**683**	**1,508**	**avg day**	**27**	**350**	**377**
									observed	56,583	avg month			
										38	days at avg			
									observed	1,886	avg day			

Table 2 - Summary of Current Water Use and Potential Water Savings
Boss Hoggs Restaurant Audit Summary

Costs to Implement

	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Toilet	5	$ 282	$ 95	$ 1,885	2.63	87,480		$ 717	$ 143
Urinals	3	$ 311	$ 85	$ 1,188	5.04	28,728		$ 236	$ 79
Bath Sinks	5	$ 1.61	$ 5	$ 33	0.10	19,575	2,542	$ 326	$ 65
				$ 3,106		135,783	2,542	$ 1,279	

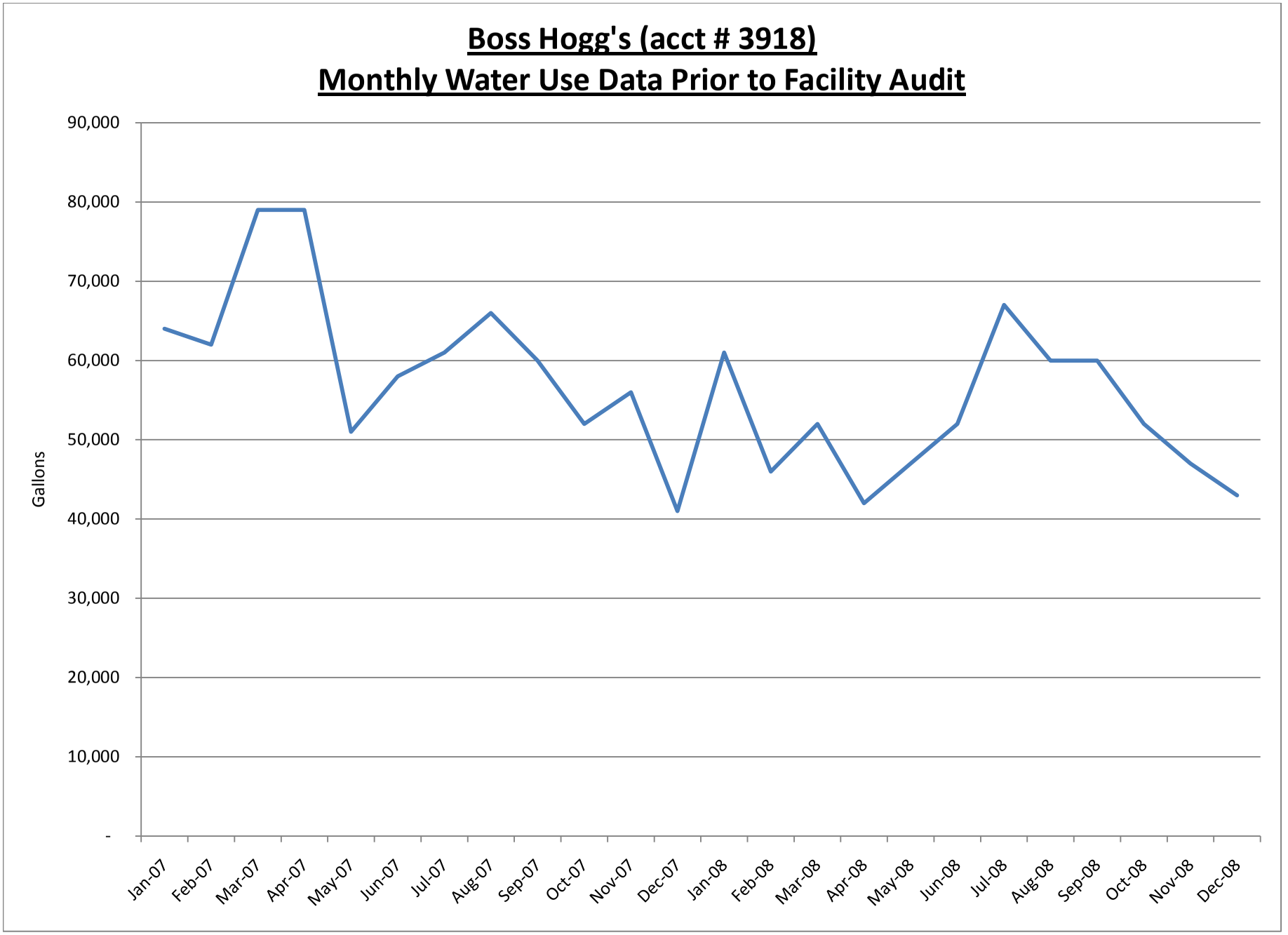
AF Savings: 0.42 $/AF: $ 7,454 Replacement Water Cost* : $ 12,501 Avoided Cost** : $ 1,290

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

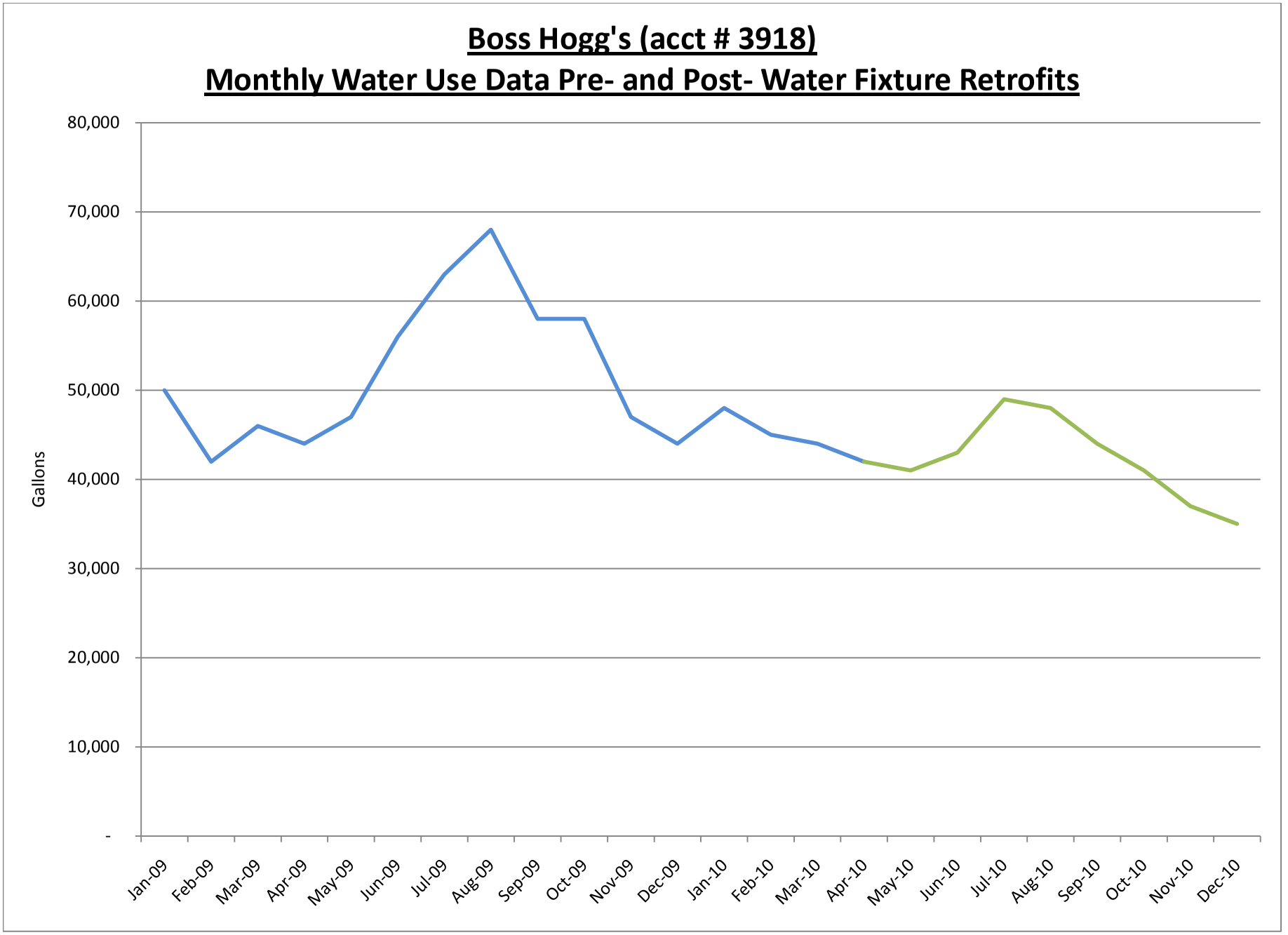
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

Boss Hogg's (acct # 3918)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Boss Hogg's (acct # 3918)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 30, 2010 and April 28, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

Higher Grounds Cafe

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 189 Talisman Dr # A in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

The Higher Grounds Cafe uses water in a manner consistent with restaurants throughout Colorado. Similar to many restaurants built before 1993, the Higher Grounds Cafe has sinks and toilets that have not been updated with water efficient fixtures that are currently available in the marketplace. The Higher Grounds Cafe does utilize a pre-rinse spray nozzle that was provided by PAWSD 3 to 4 years ago.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for Higher Grounds included the following assumption:

- Higher Grounds indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property

The two sink faucet aerators in the men's and women's bathrooms used about 2.25 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $50 dollars per year per sink. This savings results in a payback period of four months.

The two restaurant toilets, on average, use about 2.5 gallons per flush. New Water Sense approved high efficiency dual-flush toilets, which use on average 0.9 gallons per flush, were installed at a total cost of $754 with an estimated total water savings of about 35,000 gallons annually. With these savings, the payback period for the installation of the toilets should be about five years. Additionally, one urinal was also replaced with a Water Sense approved waterless urinal at a cost of $396 with a payback period of about four years. It is estimated that the urinal replacements will have a total water savings of about 13,000 gallons annually.

In total, two faucet aerators, two toilets and one urinal in Higher Grounds Cafe were updated at a cost of $1,163. From the water demand model, it is estimated that a total annual water and energy cost savings of about $500 will result from these changes, saving about 59,000 gallons of water and 2,400 kilowatt hours of energy.

Table 2- Summary of Current Water Use and Potential Water Savings
Higher Grounds Audit Summary

Maximum Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets	2	0	2.5	2.5	gpf	58	flushes	0	290	290	
Urinals	1	0	1	1	gpf	60	flushes	0	60	60	
Bathroom Sinks	2	1.125	1.125	2.25	gpm	17.7	minutes	39.825	39.825	79.65	
Kitchen Sinks	1	4	1	5	gpm	180	minutes	720	180	900	
Kitchen Handwash Sink	2	1	1	2	gpm	120	minutes	240	240	480	
Other											
Ice Machine	1	0	17.8	17.8	gp100#	9	100#	0	160.2	160.2	
Dishwasher	1	0	1.2	1.2	gpcycle	50	cycles	0	60	60	
								1,000	**1,030**	**2,030**	**max day**
								observed		61,000	max month
										30	days at max
								observed		2,033	max day

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets	2	0	2.5	2.5	gpf	30	flushes	0	150	150	
Urinals	1	0	1.2	1.2	gpf	30	flushes	0	36	36	
Bathroom Sinks	2	1.125	1.125	2.25	gpm	9	minutes	20.25	20.25	40.5	
Kitchen Sinks	1	4	1	5	gpm	100	minutes	400	100	500	
Kitchen Handwash Sink	2	1	1	2	gpm	90	minutes	180	180	360	
Other											
Ice Machine	1	0	17.8	17.8	gp100#	5	100#	0	89	89	
Dishwasher	1	0	1.2	1.2	gpcycle	25	cycles	0	30	30	
								600	**605**	**1,206**	**avg day**
								observed		36,250	avg month
										30	days at avg
								observed		1,208	avg day

Maximum Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets	2	0	0.9	0.9	gpf	58	flushes	0	104.4	104.4		0	185.6	185.6
Urinals	1	0	0	0	gpf	60	flushes	0	0	0		0	60	60
Bathroom Sinks	2	0.25	0.25	0.5	gpm	17.7	minutes	8.85	8.85	17.7		30.975	30.975	61.95
Kitchen Sinks	1	4	1	5	gpm	180	minutes	720	180	900		0	0	0
Kitchen Handwash Sink	2	1	1	2	gpm	120	minutes	240	240	480		0	0	0
Other														
Ice Machine	1	0	17.8	17.8	gp100#	9	100#	0	160.2	160.2		0	0	0
Dishwasher	1	0	1.2	1.2	gpcycle	50	cycles	0	60	60		0	0	0
								969	**753**	**1,722**	**max day**			
								observed		61,000	max month			
										35	days at max			
								observed		2,033	max day			

Table 2- Summary of Current Water Use and Potential Water Savings
Higher Grounds Audit Summary

Average Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets	2	0	0.9	0.9	gpf	30	flushes	0	54	54		0	96	96
Urinals	1	0	0	0	gpf	30	flushes	0	0	0		0	36	36
Bathroom Sinks	2	0.25	0.25	0.5	gpm	9	minutes	4.5	4.5	9		15.75	15.75	31.5
Kitchen Sinks	1	4	1	5	gpm	100	minutes	400	100	500		0	0	0
Kitchen Handwash Sink	2	1	1	2	gpm	90	minutes	180	180	360		0	0	0
Other														
Ice Machine	1	0	17.8	17.8	gp100#	5	100#	0	89	89		0	0	0
Dishwasher	1	0	1.2	1.2	gpcycle	25	cycles	0	30	30		0	0	0
								585	**458**	**1,042**	**avg day**			
								observed		36,250	avg month			
										35	days at avg			
								observed		1,208	avg day			

Costs to Implement

	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
toilet	2	$ 282	$ 95	$ 754	5.32 yrs	34,560		$ 283	$ 142
urinal	1	$ 311	$ 85	$ 396	3.73 yrs	12,960		$ 106	$ 106
bathroom sink	2	$ 1.61	$ 5	$ 13	0.28 yrs	11,340	2,425	$ 93	$ 46
				$ 1,163		58,860		$ 483	

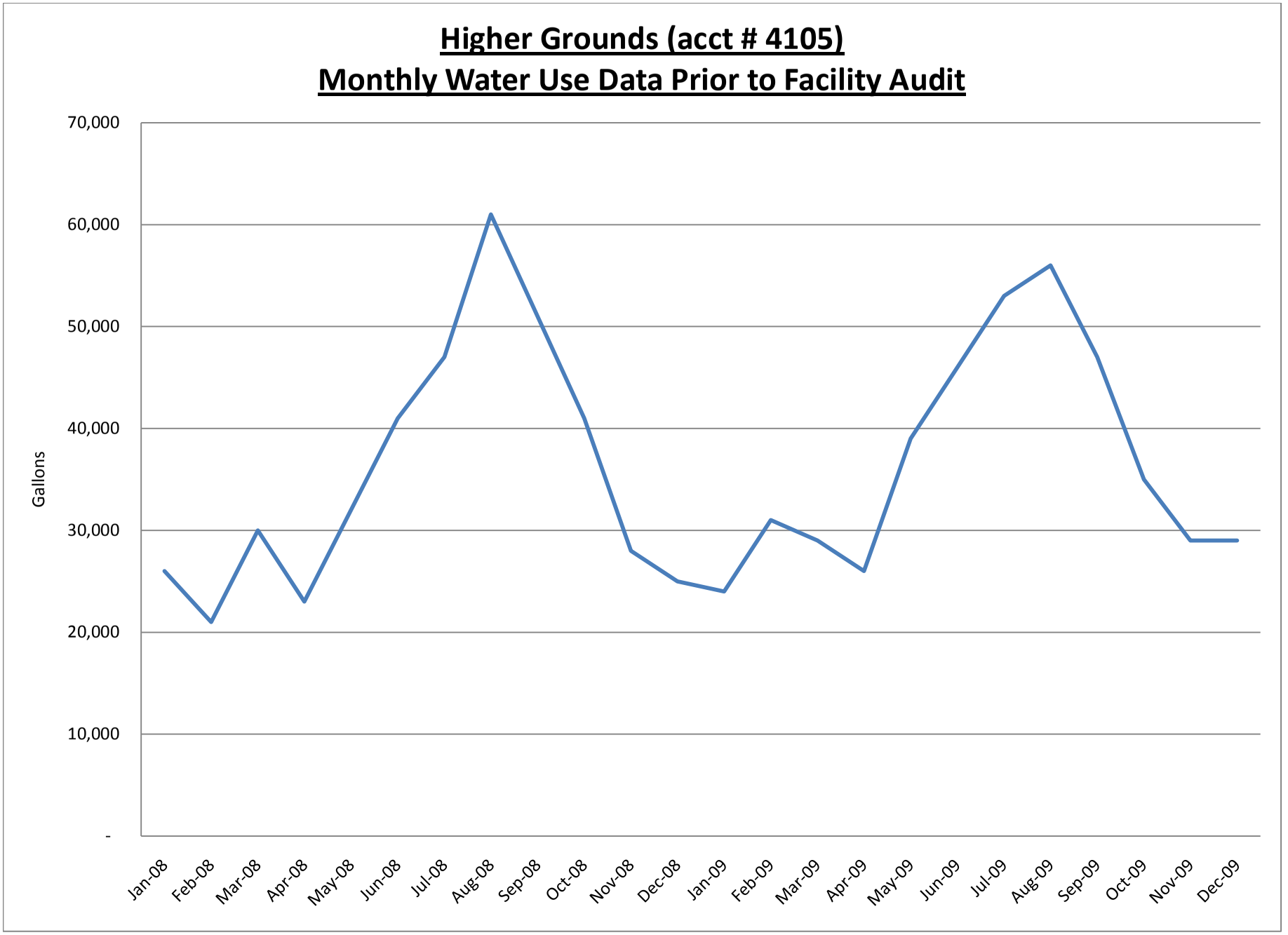
AF Savings:	0.18	$/ AF:	$ 6,440	Replacement Water Cost* :	$ 5,419	Avoided Cost** :	$ 559

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

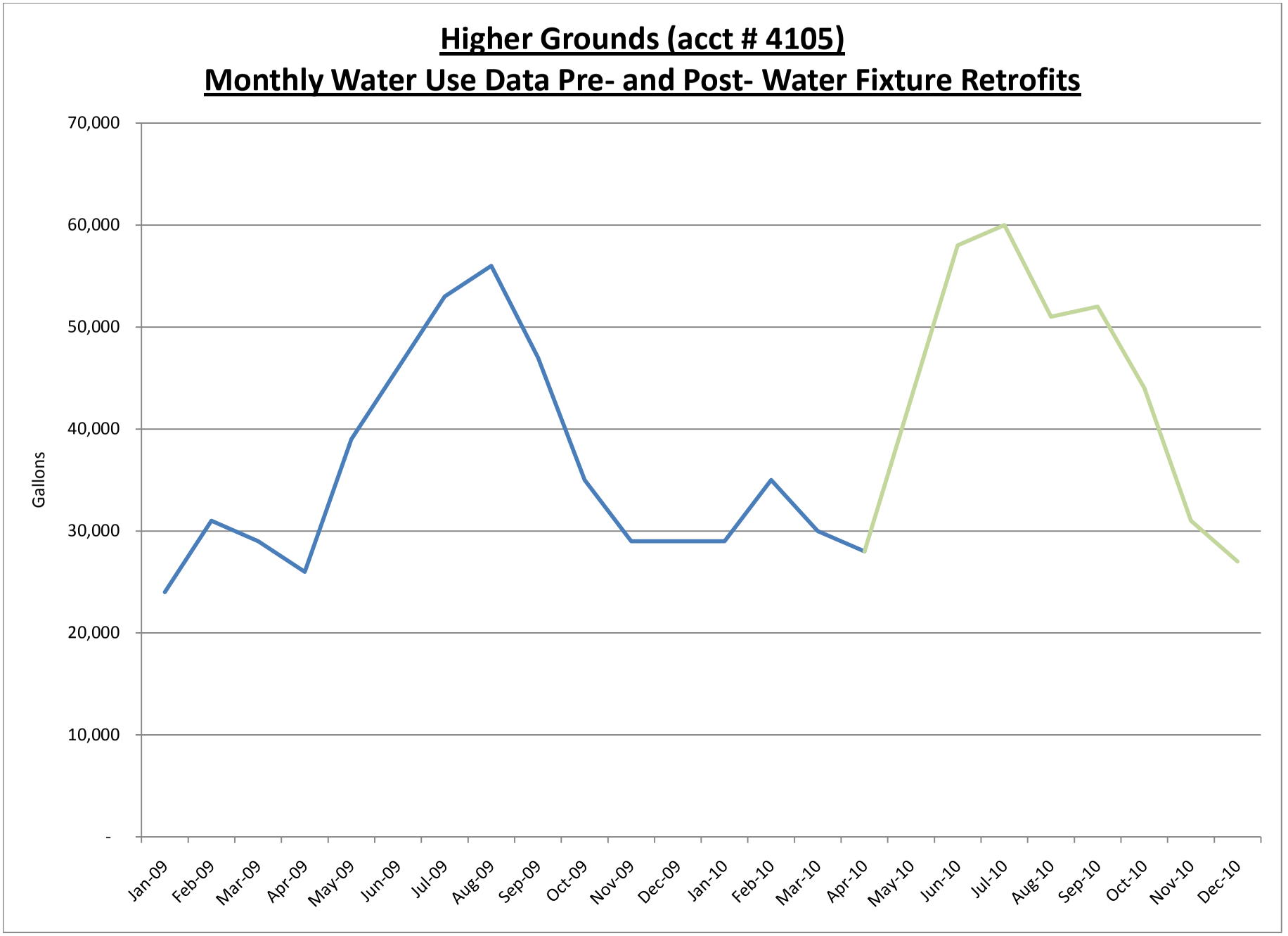
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

Higher Grounds (acct # 4105)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Higher Grounds (acct # 4105)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 31, 2010 and April 22, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

JJ's Restaurant

Overview

PAWSD working with Great Western Institute and Environmental Dimensions, conducted a SMART WATER Audit of this facility at 356 East Pagosa in Pagosa Springs on December 9, 2008. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

JJ's Restaurant uses water in a manner consistent with restaurants throughout Colorado. Similar to many restaurants built before 1993, JJ's Restaurant had sinks and toilets that had not been updated with water efficient fixtures that are currently available in the marketplace. JJ's Restaurant does, however, utilize a pre-rinse spray nozzle that was provided by PAWSD 3 to 4 years ago.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water model table for JJ's included the following assumptions:

- JJ's indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property
- During the SMART WATER Audit, a leak associated with the ice machine was found. This leak was assumed to be two gallons per minute on a maximum water use day, and one gallon per minute on an average use day.[1]

Based on the 2008 audit, the following fixture replacements occurred in 2010. The two sink faucet aerators in the men's and women's bathrooms used about 2.25 gallons of water per minute (gpm). One of these aerators were replaced with a 0.5 gpm aerator at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately about $9 dollars per year per sink. This savings results in a payback period of about nine months.

Four restaurant toilets, on average, use about 1.6 gallons per flush. New Water Sense approved high efficiency dual-flush toilets, which use on average 0.9 gallons per flush, were installed at a total cost of $1,508 with an estimated total water savings of about 50,000 gallons annually. With these savings, the payback period for the installation of the toilets is estimated to be about four years. Additionally, two urinals were replaced with a Water Sense approved waterless urinals at a cost of $792 with a payback period of about five years. It is estimated that the urinal replacements will create a total water savings of about 18,000 gallons annually.

In total, one sinks, four toilets and two urinals in JJ's Restaurant were updated at a cost of $2,307. From the water demand model, it is estimated that a total annual water and energy cost savings of about $560 will result from these changes, saving about 68,000 gallons of water and 70 kilowatt hours of energy.

[1] This leak was not addressed by Great Western Institute during the SMART WATER Audit. If fixed, 525,000 gallons of water per year may be saved on average, saving about $1,500 in annual water costs.

Table 2 - Summary of Current Water Use and Potential Water Savings
JJs Restaurant Audit

Maximum Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
men	1	0	3.5	3.5	gpf	23	flushes	-	81	81	
women	2	0	2.55	2.55	gpf	50	flushes	-	255	255	
								-	-	-	
kitchen bathroom	1	0	3.5	3.5	gpf	12	flushes	-	42	42	
								-	-	-	
Urinals	2	0	1.25	1.25	gpf	40	flushes	-	100	100	
								-	-	-	
Sinks								-	-	-	
men	1	0.25	0.25	0.5	gpm	9.45	minutes	2	2	5	
women	2	0.25	0.25	0.5	gpm	7.5	minutes	4	4	8	
								-	-	-	
kitchen bathroom	1	1.1	1.1	2.2	gpm	1.8	minutes	2	2	4	
								-	-	-	
Kitchen Sinks	3	4	1	5	gpm	100	minutes	1,200	300	1,500	
								-	-	-	
Bar Sinks	2	3.2	0.8	4	gpm	45	minutes	288	72	360	
								-	-	-	
Other								-	-	-	
Laundry In-House	1	21	21	42	gpcycle	4	loads	84	84	168	
Ice Machine	2	0	17.8	17.8	gp100#	4	100#	-	142	142	
Dishwasher	1	0	1.2	1.2	gpcycle	90	cycles	-	108	108	
Steamtable	1	0	2	2	gpuse	1	uses	-	2	2	
LEAK (associated with ice machine)	1	0	1.5	1.5	gpm	1440	minutes	-	2,160	2,160	
								1,580	**3,354**	**4,934**	**max day**
								observed		148,000	max month
										30	days at max
								observed		4,933	max day

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
men	1	0	3.5	3.5	gpf	15	flushes	0	52.5	52.5	
women	2	0	2.55	2.55	gpf	25	flushes	0	127.5	127.5	
kitchen bathroom	1	0	3.5	3.5	gpf	6	flushes	0	21	21	
Urinals	2	0	1.25	1.25	gpf	20	flushes	0	50	50	
Sinks											
men	1	0.25	0.25	0.5	gpm	5.25	minutes	1.3125	1.3125	2.625	
women	2	0.25	0.25	0.5	gpm	3.75	minutes	1.875	1.875	3.75	
kitchen bathroom	1	1.1	1.1	2.2	gpm	0.9	minutes	0.99	0.99	1.98	
Kitchen Sinks	3	4	1	5	gpm	70	minutes	840	210	1050	
Bar Sinks	2	3.2	0.8	4	gpm	30	minutes	192	48	240	
Other											
Laundry In-House	1	21	21	42	gpcycle	2	loads	42	42	84	
Ice Machine	2	0	17.8	17.8	gp100#	2	100#	0	71.2	71.2	
Dishwasher	1	0	1.2	1.2	gpcycle	45	cycles	0	54	54	
Steamtable	1	0	2	2	gpuse	1	uses	0	2	2	
LEAK (associated with ice machine)	1	0	1	1	gpm	1440	minutes	0	1440	1440	
								1,078	**2,122**	**3,201**	**avg day**
								observed		96,042	avg month
										30	days at avg
								observed		3,201	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
JJs Restaurant Audit

Maximum Use Savings Calculation

		per use					subtotal gpd				Savings		
	number	hot	cold	total		uses/day	hot	cold	total		hot	cold	total
Toilets													
men	1	0	0.9	0.9	gpf	23 flushes	0	20.7	20.7		-	60	60
women	2	0	0.9	0.9	gpf	50 flushes	0	90	90		-	165	165
kitchen bathroom	1	0	0.9	0.9	gpf	12 flushes	0	10.8	10.8		-	31	31
Urinals	2	0	0	0	gpf	40 flushes	0	0	0		-	100	100
Sinks													
men	1	0.25	0.25	0.5	gpm	9.45 minutes	2.3625	2.3625	4.725		-	-	-
women	2	0.25	0.25	0.5	gpm	7.5 minutes	3.75	3.75	7.5		-	-	-
kitchen bathroom	1	0.25	0.25	0.5	gpm	1.8 minutes	0.45	0.45	0.9		2	2	3
Kitchen Sinks	3	4	1	5	gpm	100 minutes	1200	300	1500		-	-	-
Bar Sinks	2	3.2	0.8	4	gpm	45 minutes	288	72	360		-	-	-
Other													
Laundry In-House	1	21	21	42	gpcycle	4 loads	84	84	168		-	-	-
Ice Machine	2	0	17.8	17.8	gp100#	4 100#	0	142.4	142.4		-	-	-
Dishwasher	1	0	1.2	1.2	gpcycle	90 cycles	0	108	108		-	-	-
Steamtable	1	0	2	2	gpuse	1 uses	0	2	2		-	-	-
LEAK (associated with ice machine)	1	0	2	2	gpm	0 minutes	0	0	0		-	2,160	2,160
							1,579	**836**	**2,415**	**max day**			
							observed		148,000	max month			
									61	days at max			
							observed		4,933	max day			

Average Use Savings Calculation

		per use					subtotal gpd				Savings		
	number	hot	cold	total		uses/day	hot	cold	total		hot	cold	total
Toilets													
men	1	0	0.9	0.9	gpf	15 flushes	0	13.5	13.5		-	39	39
women	2	0	0.9	0.9	gpf	25 flushes	0	45	45		-	83	83
kitchen bathroom	1	0	0.9	0.9	gpf	6 flushes	0	5.4	5.4		-	16	16
Urinals	2	0	0	0	gpf	20 flushes	0	0	0		-	50	50
Sinks													
men	1	0.25	0.25	0.5	gpm	5.25 minutes	1.3125	1.3125	2.625		-	-	-
women	2	0.25	0.25	0.5	gpm	3.75 minutes	1.875	1.875	3.75		-	-	-
kitchen bathroom	1	0.25	0.25	0.5	gpm	0.9 minutes	0.225	0.225	0.45		1	1	2
Kitchen Sinks	3	4	1	5	gpm	70 minutes	840	210	1050		-	-	-
Bar Sinks	2	3.2	0.8	4	gpm	30 minutes	192	48	240		-	-	-
Other													
Laundry In-House	1	21	21	42	gpcycle	2 loads	42	42	84		-	-	-
Ice Machine	2	0	17.8	17.8	gp100#	2 100#	0	71.2	71.2		-	-	-
Dishwasher	1	0	1.2	1.2	gpcycle	45 cycles	0	54	54		-	-	-
Steamtable	1	0	2	2	gpuse	1 uses	0	2	2		-	-	-
LEAK (associated with ice machine)	1	0	1.5	1.5	gpm	0 minutes	0	0	0		-	1,440	1,440
							1,077	**495**	**1,572**	**avg day**			
							observed		96,042	avg month			
									61	days at avg			
							observed		3,201	avg day			

Table 2 - Summary of Current Water Use and Potential Water Savings
JJs Restaurant Audit

Costs to Implement

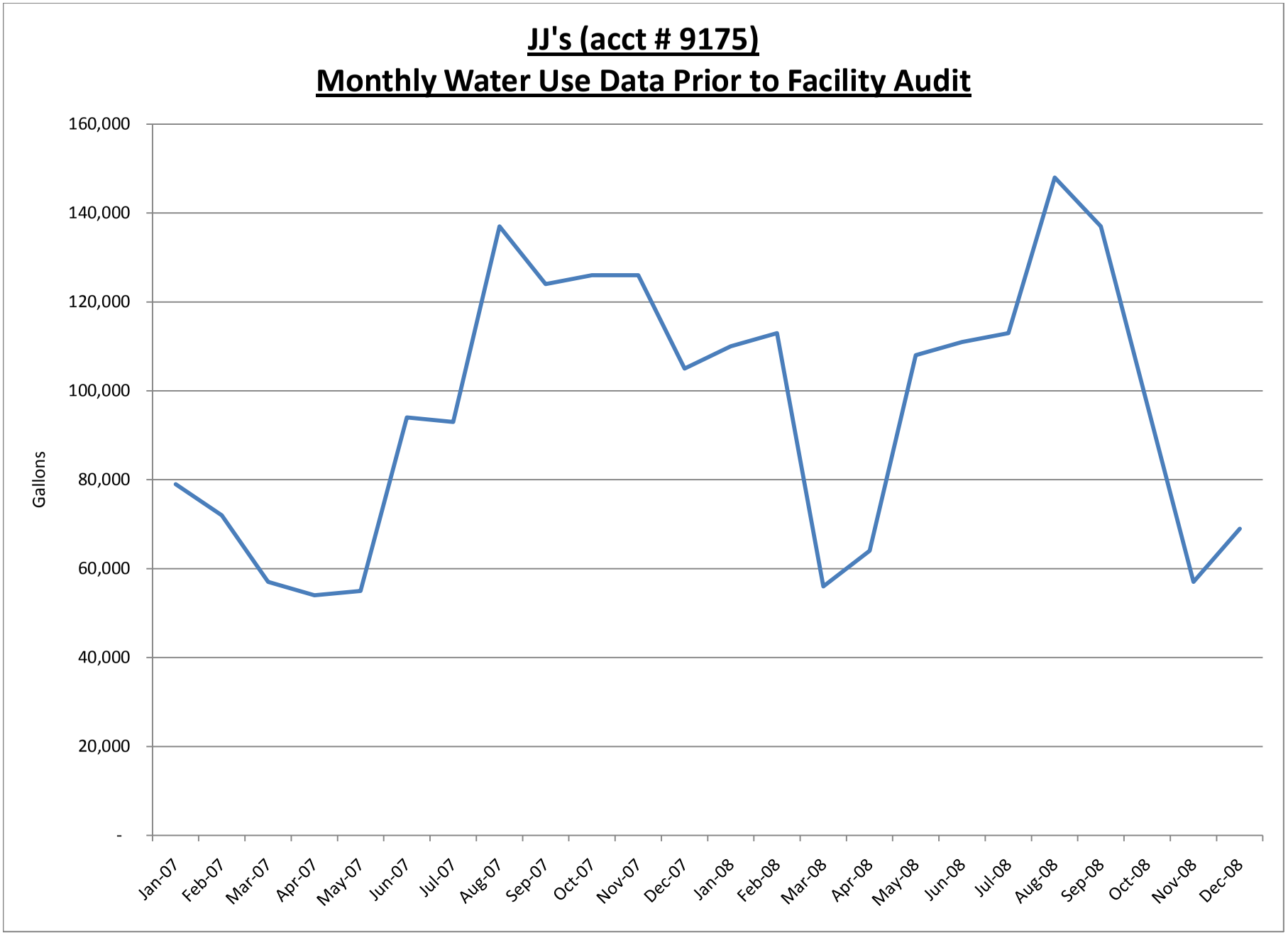
	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Toilet	4	$ 282	$ 95	$ 1,508	3.73	49,356	-	$ 405	$ 101
Urinals	2	$ 311	$ 85	$ 792	5.37	18,000	-	$ 148	$ 74
Bath Sinks	1	$ 1.61	$ 5	$ 6.61	0.72	551	72	$ 9	$ 9
				$ 2,307		67,907	72	$ 561	

AF Savings:	0.21	$/AF:	$ 11,068	Replacement Water Cost* :	$ 6,252	Avoided Cost** : $ 645

* Calculation based on $30,000 per AF

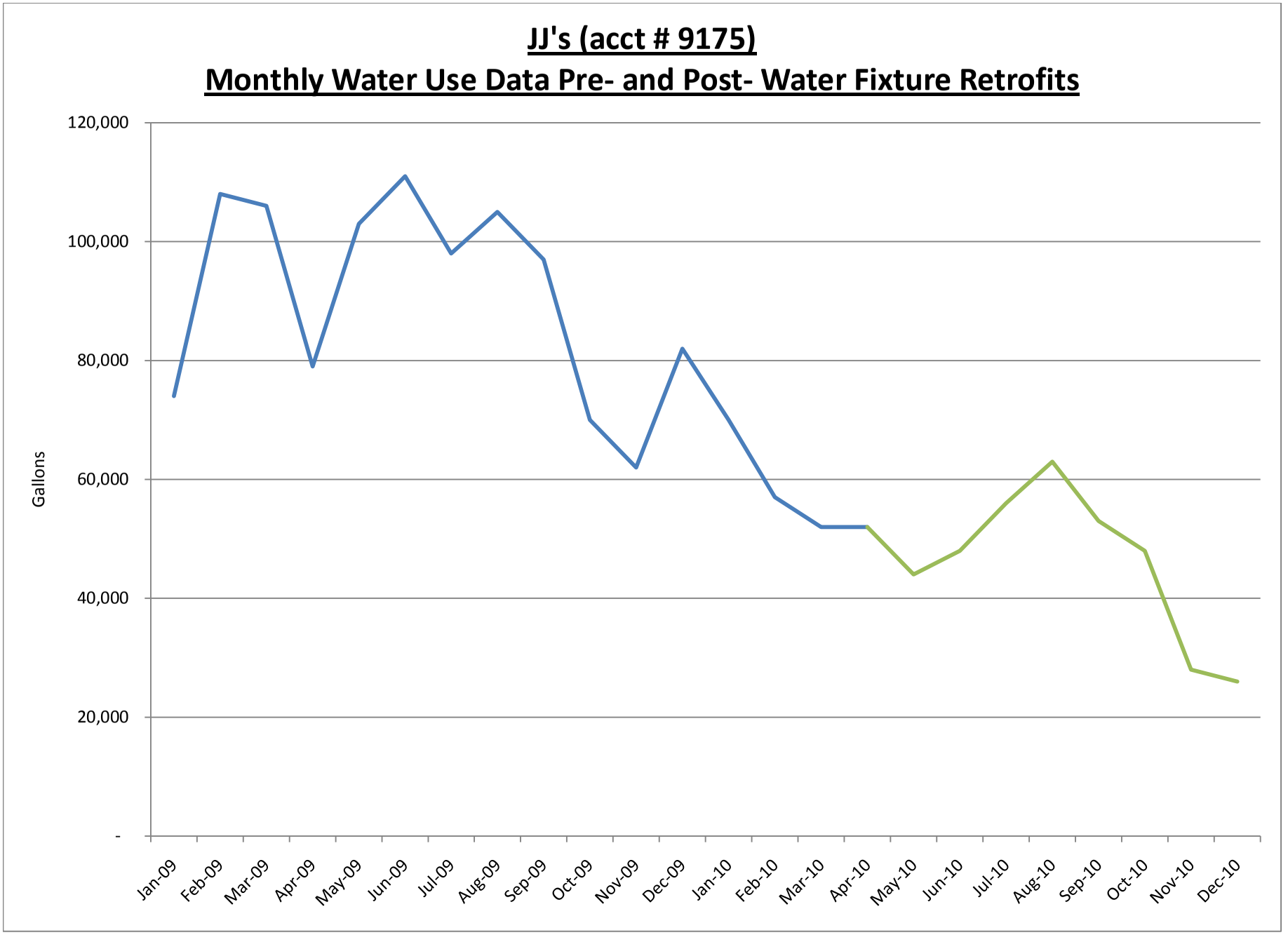
** Calculation based on $9.50/ 1000 gal

Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy



*Monthly water use data for two years prior to the facility audit. this data was used to configure and calibrate the water model

JJ's (acct # 9175)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 30, 2010 and April 23, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

Kip's Restaurant

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this restaurant at 121 Pagosa St. in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

Kip's Restaurant uses water in a manner consistent with restaurants throughout Colorado. Similar to many restaurants built before 1993, Kip's Restaurant had sinks and toilets that had not been updated with EPA Water Sense certified water efficient fixtures that are currently available in the marketplace. Kip's Restaurant does, however, utilize an air cooled ice machine, which helps to reduce water use.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for Kip's Restaurant included the following assumption:

- Kip's Restaurant indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property

The three sink faucet aerators in the men's and women's bathrooms and the kitchen hand-wash sink used, on average, 3 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $185 dollars per year per sink. This savings results in a payback period of about 2 weeks.

The two restaurant toilets, on average, use about 2.55 gallons per flush. New Water Sense approved high efficiency dual-flush toilets, which use on average 0.9 gallons per flush, were installed at a total cost of $754 with an estimated total water savings of about 25,000 gallons annually. With these savings, the payback period for the installation of the toilets is estimated to be about 4 years. Additionally, one urinal was replaced with a Water Sense approved waterless urinal at a cost of $396 with a payback period of about 5 years. It is estimated that the urinal replacements will have a total water savings of 9,000 gallons annually.

In total, three sink faucet aerators, two toilets and one urinal in Kip's Restaurant were updated at a cost of $1,170. From the water demand model, it is estimated that a total annual water and energy cost savings of about $800 will result from these changes, saving about 70,000 gallons of water and 4,000 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
Kips Bar Audit Summary

Maximum Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
Mens	1		1.6	1.6	gpf	15	flushes	-	24	24	
Womens	1		3.5	3.5	gpf	40	flushes	-	140	140	
Urinals											
Mens	1		1	1	gpf	35	flushes	-	35	35	
Bathroom Sinks											
Mens	1	1	1	2	gpm	7.5	minutes	30	30	60	
Womens	1	2.5	2.5	5	gpm	6	minutes	60	60	120	
Kitchen Sinks	2	4	1	5	gpm	50	minutes	400	100	500	
Kitchen Handwash Sink	1	1	1	2	gpm	15	minutes	15	15	30	
Bar Sinks	1	1.5	1.5	3	gpm	30	minutes	45	45	90	
Other											
Ice Machine (Manitowoc Series 800 - JYO804A)	1		17.8	17.8	gp100#	2	100# Ice	-	36	36	
								550	**485**	**1,035**	**max day**
								observed		31,000	max month
										30	days at max
								observed		1,033	max day

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
Mens	1		1.6	1.6	gpf	10	flushes	-	16	16	
Womens	1		3.5	3.5	gpf	24	flushes	-	84	84	
Urinals											
Mens	1		1	1	gpf	25	flushes	-	25	25	
Bathroom Sinks											
Mens	1	1	1	2	gpm	5.25	minutes	21	21	42	
Womens	1	2.5	2.5	5	gpm	3.6	minutes	36	36	72	
Kitchen Sinks	2	4	1	5	gpm	25	minutes	200	50	250	
Kitchen Handwash Sink	1	1	1	2	gpm	3.5	minutes	4	4	7	
Bar Sinks	1	1.5	1.5	3	gpm	20	minutes	30	30	60	
Other											
Ice Machine (Manitowoc Series 800 - JYO804A)	1		17.8	17.8	gp100#	1.2	100# Ice	-	21	21	
								291	**287**	**577**	**avg day**
								observed		17,320	avg month
										30	days at avg
								observed		577	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
Kips Bar Audit Summary

Maximum Use Water Savings

	number	per use hot	per use cold	per use total		uses/day	subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets													
Mens	1		0.9	0.9	gpf	15 flushes	-	14	14		-	11	11
Womens	1		0.9	0.9	gpf	40 flushes	-	36	36		-	104	104
											-	-	-
											-	-	-
Urinals											-	-	-
Mens	1		0	0	gpf	35 flushes	-	-	-		-	35	35
											-	-	-
Bathroom Sinks											-	-	-
Mens	1	0.25	0.25	0.5	gpm	7.5 minutes	8	8	15		23	23	45
Womens	1	0.25	0.25	0.5	gpm	6 minutes	6	6	12		54	54	108
											-	-	-
											-	-	-
Kitchen Sinks	2	4	1	5	gpm	50 minutes	400	100	500		-	-	-
											-	-	-
Kitchen Handwash Sink	1	0.25	0.25	0.5	gpm	15 minutes	4	4	8		11	11	23
											-	-	-
Bar Sinks	1	1.5	1.5	3	gpm	30 minutes	45	45	90		-	-	-
											-	-	-
Other											-	-	-
Ice Machine (Manitowoc Series 800 - JYO804A)	1		17.8	17.8	gp100#	2 100# Ice	-	36	36		-	-	-
							462	**247**	**710**	**max day**	**88**	**237**	**325**
							observed		31,000	max month			
									44	days at max			
							observed		1,033	max day			

Average Use Water Savings

	number	per use hot	per use cold	per use total		uses/day	subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets													
Mens	1		0.9	0.9	gpf	10 flushes	-	9	9		-	7	7
Womens	1		0.9	0.9	gpf	24 flushes	-	22	22		-	62	62
											-	-	-
											-	-	-
Urinals											-	-	-
Mens	1		0	0	gpf	25 flushes	-	-	-		-	25	25
											-	-	-
Bathroom Sinks											-	-	-
Mens	1	0.25	0.25	0.5	gpm	5.25 minutes	5	5	11		16	16	32
Womens	1	0.25	0.25	0.5	gpm	3.6 minutes	4	4	7		32	32	65
											-	-	-
											-	-	-
Kitchen Sinks	2	4	1	5	gpm	25 minutes	200	50	250		-	-	-
											-	-	-
Kitchen Handwash Sink	1	0.25	0.25	0.5	gpm	3.5 minutes	1	1	2		3	3	5
											-	-	-
Bar Sinks	1	1.5	1.5	3	gpm	20 minutes	30	30	60		-	-	-
											-	-	-
Other											-	-	-
Ice Machine (Manitowoc Series 800 - JYO804A)	1		17.8	17.8	gp100#	1.2 100# Ice	-	21	21		-	-	-
							240	**142**	**381**	**avg day**	**51**	**145**	**196**
							observed		17,320	avg month			
									45	days at avg			
							observed		577	avg day			

Costs to Implement

	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Toilet	2	$ 282	$ 95	$ 754	3.68 yrs	24,984	-	$ 205	$ 102
Urinals	1	$ 311	$ 85	$ 396	5.37 yrs	9,000	-	$ 74	$ 74
Sinks	3	$ 1.61	$ 5	19.83	0.04 yrs	36,558	3,909	$ 554	$ 185
				$ 1,170		70,542	3,909	$ 833	

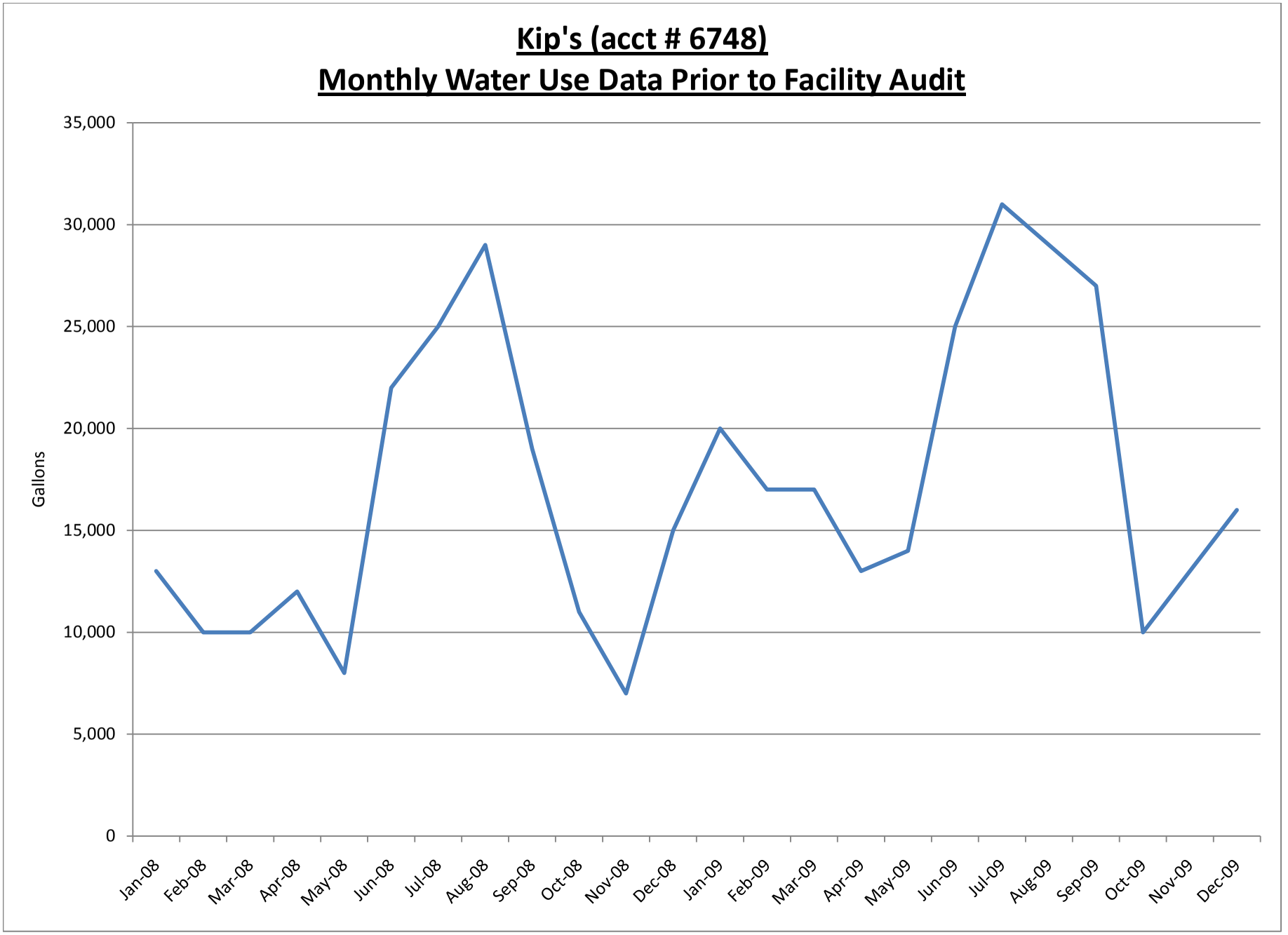
AF Savings: 0.22 $/ AF: $ 5,404 Replacement Water Cost* : $ 6,495 Avoided Cost** : $ 670

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

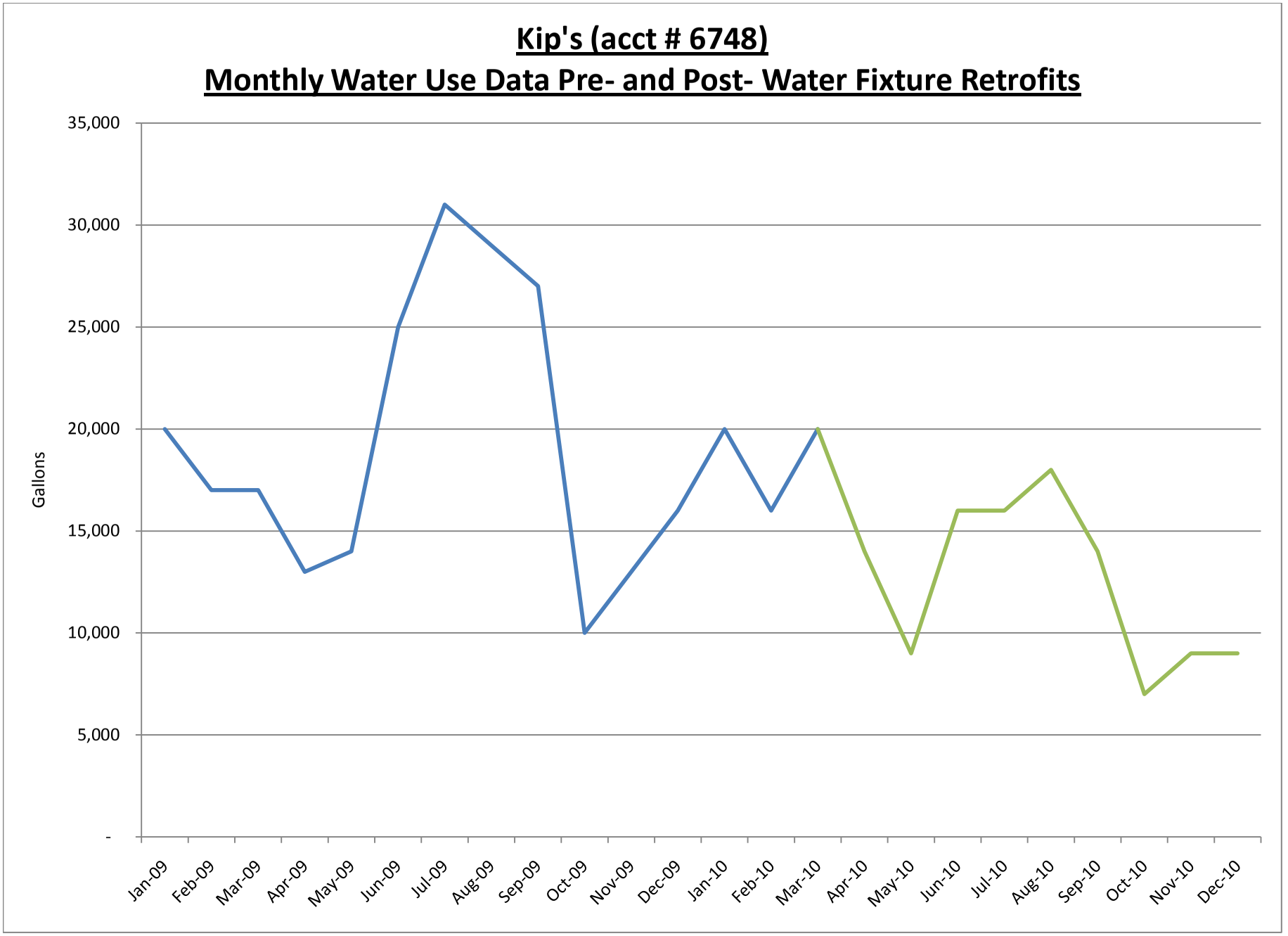
Kip's (acct # 6748)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Kip's (acct # 6748)

Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 30, 2010 and April 6, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

Town Library

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 811 San Juan Street in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

The Library uses water in a manner consistent with public buildings throughout Colorado. Similar to many of public facilities built before 1993, the Library had sinks and toilets that had not been updated with EPA Water Sense certified water efficient fixtures that are currently available in the marketplace.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for the Library included the following assumption:

- The Library indicated that they have outdoor irrigation during peak summer months in order to help establish a recently installed xericscape on the property. In order to isolate indoor water use, the maximum and average water use values were derived from the winter months of 2008 and 2009 only. This method assumes consistent monthly water demand.

The three sink faucet aerators in the men's, women's and staff's bathrooms used, on average, 3 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $70 dollars per year per sink. This savings results in a payback period of about one month.

In addition, one urinal was replaced with a Water Sense approved waterless urinal at a cost of $396. It is estimated that the urinal replacement will have a total water savings of about 3,200 gallons annually with a payback period of about 15 years.

In total, three sinks and one urinal in the Library were updated at a cost of $416. From the water demand model, it is estimated that a total annual water and energy cost savings of about $200 will result from these changes, saving about 15,000 gallons of water and 1,500 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
Library Audit Summary

Maximum Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
	Mens	1		1.6	1.6 gpf	5	flushes	-	8	8	
	Womens	1		1.6	1.6 gpf	8	flushes	-	13	13	
	Staff	1		1.6	1.6 gpf	6	flushes	-	10	10	
Urinals											
	Mens	1		1.5	1.5 gpf	8	flushes	-	12	12	
Bathroom Sinks											
	Mens	1	1.5	1.5	3 gpm	2	minutes	12	12	23	
	Womens	1	1.5	1.5	3 gpm	4	mintues	24	24	48	
	Staff	1	1.5	1.5	3 gpm	1	minutes	5	5	11	
Sink in Library		1	1.5	1.5	3 gpm	3	minutes	5	5	9	
Drinking Fountain		1	0	8	8 g/day	1	daily	-	8	8	
Break Room Sink		1	1.5	1.5	3 gpm	5	minutes	8	8	15	
Other											
Dishwasher (kenmore) Energy Star 665.1601		1		17.8	17.8 g/cycle	0.5	uses	-	9	9	
Irrigation/Outdoor											
								53	**112**	**166**	**max day**
									observed	5,000	max month
										30	days at max
									observed	167	max day

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
	Mens	1		1.6	1.6 gpf	4	flushes	-	6	6	
	Womens	1		1.6	1.6 gpf	6	flushes	-	10	10	
	Staff	1		1.6	1.6 gpf	6	flushes	-	10	10	
Urinals											
	Mens	1		1.5	1.5 gpf	6	flushes	-	9	9	
Bathroom Sinks											
	Mens	1	1.5	1.5	3 gpm	2	minutes	9	9	18	
	Womens	1	1.5	1.5	3 gpm	1	mintues	5	5	11	
	Staff	1	1.5	1.5	3 gpm	1	minutes	5	5	11	
Sink in Library		1	1.5	1.5	3 gpm	3	minutes	5	5	9	
Drinking Fountain		1	0	8	8 g/day	1	daily	-	8	8	
Break Room Sink		1	1.5	1.5	3 gpm	4	minutes	6	6	12	
Other											
Dishwasher (kenmore) Energy Star 665.1601		1		17.8	17.8 g/cycle	0.5	uses	-	9	9	
Irrigation/Outdoor											
								30	**82**	**112**	**avg day**
									observed	3,300	avg month
										29	days at avg
									observed	110	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
Library Audit Summary

Maximum Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets														
Mens	1		1.6	1.6	gpf	5	flushes	-	8	8		-	-	-
Womens	1		1.6	1.6	gpf	8	flushes	-	13	13		-	-	-
Staff	1		1.6	1.6	gpf	6	flushes	-	10	10		-	-	-
Flushmate?														
Urinals														
Mens	1		0	0	gpf	8	flushes	-	-	-		-	12	12
Bathroom Sinks														
Mens	1	0.25	0.25	0.5	gpm	2	minutes	2	2	4		10	10	20
Womens	1	0.25	0.25	0.5	gpm	4	mintues	4	4	8		20	20	40
Staff	1	0.25	0.25	0.5	gpm	1	minutes	1	1	2		5	5	9
Sink in Library	1	1.5	1.5	3	gpm	3	minutes	5	5	9		-	-	-
Drinking Fountain	1	0	8	8	g/day	1	daily	-	8	8		-	-	-
Break Room Sink	1	1.5	1.5	3	gpm	5	minutes	8	8	15		-	-	-
Other														
Dishwasher (kenmore) Energy Star 665.1601	1		17.8	17.8	g/cycle	1	uses	-	9	9		-	-	-
												34	46	81
Irrigation/Outdoor						-								
								19	**66**	**85**	**max day**			
									observed	5,000	max month			
										59	days at max			
									observed	167	aver day			

Average Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets														
Mens	1		1.6	1.6	gpf	4	flushes	-	6	6		-	-	-
Womens	1		1.6	1.6	gpf	6	flushes	-	10	10		-	-	-
Staff	1		1.6	1.6	gpf	6	flushes	-	10	10		-	-	-
Flushmate?														
Urinals														
Mens	1		0	0	gpf	6	flushes	-	-	-		-	9	9
Bathroom Sinks														
Mens	1	0.25	0.25	0.5	gpm	2	minutes	2	2	3		8	8	15
Womens	1	0.25	0.25	0.5	gpm	1	mintues	1	1	2		5	5	9
Staff	1	0.25	0.25	0.5	gpm	1	minutes	1	1	2		5	5	9
Sink in Library	1	1.5	1.5	3	gpm	3	minutes	5	5	9		-	-	-
Drinking Fountain	1	0	8	8	g/day	1	daily	-	8	8		-	-	-
Break Room Sink	1	1.5	1.5	3	gpm	4	minutes	6	6	12		-	-	-
Other														
Dishwasher (kenmore) Energy Star 665.1601	1		17.8	17.8	g/cycle	1	uses	-	9	9		-	-	-
												17	26	42
Irrigation/Outdoor						-								
								14	**56**	**70**	**avg day**			
									observed	3,300	avg month			
										47	days at avg			
									observed	110	avg day			

Table 2 - Summary of Current Water Use and Potential Water Savings
Library Audit Summary

Costs to Implement

	number	Hardware	Installation	Total	Pay Back		Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Urinal	1	$ 311	$ 85	$ 396	14.91	yrs	3,240		$ 27	$ 27
Bath Sinks	3	$ 1.61	$ 5	$ 20	0.10	yrs	11,880	1,543	$ 198	$ 66
				$ 416			15,120	1,543	$ 224	

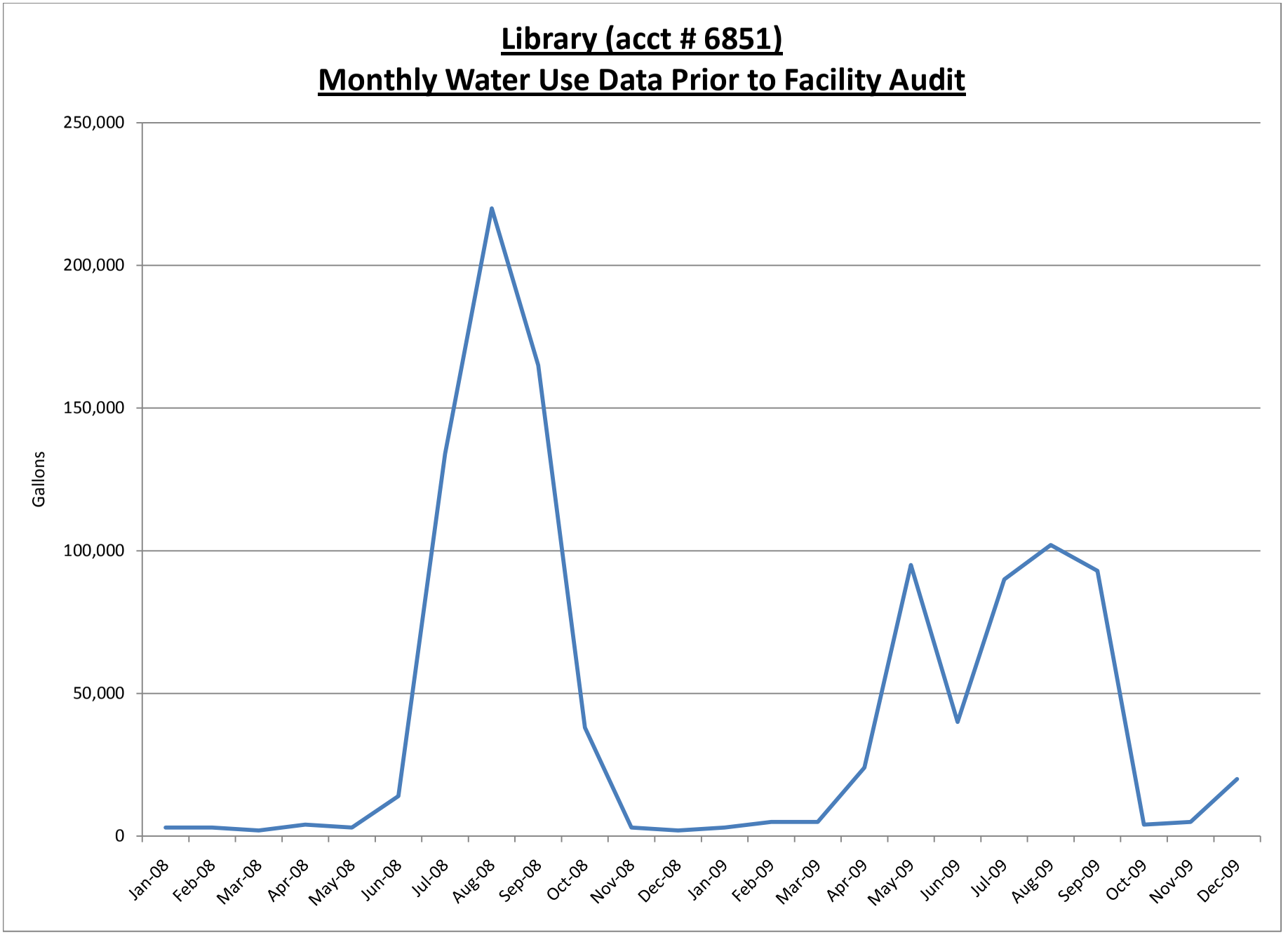
AF Savings: 0.05 $/AF: $ 8,962 Replacement Water Cost* : $ 1,392 Avoided Cost** : $ 144

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

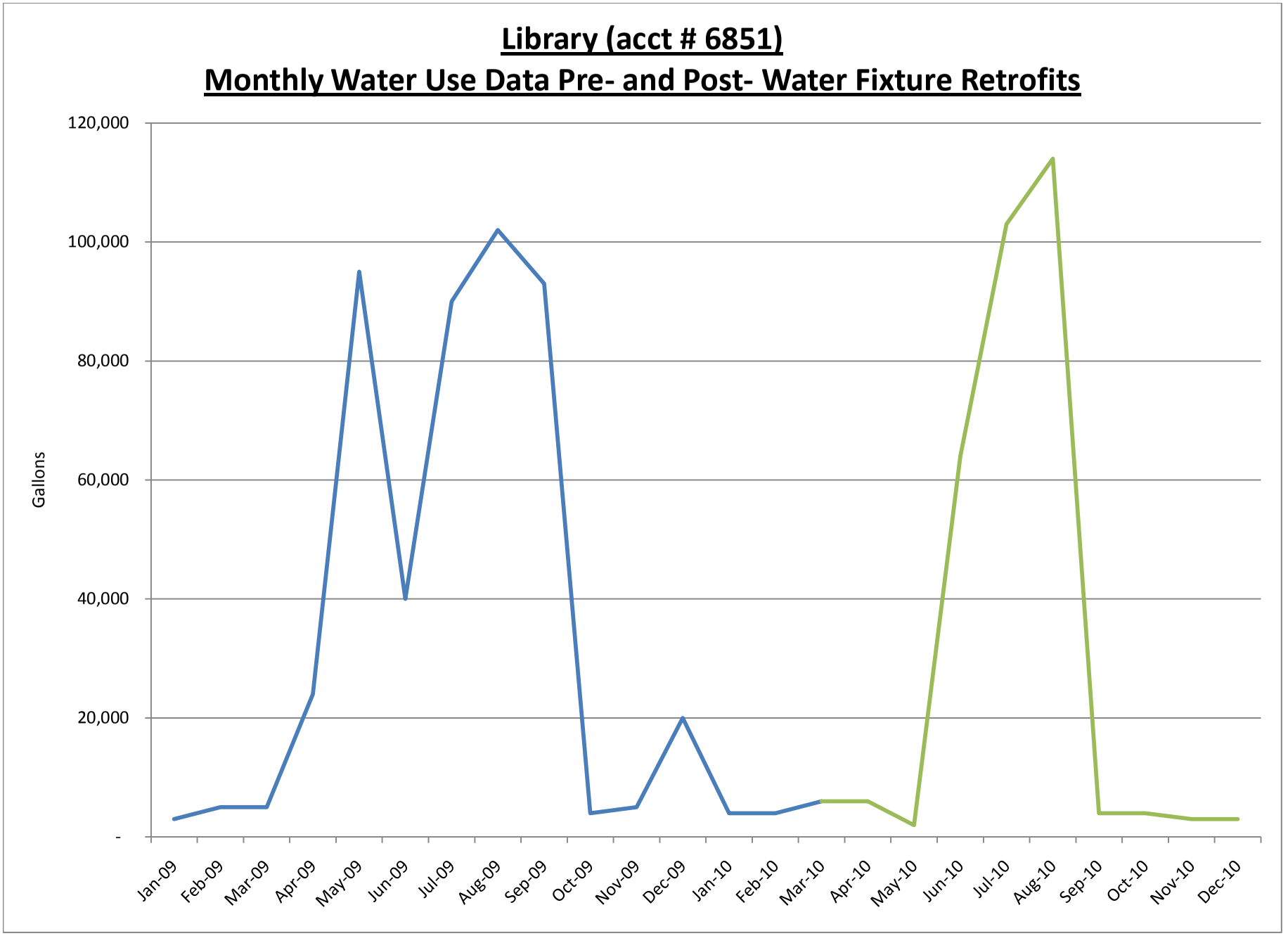
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

Library (acct # 6851)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Library (acct # 6851)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 30, 2010 and April 13, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

Ramon's Restaurant

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 56 Talisman Drive. in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

Ramon's Restaurant uses water in a manner consistent with restaurants throughout Colorado. Similar to many restaurants built before 1993, Ramon's Restaurant had sinks and toilets that had not been updated with EPA Water Sense certified water efficient fixtures that are currently available in the marketplace. Ramon's Restaurant does, however, utilize a pre-rinse spray nozzle that was provided by PAWSD 3 to 4 years ago, which helps to reduce water use.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for Ramon's Restaurant included the following assumption:

- Ramon's Restaurant indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property

The four sink faucet aerators in the men's and women's bathrooms used, on average, 3.1 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $165 dollars per year per sink. This savings results in a payback period of two week.

The four restaurant toilets, on average, use about 2.55 gallons per flush. New Water Sense approved high efficiency dual-flush toilets, which use on average 0.9 gallons per flush, were installed at a total cost of $1,508 with an estimated total water savings of about 27,000 gallons annually. With these savings, the payback period for the installation of the toilets should be about 7 years. Additionally, one urinal was replaced with a Water Sense approved waterless urinal at a cost of $396 with a payback period of less than 7 years. It is estimated that the urinal replacements will have a total water savings of about 7,200 gallons annually.

In total, four faucet aerators, four toilets and one urinal in Ramon's Restaurant were updated at a cost of $1,930. From the water demand model, it is estimated that a total annual water and energy cost savings of about $950 will result from these changes, saving about 74,000 gallons of water and 5,100 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
Ramons Restaurant Audit Summary

Maximum Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
Upstairs -Mens	1		3.5	3.5	gpf	18	flushes	-	63	63	
Upstairs - Womens	1		3.5	3.5	gpf	25	flushes	-	88	88	
Downstairs - Mens	1		1.6	1.6	gpf	18	flushes	-	29	29	
Downstairs - Womens	1		1.6	1.6	gpf	25	flushes	-	40	40	
Urinals											
Downstairs - Mens	1		1	1	gpf	35	flushes	-	35	35	
Bathroom Sinks											
Upstairs -Mens	1	1.25	1.25	2.5	gpm	2.7	uses	14	14	27	
Upstairs - Womens	1	2.5	2.5	5	gpm	3.75	uses	38	38	75	
Downstairs - Mens	1	1.5	1.5	3	gpm	7.95	uses	48	48	95	
Downstairs - Womens	1	1	1	2	gpm	3.75	uses	15	15	30	
Kitchen Sinks	3	4	1	5	gpm	95	minutes	1,140	285	1,425	
Kitchen Handwash Sink	1	2.5	2.5	5	gpm	15	minutes	38	38	75	
Bar Sinks	2	1.5	1.5	3	gpm	45	minutes	135	135	270	
Other											
Ice Machine (Manitowoc Series 800 - JYO804A)	1		17.8	17.8	gp100#	5	100# Ice	-	89	89	
Dishwasher (Autochlor A5)	1	0	1.2	1.2	gpcycle	240	cycles	-	288	288	
Mop Closet	1		5	5	gpm	2	uses	-	10	10	
Steam Table	1		3.74	3.74	gpuse	1	daily	-	4	4	
								1,426	**1,216**	**2,642**	**max day**
								observed		79,000	max month
										30	days at max
								observed		2,633	max day

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
Upstairs -Mens	1		3.5	3.5	gpf	7	flushes	-	25	25	
Upstairs - Womens	1		3.5	3.5	gpf	15	flushes	-	53	53	
Downstairs - Mens	1		1.6	1.6	gpf	10	flushes	-	16	16	
Downstairs - Womens	1		1.6	1.6	gpf	18	flushes	-	29	29	
Urinals											
Downstairs - Mens	1		1	1	gpf	20	flushes	-	20	20	
Bathroom Sinks											
Upstairs -Mens	1	1.25	1.25	2.5	gpm	1.05	uses	5	5	11	
Upstairs - Womens	1	2.5	2.5	5	gpm	2.25	uses	23	23	45	
Downstairs - Mens	1	1.5	1.5	3	gpm	4.5	uses	27	27	54	
Downstairs - Womens	1	1	1	2	gpm	2.7	uses	11	11	22	
Kitchen Sinks	3	4	1	5	gpm	62	minutes	744	186	930	
Kitchen Handwash Sink	1	2.5	2.5	5	gpm	5	minutes	13	13	25	
Bar Sinks	2	1.5	1.5	3	gpm	25	minutes	75	75	150	
Other											
Ice Machine (Manitowoc Series 800 - JYO804A)	1		17.8	17.8	gp100#	3	100# Ice	-	53	53	
Dishwasher (Autochlor A5)	1	0	1.2	1.2	gpcycle	100	cycles	-	120	120	
Mop Closet	1		5	5	gpm	1	uses	-	5	5	
Steam Table	1		3.74	3.74	gpuse	1	daily	-	4	4	
								897	**663**	**1,560**	**avg day**
								observed		46,680	avg month
										30	days at avg
								observed		1,556	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
Ramons Restaurant Audit Summary

Maximum Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets														
Upstairs -Mens	1		0.9	0.9	gpf	18	flushes	-	16	16		-	47	47
Upstairs - Womens	1		0.9	0.9	gpf	25	flushes	-	23	23		-	65	65
Downstairs - Mens	1		0.9	0.9	gpf	18	flushes	-	16	16		-	13	13
Downstairs - Womens	1		0.9	0.9	gpf	25	flushes	-	23	23		-	18	18
Urinals														
Downstairs - Mens	1		0	0	gpf	35	flushes	-	-	-		-	35	35
Bathroom Sinks														
Upstairs -Mens	1	0.25	0.25	0.5	gpm	2.7	uses	3	3	5		11	11	22
Upstairs - Womens	1	0.25	0.25	0.5	gpm	3.75	uses	4	4	8		34	34	68
Downstairs - Mens	1	0.25	0.25	0.5	gpm	7.95	uses	8	8	16		40	40	80
Downstairs - Womens	1	0.25	0.25	0.5	gpm	3.75	uses	4	4	8		11	11	23
Kitchen Sinks	3	4	1	5	gpm	95	minutes	1,140	285	1,425		-	-	-
Kitchen Handwash Sink	1	0.25	0.25	0.5	gpm	15	minutes	4	4	8		34	34	68
Bar Sinks	2	1.5	1.5	3	gpm	45	minutes	135	135	270		-	-	-
Other														
Ice Machine (Manitowoc Series 800 - JYO804A)	1		17.8	17.8	gp100#	5	100# Ice	-	89	89		-	-	-
Dishwasher (Autochlor A5)	1	0	1.2	1.2	gpcycle	240	cycles	-	288	288		-	-	-
Mop Closet	1		5	5	gpm	2	uses	-	10	10		-	-	-
Steam Table	1		3.74	3.74	gpuse	1	daily	-	4	4		-	-	-
								1,297	**910**	**2,207**	**max day**	**129**	**306**	**436**
								observed		79,000	max month			
										36	days at max			
								observed		2,633	max day			

Average Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets														
Upstairs -Mens	1		0.9	0.9	gpf	7	flushes	-	6	6		-	18	18
Upstairs - Womens	1		0.9	0.9	gpf	15	flushes	-	14	14		-	39	39
Downstairs - Mens	1		0.9	0.9	gpf	10	flushes	-	9	9		-	7	7
Downstairs - Womens	1		0.9	0.9	gpf	18	flushes	-	16	16		-	13	13
Urinals														
Downstairs - Mens	1		0	0	gpf	20	flushes	-	-	-		-	20	20
Bathroom Sinks														
Upstairs -Mens	1	0.25	0.25	0.5	gpm	1.05	uses	1	1	2		4	4	8
Upstairs - Womens	1	0.25	0.25	0.5	gpm	2.25	uses	2	2	5		20	20	41
Downstairs - Mens	1	0.25	0.25	0.5	gpm	4.5	uses	5	5	9		23	23	45
Downstairs - Womens	1	0.25	0.25	0.5	gpm	2.7	uses	3	3	5		8	8	16
Kitchen Sinks	3	4	1	5	gpm	62	minutes	744	186	930		-	-	-
Kitchen Handwash Sink	1	2.5	2.5	5	gpm	5	minutes	13	13	25		-	-	-
Bar Sinks	2	1.5	1.5	3	gpm	25	minutes	75	75	150		-	-	-
Other														
Ice Machine (Manitowoc Series 800 - JYO804A)	1		17.8	17.8	gp100#	3	100# Ice	-	53	53		-	-	-
Dishwasher (Autochlor A5)	1	0	1.2	1.2	gpcycle	100	cycles	-	120	120		-	-	-
Mop Closet	1		5	5	gpm	1	uses	-	5	5		-	-	-
Steam Table	1		3.74	3.74	g/use	1	daily	-	4	4		-	-	-
								842	**511**	**1,353**	**avg day**	**55**	**152**	**207**
								observed		46,680	avg month			
										34	days at avg			
								observed		1,556	avg day			

Table 2 - Summary of Current Water Use and Potential Water Savings
Ramons Restaurant Audit Summary

Costs to Implement

	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Toilet	4	$ 282	$ 95	$ 1,508	6.65 yrs	27,648	-	$ 227	$ 57
Urinals	1	$ 311	$ 85	$ 396	6.71 yrs	7,200	-	$ 59	$ 59
Bath Sinks	4	$ 1.61	$ 5	$ 26	0.04 yrs	39,636	5,147	$ 660	$ 165
				$ 1,930		74,484	5,147	$ 945	

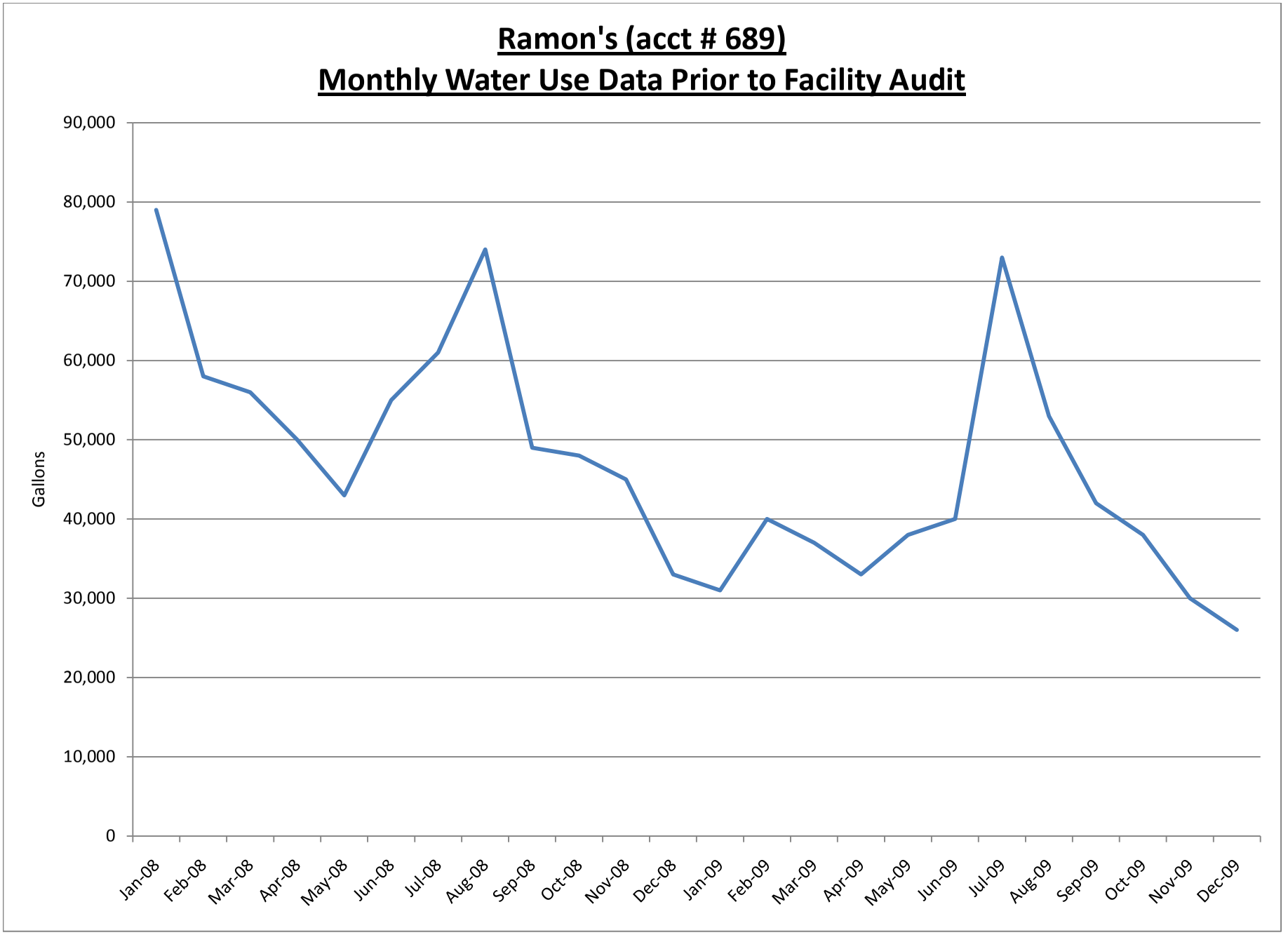
AF Savings: 0.23 $/AF: $ 8,445 Replacement Water Cost* : $ 6,857 Avoided Cost** : $ 708

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

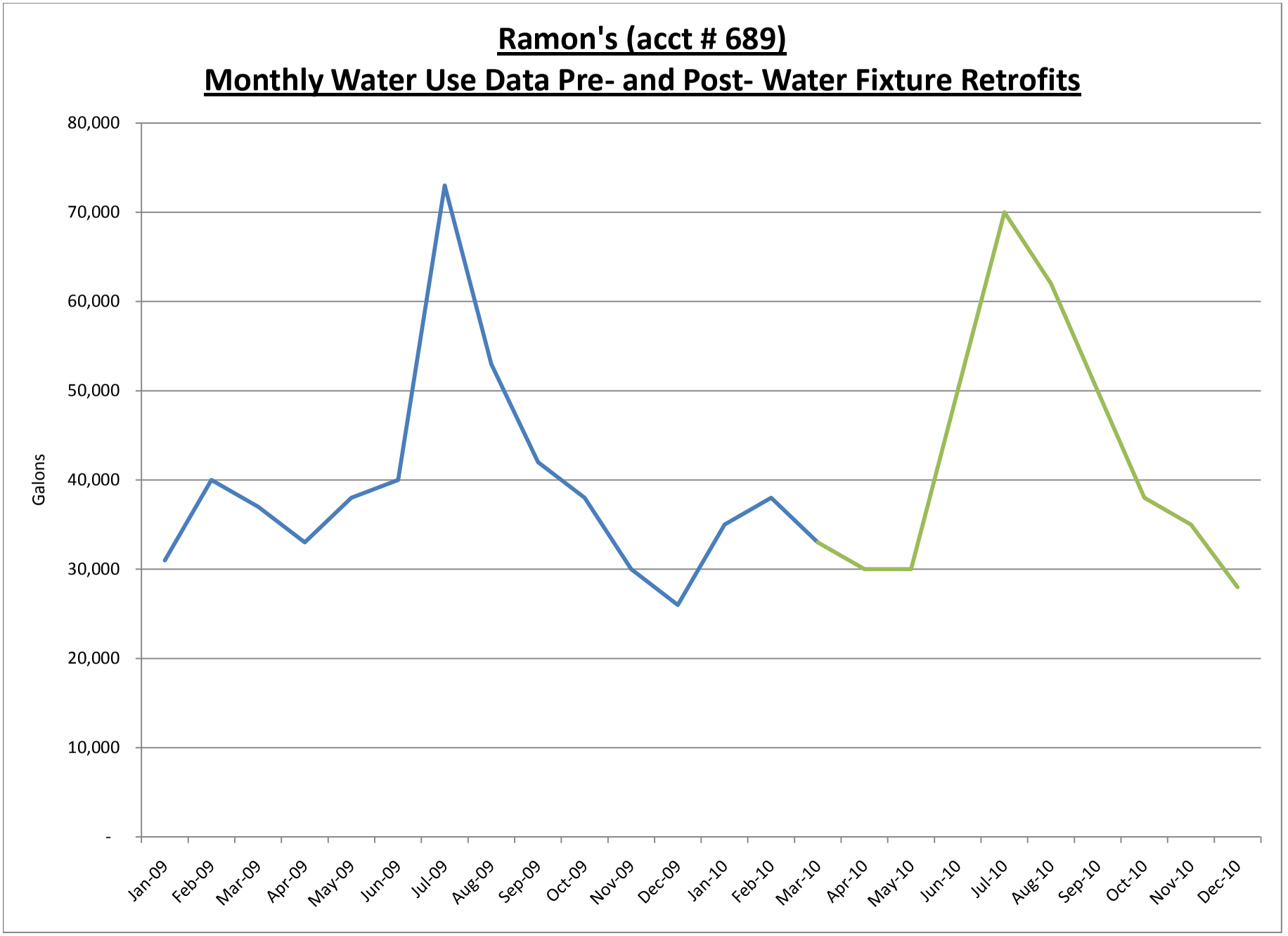
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

Ramon's (acct # 689)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Ramon's (acct # 689)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 30, 2010 and April 8, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

PLPOA Recreation Center

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 230 Port Ave # A. in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

The Recreation Center uses water in a manner consistent with public facilites throughout Colorado. Similar to many buildings built before 1993, the Recreation Center had sinks, showers, and toilets that had not been updated with water efficient fixtures that are currently available in the marketplace.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for the Recreation Center included the following assumption:

- The Recreation Center indicated that use lake water for outdoor irrigation during summer months; therefore, no evaluation was performed to characterize outdoor water use for this property

The 9 sink faucet aerators found in the men's, women's and family bathrooms used, on average, about two gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $211 dollars per year per sink. This savings results in a payback period of about two weeks.

The 12 facility showers, on average, used about 2.2 gallons of water per minute. New low flow showerheads, which use 1.5 gallons per minute, were installed at a total cost of $516 with an estimated total water savings of 38,160 gallons annually. With these savings, the payback period for the installation of the shower heads should just under one year.

Two urinals were also replaced with a Water Sense approved high efficiency waterless urinal at a cost of $792 with a payback period of about five years. It is estimated that the urinal replacements will have a total water savings of 18,000 gallons annually.

In total, nine faucet aerators, twelve showerheads and two urinals in the Recreation Center were updated at a cost of $1,367. From the water demand model, it is estimated that a total annual water and energy cost savings about $2,600 will result from these changes, saving about 180,000 gallons of water and 18,000 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
PLPOA Rec Center Audit Summary

Maximum Use Calculation **Avg 315 people daily**

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
Mens	2		1.6	1.6	gpf	15	flushes	-	48	48	
Womens	4		1.6	1.6	gpf	25	flushes	-	160	160	
Family Bathroom	2		1.6	1.6	gpf	10	flushes	-	32	32	
Urinals											
Mens	2		1	1	gpf	25	flushes	-	50	50	
Bathroom Sinks											
Mens	2	1	1	2	gpm	13	minutes	107	107	213	
Mens	1	1.5	1.5	3	gpm	7	minutes	40	40	80	
Womens	4	1	1	2	gpm	13	minutes	200	200	400	
Family Bathroom Sink (1)	1	1	1	2	gpm	3	minutes	3	3	5	
Family Bathroom Sink (2)	1	1	1	2	gpm	3	minutes	3	3	5	
Laundry Room Sink	2	2.4	0.6	3	gpm	8	minutes	38	10	48	
Mop Sink Closet	1	0	5	5	gpm	2	uses	-	10	10	
Showers											
Mens	3	1	1	2	gpm	23	minutes	69	69	138	
Mens	1	0.75	0.75	1.5	gpm	23	minutes	17	17	35	
Womens	3	1.5	1.5	3	gpm	23	minutes	104	104	207	
Womens	3	0.75	0.75	1.5	gpm	23	minutes	52	52	104	
Family Shower	1	1.5	1.5	3	gpm	10	minutes	15	15	30	
Family Shower	1	1	1	2	gpm	10	minutes	10	10	20	
Other											
Washing Machine (Whirlpool) WTW5320SQ)	1	9	9	18	g/use	4	use	36	36	72	
Drinking Fountain	1		8	8	g/day	1	daily	-	8	8	
Swimming Pool	1		750	750	g/day	1	daily	-	750	750	
								693	**1,722**	**2,414**	**max day**
								observed		72,000	max month
										30	days at max
								observed		2,400	max day

Table 2 - Summary of Current Water Use and Potential Water Savings
PLPOA Rec Center Audit Summary

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
	Mens	2		1.6	1.6 gpf	10	flushes	-	32	32	
	Womens	4		1.6	1.6 gpf	12	flushes	-	77	77	
	Family Bathroom	2		1.6	1.6 gpf	5	flushes	-	16	16	
Urinals											
	Mens	2		1	1 gpf	25	flushes	-	50	50	
Bathroom Sinks											
	Mens	2	1	1	2 gpm	12	minutes	93	93	187	
	Mens	1	1.5	1.5	3 gpm	6	minutes	35	35	70	
	Womens	4	1	1	2 gpm	6	minutes	96	96	192	
	Family Bathroom Sink (1)	1	1	1	2 gpm	1	minutes	1	1	3	
	Family Bathroom Sink (2)	1	1	1	2 gpm	1	minutes	1	1	3	
Laundry Room Sink		2	2.4	0.6	3 gpm	5	minutes	24	6	30	
Mop Sink Closet		1	0	5	5 gpm	1	uses	-	5	5	
Showers											
	Mens	3	1	1	2 gpm	15	minutes	45	45	90	
	Mens	1	0.75	0.75	1.5 gpm	15	minutes	11	11	23	
	Womens	3	1.5	1.5	3 gpm	15	minutes	68	68	135	
	Womens	3	0.75	0.75	1.5 gpm	15	minutes	34	34	68	
	Family Shower	1	1.5	1.5	3 gpm	8	minutes	12	12	24	
	Family Shower	1	1	1	2 gpm	8	minutes	8	8	16	
Other											
Washing Machine (Whirlpool) WTW5320SQ)		1	9	9	18 g/use	2	uses	18	18	36	
Drinking Fountain		1		8.00	8.00 g/day	1	daily	-	8	8	
Swimming Pool		1		750	750 g/day	1	daily	-	750	750	
								446	**1,366**	**1,812**	**avg day**
								observed		54,400	avgmonth
										30	days at avg
								observed		1,813	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
PLPOA Rec Center Audit Summary

Maximum Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets														
Mens	2		1.28	1.28	gpf	15	flushes	-	38	38		-	10	10
Womens	4		1.28	1.28	gpf	25	flushes	-	128	128		-	32	32
												-	-	-
Family Bathroom	2		1.28	1.28	gpf	10	flushes	-	26	26		-	6	6
												-	-	-
Urinals												-	-	-
Mens	2		0	0	gpf	25	flushes	-	-	-		-	50	50
												-	-	-
Bathroom Sinks												-	-	-
Mens	2	0.25	0.25	0.5	gpm	13	minutes	27	27	53		80	80	160
Mens	1	0.25	0.25	0.5	gpm	7	minutes	7	7	13		33	33	67
Womens	4	0.25	0.25	0.5	gpm	13	minutes	50	50	100		150	150	300
												-	-	-
Family Bathroom Sink (1)	1	0.25	0.25	0.5	gpm	3	minutes	1	1	1		2	2	4
Family Bathroom Sink (2)	1	0.25	0.25	0.5	gpm	3	minutes	1	1	1		2	2	4
												-	-	-
Laundry Room Sink	2	2.4	0.6	3	gpm	8	minutes	38	10	48		-	-	-
												-	-	-
												-	-	-
Mop Sink Closet	1	0	5	5	gpm	2	uses	-	10	10		-	-	-
												-	-	-
Showers												-	-	-
Mens	3	0.75	0.75	1.5	gpm	23	minutes	52	52	104		17	17	35
Mens	1	0.75	0.75	1.5	gpm	23	minutes	17	17	35		-	-	-
Womens	3	0.75	0.75	1.5	gpm	23	minutes	52	52	104		52	52	104
Womens	3	0.75	0.75	1.5	gpm	23	minutes	52	52	104		-	-	-
Family Shower	1	0.75	0.75	1.5	gpm	10	minutes	8	8	15		8	8	15
Family Shower	1	0.75	0.75	1.5	gpm	10	minutes	8	8	15		3	3	5
						-						-	-	-
Other						-						-	-	-
Washing Machine (Whirlpool) WTW5320SQ)	1	9	9	18	g/use	4	use	36	36	72		-	-	-
Drinking Fountain	1		8	8	g/day	1	daily	-	8	8		-	-	-
Swimming Pool	1		1,500	1,500	g/day	1	daily	-	1,500	1,500		-	(750)	(750)
								346	**2,028**	**2,374**	**max day**	**346**	**(306)**	**40**
									observed	72,000	max month			
										30	days at max			
									observed	2,400	max day			

Table 2 - Summary of Current Water Use and Potential Water Savings
PLPOA Rec Center Audit Summary

Average Use Water Savings

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets														
Mens	2		1.28	1.28	gpf	10	flushes	-	26	26		-	6	6
Womens	4		1.28	1.28	gpf	12	flushes	-	61	61		-	15	15
Family Bathroom	2		1.28	1.28	gpf	5	flushes	-	13	13		-	3	3
Urinals														
Mens	2		0	0	gpf	25	flushes	-	-	-		-	50	50
Bathroom Sinks														
Mens	2	0.25	0.25	0.5	gpm	12	minutes	23	23	47		70	70	140
Mens	1	0.25	0.25	0.5	gpm	6	minutes	6	6	12		29	29	58
Womens	4	0.25	0.25	0.5	gpm	6	minutes	24	24	48		72	72	144
Family Bathroom Sink (1)	1	0.25	0.25	0.5	gpm	1	minutes	0	0	1		1	1	2
Family Bathroom Sink (2)	1	0.25	0.25	0.5	gpm	1	minutes	0	0	1		1	1	2
Laundry Room Sink	2	2.4	0.6	3	gpm	5	minutes	24	6	30		-	-	-
Mop Sink Closet	1	0	5	5	gpm	1	uses	-	5	5		-	-	-
Showers														
Mens	3	0.75	0.75	1.5	gpm	15	minutes	34	34	68		11	11	23
Mens	1	0.75	0.75	1.5	gpm	15	minutes	11	11	23		-	-	-
Womens	3	0.75	0.75	1.5	gpm	15	minutes	34	34	68		34	34	68
Womens	3	0.75	0.75	1.5	gpm	15	minutes	34	34	68		-	-	-
Family Shower	1	0.75	0.75	1.5	gpm	8	minutes	6	6	12		6	6	12
Family Shower	1	0.75	0.75	1.5	gpm	8	minutes	6	6	12		2	2	4
Other														
Washing Machine (Whirlpool) WTW5320SQ)	1	9	9	18	g/use	2	uses	18	18	36		-	-	-
Drinking Fountain	1		8.00	8.00	g/day	1	daily	-	8	8		-	-	-
Swimming Pool	1		750	750	g/day	1	daily	-	750	750		-	-	-
								220	**1,065**	**1,285**	**avg day**	**226**	**301**	**527**
								observed		54,400	avg month			
										42	days at avg			
								observed		1,813	avg day			
								observed						

Costs to Implement

	number	Hardware	Installation	Total	Payback	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Urinal	2	$ 311	$ 85	$ 792	5.37 yrs	18,000	-	$ 148	$ 74
Shower	12	$ 33	$ 10	$ 516	0.89 yrs	38,160	4,137	$ 582	$ 48
Sinks	9	$ 1.61	$ 5	$ 59	0.03 yrs	124,590	13,508	$ 1,900	$ 211
				$ 1,367		180,750	17,645	$ 2,629	

AF Savings: 0.55 $/AF: $ 2,465

Replacement Water Cost*: $ 16,641

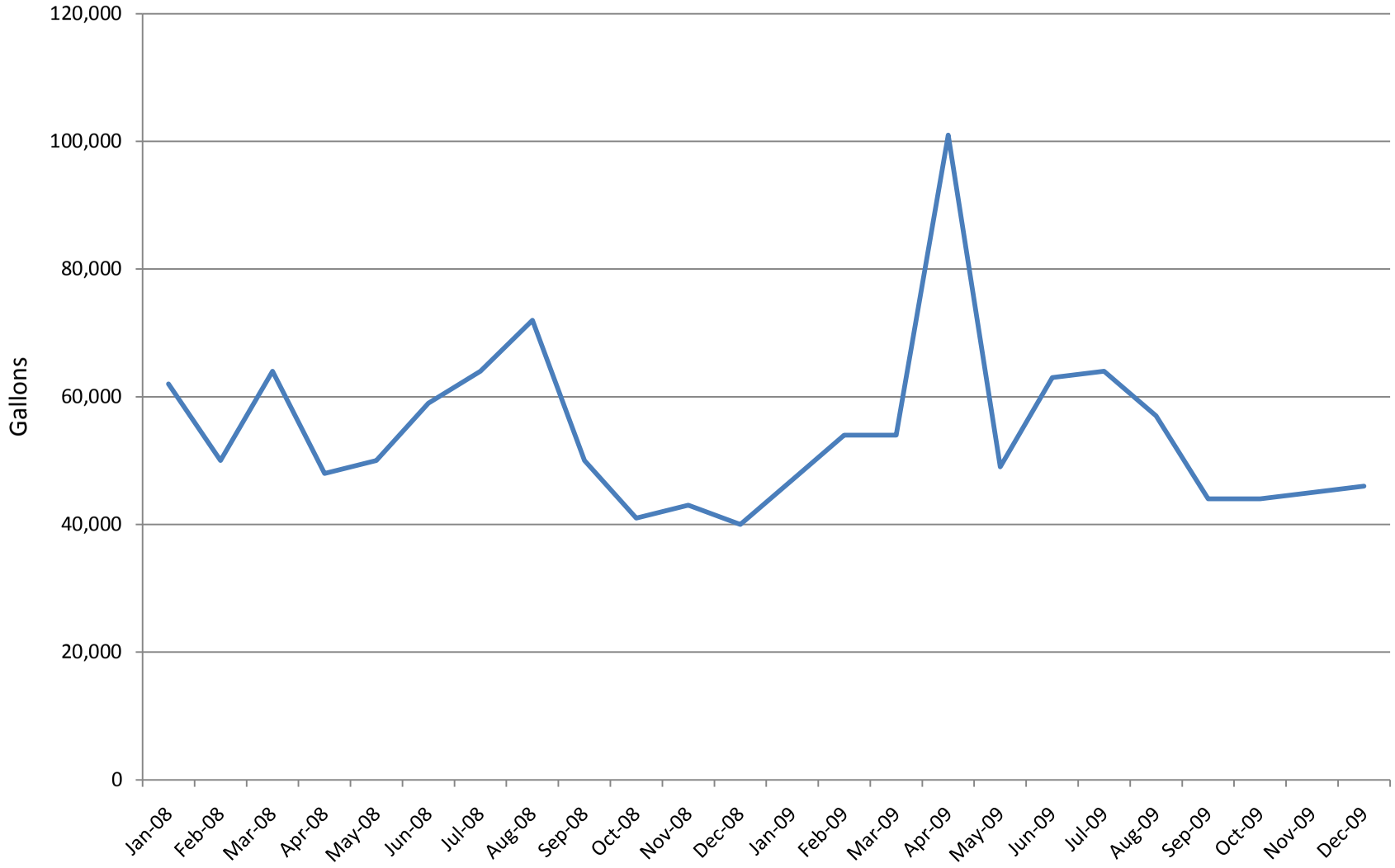
Avoided Cost** : $ 1,717

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

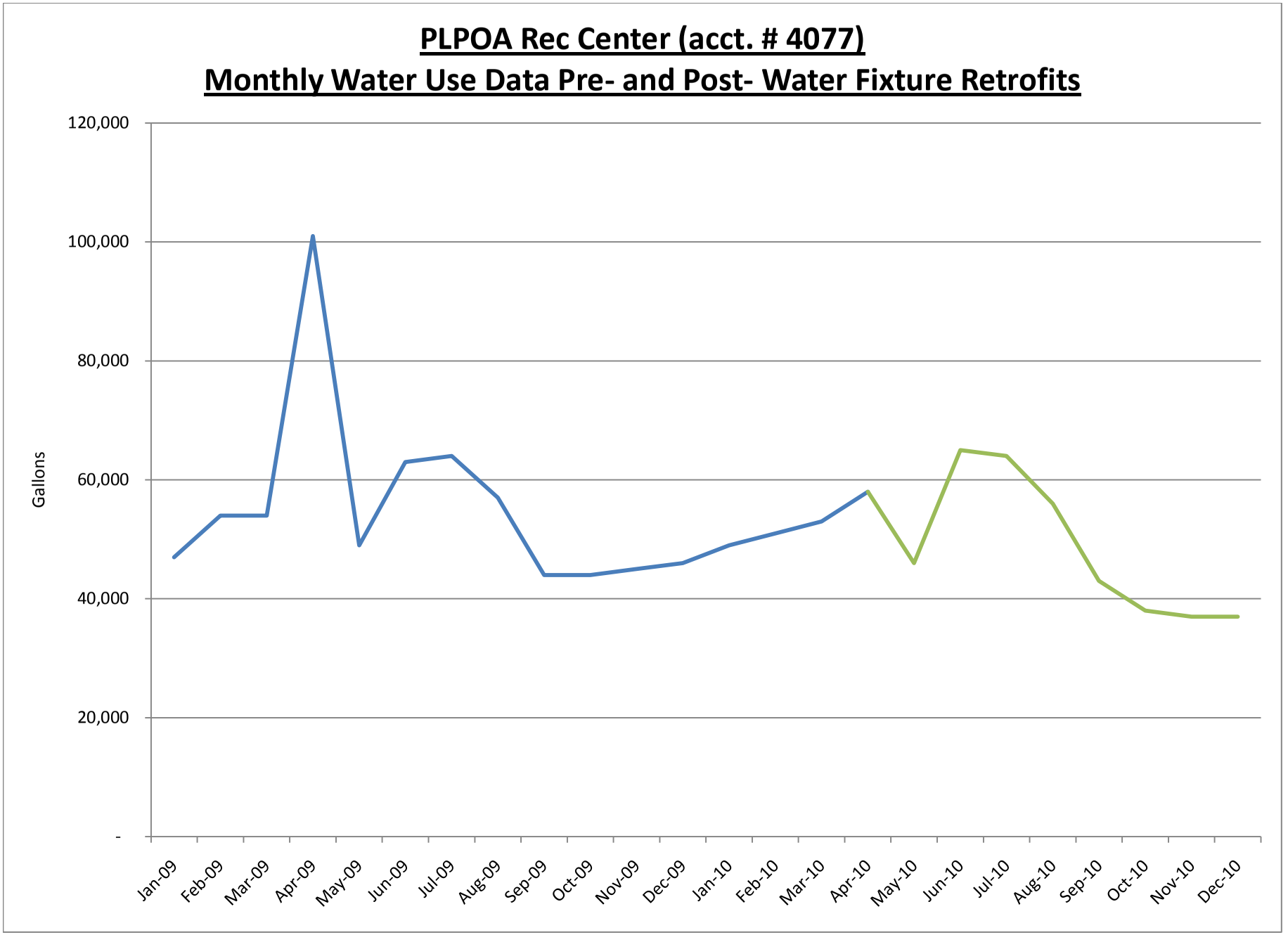
Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

PLPOA Rec Center (acct. # 4077)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

PLPOA Rec Center (acct. # 4077)
Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 30, 2010 and April 26, 2010

GREAT WESTERN INSTITUTE

SMART WATER Audit Report

Tequila's Restaurant

Overview

PAWSD working with Great Western Institute conducted a SMART WATER Audit of this facility at 439 San Juan St. in Pagosa Springs on March 29, 2010. The SMART WATER Audit was conducted as part of the District's demonstration audit project, whereby a small group of selected local businesses volunteered to help PAWSD develop a commercial audit program intended to assist local businesses improve water use efficiency and in doing so, reduce water and energy operational costs.

Water Use Summary

Tequila's Restaurant uses water in a manner consistent with restaurants throughout Colorado. Similar to many restaurants built before 1993, Tequila's Restaurant had sinks and toilets that had not been updated with EPA Water Sense certified water efficient fixtures that are currently available in the marketplace. Tequila's Restaurant does, however, utilize a pre-rinse spray nozzle that was provided by PAWSD 3 to 4 years ago. In addition, the Tequila's Restaurant also utilizes air cooled ice makers which help to reduce water use.

A water demand model was created to estimate maximum and average daily water uses per existing fixture and to project the annual water savings that may be realized with the installment of new Water Smart fixtures. The water demand model for Tequila's Restaurant included the following assumption:

- Tequila's Restaurant indicated that they do not have any outdoor irrigation; therefore, no evaluation was performed to characterize outdoor water use for this property

The six sink faucet aerators in the men's, women's, and kitchen bathrooms used, on average, 2.6 gallons of water per minute (gpm). These aerators were replaced with 0.5 gpm aerators at a cost of about $7 per sink and are estimated to have a water and energy savings of approximately $100 dollars per year per sink. This savings results in a payback period of about 4 weeks.

The four restaurant toilets, on average, use about 1.8 gallons per flush. New Water Sense approved high efficiency dual-flush toilets, which use on average 0.9 gallons per flush, were installed at a total cost of $1,508 with an estimated total water savings of about 17,000 gallons annually. With these savings, the payback period for the installation of the toilets should be about 11 years.

In total, six sinks and four toilets in Tequila's Restaurant were updated at a cost of $1,548. From the water demand model, it is estimated that a total annual water and energy cost savings of about $800 will result from these changes, saving about 57,000 gallons of water and 5,200 kilowatt hours of energy.

Table 2 - Summary of Current Water Use and Potential Water Savings
Tequila's Audit Summary

Maximum Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
Mens	1			2.5	gpf	25	flushes	-	63	63	
Womens	2			1.6	gpf	50	flushes	-	160	160	
Kitchen Bathroom	1			1.6	gpf	20	flushes	-	32	32	
Urinals											
Mens	1			0.5	gpf	75	flushes	-	38	38	
Bathroom Sinks											
Mens	2	1	1	2	gpm	15	minutes	120	120	240	
Womens	2	1	1	2	gpm	7.5	minutes	60	60	120	
Kitchen Sinks	2	4	1	5	gpm	180	minutes	1,440	360	1,800	
Kitchen Handwash Sink	1	0.75	0.75	1.5	gpm	20	minutes	15	15	30	
Kitchen Bathroom Sink	1	3	3	6	gpm	3	minutes	9	9	18	
Bus Station	1	1	1	2	gpm	150	minutes	150	150	300	
Mop Sink	1	0	5	5	gpm	2	uses	-	10	10	
Bar Sink	2	1	1	2	gpm	45	minutes	90	90	180	
Bar Hand Sink	2	2	2	4	gpm	15	minutes	60	60	120	
Other											
Ice Machine (Manitowoc Series QD1003W)	1		17.8	17.8	gp100#	6	100# Ice	-	107	107	
Dishwasher (Ecolab ES2000)	1	0	1.2	1.2	gpcycle	200	cycles	-	240	240	
Steam Table	1		8.73	8.73	gpuse	1	daily	-	9	9	
								1,944	**1,522**	**3,466**	**max day**
								observed		105,000	max month
										30	days at max
								observed		3,500	max day

Average Use Calculation

	number	per use hot	per use cold	per use total		uses/day		subtotal gpd hot	subtotal gpd cold	subtotal gpd total	
Toilets											
Mens	1			2.5	gpf	10	flushes	-	25	25	
Womens	2			1.6	gpf	15	flushes	-	48	48	
Kitchen Bathroom	1			1.6	gpf	15	flushes	-	24	24	
Urinals											
Mens	1			0.5	gpf	25	flushes	-	13	13	
Bathroom Sinks											
Mens	2	1	1	2	gpm	5.25	minutes	42	42	84	
Womens	2	1	1	2	gpm	2.25	minutes	18	18	36	
Kitchen Sinks	2	4	1	5	gpm	98	minutes	784	196	980	
Kitchen Handwash Sink	1	0.75	0.75	1.5	gpm	8	minutes	6	6	12	
Kitchen Bathroom Sink	1	3	3	6	gpm	2.25	minutes	7	7	14	
Bus Station	1	1	1	2	gpm	45	minutes	45	45	90	
Mop Sink	1	0	5	5	gpm	1	uses	-	5	5	
Bar Sink	2	1	1	2	gpm	30	minutes	60	60	120	
Bar Hand Sink	2	2	2	4	gpm	5	minutes	20	20	40	
Other											
Ice Machine (Manitowoc Series QD1003W)	1		17.8	17.8	gp100#	3	100# Ice	-	53	53	
Dishwasher (Ecolab ES2000)	1	0	1.2	1.2	gpcycle	100	cycles	-	120	120	
Steam Table	1		8.73	8.72725	gpuse	1	daily	-	9	9	
								982	**690**	**1,672**	**avg day**
								observed		50,160	avg month
										30	days at avg
								observed		1,672	avg day

Table 2 - Summary of Current Water Use and Potential Water Savings
Tequila's Audit Summary

Maximum Use Water Savings

	number	per use hot	per use cold	per use total		uses/day	subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets													
Mens	1			0.9	0.9 gpf	25 flushes	-	23	23		-	40	40
Womens	2			0.9	0.9 gpf	50 flushes	-	90	90		-	70	70
Kitchen Bathroom	1			0.9	0.9 gpf	20 flushes	-	18	18		-	14	14
Urinals													
Mens	1			0.5	0.5 gpf	75 flushes	-	38	38		-	-	-
Bathroom Sinks													
Mens	2	0.25	0.25	0.5	gpm	15 uses	30	30	60		90	90	180
Womens	2	0.25	0.25	0.5	gpm	7.5 uses	15	15	30		45	45	90
Kitchen Sinks	2	4	1	5	gpm	180 minutes	1,440	360	1,800		-	-	-
Kitchen Handwash Sink	1	0.25	0.25	0.5	gpm	20 minutes	5	5	10		10	10	20
Kitchen Bathroom Sink	1	0.25	0.25	0.5	gpm	3 minutes	1	1	2		8	8	17
Bus Station	1	1	1	2	gpm	150 minutes	150	150	300		-	-	-
Mop Sink	1	0	5	5	gpm	2 uses	-	10	10		-	-	-
Bar Sink	2	1	1	2	gpm	45 minutes	90	90	180		-	-	-
Bar Hand Sink	2	2	2	4	gpm	15 minutes	60	60	120		-	-	-
Other													
Ice Machine (Manitowoc Series QD1003W)	1		17.8	17.8	gp100#	6 100# Ice	-	107	107		-	-	-
Dishwasher (Ecolab ES2000)	1	0	1.2	1.2	gpcycle	200 cycles	-	240	240		-	-	-
Steam Table	1		8.73	8.73	gpuse	1 daily	-	9	9		-	-	-
							1,791	**1,244**	**3,035**	**max day**	**153**	**277**	**431**
							observed		105,000	max month			
									35	days at max			
							observed		3,500	max day			

Average Use Water Savings

	number	per use hot	per use cold	per use total		uses/day	subtotal gpd hot	subtotal gpd cold	subtotal gpd total		Savings hot	Savings cold	Savings total
Toilets													
Mens	1			0.9	0.9 gpf	10 flushes	-	9	9		-	16	16
Womens	2			0.9	0.9 gpf	15 flushes	-	27	27		-	21	21
											-	-	-
Kitchen Bathroom	1			0.9	0.9 gpf	15 flushes	-	14	14		-	11	11
											-	-	-
Urinals											-	-	-
Mens	1			0.5	0.5 gpf	25 flushes	-	13	13		-	-	-
											-	-	-
Bathroom Sinks											-	-	-
Mens	2	0.25	0.25	0.5	gpm	5.25 minutes	11	11	21		32	32	63
Womens	2	0.25	0.25	0.5	gpm	2.25 minutes	5	5	9		14	14	27
											-	-	-
											-	-	-
Kitchen Sinks	2	4	1	5	gpm	98 minutes	784	196	980		-	-	-
											-	-	-
Kitchen Handwash Sink	1	0.25	0.25	0.5	gpm	8 minutes	2	2	4		4	4	8
											-	-	-
Kitchen Bathroom Sink	1	0.25	0.25	0.5	gpm	2.25 minutes	1	1	1		6	6	12
											-	-	-
Bus Station	1	1	1	2	gpm	45 minutes	45	45	90		-	-	-
											-	-	-
Mop Sink	1	0	5	5	gpm	1 uses	-	5	5		-	-	-
											-	-	-
Bar Sink	2	1	1	2	gpm	30 minutes	60	60	120		-	-	-
											-	-	-
Bar Hand Sink	2	2	2	4	gpm	5 minutes	20	20	40		-	-	-
											-	-	-
Other											-	-	-
Ice Machine (Manitowoc Series QD1003W)	1		17.8	17.8	gp100#	3 100# Ice	-	53	53		-	-	-
Dishwasher (Ecolab ES2000)	1	0	1.2	1.2	gpcycle	100 cycles	-	120	120		-	-	-
Steam Table	1		8.73	8.72725	gpuse	1 daily	-	9	9		-	-	-
							927	**588**	**1,514**	**avg day**	**55**	**103**	**158**
							observed		50,160	avg month			
									33	days at avg			
							observed		1,672	avg day			

Costs to Implement

	number	Hardware	Installation	Total	Pay Back	Water Savings (gpy)	Energy Savings (kWhr)	Total Cost Savings/yr	Total Cost Savings/yr/fixture
Toilet	4	$ 282	$ 95	$ 1,508	10.75	17,100		$ 140	$ 35
Bath Sinks	6	$ 1.61	$ 5	$ 39.66	0.06	39,735	5,159	$ 661	$ 110
				$ 1,548		56,835	5,159	$ 801	

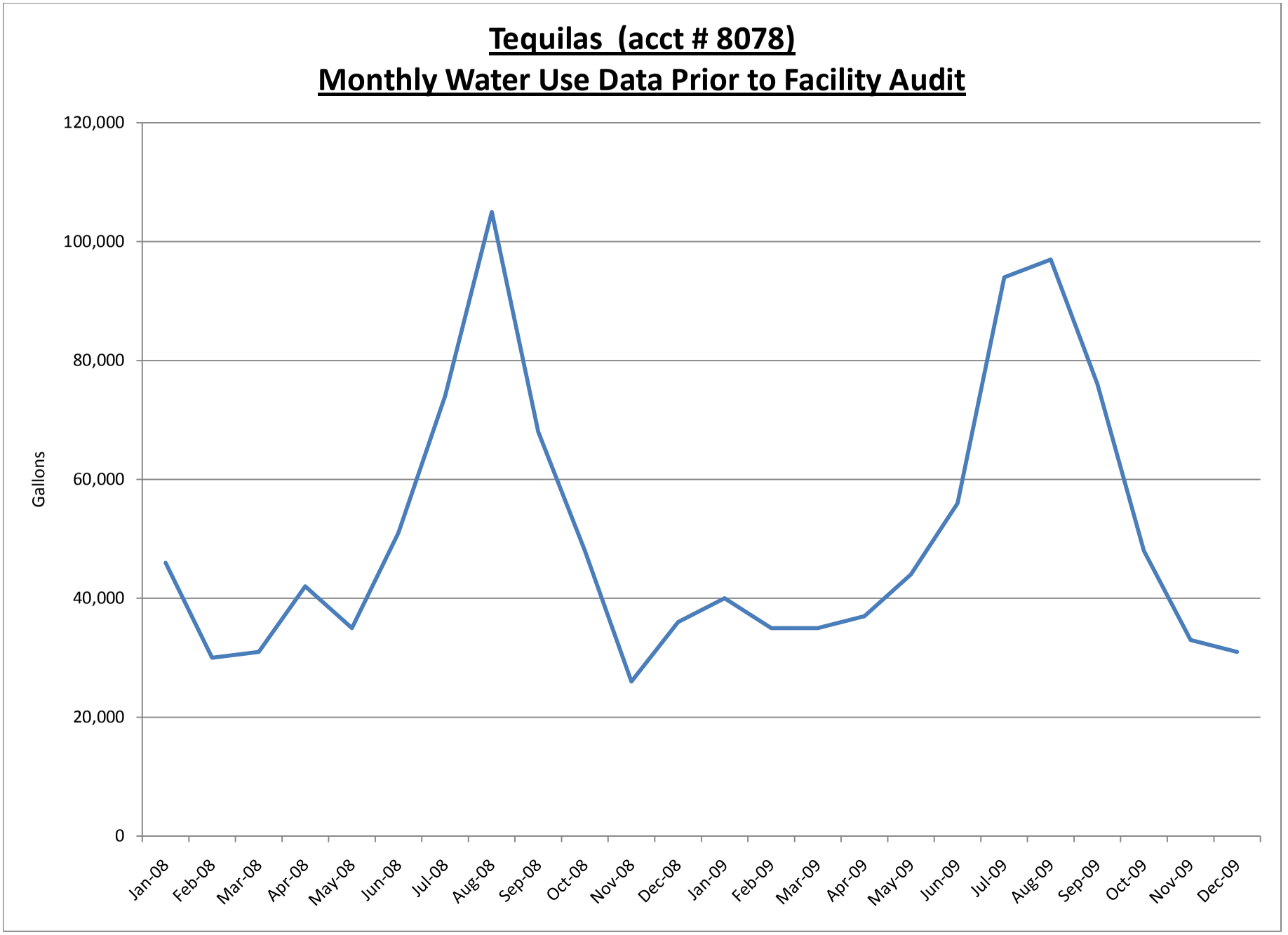
AF Savings: 0.17 $/AF: $ 8,873 Replacement Water Cost* : $ 5,233 Avoided Cost** : $ 540

* Calculation based on $30,000 per AF

** Calculation based on $9.50/ 1000 gal

Cost Savings Assumptions: $8.50/1000 gal - cost of water and sewer, $0.065/kwh cost of energy

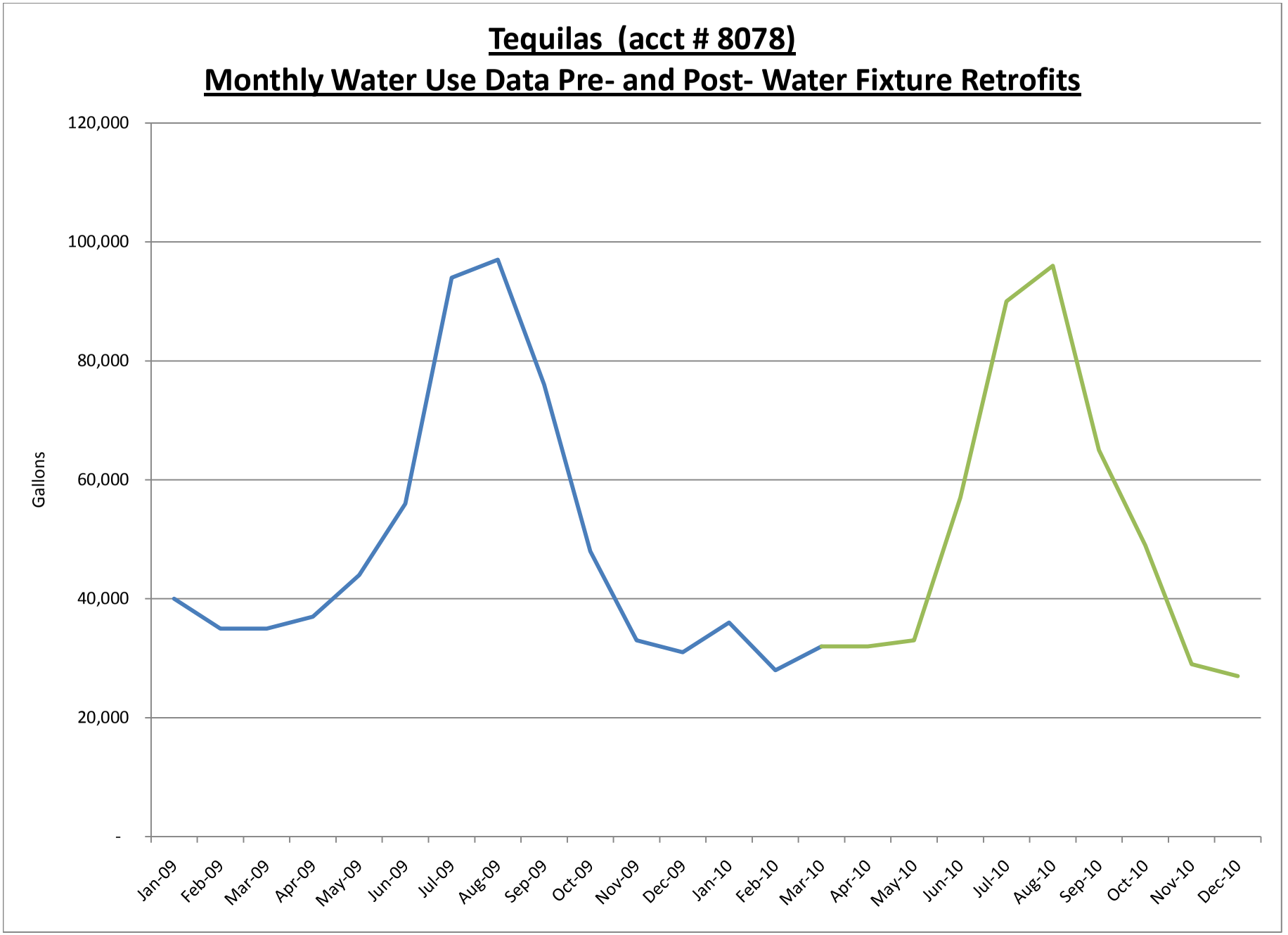
Tequilas (acct # 8078)
Monthly Water Use Data Prior to Facility Audit



*Monthly water use data for two years prior to the facility audit. This data was used to configure and calibrate the water model

Tequilas (acct # 8078)

Monthly Water Use Data Pre- and Post- Water Fixture Retrofits



*Water fixture retrofits were installed March 30, 2010 and April 16, 2010

GREAT WESTERN INSTITUTE

Appendix D

Facility Monthly Water Use Data Prior to and After Fixture Replacements were Installed

Appendix D: Monthly Water Use Data per Facility: 2009-2010

Facility	Acct #(s)	January		February		March		April		May		June		July		August		September		October		November		December		Annual Water Use May-Dec		Average Savings per Month (gallons)	Annual Savings (gallons)
		2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010		
The Spa	7141, 10124*	140,000	152,000	125,000	160,000	106,000	171,000	128,000	171,000	123,000	126,000	152,000	162,000	230,000	197,000	160,000	174000	328,000	167,000	206,000	145,000	204,000	161,000	146,000	156,000	1,549,000	1,288,000	32,625	391,500
Best Western	8082, 8081, 8245*	151,000	71,000	85,000	52,000	105,000	75,000	126,000	49,000	75,000	49,000	176,000	95,000	179,000	100,000	146,000	95,000	134,000	91,000	66,000	57,000	42,000	28,000	131,000	56,000	949,000	571,000	47,250	567,000
Pinewood Inn	8237, 6749, 8238*	49,000	35,000	35,000	25,000	34,000	61,000	26,000	27,000	27,000	29,000	38,000	39,000	61,000	104,000	60,000	40,000	52,000	42,000	43,000	28,000	29,000	20,000	67,000	20,000	377,000	322,000	6,875	82,500
Pagosa Inn and Suites	4086	77,000	108,000	56,000	53,000	83,000	94,000	81,000	58,000	63,000	45,000	81,000	90,000	144,000	153,000	125,000	121,000	176,000	101,000	147,000	84,000	61,000	165,000	63,000	60,000	860,000	819,000	5,125	61,500
First Inn	8062	101,000	61,000	53,000	37,000	87,000	58,000	63,000	25,000	45,000	20,000	89,000	65,000	131,000	78,000	110,000	63,000	85,000	42,000	46,000	31,000	8000	16,000	47,000	17,000	561,000	332,000	28,625	343,500
Tequilas	8078	40,000	36,000	35,000	28,000	35,000	32,000	37,000	32,000	44,000	33,000	56,000	57,000	94,000	90,000	97,000	96,000	76,000	65,000	48,000	49,000	33,000	29,000	31,000	27,000	479,000	446,000	4,125	49,500
Ramons	689	31,000	35,000	40,000	38,000	37,000	33,000	33,000	30,000	38,000	30,000	40,000	50,000	73,000	70,000	53,000	62,000	52,000	50,000	38,000	38,000	30,000	35,000	26,000	28,000	350,000	363,000	(1,625)	(19,500)
Chamber	8079	0	0	0	0	0	0	0	0	0	29,000	0	138,000	0	108,000	28,000	82,000	68,000	74,000	20,000	15,000	3000	1,000	2,000	1000	93,000	91,000	250	3,000
Library	6851	3,000	4,000	5,000	4,000	5,000	6,000	24,000	6,000	95,000	2,000	40,000	64,000	90,000	103,000	102,000	114,000	93,000	4,000	4000	4,000	5000	3,000	20,000	3000	449,000	297,000	19,000	228,000
Kip's	6748	20,000	20,000	17,000	16,000	17,000	20,000	13,000	14,000	14,000	9,000	25,000	16,000	31,000	16,000	29,000	18,000	27,000	14,000	10,000	7000	13,000	9000	16,000	9,000	165,000	98,000	8,375	100,500
Higher Grounds	4105	24,000	29,000	31,000	35,000	29,000	30,000	26,000	28,000	39,000	43,000	46,000	58,000	53,000	60,000	56,000	51,000	47,000	52,000	35,000	44,000	29,000	31,000	29,000	27,000	334,000	366,000	(4,000)	(48,000)
PLPOA Rec Center	4077	47,000	49,000	54,000	51,000	54,000	53,000	101,000	58,000	49,000	46,000	63,000	65,000	64,000	64,000	57,000	56,000	44,000	43,000	44,000	38,000	45,000	37,000	46,000	37,000	412,000	386,000	3,250	39,000
Boss Hogg's	3918	50,000	48,000	42,000	45,000	46,000	44,000	44,000	42,000	47,000	41,000	56,000	43,000	63,000	49,000	68,000	48,000	58,000	44,000	58,000	41,000	47,000	37,000	44,000	35,000	441,000	338,000	12,875	154,500
JJ's	9175	74,000	70,000	108,000	57,000	106,000	52,000	79,000	52,000	103,000	44,000	111,000	48,000	98,000	56,000	105,000	63,000	97,000	53,000	70,000	48,000	62,000	28,000	82,000	26,000	728,000	366,000	45,250	543,000

* use combined

Appendix E

Town of Pagosa Lodger Tax Revenue Data

Appendix E: Lodging Tax Revenue Data for the Town of Pagosa

Jan-06	$	14,059
Feb-06	$	13,668
Mar-06	$	26,847
Apr-06	$	12,700
May-06	$	19,278
Jun-06	$	34,441
Jul-06	$	40,571
Aug-06	$	34,204
Sep-06	$	36,758
Oct-06	$	24,487
Nov-06	$	23,836
Dec-06	$	35,091
Jan-07	$	22,904
Feb-07	$	20,543
Mar-07	$	33,516
Apr-07	$	15,879
May-07	$	20,590
Jun-07	$	31,804
Jul-07	$	43,728
Aug-07	$	36,391
Sep-07	$	36,500
Oct-07	$	25,776
Nov-07	$	14,866
Dec-07	$	31,652
Jan-08	$	23,544
Feb-08	$	17,002
Mar-08	$	31,216
Apr-08	$	12,500
May-08	$	19,276
Jun-08	$	29,041
Jul-08	$	44,693
Aug-08	$	42,822
Sep-08	$	32,363
Oct-08	$	22,041
Nov-08	$	16,232
Dec-08	$	31,934
Jan-09	$	24,228
Feb-09	$	19,360
Mar-09	$	29,925
Apr-09	$	15,186
May-09	$	21,949
Jun-09	$	32,622
Jul-09	$	50,124
Aug-09	$	42,307
Sep-09	$	35,610
Oct-09	$	25,764
Nov-09	$	19,815
Dec-09	$	35,482
Jan-10	$	27,295
Feb-10	$	21,960
Mar-10	$	34,928
Apr-10	$	15,765
May-10	$	21,049
Jun-10	$	37,304
Jul-10	$	51,892
Aug-10	$	41,714
Sep-10	$	41,333
Oct-10	$	28,858
Nov-10	$	21,348
Dec-10	$	-