Disclaimer

This project was conducted with financial assistance from a grant from the Metropolitan Water District of Southern California through Metropolitan’s Innovative Conservation Program (ICP). ICP grants are provided to selected projects to test water savings potential and functional reliability of new water use efficiency devices. The findings of this project, summarized in this report, are solely from the project proponent. Metropolitan does not endorse any particular product, service, or company, including those discussed within this report. The information provided within this report is not certified by Metropolitan and any party referencing this report should verify information as needed for its own purpose.
Final Report, June 1, 2011
Agreement No. 91698

For
Metropolitan Water District’s (MWD’s)
Innovative Conservation Program

Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

1.0 Summary

The purpose of this project was to perform a small scale evaluation of the typical water savings achieved by using the Spray Smart valve as a tool to optimize existing irrigation systems.

The water savings were compared for two different methods of implementation. One method measured the savings when semi-skilled homeowners performed their own upgrades. The second method measured the water savings when the upgrade was performed by a professional irrigation designer.

Water savings were determined by audits of the irrigation system before and after the Spray Smart upgrade. Professional irrigation auditors performed the audits measuring actual water delivery and distribution uniformity (where applicable). The auditors used their expertise to determine the revised irrigation scheduling and, therefore, predicted water savings.

The net result was an evaluation of the water savings achieved and the measured difference between professional upgrades and homeowner upgrades.

Both groups reduced water use by an average of 34%. They used an average of 16 Spray Smart valves. With an average savings of 662 gallons per valve, the per site annual savings was 10,592 gallons, or 86% of our prediction. While all but one of our participants chose to upgrade a single zone, the site average was 2.4 "problem" zones. Therefore, the water savings could have been substantially higher had all applicable zones been addressed.

2.0 Spray Smart Valve Technology Overview

Spray Smart patented technology substantially reduces water consumption by enabling irrigation system optimization. More specifically, Spray Smart fixes inefficiency problems commonly found in most existing residential or commercial irrigation systems. This is achieved with a simple, low cost device.

Most irrigation systems are not properly optimized to apply differing amounts of water to landscape areas that have differing water demands. In fact, "ideal" irrigation systems are often meant to uniformly apply water. Since some areas have higher water demand (due to more sun or thirsty landscape), owners are "forced" to set their irrigation schedule based upon these
highest demand areas to maintain appearance. In the process, they simultaneously over-water the areas with lower water demand. These “over-watered” problem areas are responsible for up to 50% water waste. In-ground irrigation plumbing is expensive to modify, leading owners to continue this over-watering behavior.

The Spray Smart valve installs in the base of each sprinkler head in the problem watering zones. Within each valve is a toggle which turns the valve “on” or “off” when triggered by water pressure. By simply installing some Spray Smart valves in the "on" state, and others in the "off" state, the original irrigation zone is effectively sub-divided into independent subzones. Then, by utilizing the “A” and “B” programs (found on most irrigation system controllers) property owners can adjust each subzone to function for a unique time period thereby controlling total water use.

Figure 1: Typical Mixed Landscape Solution using Spray Smart
3 Easy Steps:
1. Preset some valves to second cycle
2. Install valves under (or in) all heads
3. Program controller to run the zone twice with optimized run times

In addition, Spray Smart installation allows owners to elect to make additional changes. They can change the landscape without having to worry about water demand compatibility. This is often used to substitute water saving plants. They can also use higher efficiency water delivery methods, such as drip irrigation or high efficiency spray heads. In both cases, the mixing of otherwise incompatible landscape and/or water delivery equipment is enabled by the Spray Smart technology allowing the original plumbing to operate as independent subzones. Equally important, Spray Smart eliminates landscape dissatisfaction and health issues such as muddy spots or poor appearance.

3.0 Contracted Task Requirements and Results

Our project consisted of four steps.
1) Recruit applicants and segregate them into participant groups.
2) Perform pre-upgrade audits of the baseline irrigation system.
3) Perform system optimization upgrades using Spray Smart technology.
4) Perform post-upgrade audits to quantify the water savings achieved.

Each step is detailed below:
Task #1: Recruitment, Segregation and Selection:

Recruitment, segregation and selection consisted of the following steps:
A) Distribute postcards through various channels to solicit interest and recruit applicants for the program. The postcard directed the candidates to an online application process.
B) Provide additional information and inform the applicants about the program terms. To be considered for the program, applicants had to agree to the program terms by selecting a check box on the informational page. Once the box was checked, the applicant had the option to continue to the survey.
C) Use an online survey to determine whether the applicants were qualified for the program. The survey was also intended to provide sufficient information for segregation.
D) Download the survey responses and use a grading system to segregate the applicants into three groups: DIY, Professional only, non-qualified for program.
E) Contact the selected applicants and confirm that they understood the terms, the product and how it could be applied to achieve water savings. This call confirmed the applicants as participants.

The details of each step are shown below:
A) Postcard Distribution: We designed and printed 3,000 informational "postcards" that were used to recruit applicants for the audit program. The postcards introduced the product and potential uses and invited customers to apply online for a free system upgrade using Spray Smart valves. The 4.25" x 5.5" postcards were two-side color with one side in English and the reverse in Spanish.

Figure 3: English Recruitment Flyer
The original plan was to distribute the postcards at the checkout counter of irrigation distributors throughout San Diego and/or through alternative low cost methods to develop a potential participant pool.

It was fortunate that we did not rely solely on flyer distribution via the irrigation outlets. An unwritten assumption was that we would concurrently be selling through those outlets. That would have given the program much more credibility and given the salespeople incentive to promote our program to drive immediate sales. As the program began, we thought that without sales, we would not have an opportunity to use this channel. As it turns out, we were able to secure space on the counter of three local irrigation distributor stores. The stores were: Poway Irrigation, 13255 Poway Rd, Poway CA, Ewing Irrigation, 7151 Ronson Rd # A, San Diego, CA, and Grangetto’s Supply, 1105 West Mission Avenue, Escondido, CA. Although hundreds of flyers were available for an extended amount of time, only one program applicant was obtained through these efforts.

As an alternative, we attempted to obtain approval to distribute our postcards at big box retail hardware stores. While we had a good response at the local level, we were rejected at the regional level. Therefore, in an effort to increase our rate of applicant recruitment, two temporary employees were hired to hand out flyers on the street in front of the Home Depot store in Poway, CA. This was partially successful. Hundreds of flyers were handed out, but the response rate was low compared to the cost. Four applicants were obtained through this method.

Based on our poor applicant recruitment rate, we decided to invest in a booth at a local clean tech street fair. We rented a booth at the California Center for Sustainable Energy (CCSE) Family Energy Day on September 12, 2010. Photos of our booth presence can be seen below:
Figure 5: Booth Layout at CCSE Street Fair

Figure 6: Booth Placement at CCSE Street Fair
We handed out hundreds of flyers at this event. Our response rate was much better. We had nine applicants sign up for our program. It is likely that the response rate was higher due to the fact that the applicants had seen the product in action and had a chance to consider how it would work for their applications. This is noteworthy for our future marketing efforts and illustrates the importance of educating potential users about this very new technology.

Since we had not been successful in distributing all of our flyers or obtaining our quota of applicants through all of these efforts, we hired a flyer distribution service to place the remaining ~2500 flyers on doors around northern inland San Diego. This produced five more applicants.

Ultimately, we were able to recruit 25 potential applicants through all of these efforts plus referrals. We were hoping to have a much larger initial pool of applicants to choose from.

One factor that was not considered in our original proposal was retention. Some applicants who were converted to participants did not follow through with the program requirements. They either failed to make themselves available for the audits, or simply stopped responding to our communications for unknown reasons. As a result, our pool of active participants dropped below the program goal of five pro participants and ten DIY participants. Luckily, by the time we had exhausted our original applicant pool, program participants were able to provide referrals that replenished the pool. Ultimately, our participants were selected from a pool of 32 applicants. None of the applicants used the Spanish survey.

B) Informational and Terms Agreement: The first step of the online application process was a landing page (identical English and Spanish) that outlined the terms of participation for the homeowners. They were required to agree to the terms to activate a link to the segregation questionnaire. The English version of the page is shown here:
FREE WATER-SAVING SPRINKLER SYSTEM UPGRADE

En Español

We have been awarded a contract by the Metropolitan Water District of Southern California (MWD) to demonstrate the water saving performance of the Spray Smart valve. (http://www.bewaterwise.com/icp.html)

The MWD contract pays all the costs to provide Spray Smart valves and installation services to selected homeowners.

Here’s how the program works:

By answering 10 quick questions, homeowners are entered into a drawing to receive either:

1. A free irrigation system upgrade performed by a professional irrigation contractor that uses Spray Smart valves to save water and improve landscape health. Participants selected for this group are referred to as “Pro” jobs.

-or-

2. Up to 30 free Spray Smart valves and standard adapters to perform their own system upgrade. Participants selected for this group are referred to as Do-it-Yourself (“DIY”) jobs.

If you would like to be selected as a participant, you must agree to these terms:

1. You must allow a pre-upgrade audit by a licensed, certified irrigation expert. The pre-upgrade audit will establish the current efficiency of your irrigation system and identify any maintenance issues that may be causing poor efficiency. You must be home for the audit. The audit will be scheduled at a convenient time.

2. You must repair any maintenance issues discovered during the pre-upgrade audit (such as leaks) at your own expense. If you decline to repair maintenance issues, you will be disqualified from further participation and will not receive any free valves or services.

3. “DIY” homeowners must perform their own system upgrades within 30 days of receiving the Spray Smart valves and adapters. “DIY” homeowners must also purchase any additional plumbing, fittings, heads or drip hardware if any system configuration changes require such equipment. “DIY” homeowners will determine the extent of their changes and the resulting additional cost (if any).

4. “Pro” homeowners must schedule their system upgrade with the licensed irrigation contractor within 30 days of being contacted. There will be no additional expenses for “Pro” jobs even if system configuration changes are required.

5. You must allow a post-upgrade audit by the same licensed, certified irrigation expert. The post-upgrade audit will measure the efficiency of your irrigation system after installing the Spray Smart valves. This audit will give you an immediate and accurate indication of the water that you will save every month for years to come. You must be home for the audit. The audit will be scheduled at a convenient time.
6. You must allow a visit by MWD representatives (if requested) after the upgrade to witness the benefits of the Spray Smart valve. The visit will be scheduled at a convenient time.

7. Aeromaster Innovations Inc. cannot be responsible for any landscape damage or financial liabilities of any type for “DIY” homeowner jobs. If you elect to participate as a “DIY” homeowner, you understand that the free hardware is provided without warranty. You will be solely responsible for any additional repairs or landscape replacement requirements that arise from use of the Spray Smart valves. You should plan to return your irrigation system to its original condition or perform additional repairs if you are dissatisfied with the performance of the Spray Smart valves.

8. Aeromaster Innovations Inc. cannot be responsible for any landscape damage for “Pro” homeowner jobs. If you elect to participate as a “Pro” homeowner, it is your responsibility to notify Aeromaster Innovations Inc. promptly, before landscape damage has occurred, if you are dissatisfied with the “Pro” installation. Aeromaster Innovations Inc. liability for “Pro” landscape jobs will be limited to covering the costs for the landscape contractor to return the irrigation system to its original configuration.

9. Auditor(s) and Contractor(s) will be selected by Aeromaster Innovations Inc.

10. The number of Spray Smart valves for the program is limited to 500. The exact number of home sites to receive upgrades will depend upon the number of valves requested by selected participants. Our goal is to provide a minimum of five “Pro” installations and ten “DIY” installations. Your odds of being selected cannot be precisely determined. Approximately 3,000 invitations will be given out. Your odds for being selected as a “DIY” homeowner are better than 1 in 200. Your actual odds of being selected will depend upon:

1. How many total applicants there are. Not everyone who is invited will apply.

2. Whether you have indicated that you are only interested in “Pro” installation or would like to be considered for either “Pro” or “DIY”. Your odds will improve if you select either option.

The number of valves requested by each applicant as they are chosen from the participant pool. Once the allocated valves are exhausted, no further applicants will be selected.

This offer is only open to owners of residential homes. By applying to participate, you certify that you are the owner and occupant of the property being upgraded.

I have read, understand, and agree to the conditions described above.
C) Online Survey: Once the applicants agreed to the terms outlined, they were provided a link to a survey at www.surveymonkey.com. The survey asked a few questions that allowed applicants to be segregated into Do-It-Yourself (DIY) candidates and professional upgrade candidates. (Three groups total: DIY, Professional only, non-qualified for program). The English version of the actual survey used is included here:

FREE WATER-SAVING SPRINKLER SYSTEM UPGRADE questionnaire:

1) Which type of problem would you like to solve with Spray Smart valves?
   a. Fix wet or dry spots
   b. Increase pressure, spray further
   c. Water more evenly
   d. Optimize watering for mixed landscapes
   e. More than one of the above
   f. Other, Please Specify_______________

2) How severe are your problem(s)?
   a. Major: I have dry spots and/or muddy areas. I need my system fixed just to make things right. I know I could save a lot of water.
   b. Widespread: I have multiple applications that could save water.
   c. Medium: If I try to save water, my landscape looks bad. I wish I could save water and still have my landscape look good.
   d. Not sure: Now that I see what types of problems Spray Smart can fix, I think I could probably save water and improve my landscape.

3) How important is your landscape appearance?:
   a. Very Important: I enjoy my landscape and make sure that it is well maintained and looking good at all times.
   b. Important: I try my best to maintain a healthy landscape but if some issues appear it is not a big deal.
   c. Average: I try to maintain a healthy looking landscape, but with watering restrictions it is not always possible.
   d. Not important: If my landscape is unhealthy it doesn't bother me too much.

4) How many sprinkler zones are installed on your current system?:
   a. Fifteen or more.
   b. Ten or more.
   c. Five or more.
   d. Less than five.
   e. I'm not sure.

5) How many zones could be improved by using Spray Smart?
   a. More than five.
   b. Three to five.
   c. Two.
   d. One.
   e. I'm not sure.
6) For all zones that you would like to fix, how many total Spray Smart valves would you need?
   b. 20 to 30.
   c. 10 to 20.
   d. Less than 10.
   e. I'm not sure.

7) How often do you adjust your irrigation controller?
   a. Never, my gardener handles that.
   b. Occasionally, whenever I see a problem.
   c. Often, I try to keep up with the changing seasons and optimize watering.
   d. Never, it runs just fine the way it is.
   e. I don't have an irrigation controller, my sprinklers are operated manually.

8) I would like to be considered for:
   a. Pro installation only. I don't want to hassle with system upgrades.
   b. I prefer Pro installation but would like to have the free Spray Smart valves for a DIY installation if I am not selected for a Pro installation.
   c. DIY installation only. I prefer to do it myself.
   d. I'm not sure.

9) If I am selected for the DIY program, who will do the installation?
   a. I will do the work myself (or my family/friends).
   b. I will use my existing gardener to do the work.
   c. I will hire a new gardener or landscape contractor to do the work.
   d. I'm not sure.

10) How would you describe your sprinkler maintenance ability?
    a. I can design and install my own irrigation system with confidence
    b. I regularly maintain my irrigation system such as fixing a leak or replacing a head.
    c. I think I could fix my irrigation system if I had to.
    d. I wouldn't feel comfortable working on my sprinkler system.
    e. I'm not sure.

11) My preferred contact method is:
    a. Evening phone number
    b. Daytime phone number
    c. Email

12) Name on flyer or where flyer was obtained:_____________________________

13) Please provide your contact information:_____________________________

Note: Your contact information will not be shared with anyone else or used for any other purpose except to notify you of your selection status.
During the initial recruitment phase, 23 applicants completed the survey. As more applicants were added, more survey responses were collected. A summary of the results for all 32 applicants is shown below:

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fix wet or dry spots</td>
<td>15.6%</td>
<td>5</td>
</tr>
<tr>
<td>Increase pressure, spray further</td>
<td>3.1%</td>
<td>1</td>
</tr>
<tr>
<td>Water more evenly</td>
<td>3.1%</td>
<td>1</td>
</tr>
<tr>
<td>Optimize watering for mixed landscapes</td>
<td>15.6%</td>
<td>5</td>
</tr>
<tr>
<td>More than one of the above</td>
<td>59.4%</td>
<td>19</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>3.1%</td>
<td>1</td>
</tr>
</tbody>
</table>

Which type of problem would you like to solve with Spray Smart valves?
### How severe are your problem(s)?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major: I have dry spots and/or muddy areas. I need my system fixed just to make things right. I know I could save a lot of water.</td>
<td>21.9%</td>
<td>7</td>
</tr>
<tr>
<td>Widespread: I have multiple applications that could save water.</td>
<td>15.6%</td>
<td>5</td>
</tr>
<tr>
<td>Medium: If I try to save water, my landscape looks bad. I wish I could save water and still have my landscape look good.</td>
<td>37.5%</td>
<td>12</td>
</tr>
<tr>
<td>Not sure: Now that I see what types of problems Spray Smart can fix, I think I could probably save water and improve my landscape.</td>
<td>25.0%</td>
<td>8</td>
</tr>
</tbody>
</table>

![Pie chart showing the distribution of responses for the severity of problems.](chart_image)
<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Important: I enjoy my landscape and make sure that it is well maintained</td>
<td>53.1%</td>
<td>17</td>
</tr>
<tr>
<td>and looking good at all times.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important: I try my best to maintain a healthy landscape but if some issues</td>
<td>21.9%</td>
<td>7</td>
</tr>
<tr>
<td>appear it is not a big deal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average: I try to maintain a healthy looking landscape, but with watering</td>
<td>25.0%</td>
<td>8</td>
</tr>
<tr>
<td>restrictions it is not always possible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not important: If my landscape is unhealthy it doesn’t bother me too much.</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

**How important is your landscape appearance?**

- **Very Important**: I enjoy my landscape and make sure that it is well maintained and looking good at all times.
- **Important**: I try my best to maintain a healthy landscape but if some issues appear it is not a big deal.
- **Average**: I try to maintain a healthy looking landscape, but with watering restrictions it is not always possible.
- **Not important**: If my landscape is unhealthy it doesn’t bother me too much.
How many sprinkler zones are installed on your current system?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fifteen or more.</td>
<td>12.5%</td>
<td>4</td>
</tr>
<tr>
<td>Ten or more.</td>
<td>12.5%</td>
<td>4</td>
</tr>
<tr>
<td>Five or more.</td>
<td>53.1%</td>
<td>17</td>
</tr>
<tr>
<td>Less than five.</td>
<td>21.9%</td>
<td>7</td>
</tr>
<tr>
<td>I'm not sure.</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

How many sprinkler zones are installed on your current system?
How many zones could be improved by using Spray Smart?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than five.</td>
<td>25.0%</td>
<td>8</td>
</tr>
<tr>
<td>Three to five.</td>
<td>59.4%</td>
<td>19</td>
</tr>
<tr>
<td>Two.</td>
<td>6.3%</td>
<td>2</td>
</tr>
<tr>
<td>One.</td>
<td>3.1%</td>
<td>1</td>
</tr>
<tr>
<td>I'm not sure.</td>
<td>6.3%</td>
<td>2</td>
</tr>
</tbody>
</table>

Two.
For ALL ZONES that you would like to fix, how many TOTAL Spray Smart valves would you need?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 30.</td>
<td>12.5%</td>
<td>4</td>
</tr>
<tr>
<td>20 to 30.</td>
<td>28.1%</td>
<td>9</td>
</tr>
<tr>
<td>10 to 20.</td>
<td>34.4%</td>
<td>11</td>
</tr>
<tr>
<td>Less than 10.</td>
<td>9.4%</td>
<td>3</td>
</tr>
<tr>
<td>I'm not sure.</td>
<td>15.6%</td>
<td>5</td>
</tr>
</tbody>
</table>
How often do you adjust your irrigation controller?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never, my gardener handles that.</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Occasionally, whenever I see a problem.</td>
<td>31.3%</td>
<td>10</td>
</tr>
<tr>
<td>Often, I try to keep up with the changing seasons and optimize watering.</td>
<td>59.4%</td>
<td>19</td>
</tr>
<tr>
<td>Never, it runs just fine the way it is.</td>
<td>3.1%</td>
<td>1</td>
</tr>
<tr>
<td>I don't have an irrigation controller, my sprinklers are operated manually.</td>
<td>6.3%</td>
<td>2</td>
</tr>
</tbody>
</table>

Often, I try to keep up with the changing seasons and optimize watering.
I would like to be considered for:

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro installation only. I don't want to hassle with system upgrades.</td>
<td>18.8%</td>
<td>6</td>
</tr>
<tr>
<td>I prefer Pro installation but would like to have the free Spray Smart valves for a DIY installation if I am not selected for a Pro installation.</td>
<td>40.6%</td>
<td>13</td>
</tr>
<tr>
<td>DIY installation only. I prefer to do it myself.</td>
<td>28.1%</td>
<td>9</td>
</tr>
<tr>
<td>I'm not sure.</td>
<td>12.5%</td>
<td>4</td>
</tr>
</tbody>
</table>

- Pro installation only. I don't want to hassle with system upgrades.
- I prefer Pro installation but would like to have the free Spray Smart valves for a DIY installation if I am not selected for a Pro installation.
- DIY installation only. I prefer to do it myself.
- I'm not sure.
If you are selected for the DIY program, who will do the installation?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>I will do the work myself (or my family/friends).</td>
<td>56.3%</td>
<td>18</td>
</tr>
<tr>
<td>I will use my existing gardener to do the work.</td>
<td>18.8%</td>
<td>6</td>
</tr>
<tr>
<td>I will hire a new gardener or landscape contractor to do the work.</td>
<td>3.1%</td>
<td>1</td>
</tr>
<tr>
<td>I'm not sure.</td>
<td>21.9%</td>
<td>7</td>
</tr>
</tbody>
</table>

![Pie chart showing response distribution](chart.png)
<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can design and install my own irrigation system with confidence</td>
<td>9.4%</td>
<td>3</td>
</tr>
<tr>
<td>I regularly maintain my irrigation system such as fixing a leak or replacing a head.</td>
<td>53.1%</td>
<td>17</td>
</tr>
<tr>
<td>I think I could fix my irrigation system if I had to.</td>
<td>12.5%</td>
<td>4</td>
</tr>
<tr>
<td>I wouldn't feel comfortable working on my sprinkler system.</td>
<td>15.6%</td>
<td>5</td>
</tr>
<tr>
<td>I'm not sure.</td>
<td>9.4%</td>
<td>3</td>
</tr>
</tbody>
</table>

How would you describe your sprinkler maintenance ability?

- I can design and install my own irrigation system with confidence
- I regularly maintain my irrigation system such as fixing a leak or replacing a head.
- I think I could fix my irrigation system if I had to.
- I wouldn't feel comfortable working on my sprinkler system.
- I'm not sure.
D) Segregation: The initial recruitment phase yielded 23 applicants. They were segregated using a scoring system shown below. Weighting factors were applied to the survey responses to yield answer scores. Disqualifying answers resulted in a large negative multiplier that insured the total score would be negative. Therefore, only positive totals were considered for the program. Applicants were segregated into three groups: DIY, Pro, and Disqualified.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total Result</th>
<th>DIY</th>
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Table 1: Segregation of Original Applicants
E) Contact and Confirm: The participants shown below were confirmed via phone and/or email conversation yielding the original participant list:

<table>
<thead>
<tr>
<th>Do-It-Yourself</th>
<th>Pro</th>
</tr>
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<tr>
<td>1 Richard Zohn</td>
<td>1 Patrick Crais</td>
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<tr>
<td>12230 Creekside Ct</td>
<td>1080 Linda Vista Dr</td>
</tr>
<tr>
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<td>San Marcos</td>
</tr>
<tr>
<td>92131</td>
<td>92078</td>
</tr>
<tr>
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<td>2 Dean Tilton</td>
</tr>
<tr>
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<td>132 Las Posas Rd</td>
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<tr>
<td>San Diego</td>
<td>San Marcos</td>
</tr>
<tr>
<td>92126</td>
<td>92078</td>
</tr>
<tr>
<td>3 Chi Yau</td>
<td>3 Joe Werner</td>
</tr>
<tr>
<td>8813 Detwiler Road</td>
<td>11793 Scripps Cape Vista</td>
</tr>
<tr>
<td>Escondido</td>
<td>San Diego</td>
</tr>
<tr>
<td>92029</td>
<td>92131</td>
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<tr>
<td>4 Linda Espino</td>
<td>4 Larry Kelly</td>
</tr>
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<td>12510 Pacato Circle So.</td>
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<td>Bonita</td>
<td>San Diego</td>
</tr>
<tr>
<td>91902</td>
<td>92128</td>
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<tr>
<td>5 Theodore S McColl</td>
<td>5 Clinton Barlow</td>
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<td>5942 Henley Dr.</td>
<td>3859 King Street</td>
</tr>
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<td>La Mesa, Ca.</td>
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<tr>
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<td>91941</td>
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<td>6 Richard Lyons</td>
<td>7 Martin Popma</td>
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<tr>
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<td>2402 Amick St.</td>
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<td>Oceanside</td>
</tr>
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<td>92128</td>
<td>92058</td>
</tr>
<tr>
<td>7 Martin Popma</td>
<td>8 Marjory Clyne</td>
</tr>
<tr>
<td>2402 Amick St.</td>
<td>4969 Paguera Ct.</td>
</tr>
<tr>
<td>Oceanside</td>
<td>San Diego</td>
</tr>
<tr>
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<td>92124</td>
</tr>
<tr>
<td>9 Marilyn Wilson</td>
<td>9 Marilyn Wilson</td>
</tr>
<tr>
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<td>11477 Alcalde Court</td>
</tr>
<tr>
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<td>San Diego</td>
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<td>92127</td>
</tr>
<tr>
<td>10 mark detwiler</td>
<td>10 mark detwiler</td>
</tr>
<tr>
<td>8810 detwiler rd</td>
<td>8810 detwiler rd</td>
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<tr>
<td>escondido</td>
<td>escondido</td>
</tr>
<tr>
<td>92029</td>
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Table 2: Original Participant List

As stated previously, we had a considerable problem with retention of participants. Most participants who were eliminated were excited about the program when initially contacted, but could not commit to a date to begin the process. While we made every attempt to retain and fulfill our project obligations with each participant, we did not find an equivalent level of commitment on the other side. As time went by, they seemed to lose interest and simply stop communicating. In a few cases, participants who originally confirmed that they had a valid application stalled until finally admitting that they really did not have an application. All eliminated participants had to be replaced. This was tedious and time consuming.

We described the numerous methods we used to recruit the original participants from the general population. These methods were intended to provide a diverse applicant pool which would represent the larger pool of all MWD homeowners as accurately as possible. This approach did not produce a high percentage of successful product installations. Therefore, it was not reasonable to expect that another round of recruiting using these same methods would yield any different results.

Therefore, in order to provide for the full 15 installations outlined in the project description, the vacancies were filled by word-of-mouth processes. As the product was successfully installed at more sites, friends and neighbors of the project participants could see how the product was working and better understand the value and whether it might be applicable to them.

We were also provided two participants (Baptiste and Gersten) via referral from the Otay Municipal Water District. William Granger, Water Conservation Manager, was aware of our
product and allowed his representatives to suggest participation in our program to homeowners who requested water efficiency audits from OMWD. Both of these installations generated substantial water savings for the OMWD customers.

The final list of participants is shown below along with a brief description of the reasons for elimination:

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<tr>
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<th>DIYPro Do-It-Yourself</th>
<th>Elimination Reason</th>
</tr>
</thead>
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<td>1</td>
<td>Richard Zohn 12230 Creekside Ct 92131</td>
<td>Stopped communicating</td>
</tr>
<tr>
<td>2</td>
<td>Tito Colon 7115 Calston Place 92126</td>
<td>Stopped communicating</td>
</tr>
<tr>
<td>3</td>
<td>Chi Yau 8813 Detwiler Road 92029</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Linda Espine 5730 Casa Grande Way 91902</td>
<td>Mis-represented intended use</td>
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<td>5</td>
<td>Theodore McColl 5942 Henley Dr. 92120</td>
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<td>6</td>
<td>Richard Lyons 17438 Plaza Destacado 92128</td>
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</tr>
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<td>7</td>
<td>Martin Popma 2402 Amick St. 92058</td>
<td>Stopped communicating</td>
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<td>8</td>
<td>Marjory Clyne 4969 Paguera Ct. 92124</td>
<td>Determined that she had no application</td>
</tr>
<tr>
<td>9</td>
<td>Marilyn Wilson 11477 Alcalde Court 92127</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mark Detwiler 8810 detwiler rd 92029</td>
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<table>
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<th>Pro Replacements</th>
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<td>Patrick Crais 1080 Linda Vista Dr 92078</td>
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</tr>
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<td>Dean Tilton 132 N. Las Posas Rd 92078</td>
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<tr>
<td>13</td>
<td>Joe Werner 41793 Scripps Cape Vista 92131</td>
<td>Determined that he had no application</td>
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<tr>
<td>14</td>
<td>Larry Kelly 12510 Pacato Circle So. 92128</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Clinton Barlow 3859 King Street 91941</td>
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<table>
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<th>Do-It-Yourself Replacements</th>
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<td>Levanto Schachter 4581 Pocahontas Ave 92117</td>
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<td>John Furze 4147 Huerfano Ave 92117</td>
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<td>Anne Baptiste 1365 Corte de las Piedras 92019</td>
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<td>Rob Mackintosh 12729 Tustin Ave. 92064</td>
<td>Unwilling to fix maintenance issues</td>
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<td>Dave Putnam 750 Chaparral lane 92025</td>
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<td>23</td>
<td>Janie Anderson 11039 Turret Dr 92131</td>
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<td>Larry Noble 11405 Poblado Rd. 92127</td>
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<td>R. Scott Dann 9760 Caminito Pudregal 92131</td>
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<tr>
<td>21</td>
<td>Bill Gersten 2960 Babbling Brook Roac 91914</td>
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Table 3: Final List of Participants

In three cases, participants dropped out after they had already received a pre-upgrade audit. In one case, a participant stopped communicating after receiving upgrade valves and adapters. This required us to absorb additional cost to provide audits/valves for the replacement participants. The detailed reasons for elimination of participants is described below.
DIY Participants:
Richard Zohn: He perpetually failed to respond to email and phone messages attempting to schedule the pre-upgrade audit. He was warned and then eliminated for lack of response.

Tito Colon: No application for Spray Smart was found upon conducting the pre-upgrade audit.

Linda Espino: She had considerable difficulty committing to a pre-upgrade audit schedule. After many phone calls, I asked her to describe her application and found that she was delaying the upgrade because she was making landscape changes and wasn't sure how Spray Smart may or may not be of benefit. When I pressed further, she revealed that she actually had no present application. She voluntarily removed herself.

Martin Popma: He was fairly responsive early in the project. He scheduled and received a pre-upgrade audit and had a legitimate application. He was sent valves for the upgrade. After he confirmed receiving the valves, he never responded to another call or email. We do not know if he installed the valves. He was warned and then eliminated for lack of response. This was costly for us, since we had already invested in the pre-upgrade audit and valves.

Marjory Cline: She was voluntarily eliminated while discussing the pre-upgrade audit. She confirmed that she had no legitimate application.

Levanto Schachter: He was initially very responsive as a replacement participant. He scheduled and received a pre-upgrade audit. While trying to contact to review his upgrade plans, he stopped communicating.

Rob Mackintosh: Substantial maintenance issues were discovered during the pre-upgrade audit. Although the homeowner intended to fix the issues, he was unable to complete the repairs in a timely manner to remain in the program.

Pro Upgrade Participants:
Joe Werner: He was voluntarily eliminated while discussing the pre-upgrade audit. He confirmed that he had no legitimate application.

Clinton Barlow: He had considerable difficulty committing to an upgrade schedule. Eventually he stopped responding to email and phone messages attempting to schedule the upgrade. He was warned and then eliminated for lack of response.

The recruitment task exceeded our original estimates for cost and duration for one more reason. We decided that in order for DIY homeowners to apply Spray Smart technology effectively we would need an instructional video. We felt that this was a necessary element even for the recruitment phase, since homeowners would need to have a good idea how to apply the valves before signing up for the program. An instructional video was written, produced, and edited. It can be seen at http://www.youtube.com/watch?v=0FnFj6f9w. The video was also linked to the website. The written installation instructions on the website were also updated and expanded.
Task #2: Perform Pre-Upgrade Audits:

Audits were performed by Irrigation Association (IA) certified irrigation system auditors. The auditors were trained (by Aeromaster Innovations Inc.) in the specific requirements that were unique to this project. The Audits under this program consisted of four main elements:
- System maintenance condition assessment
- System capacity assessment
- Distribution uniformity assessment
- Total water usage of audited landscapes

System maintenance inspection is somewhat self-explanatory. Any leaks or defective equipment were identified and required to be replaced (at the owner's expense) prior to completing the baseline audit. Homeowners who declined to fix maintenance issues on upgrade zones were disqualified and replaced. This was only an issue with one homeowner who needed extensive repairs and was unwilling to complete them within our time constraints.

System capacity assessments were not performed as originally intended. Originally, there was an assumption that system changes would be based on hydraulic design criteria. In fact, these calculations are of little use once a system is already installed and operating. The capacity of the system is evident based upon the actual pressure and performance while operating. Therefore, changes could be based upon improvements upon the baseline, and theoretical system capacity was irrelevant.

Distribution uniformity (DU) assessment was accomplished by the standard method of distributing catch cans throughout the irrigated area and measuring the amount of water applied to each location. DU measurements were only performed for systems where the homeowner indicated that they intended to address distribution problems on turf or ground covers where DU measurements were possible and relevant.

Total water usage was established by measuring the water usage for each audited zone. Flow rate for each zone was measured using the city water meter during a timed run of the zone. This gave the gallons per minute for each zone. By multiplying the flow rate by the baseline run time, the baseline total water usage was established. For systems with now water meter (well water) the flow rates were determined based upon the spray equipment manufacturer's data and the measured system pressure. This process was repeated for each zone (within limits due to budget constraints). Summing the water usage for each zone gave the total water usage for the audited landscapes.

During the pre-upgrade audits, a few trends started to emerge. Many of our participants intended to use our product to fix problems that addressed landscape health issues rather than looking for ways to save water. In some cases, this made the water savings harder to quantify. Others wanted to use the Spray Smart valves to enable landscape changes. While these changes were targeting water savings via changes to lower water demand landscapes, the original premise of "water savings by improving the existing system" was not always possible. In all, only 60% of the participants used Spray Smart to upgrade their irrigation system without any additional changes to either landscape or water delivery hardware. This will be discussed more later.

Results of the pre-upgrade audits are included in the next section. A detailed pre-audit upgrade report template was prepared as shown below:
Pre-Upgrade Audit Results:

Property Address:

Property Type: (Residential / Commercial)

Water Meter Size: Supply Static Pressure:

Approximate Irrigated Area: (Total acreage of irrigated land, estimated by eyeball)

Number of active irrigation zones:

System Level Maintenance Condition:
- Leaks on main supply to irrigation? (Major/Minor/None)
- Leaky control valves? (Major/Minor/None)

Controller Type:
- Brand and model? (or no controller)
- Weather based? (Yes/No) Weather adjustable? (Yes/No)
- Multi-cycle capable? (Yes/No)

Landscape Health:
## Pre-Upgrade Audit Summary:

<table>
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<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
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</tr>
</tbody>
</table>

**Total Weekly Water Usage**

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)

Property Address:

Zone #:

- Type of landscape (e.g. turf, shrub, ground cover, mix...describe)

- Supply line leaks? (Major/Minor/None)
- Heads leaking around pop-up seal? (Major/Minor/None) Heads need replacement?

- Heads clogged or spraying improperly? (Major/Minor/None)
- Zone capacity issues? (too many heads on the zone? Not enough pressure for head to head coverage?) (Major/Minor/None)

- Head Layout issues? (heads are obviously not properly placed to give good DU?) (Major/Minor/None)

Spray Smart Improvement Opportunities:
- None?
- Mixed Hydrozones?: (Yes/No) (If yes, describe in detail...e.g. sun vs. shade or landscape type differences)

- Low Pressure Issues?: (Yes/No) (If yes, describe in detail and measure operating pressure using head tee gauge)

- Distribution Uniformity Issue?: (Yes/No) (If yes, measure DU with catch cans, describe problems observed)

- Alternate Solution Options?: (Example: low pressure could be fixed by switching to low flow heads)
Task #3: Perform System Upgrades:

The system upgrades were divided into Pro installations, completed by a professional irrigation designer and contractor, and Do-It-Yourself (DIY) installations, completed by the property owners.

For the professional upgrades, we discussed the planned upgrade with the property owner (via telephone) to make sure there was a valid application. We passed the information from this conversation to the irrigation designer so they would know what the property owner had in mind. This would also give us a general feel for the scope of work and materials needed. For the Pro installations, it was usually found to be more efficient to perform all three steps (pre-upgrade audit, upgrade and post-upgrade audit) in a single visit. The irrigation consultant/designer performed the audit and identified the most promising water saving upgrade opportunities. Their sub-contractor bought and installed the necessary equipment. If the installation was successful, then the auditor could return for the post-upgrade audit. In some cases, problems were encountered during the installation requiring the post-upgrade audit to be completed at a later date.

The original program description assumed that the majority of Pro upgrades would be addressing DU issues. We proposed using a computerized distribution optimization program to determine head placement and or scheduling changes required to raise DU. This was not accomplished for two reasons. First, no computer program was found that was intended to optimize smaller commercial/residential areas. The existing mature programs are intended for large scale irrigation systems. Also, there was only one Pro installation where DU was targeted. Most Pro installations targeted mixed hydrozones, which did not require computerized optimization.

For the DIY upgrades, we discussed the planned upgrade with the property owner (via telephone) while reviewing the pre-upgrade audit results. As long as the pre-upgrade audit agreed with the homeowners representation of the problem(s) to be addressed, we allowed them to proceed without further influence. We simply asked them how many valves they would need to complete the upgrade and sent them the requested quantity. We also sent an equal number of riser extension adapters that are often useful for setting the spray head height when installing our product.

Most DIY customers elected to upgrade one zone, while others decided to rework multiple zones. We were able to accommodate all the requests within the program budget. Since they were expected to complete their own system upgrade, we made sure they were provided with sufficient instructional materials to understand and utilize the Spray Smart valves effectively. This was primarily accomplished via the instructional video mentioned previously.

All of the upgrade details were recorded during the post-upgrade audit. Standard report templates were used for both the upgrade details and the post upgrade water usage. A sample of both templates is included in the next section.

As planned, ten DIY system upgrades and five Pro system upgrades were completed.

One unexpected finding from the project, was the extent of collateral changes that were elected. Our original project description assumed that the system changes would be minimal and simply adding or moving a few heads would improve efficiency. While 60% of both the professional
and the DIY participants did substantially re-use their existing water delivery hardware, the other 40% made changes that were more extensive. These collateral changes were typically enabled only as a result of implementing Spray Smart technology. Specifically, water delivery hardware was changed to otherwise incompatible combinations such as low precipitation rate spray heads and high precipitation rate heads, or spray heads and drip on the same zone. None of our participants relocated the original underground plumbing which is the key to making Spray Smart cost effective and minimizing the impact to the existing landscape.

A brief description of the upgrades performed by/for each of the final participants shown in Table 3 is included below:

#3 Chi Yau: At this DIY homeowner site, three of twelve zones were identified that could benefit from Spray Smart. All three were zones were irrigating ground cover with large capacity rotors, but had insufficient pressure. This made the DU very low (although it could not be readily measured in the ground cover). Installing Spray Smart valves in one zone raised the pressure from 25 to 55 psi, thus eliminating the distribution issues. The homeowner is anxious to retrofit the additional zones. **This was one of the most relevant Spray Smart upgrades because all the existing delivery hardware was re-used.**

#5 Theodore McColl: At this DIY homeowner site, two zones (of eleven total) were identified that could benefit from Spray Smart. The upgraded zone had a mixture of turf and shrubs. The homeowner elected to install the Spray Smart valves only under the heads spraying the shrubs. This cut the flow to the shrubs in half, but did not provide the opportunity to individually optimize the sub-zones. **This was one of the most relevant Spray Smart upgrades because all the existing delivery hardware was re-used.**

#6 Richard Lyons: At this DIY site, the homeowner had two complaints about one of two zones. Even though all the heads on the zone were spraying similar shrubs, low pressure (5 psi) resulted in poor distribution. In addition, applying sufficient water led to excessive runoff. The homeowner split the zone in half by simply running every other head on the two different Spray Smart cycles. In addition, the homeowner replaced the supply valve. Initially, the pressure only reached about 18 psi based on changing the supply valve alone. This was insufficient to operate the Spray Smart valves. By simply adjusting the existing heads slightly to reduce the flow rate, the Spray Smart valves started operating and raised the operating pressure to 30 psi.

#9 Marilyn Wilson: At this DIY homeowner site, there were several issues to be addressed. The targeted zone had a mix of plants and turf being watered by the same zone. The supply pressure was very low (<50 psi) and there were 21 heads on the zone. Further, the DU on the turf was very low due to lack proper pressure (15 psi) while running. The homeowner split the turf and shrubs in an attempt to raise the system pressure. However, the 15 psi was insufficient to operate the Spray Smart valves. Therefore, the homeowner retrofit the turf with MP Rotator spray nozzles to reduce the startup flow and raise the pressure. This provided the necessary pressure to successfully operate the Spray Smart valves. The controller was replaced to allow multi-cycle operation of the Spray Smart valves. Three of eight zones were candidate zones for Spray Smart and the homeowner has requested additional valves as soon as they are available to upgrade her other zones.

#10 Mark Detwiler: At this DIY homeowner site, the homeowner was operating 24 zones on a mixture of ornamentals, turf and agriculture. One zone was targeted due to mixed plant types on
a single zone. The same zone was watering both roses and waxy shrubs. The zone was effectively subdivided using all the original equipment allowing the two different landscapes to be watered individually. This site used a well and therefore did not have a water meter to measure system capacity. Therefore, water delivery was estimated from manufacturer data for the spray heads and the operating pressure. **This was one of the most relevant Spray Smart upgrades because all the existing delivery hardware was re-used.** The existing Irritrol controller was reprogrammed to run the zone as a Spray Smart zone.

**#11 Patrick Crais:** At this Pro commercial site, two of five zones were identified as Spray Smart candidates. One zone had a serious problem with hydrozone mismatch. There were 21 heads spraying a combination of shrubs and turf. The turf was also a much smaller area than the shrubs. **This was one of the most relevant Spray Smart upgrades because all the existing delivery hardware was re-used.** The zone was split with 14 heads in the shrubs and 7 heads on the turf as a Pro upgrade. The Hunter Pro-C controller was re-programmed to run the zone as a Spray Smart zone.

**#12 Dean Tilton:** At this Pro commercial site, one of six zones had a high degree of hydrozone mismatch. The targeted zone had 12 heads spraying a combination of plants and turf. The zone was split with 6 heads in the shrubs and 6 heads on the turf as a Pro upgrade. **This was one of the most relevant Spray Smart upgrades because all the existing delivery hardware was re-used.** The Hunter Pro-C controller was re-programmed to run the zone as a Spray Smart zone.

**#14 Larry Kelly:** At this homeowner site, a Pro upgrade was completed to address a combination of low pressure (estimated at ~10 psi since heads barely popped up - not measured), DU and mixed hydrozone problems. The zone had a mix of drip and spray on shrubs, planters, and ground cover. As a result, there was a considerable mismatch between the watering needs and the water applied. In fact, the watering schedule was determined by the ground cover that had very low DU (45%). The upgrade here was more substantial. The ground cover spray heads were switched to MP Rotator in order to reduce the overall system flow and provide sufficient pressure to operate the Spray Smart valves. The drip (microspray) sections were then separated from the ground cover spray area. The existing Orbit multi-cycle controller was re-programmed to run the Spray and Drip sub-zones for different run times.

**#17 John Furze:** At this DIY homeowner site, one of three zones had a serious problem with low pressure (10 psi), extremely low DU (25%) and mixed hydrozones due to sun/shade on turf. The homeowner decided to split the zone into three subzones. He split 13 heads into an "A" zone with three heads, a "B" zone with five heads, and a "C" zone that ran every time (no Spray Smart valves installed). **This was one of the most relevant Spray Smart upgrades because all the existing delivery hardware was re-used.** The existing Rain Bird controller was re-programmed to run the zone twice, with the "C" zone running every time.

**#18 Anne Baptiste:** At this DIY homeowner site, the homeowner had previously decided to replace some landscape with lower water demand plants. She recognized that her existing irrigation system would not accommodate the change, and called the Otay Municipal Water District water conservation department for assistance. They recommended that she consider using Spray Smart to enable the change. She performed a change to one of nine zones. Spray Smart allowed the two subzones to water drastically different plant material (turf vs. drought tolerant) without changing the underground plumbing. She replaced PGJ rotors in the turf with ten MP rotators. She continued to use seven PGJ's on the xeriscape. One head was relocated to
improve DU. The existing Irritrol Rain Dial controller was re-programmed to run the Spray Smart zone.

#20 Scott Dann: At this homeowner site, a Pro upgrade was completed to address a combination of low pressure (15 psi), poor DU (40%) and mixed hydrozone problems. The zone had 20+ spray heads on a mix of shrubs and turf. As a result, there was a considerable mismatch between the watering needs and the water applied. The watering schedule was determined by the turf having very low DU and suffering from landscape health issues. The upgrade here was very substantial. The turf spray heads were switched to MP Rotator in order to reduce the overall system flow and provide sufficient pressure to operate the Spray Smart valves. The planter areas were switched to drip to improve the application efficiency. The existing Orbit controller was set to run two cycles for the Spray Smart zone.

#21 Bill Gersten: At this homeowner site, a Pro upgrade was completed to address a combination of low pressure (20 psi), and a serious mixed hydrozone problem. The zone had 28 spray heads on a mix of ground cover and turf. Worse, the area of the turf was very small compared to the ground cover. The watering schedule was determined by the turf which also suffered low DU (58%) due to the lack of pressure. **This was one of the most relevant Spray Smart upgrades because all the existing delivery hardware was re-used.** Spray Smart was installed under the existing spray heads with no change to type of delivery method or number/arrangement of heads. The turf was separated from the ground cover. The existing Hunter Pro/C controller was set to run two cycles for the Spray Smart zone.

#22 Dave Putnam: At this DIY homeowner site, the homeowner was operating 30 irrigation zones using well water. Due to the extremely large system and property area, only candidate zones (seven of thirty) were audited. Each targeted zone suffered from both low pressure and mixed plant type issues. Spray Smart was used to separate turf from roses and perennials. The existing Orbit Watermaster controller was set to run two cycles for the Spray Smart zone.

#23 Janie Anderson: At this DIY homeowner site, the entire system consisted of a normal size front zone and a larger back zone. In the front, spray heads were watering low demand plants and a drip system was watering higher demand plants, on the same zone. The drip was separated from the spray using Spray Smart valves. In the rear, there were 19 heads including some spray and bubblers on various types of plant material. The higher demand plants were separated from the lower demand plants and two heads were capped for efficiency. The existing controller, an extremely old Orbit model did not allow for different run times for the two cycles. Therefore, the controller was replaced with a newer low cost model that allowed the homeowner to take advantage of the Spray Smart retrofit. The system also had excessive operating pressure and was fitted with pressure regulators to reduce the pressure on each zone. **This was one of the most relevant Spray Smart upgrades because all the existing delivery hardware was re-used.**

#24 Larry Noble: At this DIY homeowner site, the sprinklers that sprayed turf in the front lawn were also irrigating a planter that contained a mix of shrubs and roses. Fourteen spray heads sprayed the turf and planter. The planter was relatively small compared to the turf. The higher demand turf was separated from the lower demand plants and two heads were capped for efficiency. The result was eleven heads spraying turf only and a single Spray Smart valve operating a drip system in the planter. The system was run manually before and after the upgrade.
**Task #4: Perform Upgraded Efficiency Audits:**

The upgraded system efficiency audits used the same methods outlined in the baseline audit program above. Only upgraded zones were audited after the upgrades were complete.

For each post-upgrade audit, the water savings were quantified by making a combination of measurements and assumptions. The actual flow rate of the newly divided sub-zones were measured and compared to the flow rate of the original zone. If the zone was previously scheduled based on the higher water usage area (e.g. turf section), then the schedule of that sub-zone was assumed to be unchanged with the addition of the Spray Smart valves. For the lower water use section, an assumption was made regarding the new scheduling based upon the considerable experience of the auditor as a landscape manager. For all cases, the scheduling was estimated for a summer schedule at 100% Eto. Based on this proposed scheduling, annualized water savings can be estimated at 54% of the measured flow rates and proposed 100% Eto schedules. (Equivalent to 200 watering days at 100%).

In cases where DU was improved, as per the original project description, we compared the expected savings based on DU improvement to the savings quantified by the method above. Since the results always compared favorably, the savings based on water delivered was presented in lieu of using the DU as the basis for observed savings. In some cases, DU was improved partially as a result of changing to higher efficiency spray heads. As discussed previously, these changes were enabled by the Spray Smart upgrade. Therefore, the savings are attributable to Spray Smart.

We expected the five professional upgrades to achieve fairly consistent results that would demonstrate the typical benefit of the Spray Smart valve. More specifically, we expected the professional irrigation designer to focus on improving distribution uniformity. In practice, the irrigation designer did address a common problem. The problem, however, was mixed landscapes (that had different water demands) that were being watered by the same irrigation equipment. We also expected that the need for additional system changes (e.g. change of delivery hardware) would be minimal since our focus was distribution uniformity on turf.

The professional upgrades achieved a more consistent water savings than the DIY upgrades, as expected. The professional upgrades achieved an average water savings of 34% with a standard deviation of 8%. By comparison, the DIY upgrades averaged an identical 34% but had a standard deviation of 19%. By another measure, however, the homeowners out-performed the professional contractor. The average annual water saved per Spray Smart valve installed was 734 gallons for the homeowners, but 589 gallons for the professional contractor.

We expected to see more variation in the Do-It-Yourself (DIY) results, hence the greater number of samples. We did find greater variation in savings, as noted above. On the other hand, we found that the types of problems addressed, the percentage of sites using exclusively existing hardware and the degree of collateral changes in those that made changes were nearly identical. In other words, while the homeowners had more variation in water savings, their collective approach to achieving those savings was statistically identical to the professional irrigation designer.

The following form was used to assess the post-upgrade results:
## Spray Smart Upgrade Summary:

Property Address:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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<td>20</td>
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<td></td>
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<td></td>
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</tr>
</tbody>
</table>
**Zone Upgrade Details: (For each upgraded zone)**

Property Address:

Zone #:

Type of problem(s) being addressed:

Upgrade Completed By:

Total number of Spray Smart Valves used on this zone?:

"A" Zone Details:
- Landscape Type:
  - Type and Number of heads:

"B" Zone Details:
- Landscape Type:
  - Type and Number of heads:

Additional Changes Required: (list all additional changes including repairs and new equipment)
**Post-Upgrade Audit Report:**

Property Address:

System Level Maintenance Issues Repaired?: (Yes/No/N.A.)
All Zone Maintenance Issues Repaired?: (Yes/No/N.A.)

Summary Of Changes:

Measured Water Savings (As installed and programmed by water manager):

Projected Annual Water Savings (As installed and programmed by water manager):

Confidence that water manager will utilize product properly:

Opportunity for additional savings with existing installation (e.g. re-program)?

Projected Annual Water Savings (For properly programmed and maintained upgrade):

Opportunity for additional upgrades on this site:

Issues/Comments:
A brief description of the water savings realized by each final participant shown in Table 3 is included below:

#3 Chi Yau: For this DIY upgrade, the homeowner elected to install the Spray Smart valves under all the heads spraying one ground cover zone. Five valves were used to create the "A" zone and eight valves were used for the "B" Zone. The identical spray hardware and head locations were used. Although DU could not be measured, it was drastically and obviously improved due to the pressure increase from 25 psi to 55 psi. The scheduling of the two subzones was adjusted based upon the improved DU. The net result was a 61% reduction in water use for the zone. Specifically, the scheduled weekly water use was reduced from 1008 gallons to 390 gallons, a savings of 618 gallons. Using the annualized estimation outlined above, this site will save 17,353 gallons annually using 13 Spray Smart valves. This is equal to 1,335 gallons/year/valve.

#5 Theodore McColl: For this DIY upgrade, the homeowner elected to install the Spray Smart valves only under the heads spraying his lower demand shrubs. He did not install valves under the heads spraying the turf. Thus, three valves were used to create zone "A" under the shrubs. Zone "B" was the unchanged turf. Water savings were realized, though, since the shrubs were intended to run half the time. The flow rate of the two subzones was measured and compared to the flow rate of the original zone. Also, the scheduling of the two subzones was estimated based on the same criteria used to originally schedule the zone. The net result was a 26% reduction in water use for the zone. Specifically, the scheduled weekly water use was reduced from 450 gallons to 330 gallons, a savings of 120 gallons. Using the annualized estimation outlined above, this zone will save 3,429 gallons using 3 Spray Smart valves. This is equal to 1,143 gallons/year/valve. Savings due to improved DU were not applicable to this site.

#6 Richard Lyons: For this DIY upgrade, the homeowner elected to install the Spray Smart valves under all the heads in a zone that only sprayed shrubs. Thus, heads 1, 3, 5 etc. became the "A" zone, while heads 2, 4, 6 etc. became the "B" zone. Because the pre-upgrade pressure was so low (5 psi), the flow rate was not representative of a properly operating spray head. The water was streaming into poorly distributed patterns and largely running off (due to exceptionally high precipitation rate where the water fell). Installing Spray Smart, and replacing his supply valve allowed him to reach 30 psi and achieve a proper spray distribution from his existing spray heads. However, based on the methods used for this study, there was no way to accurately quantify the expected water savings. No water savings are claimed for this site although savings were certainly achieved.

#9 Marilyn Wilson: For this DIY upgrade, the homeowner was primarily targeting low pressure. However, Spray Smart technology gave her the opportunity to also separate turf from shrubs. While the extremely low flow/pressure required a change to MP Rotators in the turf, this site would have benefitted greatly without that change. The zone consisted of 21 heads. Sixteen heads were designated as the "A" zone in the turf. Five heads were designated as the "B" zone in the shrubs. The DU was measured at 21% on the turf before the upgrade. Due to an auditing oversight, the DU was not measured after the upgrade, but could be estimated at 70%+ due to the MP Rotators operating at the proper pressure with a nominal head layout. The flow rate of the two subzones was measured and compared to the flow rate of the original zone. Also, the scheduling of the two subzones was estimated based on the same criteria used to originally schedule the zone. The net result was a 41% reduction in water use for the zone. Specifically, the scheduled weekly water use was reduced from 1120 gallons to 665 gallons, a savings of 455 gallons.
gallons. Using the annualized estimation outlined above, this zone will save 12,776 gallons using 21 Spray Smart valves. This is equal to 608 gallons/year/valve.

#10 Mark Detwiler: At this DIY homeowner site, Spray Smart valves were used to split a zone that was watering both waxy hedges and roses. No spray hardware was changed. Fourteen heads under the hedges were designated as the "A" zone. Five heads under the roses were designated as the "B" zone. The flow rate of the two subzones was estimated based upon the same criteria as the pre-upgrade audit. The scheduling of the two subzones was adjusted based upon the demand of the landscape and the estimated flow rates. The net result was a 41% reduction in water use for the zone. Specifically, the scheduled weekly water use was reduced from 630 gallons to 371 gallons, a savings of 259 gallons. Using the annualized estimation outlined above, this site will save 7,273 gallons annually using 19 Spray Smart valves. This is equal to 383 gallons/year/valve.

#11 Patrick Crais: At this commercial site, Spray Smart valves were used to split shrubs from turf. No spray hardware was changed (although there were changes required to lower excessive pressure and lengthen the swing joints to accommodate the Spray Smart valves). The flow rate of the two subzones was measured and compared to the flow rate of the original zone. Also, the scheduling of the two subzones was estimated based on the same criteria used to originally schedule the zone (driven by turf requirements). The net result was a 34% reduction in water use for the zone. Specifically, the scheduled weekly water use was reduced from 1404 gallons to 924 gallons, a savings of 480 gallons. Using the annualized estimation outlined above, this site will save 13,478 gallons annually using 21 Spray Smart valves. This is equal to 642 gallons/year/valve.

#12 Dean Tilton: At this commercial site, a mixed hydrozone zone was split with zero additional hardware changes. The flow rate of the two subzones was measured and compared to the flow rate of the original zone. Also, the scheduling of the two subzones was estimated based on the same criteria used to originally schedule the zone (driven by turf requirements). The net result was a 23% reduction in water use for the zone. Specifically, the scheduled weekly water use was reduced from 1,728 gallons to 1,344 gallons, a savings of 384 gallons. Using the annualized estimation outlined above, this zone will save 10,782 gallons using 16 Spray Smart valves. This is equal to 674 gallons/year/valve.

#14 Larry Kelly: At this homeowner site, multiple changes were enabled by the Spray Smart valves. The pressure was increased and new heads were added, which dramatically improved the DU of the ground cover (96% vs 45%). In addition, the drip sections were split into a separate sub-zone. In this case, the original scheduling could not be used because of the spray hardware changes. Based upon professional experience, the scheduling was estimated. The net result was a 28% reduction in water use for the zone. Specifically, the scheduled weekly water use was reduced from 600 gallons to 435 gallons, a savings of 165 gallons. Using the annualized estimation outlined above, this zone will save 4,633 gallons using 11 Spray Smart valves. This is equal to 421 gallons/year/valve.

#17 John Furze: At this homeowner site, Spray Smart valves were used to create a highly customized three zone solution. All existing heads were re-used. The pressure was drastically improved to 30-49 psi instead of the original 10 psi. This improved the DU using the existing heads from about 25% to an average of 62% for the three sub-zones. The DU change alone predicts a savings of approximately 60%. In this case, the homeowner also expects to run
different scheduling due to differences in the amount of sunlight received. Based upon the measured flow, and the proposed scheduling, a 56% reduction of water usage was realized compared to the original single zone. Specifically, the scheduled weekly water use was reduced from 483 gallons to 208 gallons, a savings of 275 gallons. Using the annualized estimation outlined above, this zone will save 7,857 gallons using 8 Spray Smart valves. This is equal to 982 gallons/year/valve.

#18 Anne Baptiste: At this homeowner site, Spray Smart valves enabled the existing plumbing to be used for a significant landscape change. This is a unique benefit of Spray Smart technology that was not included in our original proposal. Water conservation initiatives are encouraging homeowners to consider changing landscape. But, without Spray Smart, the changes to underground plumbing are often cost prohibitive or excessively damage the retained landscape. With Spray Smart, the homeowner optimized the water delivery for drastically different landscape water demands using an otherwise incompatible mix of delivery hardware. The DU was doubled from around 37% to 75%. Based upon the measured flow, and the proposed scheduling, a 44% reduction of water usage was realized compared to the original single zone. Specifically, the scheduled weekly water use was reduced from 1,995 gallons to 1,125 gallons, a savings of 870 gallons. Using the annualized estimation outlined above, this zone will save 24,875 gallons using 17 Spray Smart valves. This is equal to 1,462 gallons/year/valve.

#20 Scott Dann: At this homeowner site, multiple changes were enabled by the Spray Smart valves. Turf and shrubs were separated into two subzones. Sixteen heads on the turf were designated as the "A" zone. MP rotators were substituted for the old spray heads to help increase the operating pressure from 15 psi to 35 psi. The original head locations were used. The combination of improved pressure and MP rotator spray heads dramatically improved the DU of the turf from 40% to 70%. All spray heads were removed from the shrubs and replaced by two separate drip lines totaling about 100 feet as the "B" zone. Based upon the measured flow, and the proposed scheduling, a 39% reduction of water usage was realized compared to the original single zone. Specifically, the scheduled weekly water use was reduced from 1,995 gallons to 990 gallons, a savings of 620 gallons. Using the annualized estimation outlined above, this zone will save 17,410 gallons using 18 Spray Smart valves. This is equal to 967 gallons/year/valve.

#21 Bill Gersten: At this homeowner site, Spray Smart valves were used to split a zone that was watering both ground cover and turf. Eleven heads on the turf were designated as the "A" zone. Seventeen heads on the ground cover were designated as the "B" zone. This increased the pressure from 20 psi to 41 psi. The original spray nozzles and head locations were used. The increased pressure raised the DU on the turf from 52% to 82%. Based upon the measured flow, and the proposed scheduling, a 46% reduction of water usage was realized compared to the original single zone. Specifically, the scheduled weekly water use was reduced from 486 gallons to 261 gallons, a savings of 225 gallons. Using the annualized estimation outlined above, this zone will save 6,318 gallons using 28 Spray Smart valves. This is equal to 226 gallons/year/valve.

#22 Dave Putnam: At this homeowner site, the targeted zone suffered from both low pressure and mixed plant type issues. While the homeowner indicated that at least four zones would be upgraded, the post-upgrade audit showed that only one had been completed. For the completed zone, turf and roses/perennials were previously irrigated by rotors. Four rotors were changed to MP Rotators for the turf area as the "A" zone. Four rotors were removed from the non-turf area
and replaced with four drip lines as the "B" zone. The DU was improved, but not measured. This resulted in a 17% reduction of water use. The water usage was reduced from 720 gallons to 600 gallons, using weekly run time of 120 minutes, a savings of 120 gallons. Using the annualized estimation outlined above, this zone will save 3,370 gallons using 8 Spray Smart valves. This is equal to 421 gallons/year/valve.

#23 Janie Anderson: At this homeowner site, Spray Smart valves were used to split both operational zones. For both zones, the homeowner felt that there was a mix of high water demand plants and low water demand plants. The homeowner had also already mixed delivery hardware on the two zones. For the front zone, fourteen spray smart valves were used to separate spray heads on low demand plants from a drip system feeding higher demand plants. In the rear zone, twenty spray smart valves were used to split spray and bubblers watering different types of plants. Surprisingly, the post-upgrade audit produced some disturbing results. Even though the homeowner had sub-divided the zones, and improved the efficiency by lowering the operating pressure, the measured water use rose. There are two factors that likely contribute to this result. First, there is obviously an error in the measurements. The flow rate for the rear nearly doubled although the pressure was reduced and two heads were capped. That is not possible. Also, the homeowner doubled the scheduling for the "high demand" areas, but the flow rate was unchanged. That means that significantly more water is being applied than the baseline although the landscape was healthy before and has not changed. It is likely that the homeowner will determine that the scheduling can be reduced and water savings will be realized in the future. Therefore, while we cannot claim water savings for this site, we also reject the data due to the noted errors and did not include this data in our averages.

#24 Larry Noble: At this homeowner site, Spray Smart valves were used to split a zone that was watering both turf and a planter containing shrubs and roses. Eleven heads on the turf were designated as the "A" zone. One drip cluster was used in the planter as the "B" zone. The original spray nozzles and head locations were used (although several were capped in the planter). The DU on the turf was slightly improved, but not measured. Based upon the measured flow, and the proposed scheduling, a 21% reduction of water usage was realized compared to the original single zone. Specifically, the scheduled weekly water use was reduced from 560 gallons to 444 gallons, a savings of 116 gallons. Using the annualized estimation outlined above, this zone will save 3,257 gallons using 12 Spray Smart valves. This is equal to 271 gallons/year/valve.
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<th>#</th>
<th>Participant</th>
<th>Landscape Type</th>
<th>Problems Addressed</th>
<th>Additional Delivery Hardware Changes?</th>
<th>Spray Smart Valve Qty.</th>
<th>Percent Savings</th>
<th>Weekly Gal. Saved</th>
<th>Gal. per Valve per Year</th>
<th>Zones Fixed / Zones Possible</th>
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<td>Chi Yau</td>
<td>Ground Cover</td>
<td>Low pressure, poor DU</td>
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<td>Theodore McColl</td>
<td>Turf and Shrubs</td>
<td>Mixed landscape Low pressure, poor DU, excessive runoff Mixed landscape, low pressure</td>
<td>All original hardware</td>
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<td>Richard Lyons</td>
<td>Shrubs Turf and Ornamental</td>
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<td>All original hardware</td>
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<td>18</td>
<td>Anne Baptiste</td>
<td>Turf and Ornamental</td>
<td>Mixed landscape Low pressure, poor DU, drought tolerant Low pressure, mixed landscape</td>
<td>All original hardware Yes, MP on Turf Changed Layout Changed rotors to drip in non-turf</td>
<td>17</td>
<td>44%</td>
<td>870</td>
<td>1462</td>
<td>1/3+</td>
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<tr>
<td>22</td>
<td>Dave Putnam</td>
<td>Ground Cover, Ornamentals, Turf, Shrubs, Roses Mixed landscape</td>
<td>All original hardware Yes, planter changed to drip</td>
<td>34</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>23</td>
<td>Janie Anderson</td>
<td>Shrubs Turf, Shrubs, Roses</td>
<td>Mixed landscape All original hardware</td>
<td>12</td>
<td>21%</td>
<td>116</td>
<td>271</td>
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<td>24</td>
<td>Larry Noble</td>
<td>Turf, Shrubs, Roses Mixed landscape</td>
<td>All original hardware Yes, planter changed to drip</td>
<td>19</td>
<td>34%</td>
<td>315</td>
<td>734</td>
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**DIY Averages**

|                | 15 | 34% | 315 | 734 |

**Pro**

<table>
<thead>
<tr>
<th>#</th>
<th>Participant</th>
<th>Landscape Type</th>
<th>Problems Addressed</th>
<th>Additional Delivery Hardware Changes?</th>
<th>Spray Smart Valve Qty.</th>
<th>Percent Savings</th>
<th>Weekly Gal. Saved</th>
<th>Gal. per Valve per Year</th>
<th>Zones Fixed / Zones Possible</th>
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<td>Patrick Crais</td>
<td>Turf and Shrubs Mixed landscape</td>
<td>Mixed landscape Low pressure, poor DU, additional heads Yes, MP on Turf and new drip in shrubs</td>
<td>All original hardware</td>
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<td>Dean Tilton</td>
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<td>Larry Kelly</td>
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<td>Bill Gersten</td>
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<td>All original hardware</td>
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<td>225</td>
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**Pro Averages**

|                | 19 | 34% | 375 | 589 |

**Table 4: Water Savings for all Participants**
4.0 **Summary and Conclusions**

This project was highly successful. We showed that we could significantly reduce water use on typical residential/commercial irrigation systems with minimal cost or complications. Although we took longer than expected, we completed the project on time and within budget.

Our original grant proposal suggested that the average MWD customer who could benefit from Spray Smart would save 12,290 gallons per year using 16 valves. Our participants used 16 valves on average. With an average savings of 662 gallons per valve, the per site annual savings was 10,592 gallons, or 86% of our prediction. At the same time, our participants only fixed about half the identified problems. Therefore, our average participant could have used 32 valves per site if more valves were available (or for sale). The average water savings for 32 valves would be 21,184 gallons, or 170% of our prediction.

Each task of the project was successful for different reasons. There were also many lessons learned that can be applied to future implementation efforts.

For recruitment, there were both challenges and successes. Our originally proposed method to solicit applicants was the least effective. Putting flyers in irrigation specialty stores without product for sale or incentives for the sales staff didn't work. This was likely due to the customers (primarily contractors) being focused on their original purchase and not open to promotional products. On the other hand, when we put the same flyers directly into the hands of random homeowners (through street solicitations or door hangars) we had a better response. We attribute this to fact that the solicitation received more attention, even if only momentarily. We had the highest response rate when the product was actually displayed in action at the California Center for Sustainable Energy (CCSE) street fair. Again, the longer we were able to keep a potential applicant's attention, the more likely they were to recognize the value of our product. In total, for all methods used, we had a net 1% response/application rate for a single impression. We consider this highly successful in terms of basic marketing response and indicative of the large potential market for our product.

Our original segregation and selection went exactly according to plan. Our survey allowed us to segregate applicants effectively and develop a pool of participants. However, retention became an issue as noted earlier. While applicants were originally enthusiastic about our product and offer, they often failed to follow through. It seems that homeowners were too busy to be bothered with a water saving offer, even if it was 100% funded as a pro upgrade. It is likely that our product is not alone in this regard. This is really a much bigger issue facing the population as a whole, and all water saving technologies. It seems that the commitment to seek out and follow through on water savings retrofits is fickle in the general population. Ultimately, we were able to maintain a complete participant list, as proposed, and complete the requisite number of upgrades.

Our planned approach for the pre-upgrade audits was highly successful. We had to make some adjustments to how we measured baseline water usage. However, because we had developed a template to collect the results, we obtained consistent data that allowed for relevant comparisons after the Spray Smart technology was applied.
We found that we had adequately anticipated important issues, like system maintenance or supply pressure, such that we could insure repeatable results.

We assumed that system capacity assessments would be required to evaluate design changes using hydraulic design criteria. We learned that the calculations were not significant once a system is already installed and operating since the capacity of the system was evident based upon its operational characteristics. Therefore, quantitative system capacity calculations were not performed.

Distribution uniformity (DU) assessment was accomplished as planned. However, rather than being the primary measure of Spray Smart effectiveness, DU measurements were only performed for systems where the homeowner indicated that they intended to address distribution problems on turf or ground covers where DU measurements were possible and relevant.

During the pre-upgrade audits, we found that many of our participants intended to address landscape health issues rather than looking for ways to save water. Others wanted to use the Spray Smart valves to enable landscape changes. While these changes were targeting water savings via changes to lower water demand landscapes, the original premise of "water savings by improving the existing system" was not always the intent.

We also learned a lot about the types of challenges water users are facing with their irrigation systems. Some have pressure that is much too high. Others have pressure that is much too low. Many have poor designs with mixed delivery equipment or too many heads on a zone. Most prevalent, however, was the improper design associated with mixed landscapes on a single zone. These system design issues were not limited to old systems, or situations where landscape had changed after the system was installed. These were typically "intentionally" improperly designed. We have theorized that the improper design is intended to save money on the irrigation equipment and installation labor without concern for the resultant water waste.

Ultimately, baseline water usage was established for each zone with good accuracy for metered sites and acceptable accuracy for sites without meters. This allowed for reliable comparisons to the post-upgrade results. The pre-upgrade audits also provided the necessary foundation to enable the participants to successfully proceed with implementation of the Spray Smart technology.

We learned a lot during the upgrades. We learned that while the professional results were more consistent, the homeowner results were more creative. We learned that the homeowners in our study generally recognize their irrigation inefficiencies and can effectively apply the Spray Smart technology to solving them.

One unexpected finding from the project, was the extent of collateral changes that were elected. Our original project description assumed that the system changes would be minimal and simply adding or moving a few heads would improve efficiency. While 60% of both the professional and the DIY participants did substantially re-use their existing water delivery hardware, the other 40% made changes that were more extensive. These collateral changes were typically enabled only as a result of implementing Spray Smart technology. Specifically, water delivery hardware was changed to otherwise incompatible combinations such as low precipitation rate spray heads and high precipitation rate heads, or spray heads and drip on the same zone. None of our
participants relocated the original underground plumbing which is the key to making Spray Smart cost effective and minimizing impact to the existing landscape.

We also learned a few things about the product itself. We learned that while the valves are proof tested to 150 psi, they do not operate reliably in real world applications much above their rated 60 psi. In fact, the valves operate reliably up to about 80-90 psi and then begin to have misfire issues. This was traced to a design issue that can be addressed. The valves were very reliable within their rated 20 psi to 60 psi operating range. We also learned that our proposed method to use check valves on steep slopes needs to be refined. Specifically, even when using external check valves, as recommended, it is possible to trap high pressure water between an exceptionally well sealed check valve and an exceptionally well sealed Spray Smart valve. This disables the reset function. This problem is alleviated by simply providing a tiny leak between the check valve and Spray Smart valve (by tightening the threads less and using no sealant). We learned that when customers have low pressure problems, they have REALLY low pressure problems. Our market research had suggested that systems operating below 18-20 psi should have or would have already been fixed. On the contrary, we found multiple systems operating in the 10-15 psi range. These systems required additional hardware changes just to reach the 20 psi required for Spray Smart valve actuation. This suggests that a "very low pressure model" will be needed to fix these zones using only Spray Smart. Finally, we learned that our goal to provide a universal product by fitting it into a close nipple was not entirely met. There were a few sites using pop-up heads without bodies. These heads need to drop their stem into the riser adapter. Spray Smart valves substituted for the riser will not allow the stem to drop. While these type of heads were known and anticipated, it was the frequency of encountering them that was surprising. In addition, newer professional installations using swing joints have no riser adapter to replace. Therefore, when the Spray Smart valve is installed, the head will be raised unless the swing joint has excess vertical height adjustment capacity. In many cases, the swing joints did not, and a longer swing joint was needed. Both of these findings suggest that alternate models of the product will be desirable to address a wide range of installation challenges. These alternate models are already in development.

The most important finding from the upgrades, however, was that the professionals and homeowners were both able to understand the Spray Smart technology and apply it effectively with minimal oversight. This is critically important to market success.

The post-upgrade audits were essentially as expected. As previously noted, we found more variation in the DIY results than the professional results. When all of the data is critically reviewed, there are some readings that could be erroneous. This conclusion is based on comparison of flow rates for a given number/type of heads to comparable systems. It is expected that there will always be some error. In this case, the errors seem to be relatively small and on both sides of the expected values such that the averages are considered quite valid. We had two issues where the water savings that we expected were not reflected in the audits. In one case (Lyons) the degree and type of system changes may have made the auditing process difficult. In the other case (Anderson) there were clearly auditing issues that generated bad data. For Putnam, the auditor quoted daily run time vs. weekly run time in the table, so the water saved was adjusted based on his weekly schedule listed in the narrative.

As the project progressed it became clear that, for homeowners, the Spray Smart valve is sometimes more of an enabling technology than a solution by itself. In other words, simply installing Spray Smart valves into an existing system and enjoying water savings was not the
universal approach. Many of our participants used the Spray Smart valves to allow system changes that would not have been possible without expensive re-plumbing. In all cases, these changes also produced substantial water savings. The significance of this cannot be over-stated. Homeowners who "tolerate" their system deficiencies because the cost of changes (parts, personal labor or professional costs) outweigh the benefits. Water is still too cheap and people are generally too busy worrying about other things. When offered a low cost alternative, the Spray Smart approach, they can now make changes that they would otherwise forgo. Therefore, we assert that the full water savings result of these changes (including any alternate hardware utilized) are directly resultant of the enabling technology of the Spray Smart valve.

We found that fixing problems with mixed landscape, low pressure or mixed water delivery hardware generated substantial water savings. Sometimes, these problems affected DU, per the original proposal. But more often, the problems were more obvious to both the professional and homeowner. This is important. Because specifically addressing DU would be challenging for any Spray Smart customer. The fact that there are so many more obvious problems demonstrates that the large potential customer base will likely be successful in using Spray Smart to significantly reduce water waste.

We have previously presented our water savings as a percentage of the baseline for the upgraded zones. The average savings were fairly consistent at around 34% reduction from baseline. Equally important are the per valve water savings. This average simplifies calculation of the value of the valve in terms of ROI and avoided capacity growth valuation. The professional irrigation designer saved an annual average of 589 gallons per Spray Smart valve installed. The homeowners saved an annual average of 734 gallons. At a nominal consumer water rate of $5 per HCF (assuming some sewer charge), and a retail valve cost of around $5.50, the valves pay for themselves in just over one year. The valves are warranted for five years and are expected to last much longer. Considering a nominal five year life, each valve will save a net lifetime average of 3,310 gallons. This has a consumer value of around $22.13 - $5.50 = $16.63. The Spray Smart valves also generate a lifetime savings of $5.08 at the MWD valuation of $500 per acre foot for water saving technology applications.

5.0 Potential for Success on a Regional Scale

Assuming that the "average customer" will use 32 Spray Smart valves, and that there are about 1 million Spray Smart customers in MWD's service area (our previous projection), then regional implementation of the Spray Smart product would be projected to save over 21.2 billion gallons, or 65,000 acre-feet annually.

There are two questions remaining. How accurate is the projection of 1 million customers in MWD's service area? How will these customers be acquired?

MWD and its member agencies supply water for Agriculture and Municipal and Industrial (Urban) use. Municipal and Industrial (M&I) use accounts for approximately 93% of all water supplied by MWD. Within total M&I water use, the largest sectors are residential, accounting for 68%, and commercial/industrial, accounting for 24% (according to the MWD Regional Urban Water Management Plan, 2010). While the RUWMP does not provide a breakdown of water usage for the commercial and industrial sector, other studies have cited industrial water use at around 4%, or a small fraction of M&I water use. Assuming that 20% of the M&I water
delivered is for commercial use, approximately 88% of M&I water is used for residential and commercial purposes. Therefore, approximately 82% (88% of 93%) of all water delivered by MWD is used for residential and commercial purposes. Multiple studies have established the percentage of residential water used for irrigation at around 50% to 60% within the MWD service area. Assuming that commercial water users fall on the low end of this range (due to uses such as restaurants, etc) all residential/commercial irrigation water use is conservatively assumed at 50%. **Therefore, approximately 41% (50% of 82%) of all water delivered by MWD is used for residential and commercial irrigation.** This finding demonstrates that outdoor irrigation represents a substantial percentage of water delivered to MWD's service area. Because all member agencies contain significant percentages of customers with arid climates and automatic sprinklers, the Spray Smart product has universal applicability across the region.

Still, there is no quantifiable data to prove what percentage of customers, or what percentage of outdoor irrigation could save water using Spray Smart technology. Our previous estimates assumed that, on average, every single family residence in MWD's service area using automatic sprinklers could benefit on at least one zone. This is still considered the correct order of magnitude. While many customers will not be able to benefit, the original estimate did not include commercial use, and many customers can benefit on more than one zone. In fact, in our survey of program applicants, 59% stated that they could improve 3-5 zones and 91% thought that more than one zone would benefit. While we recognize that our respondents do not represent a statistically representative sample, we assert that our audit finding of around 2.4 valid zones per site is representative of "problem sites". So, in summary, while we cannot definitively prove that there are a million customers in MWD's service area, we feel that the order of magnitude is correct.

This project did not provide a good template to be used in regional implementation. The recruitment process was tedious and consumers are skeptical of free offers. Also, without some additional motivation, the likelihood that customers will follow through and install the valves is around 50%. Perhaps a better example of a successful program comes from MWD's existing rebate programs. Between FY90/91 and FY08/09, MWD provided rebates for over 143,000 Multi-Stream Rotating Nozzles. These rebates were worth about half the cost of the nozzle and provided additional incentive for customers to implement these higher efficiency products.

Because Multi-Stream Rotating Nozzles are a higher efficiency alternative to existing irrigation solutions, they do not accurately represent the market potential of Spray Smart. Since Spray Smart fixes problems that high efficiency nozzles can't, such as mixed hydrozones, applications requiring mixed delivery hardware and landscape satisfaction issues such as wet spots in the shade, we feel that an equivalent rebate program would produce a greater response than Multi-Stream Rotating Nozzles with greater water savings. Spray Smart also allows customers to substitute water saving landscapes using their existing underground plumbing.

These rebates would be offered through existing MWD outreach initiatives including the hundreds of thousands of annual visitors to the bewaterwise.com website. These visitors are primarily driven to the website by ongoing conservation awareness advertising by MWD. As water prices continue to rise and water rationing becomes necessary, MWD customers will be increasingly motivated to visit the bewaterwise.com website for tips on saving water and, more important, money. Once MWD has substantiated the water savings potential and reliability of the Spray Smart product via this project, a link can be provided on bewaterwise.com directing visitors to visit the Spray Smart website to determine their anticipated savings by using the Spray
Smart product. We will show them the multiple applications for the Spray Smart technology. We will show how the valves will pay for themselves in water savings in around a year (even without the rebate) or in even less time depending on the rebate amount. We will also show them how Spray Smart can fix their landscape health issues, which we found was a better motivator than water/cost savings.

Finally, we will be marketing Spray Smart through irrigation distribution independent of any rebate programs. Therefore, we will be developing our own marketing campaign to drive awareness, sales, and ultimately water savings. A good follow-on project, that would help MWD realize these water savings sooner, would provide funding to help us develop these marketing strategies, build awareness and create demand. Because Spray Smart delivers substantial water savings, we feel that this effort could be very cost effective for MWD using current conservation valuation metrics.

There are no negative environmental impacts arising from implementation of the Spray Smart valve and there are no permitting issues that could slow widespread deployment.
Appendix: Site Reports for all Project Sites.

Audits were performed by:

Patrick Crais, CLIA Or California Landscape Technologies
Blue Watchdog Systems Steve Sherman, CLIA
315 South Coast Hwy 101 970 Woodlake Drive
Encinitas, CA 92024 Cardiff by the Sea, CA 92007
760-473-8858 760-809-3241

Professional upgrades were performed by:

Patrick Crais, Certified Irrigation Designer
Blue Watchdog Systems
315 South Coast Hwy 101
Encinitas, CA 92024
760-473-8858
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:
Property Address:

8813 Detwiler Rd.
Escondido, CA 92029

Property Type: Residential

Water Meter Size: 3/4
Supply Static Pressure: 60

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

0.5 acre

Number of active irrigation zones: 12

System Level Maintenance Condition:
-Leaks on main supply to irrigation? None
-Leaky control valves? None

Controller Type:
-Brand and model? Hunter Pro-C
-Weather based? No Weather adjustable? Yes
-Multi-cycle capable? Yes

Landscape Health: Poor
### Pre-Upgrade Audit Summary:

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<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
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**Total Weekly Water Usage** 4,107

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8813 Detwiler Rd

Zone #: 1

-Type of landscape:  Ground Cover
-Supply line leaks?  None
-Heads leaking around pop-up seal?  Minor
-Heads need replacement?  No
-Heads clogged or spraying improperly?  Minor
-Zone capacity issues?  Major
-Head Layout issues?  Minor

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?:  No

-Low Pressure Issues?:  Yes. 25 psi.

-Distribution Uniformity Issue?: Yes.  Not Measured.

-Alternate Solution Options?:  Low flow heads
**Pre-Upgrade Audit Details: (for all active zones)**
Property Address: 8813 Detwiler Rd

Zone #: 2

- Type of landscape: Ground Cover
- Supply line leaks? None
- Heads leaking around pop-up seal? Minor
- Heads need replacement? No
- Heads clogged or spraying improperly? Minor
- Zone capacity issues? Major
- Head Layout issues? Minor

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No

- Low Pressure Issues?: No.
- Distribution Uniformity Issue?: No
- Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8813 Detwiler Rd

Zone #: 3

-Type of landscape: Ground Cover

-Supply line leaks? None

-Heads leaking around pop-up seal? Minor

-Heads need replacement? No

-Heads clogged or spraying improperly? Minor

-Zone capacity issues? Major

-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-Yes

-Mixed Hydrozones?: No

-Low Pressure Issues?: Yes. 25 psi.

-Distribution Uniformity Issue?: Yes. Not Measured.

-Alternate Solution Options?: Low flow heads
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8813 Detwiler Rd

Zone #: 4

-Type of landscape:  Turf
-Supply line leaks?  None
-Heads leaking around pop-up seal?  Minor
-Heads need replacement?  No
-Heads clogged or spraying improperly?  Minor
-Zone capacity issues?  Major
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?:  No

-Low Pressure Issues?:  No.

-Distribution Uniformity Issue?: No

-Alternate Solution Options?:  N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8813 Detwiler Rd

Zone #: 7

-Type of landscape:  Turf
-Supply line leaks?  None
-Heads leaking around pop-up seal?  Minor
-Heads need replacement?  No
-Heads clogged or spraying improperly?  Minor
-Zone capacity issues?  Major
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?:  No

-Low Pressure Issues?:  No.

-Distribution Uniformity Issue?: No

-Alternate Solution Options?:  N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8813 Detwiler Rd

Zone #: 9

- Type of landscape: Ground Cover
- Supply line leaks? None
- Heads leaking around pop-up seal? Minor
- Heads need replacement? No
- Heads clogged or spraying improperly? Minor
- Zone capacity issues? Major
- Head Layout issues? Minor

Spray Smart Improvement Opportunities:
- Yes
- Mixed Hydrozones?: No

- Low Pressure Issues?: Yes. 22 psi.

- Distribution Uniformity Issue?: Yes. Not Measured.

- Alternate Solution Options?: Low flow heads
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8813 Detwiler Rd

Zone #: 10

-Type of landscape: Ground Cover

-Supply line leaks? None

-Heads leaking around pop-up seal? Minor

-Heads need replacement? No

-Heads clogged or spraying improperly? Minor

-Zone capacity issues? Major

-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No

-Mixed Hydrozones?: No

-Low Pressure Issues?: No

-Distribution Uniformity Issue?: No

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8813 Detwiler Rd

Zone #: 11

-Type of landscape: Ground Cover

-Supply line leaks? None

-Heads leaking around pop-up seal? Minor

-Heads need replacement? No

-Heads clogged or spraying improperly? Minor

-Zone capacity issues? Major

-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8813 Detwiler Rd

Zone #: 12

-Type of landscape: Ground Cover
-Supply line leaks? None
-Heads leaking around pop-up seal? Minor
-Heads need replacement? No
-Heads clogged or spraying improperly? Minor
-Zone capacity issues? Major
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No

-Alternate Solution Options?: N/A
## Spray Smart Upgrade Summary:

Property Address:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Low Pressure, DU</td>
<td>5 PGP Rotors</td>
<td>8 PGP Rotors</td>
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<tr>
<td>12</td>
<td>No</td>
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</tr>
</tbody>
</table>
**Zone Upgrade Details: (For each upgraded zone)**

Property Address: 8813 Detwiler Rd.

Zone #: 1

Type of problem(s) being addressed: Low Pressure, DU

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 13

"A" Zone Details:
  - Landscape Type: Ground Cover
  - Type and Number of heads: 5 PGP Rotors, 55 psi

"B" Zone Details:
  - Landscape Type: Ground Cover
  - Type and Number of heads: 8 PGP Rotors, 55 psi

Additional Changes Required: (list all additional changes including repairs and new equipment)

None. All valves installed on above ground risers.
### Post Upgrade Audit Summary:

**Property Address:**

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week</th>
<th>Percent Savings</th>
<th>Notes</th>
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<td>10</td>
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<td>Total 3,489</td>
</tr>
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</table>
**Post-Upgrade Audit Details: (for each upgraded zone)**

Property Address: 8813 Detwiler Rd.

Zone #: 1

- Supply line leaks fixed? N.A.
- Head maintenance issues fixed? N.A.
- Zone capacity issues fixed? Yes
- Head layout issues fixed? N/A

Spray Smart Improvement Details:

"A" Zone Details:
- Approximate percentage of zone area: 40%
- Flow Rate (GPM): 10
- Operating pressure after Spray Smart (if pressure problem): 55 psi
- DU (if DU was addressed) Not Measured
- Suggested Weekly Run Time (100% Eto): 15
- Actual Weekly Run Time (Set by operator): 15

"B" Zone Details:
- Approximate percentage of zone area: 60%
- Flow Rate (GPM): 16
- Operating pressure after Spray Smart (if pressure problem): 55 psi
- DU (if DU was addressed) Not Measured
- Suggested Weekly Run Time (100% Eto): 15
- Actual Weekly Run Time (Set by operator): 15
Post-Upgrade Audit Report:
Property Address: 8813 Detwiler Rd

System Level Maintenance Issues Repaired?: No
All Zone Maintenance Issues Repaired?: No

Summary Of Changes: Added 13 Spray Smart valves to 13 PGP rotors above ground.

Measured Water Savings (As installed and programmed by water manager):
618 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):
618 x 52 weeks x 54% = 17,353 gal/yr.

Confidence that water manager will utilize product properly:
High.

Opportunity for additional savings with existing installation (e.g. re-program)?
No.

Projected Annual Water Savings (For properly programmed and maintained upgrade):
17,353 gal/yr.

Opportunity for additional upgrades on this site:
2 more Spray Smart zones
Weather Based Irrigation Controller

Issues/Comments:
Reduced run time due to better DU at higher pressure.
Easy install due to above ground risers.
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:
Property Address:

5942 Henley Dr.
San Diego, CA 92120

Property Type: Residential

Water Meter Size: Well Water, No meter. Not Available

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

0.15 acre

Number of active irrigation zones: 11

System Level Maintenance Condition:
- Leaks on main supply to irrigation? None
- Leaky control valves? None

Controller Type:
- Brand and model? Raindial 1200
- Weather based? No Weather adjustable? No
- Multi-cycle capable? Yes

Landscape Health: Average overall. Poor for rear turf.
Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
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<tr>
<td>1</td>
<td>Turf</td>
<td>Spray</td>
<td>14</td>
<td>30</td>
<td>422</td>
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<td>2</td>
<td>Turf</td>
<td>Spray</td>
<td>16</td>
<td>30</td>
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<td>Turf</td>
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<td>30</td>
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<td>4</td>
<td>Turf /Shrubs</td>
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<td>450</td>
<td>Dry Spots</td>
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<td>Shrubs</td>
<td>Impacts</td>
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<td>Shrubs</td>
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<td>Shrubs</td>
<td>Spray</td>
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<td>8</td>
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<td>Spray</td>
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<td>225</td>
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<td>Shrubs</td>
<td>Spray</td>
<td>Leak</td>
<td>N/A</td>
<td>N/A</td>
<td>No</td>
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</tbody>
</table>

Total Weekly Water Usage 2,701

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)  
(Auditor failed to completely report for all zones)

Property Address:  5942 Henley Dr.

Zone #: 4

- Type of landscape:  Turf and shrubs
- Supply line leaks?  None
- Heads leaking around pop-up seal?  Minor
- Heads need replacement?  No
- Heads clogged or spraying improperly?  None
- Zone capacity issues?  No
- Head Layout issues? None

Spray Smart Improvement Opportunities:
- Yes
- Mixed Hydrozones?:  Yes.

- Low Pressure Issues?:  No. 35 psi
- Distribution Uniformity Issue?:  No.

- Alternate Solution Options?:  None.
**Spray Smart Upgrade Summary:**
Property Address: 5942 Henley Dr.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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<tbody>
<tr>
<td>1</td>
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<td>Yes</td>
<td>Mixed Landscape: Turf and Shrubs</td>
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<td>6 Spray</td>
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</tbody>
</table>
Zone Upgrade Details: (For each upgraded zone)

Property Address: 5942 Henley Dr.

Zone #: 4

Type of problem(s) being addressed: Mixed Landscape

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 3

"A" Zone Details:
- Landscape Type: Shrubs
- Type and Number of heads: 3 Spray

"B" Zone Details:
- Landscape Type: Turf
- Type and Number of heads: 6 Spray

Additional Changes Required: (list all additional changes including repairs and new equipment)

Note: Homeowner only installed Spray Smart valves under shrubs.
Post Upgrade Audit Summary:
Property Address: 5942 Henley Dr.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
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<td>2</td>
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<td>3</td>
<td>No</td>
<td>614</td>
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</tbody>
</table>

Total 2,701

Total 2,581 3.4%
**Post-Upgrade Audit Details: (for each upgraded zone)**

Property Address: 5942 Henley Dr.

Zone #: 4

- Supply line leaks fixed? N/A
- Head maintenance issues fixed? No
- Zone capacity issues fixed? N/A
- Head layout issues fixed? N/A

Spray Smart Improvement Details:

"A" Zone Details:
- Approximate percentage of zone area: 50%
- Flow Rate (GPM): 8
- Operating pressure after Spray Smart (if pressure problem): 45 psi
- DU (if DU was addressed) N/A
- Suggested Weekly Run Time (100% Eto): 30
- Actual Weekly Run Time (Set by operator): 30

"B" Zone Details:
- Approximate percentage of zone area: 50%
- Flow Rate (GPM): 7
- Operating pressure after Spray Smart (if pressure problem): 45 psi
- DU (if DU was addressed) N/A
- Suggested Weekly Run Time (100% Eto): 30
- Actual Weekly Run Time (Set by operator): 30
**Post-Upgrade Audit Report:**
Property Address: 5942 Henley Dr.

System Level Maintenance Issues Repaired?: No
All Zone Maintenance Issues Repaired?: No

Summary Of Changes: Used 3 Spray Smart valves to split shrubs from turf. Did not install valves in turf. Turf runs every time. Shrubs run only as "A" zone.

Measured Water Savings (As installed and programmed by water manager):

120 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):

120 x 52 weeks x 54% = 3,369 gal/yr.

Confidence that water manager will utilize product properly:

Low.

Opportunity for additional savings with existing installation (e.g. re-program)?

Zone could be improved if Spray Smart was installed in turf also. Programming is questionable.

Projected Annual Water Savings (For properly programmed and maintained upgrade):

Should have gotten closer to 40% savings = 5,183 gal/yr.

Opportunity for additional upgrades on this site:

Mixed landscape on zone 10.

Issues/Comments:
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:
Property Address:

17438 Plaza Destacado
San Diego, CA 92128

Property Type: Residential

Water Meter Size: 5/8” Supply Static Pressure: Not available

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

0.15 acre

Number of active irrigation zones: 2

System Level Maintenance Condition:
   - Leaks on main supply to irrigation? None
   - Leaky control valves? None

Controller Type:
   - Brand and model? Orbit
   - Weather based? No Weather adjustable? No
   - Multi-cycle capable? Yes

Landscape Health: Average
**Pre-Upgrade Audit Summary:**

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hedges (Rear)</td>
<td>Spray</td>
<td>4</td>
<td>90</td>
<td>360</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Hedges (Front)</td>
<td>Spray</td>
<td>10</td>
<td>30</td>
<td>300</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Total Weekly Water Usage** 660

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 17438 Plaza Destacado

Zone #: 1

- Type of landscape: Shrubs
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? Yes, excessively low pressure
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- Yes
- Mixed Hydrozones?: No.

- Low Pressure Issues?: Yes, 5 psi.
- Distribution Uniformity Issue?: Yes, improper spray pattern.

- Alternate Solution Options?: Low flow heads?
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 17438 Plaza Destacado

Zone #: 2

-Type of landscape: Shrub

-Supply line leaks? None

-Heads leaking around pop-up seal? None

-Heads need replacement? No

-Heads clogged or spraying improperly? None

-Zone capacity issues? Minor

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: No.

-Low Pressure Issues?: Yes, 15 psi.

-Distribution Uniformity Issue?: Minor, not measured.

-Alternate Solution Options?: Low flow heads.
Spray Smart Upgrade Summary:
Property Address: 17438 Plaza Destacado

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Low Pressure</td>
<td>6 shrub spray</td>
<td>6 shrub spray</td>
<td>New control valve</td>
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<td>2</td>
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</tr>
</tbody>
</table>
Zone Upgrade Details: (For each upgraded zone)
Property Address: 17438 Plaza Destacado

Zone #: 1

Type of problem(s) being addressed: Low Pressure

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 12
"A" Zone Details:
    - Landscape Type: Shrubs

    - Type and Number of heads: 6 Shrub Spray

"B" Zone Details:
    - Landscape Type: Shrubs

    - Type and Number of heads: 6 Shrub Spray

Additional Changes Required: (list all additional changes including repairs and new equipment)

Replaced control valve.
Post Upgrade Audit Summary:
Property Address: 17438 Plaza Destacado

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time % Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time % Eto</th>
<th>Upgrade gal. per week</th>
<th>Percent Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>360</td>
<td>6</td>
<td>30</td>
<td>6</td>
<td>30</td>
<td>360</td>
<td>0%</td>
<td></td>
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<tr>
<td>2</td>
<td>No</td>
<td>300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>300</td>
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</tr>
</tbody>
</table>

Total 660  

Total 660  0
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 17438 Plaza Destacado

Zone #: 1

-Supply line leaks fixed? N/A
-Head maintenance issues fixed? N/A
-Zone capacity issues fixed? N/A
-Head layout issues fixed? N/A

Spray Smart Improvement Details:

"A" Zone Details:
-Approximate percentage of zone area: 50%
-Flow Rate (GPM): 6
-Operating pressure after Spray Smart (if pressure problem): 30 psi
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 30
-Actual Weekly Run Time (Set by operator): 30

"B" Zone Details:
-Approximate percentage of zone area: 50%
-Flow Rate (GPM): 6
-Operating pressure after Spray Smart (if pressure problem): 30 psi
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 30
-Actual Weekly Run Time (Set by operator): 30
Post-Upgrade Audit Report:
Property Address: 17438 Plaza Destacado

System Level Maintenance Issues Repaired?: N/A
All Zone Maintenance Issues Repaired?: N/A

Summary Of Changes: Used 12 Spray Smart valves to split shrub zone in half. Also replaced supply valve.

Measured Water Savings (As installed and programmed by water manager):
None

Projected Annual Water Savings (As installed and programmed by water manager):
None

Confidence that water manager will utilize product properly:
High.

Opportunity for additional savings with existing installation (e.g. re-program)?
Reduce run time due to better distribution at proper pressure

Projected Annual Water Savings (For properly programmed and maintained upgrade):
~20% = 2,000 gal/year

Opportunity for additional upgrades on this site:
Additional Spray Smart zone
Could also use drip

Issues/Comments:
Extremely low pressure required control valve replacement and also adjustment of spray heads to operate Spray Smart valves.
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:
Property Address:

11477 Alcade Ct.
San Diego, CA 92127

Property Type: Residential

Water Meter Size:  3/4  Supply Static Pressure:  50

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

0.25 acre

Number of active irrigation zones: 8

System Level Maintenance Condition:
- Leaks on main supply to irrigation? None
- Leaky control valves? None

Controller Type:
- Brand and model? Hunter SRC, 8 station
- Weather based? No  Weather adjustable? No
- Multi-cycle capable? No

Landscape Health: Average
## Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
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<tbody>
<tr>
<td>1</td>
<td>Shrub</td>
<td>Spray</td>
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<td>50</td>
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<td>2</td>
<td>Turf</td>
<td>Spray</td>
<td>20</td>
<td>50</td>
<td>1000</td>
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<td>No</td>
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<tr>
<td>3</td>
<td>Turf and Shrub</td>
<td>Spray</td>
<td>8</td>
<td>50</td>
<td>400</td>
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<td>Yes</td>
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<tr>
<td>4</td>
<td>Ground Cover</td>
<td>Spray</td>
<td>10</td>
<td>50</td>
<td>500</td>
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<td>5</td>
<td>Turf and Shrub</td>
<td>Spray</td>
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<td>70</td>
<td>1120</td>
<td>Dry Spots</td>
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<td>6</td>
<td>Shrub</td>
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<td>200</td>
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<td>7</td>
<td>Turf and Shrub</td>
<td>Spray</td>
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<td>450</td>
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<td>Yes</td>
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<td>8</td>
<td>Shrub</td>
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</tbody>
</table>

Total Weekly Water Usage 4,720

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  11477 Alcade Ct.

Zone #: 1

-Type of landscape:  Shrub
-Supply line leaks?  None
-Heads leaking around pop-up seal?  None
-Heads need replacement?  No
-Heads clogged or spraying improperly?  Major
-Zone capacity issues?  Major
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?:  No.

-Low Pressure Issues?:  No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11477 Alcade Ct.

Zone #: 2

- Type of landscape: Turf
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? Minor

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No.
- Low Pressure Issues?: No.
- Distribution Uniformity Issue?: No.
- Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11477 Alcade Ct.

Zone #: 3

- Type of landscape: Turf and Shrubs
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? Minor

Spray Smart Improvement Opportunities:
- Yes
- Mixed Hydrozones?: Yes.

- Low Pressure Issues?: No.

- Distribution Uniformity Issue?: No.

- Alternate Solution Options?: None.
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11477 Alcade Ct.

Zone #: 4

-Type of landscape: Ground Cover
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11477 Alcade Ct.

Zone #: 5

-Type of landscape: Turf and Shrubs
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? Minor
-Zone capacity issues? Yes
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: Yes, 15 psi.

-Distribution Uniformity Issue?: Yes, 21%

-Alternate Solution Options?: None.
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  11477 Alcade Ct.

Zone #: 6

-Type of landscape:  Shrub
-Supply line leaks?  None
-Heads leaking around pop-up seal?  None
-Heads need replacement?  No
-Heads clogged or spraying improperly?  None
-Zone capacity issues?  Major
-Head Layout issues?  Minor

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?:  No.

-Low Pressure Issues?:  Yes, 20 psi.

-Distribution Uniformity Issue?:  Yes, Not Measured

-Alternate Solution Options?:  Low Flow Heads
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11477 Alcade Ct.

Zone #: 7

-Type of landscape: Turf and Shrubs
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.
-Alternate Solution Options?: None.
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11477 Alcade Ct.

Zone #: 8

- Type of landscape: Shrubs
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? Minor

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No

- Low Pressure Issues?: No.
- Distribution Uniformity Issue?: No.
- Alternate Solution Options?: N/A
### Spray Smart Upgrade Summary:
Property Address: 11477 Alcade Ct.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
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<td>2</td>
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<td>4</td>
<td>No</td>
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</tr>
<tr>
<td>5</td>
<td>Yes</td>
<td>Mixed Landscape, Low pressure, Low DU</td>
<td>16 MP Rotator</td>
<td>5 Shrub Spray</td>
<td>Turf heads changed from spray to MP Rotator</td>
</tr>
<tr>
<td>6</td>
<td>No</td>
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<td>8</td>
<td>No</td>
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</tbody>
</table>
**Zone Upgrade Details: (For each upgraded zone)**

**Property Address:** 11477 Alcade Ct.

**Zone #:** 5

Type of problem(s) being addressed: Mixed Landscape, Low pressure, Low DU

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 21

"A" Zone Details:
- Landscape Type: Turf
  - Type and Number of heads: 16 MP Rotator

"B" Zone Details:
- Landscape Type: Shrubs
  - Type and Number of heads: 5 Spray

Additional Changes Required: (list all additional changes including repairs and new equipment)

Pop-up bodies changed to accommodate MP Rotator (was Champion).

Changed irrigation controller to multi-cycle capable.
Post Upgrade Audit Summary:
Property Address: 11477 Alcade Ct.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>750</td>
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<td>500</td>
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<tr>
<td>5</td>
<td>No</td>
<td>1120</td>
<td>8</td>
<td>70</td>
<td>3</td>
<td>35</td>
<td>665</td>
<td>41%</td>
<td>455 gal/wk</td>
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</tr>
</tbody>
</table>

| Total  | 4,720       | Total              | 4,265        | 10%                      |              |                          |                      |                 |          |
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 11477 Alcade Ct.

Zone #: 5

-Supply line leaks fixed? N.A.
-Head maintenance issues fixed? N.A.
-Zone capacity issues fixed? Yes
-Head layout issues fixed? No

Spray Smart Improvement Details:

"A" Zone Details:
-Approximate percentage of zone area: 80%
-Flow Rate (GPM): 8
-Operating pressure after Spray Smart (if pressure problem): 39 psi
-DU (if DU was addressed) Not Measured
-Suggested Weekly Run Time (100% Eto): 70
-Actual Weekly Run Time (Set by operator): 70

"B" Zone Details:
-Approximate percentage of zone area: 20%
-Flow Rate (GPM): 3
-Operating pressure after Spray Smart (if pressure problem): 50 psi
-DU (if DU was addressed) Not Measured
-Suggested Weekly Run Time (100% Eto): 35
-Actual Weekly Run Time (Set by operator): 35
**Post-Upgrade Audit Report:**
Property Address: 11477 Alcade Ct.

System Level Maintenance Issues Repaired?: N/A
All Zone Maintenance Issues Repaired?: N/A

Summary Of Changes: Used 21 Spray Smart valves to split turf from shrubs. Installed MP Rotator heads in turf.

Measured Water Savings (As installed and programmed by water manager):

455 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):

455 x 52 weeks x 54% = 12,776 gal/yr.

Confidence that water manager will utilize product properly:

High.

Opportunity for additional savings with existing installation (e.g. re-program)?

No.

Projected Annual Water Savings (For properly programmed and maintained upgrade):

12,776 gal/yr.

Opportunity for additional upgrades on this site:

2 more Spray Smart zones
Weather Based Irrigation Controller

Issues/Comments:
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart\textsuperscript{TM} Valve

Pre-Upgrade Audit Results:
Property Address:

8810 Detwiler Rd
Escondido, CA 92029

Property Type: Residential


Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

1.0 acre

Number of active irrigation zones: 24 landscape, 24 agriculture

System Level Maintenance Condition:
- Leaks on main supply to irrigation? None
- Leaky control valves? None

Controller Type:
- Brand and model? Irritrol MC24A plus
- Weather based? No Weather adjustable? No
- Multi-cycle capable? Yes

Landscape Health: Good
Pre-Upgrade Audit Summary: (Note that 12/24 zones were audited to control cost)
Only zone #5 was indicated as Spray Smart candidate

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turf</td>
<td>Spray</td>
<td>8</td>
<td>70</td>
<td>560</td>
<td>No</td>
<td>No</td>
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<tr>
<td>2</td>
<td>Turf</td>
<td>Spray</td>
<td>15</td>
<td>70</td>
<td>1050</td>
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<td>No</td>
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<tr>
<td>3</td>
<td>Turf</td>
<td>Spray</td>
<td>15</td>
<td>70</td>
<td>1050</td>
<td>No</td>
<td>No</td>
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<tr>
<td>4</td>
<td>Turf</td>
<td>Spray</td>
<td>15</td>
<td>70</td>
<td>1050</td>
<td>No</td>
<td>No</td>
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<tr>
<td>5</td>
<td>Hedge and Roses</td>
<td>Spray</td>
<td>18</td>
<td>35</td>
<td>630</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>6</td>
<td>Ground Cover</td>
<td>Rotors</td>
<td>20</td>
<td>60</td>
<td>1200</td>
<td>No</td>
<td>No</td>
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<tr>
<td>7</td>
<td>Ground Cover</td>
<td>Spray</td>
<td>15</td>
<td>30</td>
<td>450</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Ground Cover</td>
<td>Spray</td>
<td>15</td>
<td>30</td>
<td>450</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Ground Cover</td>
<td>Toro 300 Stream Rotor</td>
<td>12</td>
<td>30</td>
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</tr>
<tr>
<td>10</td>
<td>Shrubs</td>
<td>Spray</td>
<td>10</td>
<td>20</td>
<td>200</td>
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<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Shrubs</td>
<td>Spray</td>
<td>15</td>
<td>20</td>
<td>300</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>Ground Cover</td>
<td>Spray</td>
<td>17</td>
<td>20</td>
<td>340</td>
<td>No</td>
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</tr>
</tbody>
</table>

*All flow rates estimated based on manufacturer data for heads.

| Total Weekly Water Usage | 7,640 |

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8810 Detwiler Rd

Zone #: 1

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? Yes

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: Yes. Not measured.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8810 Detwiler Rd

Zone #: 2

-Type of landscape:  Turf
-Supply line leaks?  None
-Heads leaking around pop-up seal?  None
-Heads need replacement?  No
-Heads clogged or spraying improperly?  None
-Zone capacity issues?  No
-Head Layout issues? Yes

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?:  No.

-Low Pressure Issues?:  No.
-Distribution Uniformity Issue?:  Yes.  Not measured.
-Alternate Solution Options?:  N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8810 Detwiler Rd

Zone #: 3

-Type of landscape:  Turf
-Supply line leaks?  None
-Heads leaking around pop-up seal?  Major
-Heads need replacement?  Yes
-Heads clogged or spraying improperly?  None
-Zone capacity issues?  No
-Head Layout issues? Yes

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: Yes. Not measured.
-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8810 Detwiler Rd

Zone #: 4

-Type of landscape: Turf

-Supply line leaks? None

-Heads leaking around pop-up seal? Minor

-Heads need replacement? Yes

-Heads clogged or spraying improperly? None

-Zone capacity issues? No

-Head Layout issues? Yes

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: Yes. Not measured.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8810 Detwiler Rd

Zone #: 5

-Type of landscape: Hedges and Roses

-Supply line leaks? None

-Heads leaking around pop-up seal? Major

-Heads need replacement? Yes

-Heads clogged or spraying improperly? None

-Zone capacity issues? No

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8810 Detwiler Rd

Zone #: 6

-Type of landscape:  Ground Cover
-Supply line leaks?  None
-Heads leaking around pop-up seal?  None
-Heads need replacement?  No
-Heads clogged or spraying improperly?  None
-Zone capacity issues?  No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?:  No.
-Low Pressure Issues?:  No.
-Distribution Uniformity Issue?:  No.

-Alternate Solution Options?:  N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8810 Detwiler Rd

Zone #: 7
- Type of landscape: Ground Cover
- Supply line leaks? None
- Heads leaking around pop-up seal? Minor
- Heads need replacement? Yes
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No.

- Low Pressure Issues?: No.
- Distribution Uniformity Issue?: No.

- Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8810 Detwiler Rd

Zone #: 8

-Type of landscape:  Ground Cover

-Supply line leaks?  None

-Heads leaking around pop-up seal?  None

-Heads need replacement?  No

-Heads clogged or spraying improperly?  None

-Zone capacity issues?  No

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?:  No.

-Low Pressure Issues?:  No.

-Distribution Uniformity Issue?:  No.

-Alternate Solution Options?:  N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8810 Detwiler Rd

Zone #: 9

- Type of landscape:  Ground Cover

- Supply line leaks?  None

- Heads leaking around pop-up seal?  None

- Heads need replacement?  No

- Heads clogged or spraying improperly?  None

- Zone capacity issues?  No

- Head Layout issues?  No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?:  No.

- Low Pressure Issues?:  No.

- Distribution Uniformity Issue?:  No.

- Alternate Solution Options?:  N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8810 Detwiler Rd

Zone #: 10

-Type of landscape: Shrubs
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? Yes

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 8810 Detwiler Rd

Zone #: 11

-Type of landscape: Shrubs
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? Yes

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  8810 Detwiler Rd

Zone #: 12

-Type of landscape:  Ground Cover
-Supply line leaks?  None
-Heads leaking around pop-up seal?  None
-Heads need replacement?  No
-Heads clogged or spraying improperly?  None
-Zone capacity issues?  No
-Head Layout issues?  No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?:  No.
-Low Pressure Issues?:  No.
-Distribution Uniformity Issue?:  No.

-Alternate Solution Options?:  N/A
**Spray Smart Upgrade Summary:**
Property Address:  8810 Detwiler Rd.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td></td>
<td></td>
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<td>5</td>
<td>Yes</td>
<td>Mixed Landscape: Roses and Hedges</td>
<td>14 Spray</td>
<td>5 Spray</td>
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<td>6</td>
<td>No</td>
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<tr>
<td>12</td>
<td>No</td>
<td></td>
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</tr>
</tbody>
</table>
Zone Upgrade Details: (For each upgraded zone)
Property Address: 8810 Detwiler Rd.

Zone #: 5

Type of problem(s) being addressed: Mixed Landscape

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 19
"A" Zone Details:
   - Landscape Type: Hedges: Texas Wax Leaf Privet
   - Type and Number of heads: 14 Spray

"B" Zone Details:
   - Landscape Type: Roses
   - Type and Number of heads: 5 Spray

Additional Changes Required: (list all additional changes including repairs and new equipment)

Adapter fittings.
## Post Upgrade Audit Summary:
Property Address: 8810 Detwiler Rd.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>560</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>560</td>
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<td>No</td>
<td>1050</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Yes</td>
<td>630</td>
<td>14</td>
<td>14</td>
<td>5</td>
<td>35</td>
<td>371</td>
<td>41%</td>
<td>259 gal/wk.</td>
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<tr>
<td>6</td>
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<td>1200</td>
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<td>7</td>
<td>No</td>
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<td>300</td>
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<td></td>
<td>300</td>
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</tr>
<tr>
<td>12</td>
<td>No</td>
<td>340</td>
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</tr>
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<td></td>
<td><strong>Total 7,640</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

|        |             |                      |              |                             |              |                             | **Total 7,381**       | 3.4%           |                |
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 8810 Detwiler Rd.

Zone #: 5

-Supply line leaks fixed? N/A
-Head maintenance issues fixed? No
-Zone capacity issues fixed? N/A
-Head layout issues fixed? N/A

Spray Smart Improvement Details:

"A" Zone Details:
-Approximate percentage of zone area: 75%
-Flow Rate (GPM): 14
-Operating pressure after Spray Smart (if pressure problem): 40 psi
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 14
-Actual Weekly Run Time (Set by operator): 14

"B" Zone Details:
-Approximate percentage of zone area: 25%
-Flow Rate (GPM): 5
-Operating pressure after Spray Smart (if pressure problem): 40 psi
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 35
-Actual Weekly Run Time (Set by operator): 35
**Post-Upgrade Audit Report:**
Property Address: 8810 Detwiler Rd.

System Level Maintenance Issues Repaired?: No
All Zone Maintenance Issues Repaired?: No

Summary Of Changes: Used 19 Spray Smart valves to split shrubs from roses.

Measured Water Savings (As installed and programmed by water manager):

259 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):

259 x 52 weeks x 54% = 7,273 gal/yr.

Confidence that water manager will utilize product properly:

Low.

Opportunity for additional savings with existing installation (e.g. re-program)?

Better programming.

Projected Annual Water Savings (For properly programmed and maintained upgrade):

7,273 gal/yr.

Opportunity for additional upgrades on this site:

Many opportunities with mixed landscape.

Issues/Comments:

Difficult to access heads under hedges.
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:
Property Address:

4147 Huerfano Ave
San Diego, CA 92117

Property Type: Residential

Water Meter Size: 3/4” Supply Static Pressure: 140 psi.

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)
0.10 acre

Number of active irrigation zones: 3

System Level Maintenance Condition:
- Leaks on main supply to irrigation? None
- Leaky control valves? None

Controller Type:
- Brand and model? Rain Bird
- Weather based? No Weather adjustable? No
- Multi-cycle capable? Yes

Landscape Health: Average
## Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Palm Trees, Shrubs</td>
<td>Drip</td>
<td>4</td>
<td>70</td>
<td>280</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Turf</td>
<td>Spray</td>
<td>23</td>
<td>21</td>
<td>483</td>
<td>Dry Spots</td>
<td>Yes</td>
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<tr>
<td>3</td>
<td>Shrubs (Upper, Front)</td>
<td>Drip</td>
<td>1</td>
<td>49</td>
<td>49</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Total Weekly Water Usage 812

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 4147 Huerfano Ave

Zone #: 1

-Type of landscape: Palm Trees, Shrubs
-Supply line leaks? None
-Heads leaking around pop-up seal? N/A
-Heads need replacement? N/A
-Heads clogged or spraying improperly? N/A
-Zone capacity issues? No

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No

-Distribution Uniformity Issue?: N/A

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 4147 Huerfano Ave

Zone #: 2

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? Yes
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes, Sunlight variations

-Low Pressure Issues?: Yes, 10 psi.
-Distribution Uniformity Issue?: Yes, 25%

-Alternate Solution Options?: None
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 4147 Huerfano Ave

Zone #: 3
- Type of landscape: Shrubs
- Supply line leaks? None
- Heads leaking around pop-up seal? N/A
- Heads need replacement? N/A
- Heads clogged or spraying improperly? N/A
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No.

- Low Pressure Issues?: No
- Distribution Uniformity Issue?: N/A

- Alternate Solution Options?: N/A
# Spray Smart Upgrade Summary:
**Property Address:** 4147 Huerfano Ave

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>Mixed Hydrozone, low pressure, poor DU.</td>
<td>3 Spray</td>
<td>5 Spray</td>
<td>5 Spray heads did not receive Spray Smart valves = &quot;C&quot; zone.</td>
</tr>
<tr>
<td>3</td>
<td>No</td>
<td></td>
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</tr>
</tbody>
</table>
Zone Upgrade Details: (For each upgraded zone)
Property Address: 4147 Huerfano Ave

Zone #: 2

Type of problem(s) being addressed: Low Pressure, Mixed Hydrozone, Poor DU

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 8

"A" Zone Details:
  - Landscape Type: Turf
  - Type and Number of heads: 3 Spray Heads

"B" Zone Details:
  - Landscape Type: Turf
  - Type and Number of heads: 5 Spray Heads

"C" Zone Details (Runs every cycle):
  - Landscape Type: Turf
  - Type and Number of heads: 5 Spray Heads

Additional Changes Required: (list all additional changes including repairs and new equipment)
# Post Upgrade Audit Summary:
Property Address: 4147 Huerfano Ave

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
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<td>280</td>
<td>537</td>
<td>19%</td>
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<td>483</td>
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<td>21</td>
<td>208</td>
<td>56%</td>
<td>275 gal/week</td>
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<td>3</td>
<td>No</td>
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*Note: "C" zone flow rate and run time is shown in "A" and "B" zones since it runs every time.
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 4147 Huerfano Ave

Zone #: 2

-Supply line leaks fixed? N/A
-Head maintenance issues fixed? N/A
-Zone capacity issues fixed? Yes
-Head layout issues fixed? N/A

Spray Smart Improvement Details:

"A" Zone Details:
-Approximate percentage of zone area: 20%
-Flow Rate (GPM): 4
-Operating pressure after Spray Smart (if pressure problem): 49 psi
-DU (if DU was addressed) 65%
-Suggested Weekly Run Time (100% Eto): 10
-Actual Weekly Run Time (Set by operator): 10

"B" Zone Details:
-Approximate percentage of zone area: 40%
-Flow Rate (GPM): 8
-Operating pressure after Spray Smart (if pressure problem): 30 psi
-DU (if DU was addressed) 58%
-Suggested Weekly Run Time (100% Eto): 21
-Actual Weekly Run Time (Set by operator): 21

"C" Zone Details:
-Approximate percentage of zone area: 40%
-Flow Rate (GPM): N/A
-Operating pressure after Spray Smart (if pressure problem): 30 psi
-DU (if DU was addressed) 63%
-Suggested Weekly Run Time (100% Eto): N/A
-Actual Weekly Run Time (Set by operator): N/A
**Post-Upgrade Audit Report:**
Property Address: 4147 Huerfano Ave

System Level Maintenance Issues Repaired?: N/A
All Zone Maintenance Issues Repaired?: N/A

Summary Of Changes: Used 8 Spray Smart valves to split turf area into three zones. Two distinct zones and one zone that runs every time. Addresses sun and shade as well as low pressure.

Measured Water Savings (As installed and programmed by water manager):

275 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):

275 x 52 weeks x 54% = 7,722 gal/yr.

Confidence that water manager will utilize product properly:

High.

Opportunity for additional savings with existing installation (e.g. re-program)?

Improved spray heads. Re-programmed controller.

Projected Annual Water Savings (For properly programmed and maintained upgrade):

120% = 9,266 gal/yr.

Opportunity for additional upgrades on this site:

Improved spray heads throughout. Check valves to prevent draining.

Issues/Comments:
Pre-Upgrade Audit Results:
Property Address: 1365 Corte de las Piedras, El Cahon, Ca 92019

Property Type: (Residential)
Water Meter Size: 3/4” Supply Static Pressure: 80 psi

Approximate Irrigated Area: 3/4 ac

Number of active irrigation zones: 9

System Level Maintenance Condition: Good
   -Leaks on main supply to irrigation? (None)
   -Leaky control valves? (None)
   -No leaky heads noted. One possible pipe break noted in area under const.
   - High pressure noted on some spray circuits front yard (50 psi)

Controller Type:
   -Irritrol Rain Dial
   -Weather based? (No) Weather adjustable? (Manual)
   -Multi-cycle capable? (Yes)

Landscape Health:

Good
**Pre-Upgrade Audit Summary:**

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shrubs-GC/Slope</td>
<td>Rain Bird Impacts 2045-PJ maxi (resid)</td>
<td>-</td>
<td>16 Manual days on</td>
<td>unknown</td>
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<td>No</td>
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<td>2</td>
<td>Shrubs-GC/Slope</td>
<td>Rain Bird Impacts 2045-PJ maxi (resid)</td>
<td>-</td>
<td>20 days on</td>
<td>unknown</td>
<td>no</td>
<td>No</td>
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<tr>
<td>3</td>
<td>Rear turf / Shrubs mixed (proposed)</td>
<td>Spray /Hunter PGJ</td>
<td>19*</td>
<td>30 days on</td>
<td>570*</td>
<td>New planting proposed</td>
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<tr>
<td>4</td>
<td>Shrubs Planter</td>
<td>MP1000</td>
<td>-</td>
<td>30 days on</td>
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<td>No</td>
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<tr>
<td>5</td>
<td>Lawn</td>
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<td>-</td>
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<td>Shrubs Planter</td>
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<td>-</td>
<td>20 days on</td>
<td>No</td>
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<td>7</td>
<td>Shrubs Planter</td>
<td>MP1000</td>
<td>-</td>
<td>20 days on</td>
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<td>Shrubs toe of slope</td>
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</tbody>
</table>

**Total Weekly Water Usage**

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)

*Flow is for ½ circuit of current layout which includes PGJ/Spray mix for lawn area to remain.*
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 1365 Corte de las Piedras

Zone #: 3

-Type of landscape (turf/xeriscape shrub mix)

-Supply line leaks? (None) Possible leaky lateral line.
-Heads leaking around pop-up seal? (None)
-Heads need replacement? (Yes) – Replace PGJ’s with pop-up spray bodies and MP1000 nozzles for turf.

-Heads clogged or spraying improperly? (None)
-Zone capacity issues? (Not if PGJ are renozzled to 1.5gpm) (None)

-Head Layout issues? (Additional heads will be required to provide head to head coverage for both turf and shrub areas) (Major)

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: (Yes) (Lawn/Shrub mix). Lawn would irrigate with MP1000’s, shrub zone will operate with PGJ’s. While frequency of irrigation due to turf may be a problem for some plant types, the two areas should be able to be timed adequately.

-Low Pressure Issues?: (No) Flow should be good with 1.5 nozzles used on pgj rotors.

-Distribution Uniformity Issue?: (Yes) Half of heads capped during construction. Additional heads required to divide beds and provide head to head coverage. This should result in good uniformity.

-Alternate Solution Options?: (Example: low pressure could be fixed by switching to low flow heads) None.
Spray Smart Upgrade Summary:
Property Address: 1365 Corte de las Piedras

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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<td>Yes</td>
<td>Mixed Zone</td>
<td>10 for MP1000</td>
<td>7 for PGJ 1.5</td>
<td>Added heads required.</td>
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</tbody>
</table>
Zone Upgrade Details: (For each upgraded zone)
Property Address: 1365 Corte de las Piedras

Zone #: 3

Type of problem(s) being addressed: Mixed zone (turf/xeriscape shrub mix)

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?:
"A" Zone Details:
   - Landscape Type: Low Water Xeriscape
      - Type and Number of heads: 7 Hunter PGJ/Orbit Rotors

"B" Zone Details:
   - Landscape Type: Lawn
      - Type and Number of heads: 10 Hunter MP-Rotators

Additional Changes Required:

1. Repaired breaks

2. Installed new heads, capped heads and relocated heads to provide satisfactory head to head coverage.

3. Installed a fixed psi pressure regulator.

### Post Upgrade Audit Summary:

Property Address: 1365 Corte de las Piedras

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
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<tr>
<td>3</td>
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<td>105</td>
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</tbody>
</table>
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 1365 Corte de las Piedras

Zone #: 3

-Supply line leaks fixed? (N.A.)
-Head maintenance issues fixed? (Yes)
-Zone capacity issues fixed? (Yes.)
-Head layout issues fixed? (Yes)

Spray Smart Improvement Details:

"A" Zone Details:
  -Approximate percentage of zone area: 75
  -Flow Rate (GPM): 9.72
  -Operating pressure after Spray Smart (Pressure Reducer added to lateral): 40
    -DU (75%)
  -Suggested Weekly Run Time (100% Eto): 60
  -Actual Weekly Run Time (Set by operator): 60

"B" Zone Details:
  -Approximate percentage of zone area: 25
  -Flow Rate (GPM):
  -Operating pressure after Spray Smart (Pressure Reducer added to lateral): 35
    -DU (75%)
  -Suggested Weekly Run Time (100% Eto): 105
  -Actual Weekly Run Time (Set by operator): 105
**Post-Upgrade Audit Report:**
Property Address: 1365 Corte de las Piedras

System Level Maintenance Issues Repaired?: (Yes)
All Zone Maintenance Issues Repaired?: (Yes)

Summary Of Changes: Heads capped, several heads relocated, several heads added to each sub-circuit. Pressure reducer was required on lateral right at valve to reduce high water pressure of 80 psi in laterals.

Measured Water Savings (As installed and programmed by water manager): 44% water use reduction for weekly applications. Improved uniformity of 100% increased water distribution efficiency.

Projected Annual Water Savings (As installed and programmed by water manager): 21395 gallons (28.6 units)

Confidence that water manager will utilize product properly: High

Opportunity for additional savings with existing installation? Yes, additional circuits could possible benefit including entry lawn along drive, and slopes.

Projected Annual Water Savings (For properly programmed and maintained upgrade): Same as above.

Opportunity for additional upgrades on this site:

Issues/Comments: Homeowner is very attentive and involved which translates into a high probability of success and water savings.
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:
Property Address: 750 Chaparral Lane, Escondido, CA 92025

Property Type: (Residential)

Water Meter Size: Pump Static Pressure: 170 psi static

Approximate Irrigated Area: 43,560 sf

Number of active irrigation zones: 30

System Level Maintenance Condition: Moderate
- Leaks on main supply to irrigation? (None)
- Leaky control valves? (None)
  Poor coverage, mixed circuits of turf/shrub, rotors/sprays/drip, flow issues
  with some large circuits.

Controller Type:
- Brand and model? Orbit Watermaster
- Weather based? (No) Weather adjustable? (No)
- Multi-cycle capable? (Yes)

Landscape Health: Moderate – Mature shrubs and ground covers, roses and extensive
  perennial beds, areas of unplanted soil.
## Pre-Upgrade Audit Summary: 750 Chaparral Lane, Escondido, CA 92025

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
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<tbody>
<tr>
<td>A3</td>
<td>Shrubs mixed</td>
<td>Drip</td>
<td>40</td>
<td>N</td>
<td>1200</td>
<td>Spotty coverage</td>
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<td>Shrubs mixed</td>
<td>Drip</td>
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<td>N</td>
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</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes/No</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes/No</td>
<td></td>
</tr>
</tbody>
</table>

For Areas Calculated: Total Weekly Water Usage 3640 gal.

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)

Property Address: **750 Chaparral Lane, Escondido, CA 92025**
Zone #: C4/C6/B10/B11

- Type of landscape: Turf/Roses, Turf/Shrubs/Roses, Slope GC, Slope GC
- Supply line leaks? (None)
- Heads leaking around pop-up seal? (None) Heads need replacement: Some. Would benefit from rotating nozzles and Controlled flow drip emitters.
- Heads clogged or spraying improperly? (Minor)
- Zone capacity issues? Slope systems (B10/11) have too many heads operating at same time. (Major)

Spray Smart Improvement Opportunities:
- Yes B10/11 C4/6
- Mixed Hydrozones?: (Yes) Water needs are different for turf areas vs roses. Also drip used in smaller bed.
- High Pressure Issues: (No) Pressure measured at heads 5 psi operation pressure on B10/11.
- Distribution Uniformity Issue?: (Yes) But not necessarily a problem due to mature plants.
- Alternate Solution Options?: Rotating nozzles would be ideal for this system and may help with flow, drip needs to be changed from unregulated emitters to controlled flow emitters.
**Spray Smart Upgrade Summary:**
Property Address: **750 Chaparral Lane, Escondido, CA 92025**

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4</td>
<td>Yes</td>
<td>Mixed beds</td>
<td>4</td>
<td>4</td>
<td>Rotors converted to drip line/rotating nozzles.</td>
</tr>
</tbody>
</table>

**Zone Upgrade Details: (For each upgraded zone)**
Property Address: **750 Chaparral Lane, Escondido, CA 92025**
Zone #: C4

Type of problem(s) being addressed: Mixed Zone

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 4

"A" Zone Details:
- Landscape Type: Roses and Perennials
  - Type and Number of heads: 4 port loop of ¼” tubing (36 total)
    \[4 \times 0.8 = 3.2 \text{gph} \times 36 = 115.2 / 60 = 1.9 \text{ gpm}\]

"B" Zone Details:
- Landscape Type: Turf
  - Type and Number of heads: Hunter MP2000 rotating sprinklers (4)
    \[4 \times 0.74 = 2.96 \text{ gpm}\]

Additional Changes Required: Adjust Runtimes
Post Upgrade Audit Summary:
Property Address: **750 Chaparral Lane, Escondido, CA 92025**

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week</th>
<th>Percent Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4</td>
<td>Yes</td>
<td>240</td>
<td>2.0</td>
<td>40</td>
<td>3.0</td>
<td>40</td>
<td>200</td>
<td>17%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: **750 Chaparral Lane, Escondido, CA 92025**
Zone #: 1

- Supply line leaks fixed? (N.A.)
- Head maintenance issues fixed? (Yes)
- Zone capacity issues fixed? (Yes)
- Head layout issues fixed? (No)

Spray Smart Improvement Details:

"A" Zone Details:
- Approximate percentage of zone area: 60
- Flow Rate (GPM): 1.9
- Operating pressure after Spray Smart (30 psi): NA
- Suggested Weekly Run Time (100% Eto): 150 minutes
- Actual Weekly Run Time (Set by operator): 120 Minutes

"B" Zone Details:
- Approximate percentage of zone area: 40
- Flow Rate (GPM): 2.9
- Operating pressure after Spray Smart (30 psi): NA
- Suggested Weekly Run Time (100% Eto): 120 minutes
- Actual Weekly Run Time (Set by operator): 120 minutes
**Post-Upgrade Audit Report:**

Property Address:  **750 Chaparral Lane, Escondido, CA 92025**

System Level Maintenance Issues Repaired?: (Yes)
All Zone Maintenance Issues Repaired?: (Yes)

Summary Of Changes: Changed rotors to drip with controlled flow on roses, changed rotors to rotating sprinklers on lawn and increased du.

Measured Water Savings : 17%

Projected Annual Water Savings: Well water results in no cost savings for water, but some minor savings in power used. Water used now can reflect seasonal conditions for specific plant types.

Confidence that water manager will utilize product properly: High

Opportunity for additional savings with existing installation: Unclear.

Opportunity for additional upgrades on this site: Considerable. All stations noted in listing above could benefit especially zones A10/11.

Issues/Comments:
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:
Property Address: 11039 Turret Drive, San Diego, CA 92131

Property Type: (Residential)
Water Meter Size: ¾” Supply Static Pressure: 170 psi static
Approximate Irrigated Area: 5000 sf
Number of active irrigation zones: 2
System Level Maintenance Condition: Moderate
  - Leaks on main supply to irrigation? (None)
  - Leaky control valves? (None)
    Poor coverage, missing heads, lots of runoff.
    Pressure very high 80 psi at sprinkler tested.
Controller Type:
  - Brand and model? Orbit Watermaster
  - Weather based? (No) Weather adjustable? (No)
  - Multi-cycle capable? (Yes)
Landscape Health: Moderate – Mature shrubs and ground covers, roses and some color, areas of unplanted soil.
Pre-Upgrade Audit Summary: 11039 Turret Drive, San Diego, CA 92131

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shrubs/roses</td>
<td>Toro sprays/Orbit Drip</td>
<td>16</td>
<td>15 min.</td>
<td>240</td>
<td>Spotty Coverage</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Shrubs/roses</td>
<td>Toro sprays/Flood Bub</td>
<td>14</td>
<td>30 min.</td>
<td>420</td>
<td>Spotty coverage</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3
4
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16
17
18
19
20

Total Weekly Water Usage 660 gal.

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11039 Turret Drive, San Diego, CA 92131

Zone #: 1

-Type of landscape (Mature shrub, ground cover mix) some ornamentals such as roses.

-Supply line leaks? (None)
-Heads leaking around pop-up seal? (None) Heads need replacement: Some. Would benefit from rotating nozzles

-Heads clogged or spraying improperly? (Minor)
-Zone capacity issues? Excessively high pressure is destroying head to head coverage?) (Major)

-Head Layout issues? (heads are obviously not properly placed to give good DU) (Major) Renozzling should remedy this. Also, mature plantings not as problematic since roots are well out into all areas and are deep.

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: (Yes) Water needs are different for mature shrub areas vs roses. Also drip used in smaller bed.

-High Pressure Issues: (Yes) Pressure measured as 170 static in main. Pressure measured at heads exceeding 80 psi operation pressure. Misting off, broken heads and laterals everywhere.

-Distribution Uniformity Issue?: (Yes) But not necessarily a problem due to mature plants.

-Alternate Solution Options?: Pressure regulation is necessity. Then replacement of a few nozzles. Strip sprays required for narrow areas. Rotating nozzles would be ideal for this system.
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11039 Turret Drive, San Diego, CA 92131

Zone #: 2

-Type of landscape (Mature shrub, ground cover mix) some ornamentals such as roses.

-Supply line leaks? (None)
-Heads leaking around pop-up seal? (None) Heads need replacement: Some. Would benefit from rotating nozzles

-Heads clogged or spraying improperly? (Minor)
-Zone capacity issues? Excessively high pressure is destroying head to head coverage?) (Major)

-Head Layout issues? (heads are obviously not properly placed to give good DU) (Major) Renozzling should remedy this. Also, mature plantings not as problematic since roots are well out into all areas and are deep.

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: (Yes) Water needs are different for mature shrub areas vs roses. Also flood bubblers used in one bed.

-High Pressure Issues: (Yes) Pressure measured as 170 static in main. Pressure measured at heads exceeding 80 psi operation pressure. Misting off, broken heads and laterals everywhere.

-Distribution Uniformity Issue?: (Yes) But not necessarily a problem due to mature plants.

-Alternate Solution Options?: Pressure regulation is necessity. Then replacement of a few nozzles. Strip sprays required for narrow areas. Rotating nozzles would be ideal for this system.

Also recommended changing flood bubblers to stream bubblers to control flow.
**Spray Smart Upgrade Summary:**  
*Property Address: 11039 Turret Drive, San Diego, CA 92131*

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Mixed beds</td>
<td>4</td>
<td>10</td>
<td>New controller Pressure Reducer</td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>Mixed beds</td>
<td>8</td>
<td>12</td>
<td>New controller Pressure Reducer</td>
</tr>
</tbody>
</table>

**Zone Upgrade Details: (For each upgraded zone)**  
*Property Address: 11039 Turret Drive, San Diego, CA 92131*

Zone #: 1

Type of problem(s) being addressed: Mixed Zone

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 14

"A" Zone Details:
- Landscape Type: Mixed color
- Type and Number of heads: Multi-port drip emitter (4)

"B" Zone Details:
- Landscape Type: Mature Shrubs
- Type and Number of heads: Spray heads (10)

Additional Changes Required: (list all additional changes including repairs and new equipment)

Changed controller, added adjustable pressure regulators to laterals, tuned up and replaced nozzles as required.
Zone Upgrade Details: (For each upgraded zone)

Property Address: 11039 Turret Drive, San Diego, CA 92131

Zone #: 2

Type of problem(s) being addressed: Mixed Zone

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?:
"A" Zone Details:
  -Landscape Type: Roses and Ornamentals
    -Type and Number of heads: 8 spray heads

"B" Zone Details:
  -Landscape Type: Mature shrubs
    -Type and Number of heads: 10 spray heads and 2 bubblers

Additional Changes Required: (list all additional changes including repairs and new equipment)

Changed controller, added adjustable pressure regulators to laterals, tuned up and replaced nozzles as required.
Post Upgrade Audit Summary:
Property Address: 11039 Turret Drive, San Diego, CA 92131

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>240</td>
<td>4.1</td>
<td>30</td>
<td>10.3</td>
<td>15</td>
<td>277.5</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>420</td>
<td>16.6</td>
<td>15</td>
<td>13.5</td>
<td>30</td>
<td>654</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td></td>
<td>Total</td>
<td>1054</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- *Increases in efficiency, but increased run times for high water requirement sub-zones resulted in less total water saved based solely on gpw basis.

Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 11039 Turret Drive, San Diego, CA 92131
Zone #: 1

- Supply line leaks fixed? (N.A.)
- Head maintenance issues fixed? (Yes)
- Zone capacity issues fixed? (Yes)
- Head layout issues fixed? (No)

Spray Smart Improvement Details:

"A" Zone Details:
- Approximate percentage of zone area: 10
- Flow Rate (GPM): 4.1
- Operating pressure after Spray Smart (30 psi):
- DU (if DU was addressed) NA
- Suggested Weekly Run Time (100% Eto): 30 minutes
- Actual Weekly Run Time (Set by operator): 30 Minutes

"B" Zone Details:
- Approximate percentage of zone area: 90
- Flow Rate (GPM): 10.3
- Operating pressure after Spray Smart (30 psi):
- DU (if DU was addressed) NA
- Suggested Weekly Run Time (100% Eto): 15 minutes
- Actual Weekly Run Time (Set by operator): 15 minutes
Zone #: 2

-Supply line leaks fixed? (N.A.)
-Head maintenance issues fixed? (Yes)
-Zone capacity issues fixed? (Yes)
-Head layout issues fixed? (No)

Spray Smart Improvement Details:

"A" Zone Details:
-Approximate percentage of zone area: 40
-Flow Rate (GPM): 13.6
-Operating pressure after Spray Smart (30 psi):
-DU (if DU was addressed) NA
-Suggested Weekly Run Time (100% Eto): 30 minutes
-Actual Weekly Run Time (Set by operator): 30 Minutes

"B" Zone Details:
-Approximate percentage of zone area: 60
-Flow Rate (GPM): 16.6
-Operating pressure after Spray Smart (30 psi):
-DU (if DU was addressed) NA
-Suggested Weekly Run Time (100% Eto): 15 minutes
-Actual Weekly Run Time (Set by operator): 15 minutes
**Post-Upgrade Audit Report:**

Property Address:  **11039 Turret Drive, San Diego, CA 92131**

System Level Maintenance Issues Repaired?: (Yes)
All Zone Maintenance Issues Repaired?: (No)  Still need to replace flood bubblers on
zone 2 which are hemorrhaging water.

Summary Of Changes:  Added controller that provided scheduling variation for zones,
added pressure regulation to drop operating pressure to proper range for nozzles.

Measured Water Savings :  None

Projected Annual Water Savings:  Water savings should occur with fewer system
leaks and more careful nozzle choices.  Also, additional water is being applied only to
beds that require it (increased efficiency)

Confidence that water manager will utilize product properly: High

Opportunity for additional savings with existing installation: Unclear.

Projected Annual Water Savings: Unclear Increases in efficiency, but additional water
to high water requirement plants.

Opportunity for additional upgrades on this site:

Issues/Comments:  Unclear on water use increase after installation.  Possible that
renozzling and new heads added flows.  Bubblers on zone 2 are adjustable and may
have been more open on post test than on initial tests.  Also, increased run times (2x)
for areas that extra water was desired. Increase efficiency is benefit.
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:

Property Address:
11405 Poblado Rd.
San Diego, CA 92127

Property Type: Residential

Water Meter Size: 3/4"    Supply Static Pressure: N/A

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)
3000 sq. ft.

Number of active irrigation zones: 5

System Level Maintenance Condition:
    -Leaks on main supply to irrigation? None
    -Leaky control valves? None

Controller Type:
    -Weather based? N/A  Weather adjustable? N/A
    -Multi-cycle capable? N/A

Landscape Health: Good
## Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turf /Hedge/Roses</td>
<td>Spray</td>
<td>28</td>
<td>20</td>
<td>560</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Turf (Front, Outer)</td>
<td>Spray</td>
<td>20</td>
<td>15</td>
<td>300</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Turf (Side)</td>
<td>Spray</td>
<td>9</td>
<td>12</td>
<td>108</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Turf (Rear, Inner)</td>
<td>Spray</td>
<td>17</td>
<td>15</td>
<td>255</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Turf (Rear, Outer)</td>
<td>Spray</td>
<td>11</td>
<td>15</td>
<td>165</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

|                                    | Total Weekly Water Usage | 1,388 |

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11405 Poblado Rd.

Zone #: 1

-Type of landscape: Turf, Shrubs, Roses
-Supply line leaks? None
-Heads leaking around pop-up seal? Minor
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: No.

-Alternate Solution Options?: None.
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  11405 Poblado Rd.

Zone #: 2

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? Minor
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11405 Poblado Rd.

Zone #: 3

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? Minor
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11405 Poblado Rd.

Zone #: 4

- Type of landscape: Turf
- Supply line leaks? None
- Heads leaking around pop-up seal? Minor
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No.
- Low Pressure Issues?: No.
- Distribution Uniformity Issue?: No.
- Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 11405 Poblado Rd.

Zone #: 5

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? Minor
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
### Spray Smart Upgrade Summary:

Property Address: 11405 Poblado Rd.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Mixed Landscape: Turf, hedges, roses</td>
<td>11 Spray</td>
<td>1 Drip cluster and individual drip lines, emitters</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>4</td>
<td>No</td>
<td></td>
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<td>5</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Zone Upgrade Details: (For each upgraded zone)
Property Address: 11405 Poblado Rd.

Zone #: 1

Type of problem(s) being addressed: Mixed Landscape

Upgrade Completed By: Homeowner

Total number of Spray Smart Valves used on this zone?: 12

"A" Zone Details:
- Landscape Type: Hedges: Turf

- Type and Number of heads: 11 Spray

"B" Zone Details:
- Landscape Type: Hedges and Roses

- Type and Number of heads: 1 Drip cluster and individual emitters

Additional Changes Required: (list all additional changes including repairs and new equipment)
## Post Upgrade Audit Summary:
Property Address: 11405 Poblado Rd.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>560</td>
<td>23</td>
<td>15</td>
<td>2.2</td>
<td>45</td>
<td>444</td>
<td>21%</td>
<td>116 gal/wk.</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>300</td>
<td></td>
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<tr>
<td>3</td>
<td>No</td>
<td>108</td>
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<td>255</td>
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<tr>
<td>5</td>
<td>Yes</td>
<td>165</td>
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<td>1,388</td>
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</table>
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 11405 Poblado Rd.

Zone #: 1

-Supply line leaks fixed? N/A
-Head maintenance issues fixed? No
-Zone capacity issues fixed? N/A
-Head layout issues fixed? N/A

Spray Smart Improvement Details:

"A" Zone Details:
-Approximate percentage of zone area: 85%
-Flow Rate (GPM): 23
-Operating pressure after Spray Smart (if pressure problem): N/A
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 15
-Actual Weekly Run Time (Set by operator): 15

"B" Zone Details:
-Approximate percentage of zone area: 15%
-Flow Rate (GPM): 2.2
-Operating pressure after Spray Smart (if pressure problem): N/A
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 45
-Actual Weekly Run Time (Set by operator): 45
**Post-Upgrade Audit Report:**  
Property Address: 11405 Poblado Rd.

System Level Maintenance Issues Repaired?: N/A  
All Zone Maintenance Issues Repaired?: N/A

Summary Of Changes: Used 12 Spray Smart valves to split shrubs and roses from turf.

Measured Water Savings (As installed and programmed by water manager):

116 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):

116 x 52 weeks x 54% = 3,257 gal/yr.

Confidence that water manager will utilize product properly:

High.

Opportunity for additional savings with existing installation (e.g. re-program)?

Improved spray heads.

Projected Annual Water Savings (For properly programmed and maintained upgrade):

3,257 gal/yr.

Opportunity for additional upgrades on this site:

Improved spray heads throughout.

Issues/Comments:
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the *Spray Smart*™ Valve

**Pre-Upgrade Audit Results:**

Property Address:

1080 Linda Vista Dr.
San Marcos, CA 92078

Property Type: Commercial

Water Meter Size: 1"
Supply Static Pressure: Not available

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

0.25 acre

Number of active irrigation zones: 5

System Level Maintenance Condition:
- Leaks on main supply to irrigation? None
- Leaky control valves? None

Controller Type:
- Brand and model? Hunter Pro-C
- Weather based? Yes
  Weather adjustable? Yes
- Multi-cycle capable? Yes

Landscape Health: Excellent
## Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turf</td>
<td>MP Rotator</td>
<td>11</td>
<td>108</td>
<td>1188</td>
<td>No</td>
<td>No</td>
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<tr>
<td>2</td>
<td>Turf and Shrub</td>
<td>MP Rotator</td>
<td>9</td>
<td>108</td>
<td>972</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>3</td>
<td>Shrub</td>
<td>MP Rotator</td>
<td>9</td>
<td>108</td>
<td>972</td>
<td>No</td>
<td>No</td>
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<tr>
<td>4</td>
<td>Turf and Shrub</td>
<td>MP Rotator and Spray</td>
<td>13</td>
<td>108</td>
<td>1404</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Shrub</td>
<td>MP Rotator</td>
<td>19</td>
<td>108</td>
<td>2052</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

|               |                   |                       |     |                             |                    |                                        |              |
|               |                   |                       |     |                             |                    |                                        |              |
|               |                   |                       |     |                             |                    |                                        |              |
|               |                   |                       |     |                             |                    |                                        |              |
|               |                   |                       |     |                             |                    |                                        |              |
|               |                   |                       |     |                             |                    |                                        |              |

**Total Weekly Water Usage**: 6,588

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 1080 Linda Vista Dr.

Zone #: 1

-Type of landscape: Turf

-Supply line leaks? None

-Heads leaking around pop-up seal? None

-Heads need replacement? No

-Heads clogged or spraying improperly? None

-Zone capacity issues? No

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)

Property Address: 1080 Linda Vista Dr.

Zone #: 2

-Type of landscape: Turf and Shrub

-Supply line leaks? None

-Heads leaking around pop-up seal? None

-Heads need replacement? No

-Heads clogged or spraying improperly? None

-Zone capacity issues? No

-Head Layout issues? No

Spray Smart Improvement Opportunities:

-Yes

-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: None
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 1080 Linda Vista Dr.

Zone #: 3

-Type of landscape: Shrub
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 1080 Linda Vista Dr.

Zone #: 4

-Type of landscape: Turf and Shrub
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: None
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 1080 Linda Vista Dr.

Zone #: 5

-Type of landscape: Shrub

-Supply line leaks? None

-Heads leaking around pop-up seal? None

-Heads need replacement? No

-Heads clogged or spraying improperly? None

-Zone capacity issues? No

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Spray Smart Upgrade Summary:
Property Address: 1080 Linda Vista Dr.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
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<td>3</td>
<td>No</td>
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<td>4</td>
<td>Yes</td>
<td>Mixed Landscape</td>
<td>14 Spray</td>
<td>7 MP Rotator</td>
<td>Pressure regulator. Longer swing joints.</td>
</tr>
<tr>
<td>5</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Zone Upgrade Details: (For each upgraded zone)**

Property Address: 1080 Linda Vista Dr.

Zone #: 4

Type of problem(s) being addressed: Mixed Landscape

Upgrade Completed By: Blue Watchdog Systems

Total number of Spray Smart Valves used on this zone?: 21

"A" Zone Details:
   - Landscape Type: Shrubs
     - Type and Number of heads: 14 Shrub Spray

"B" Zone Details:
   - Landscape Type: Turf
     - Type and Number of heads: 7 MP Rotator

Additional Changes Required: (list all additional changes including repairs and new equipment)
### Post Upgrade Audit Summary:
Property Address: 1080 Linda Vista Dr.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>1188</td>
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<td></td>
<td>1188</td>
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<tr>
<td>2</td>
<td>No</td>
<td>972</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>No</td>
<td>1404</td>
<td>10</td>
<td>60</td>
<td>3</td>
<td>108</td>
<td>924</td>
<td>34%</td>
<td>480 gal/wk</td>
</tr>
<tr>
<td>5</td>
<td>No</td>
<td>2052</td>
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<td></td>
<td></td>
<td></td>
<td>2052</td>
<td></td>
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</tr>
</tbody>
</table>

| Total  | 6,588       |                     |              |                             |              |                             |                       |                 |       |

| Total  | 6,108       | 7.3%                |              |                             |              |                             |                       |                 |       |
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 1080 Linda Vista Dr.

Zone #: 4

-Supply line leaks fixed? N/A
-Head maintenance issues fixed? N/A
-Zone capacity issues fixed? N/A
-Head layout issues fixed? N/A

Spray Smart Improvement Details:

"A" Zone Details:
-Approximate percentage of zone area: 70%
-Flow Rate (GPM): 10
-Operating pressure after Spray Smart (if pressure problem): 38 psi
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 60
-Actual Weekly Run Time (Set by operator): 60

"B" Zone Details:
-Approximate percentage of zone area: 30%
-Flow Rate (GPM): 3
-Operating pressure after Spray Smart (if pressure problem): 30 psi
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 108
-Actual Weekly Run Time (Set by operator): 108
**Post-Upgrade Audit Report:**
Property Address: 1080 Linda Vista Dr.

System Level Maintenance Issues Repaired?: N/A
All Zone Maintenance Issues Repaired?: N/A

Summary Of Changes: Used 21 Spray Smart valves to split turf from shrubs.

Measured Water Savings (As installed and programmed by water manager):
480 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):
480 x 52 weeks x 54% = 13,478 gal/yr.

Confidence that water manager will utilize product properly:
High.

Opportunity for additional savings with existing installation (e.g. re-program)?
Weather Based irrigation controller.

Projected Annual Water Savings (For properly programmed and maintained upgrade):
13,478 gal/yr.

Opportunity for additional upgrades on this site:
Additional Spray Smart zone (2)

Issues/Comments:
Valves initially installed with extreme overpressure. Most valves survived but would not operate properly. Pressure was reduced with regulator.
Pre-Upgrade Audit Results:

Property Address:
132 N. Las Posas Rd.
San Marcos, CA 92078

Property Type: Commercial


Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)
4000 sq ft.

Number of active irrigation zones: 6

System Level Maintenance Condition:
- Leaks on main supply to irrigation?  None
- Leaky control valves?  None

Controller Type:
- Brand and model? Hunter Pro-C
- Weather based?  Yes  Weather adjustable?  Yes
- Multi-cycle capable?  Yes

Landscape Health: Excellent
### Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
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<tbody>
<tr>
<td>1</td>
<td>Shrub</td>
<td>Spray</td>
<td>4</td>
<td>60</td>
<td>240</td>
<td>No</td>
<td>No</td>
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<td>Shrub</td>
<td>Drip</td>
<td>2</td>
<td>60</td>
<td>120</td>
<td>No</td>
<td>No</td>
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<td>3</td>
<td>Turf</td>
<td>MP Rotator</td>
<td>3</td>
<td>108</td>
<td>324</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Turf</td>
<td>MP Rotator</td>
<td>9</td>
<td>108</td>
<td>972</td>
<td>No</td>
<td>No</td>
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<tr>
<td>5</td>
<td>Turf</td>
<td>MP Rotator</td>
<td>7</td>
<td>108</td>
<td>756</td>
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<td>No</td>
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<tr>
<td>6</td>
<td>Turf and Shrub</td>
<td>MP Rotator</td>
<td>16</td>
<td>108</td>
<td>1728</td>
<td>Yes</td>
<td>Yes</td>
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</table>

**Total Weekly Water Usage** 4,140

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 132 N. Las Posas Rd.

Zone #: 1

-Type of landscape: Shrub
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
**Pre-Upgrade Audit Details: (for all active zones)**

Property Address: 132 N. Las Posas Rd.

Zone #: 2

- Type of landscape: Shrub
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No.

- Low Pressure Issues?: No.
- Distribution Uniformity Issue?: No.

- Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 132 N. Las Posas Rd.

Zone #: 3

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 132 N. Las Posas Rd.

Zone #: 4

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  132 N. Las Posas Rd.

Zone #:  5

-Type of landscape:  Turf

-Supply line leaks?  None

-Heads leaking around pop-up seal?  None

-Heads need replacement?  No

-Heads clogged or spraying improperly?  None

-Zone capacity issues?  No

-Head Layout issues?  No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 132 N. Las Posas Rd.

Zone #: 6

-Type of landscape: Turf and Shrubs
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: None
**Spray Smart Upgrade Summary:**
Property Address: 132 N. Las Posas Rd.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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</tr>
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<td>6</td>
<td>Yes</td>
<td>Mixed Landscape</td>
<td>6 MP Rotator</td>
<td>6 MP Rotator</td>
<td></td>
</tr>
</tbody>
</table>
**Zone Upgrade Details: (For each upgraded zone)**

Property Address: 132 N. Las Posas Rd.

Zone #: 6

Type of problem(s) being addressed: Mixed Landscape

Upgrade Completed By: Blue Watchdog Systems

Total number of Spray Smart Valves used on this zone?: 12

"A" Zone Details:
- Landscape Type: Shrub
- Type and Number of heads: 6 MP Rotator Spray

"B" Zone Details:
- Landscape Type: Turf
- Type and Number of heads: 6 MP Rotator Spray

Additional Changes Required: (list all additional changes including repairs and new equipment)
## Post Upgrade Audit Summary:
Property Address: 132 N. Las Posas Rd.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
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<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>240</td>
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<td>No</td>
<td>120</td>
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<td>1728</td>
<td>8</td>
<td>60</td>
<td>8</td>
<td>108</td>
<td>1344</td>
<td>23%</td>
<td>384 gal/wk</td>
</tr>
</tbody>
</table>

Total 4,140

Total 3,756 9.3%
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 132 N. Las Posas Rd.

Zone #: 6

-Supply line leaks fixed? N/A
-Head maintenance issues fixed? N/A
-Zone capacity issues fixed? N/A
-Head layout issues fixed? N/A

Spray Smart Improvement Details:

"A" Zone Details:
  -Approximate percentage of zone area: 50%
  -Flow Rate (GPM): 8
  -Operating pressure after Spray Smart (if pressure problem): 60 psi
  -DU (if DU was addressed) N/A
  -Suggested Weekly Run Time (100% Eto): 60
  -Actual Weekly Run Time (Set by operator): 60

"B" Zone Details:
  -Approximate percentage of zone area: 50%
  -Flow Rate (GPM): 8
  -Operating pressure after Spray Smart (if pressure problem): 50 psi
  -DU (if DU was addressed) N/A
  -Suggested Weekly Run Time (100% Eto): 108
  -Actual Weekly Run Time (Set by operator): 108
**Post-Upgrade Audit Report:**

Property Address: 132 N. Las Posas Rd.

System Level Maintenance Issues Repaired?: N/A
All Zone Maintenance Issues Repaired?: N/A

Summary Of Changes: Used 12 Spray Smart valves to split turf from shrubs.

Measured Water Savings (As installed and programmed by water manager):

384 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):

384 x 52 weeks x 54% = 10,783 gal/yr.

Confidence that water manager will utilize product properly:

High.

Opportunity for additional savings with existing installation (e.g. re-program)?

None

Projected Annual Water Savings (For properly programmed and maintained upgrade):

10,783 gal/yr.

Opportunity for additional upgrades on this site:

None

Issues/Comments:
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the *Spray Smart™* Valve

**Pre-Upgrade Audit Results:**

Property Address:

12510 Pacato Circle, South.
San Diego, CA 92128

Property Type: Residential

Water Meter Size: 3/4"
Supply Static Pressure: 80 psi.

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

3000 sq ft.

Number of active irrigation zones: 9

System Level Maintenance Condition:
- Leaks on main supply to irrigation? None
- Leaky control valves? None

Controller Type:
- Brand and model? Orbit 9 station
- Weather based? No
- Weather adjustable? No
- Multi-cycle capable? Yes

Landscape Health: Good except for brown spots on station 9 bank.
## Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shrub/Flower</td>
<td>Drip</td>
<td>9</td>
<td>15</td>
<td>135</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Turf</td>
<td>Spray</td>
<td>12</td>
<td>21</td>
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<tr>
<td>3</td>
<td>Turf</td>
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<td>12</td>
<td>21</td>
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<td>Flowers</td>
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<td>6</td>
<td>Ground Cover</td>
<td>Rotors</td>
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<td>Ground Cover</td>
<td>Rotors</td>
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<td>Ground Cover/Trees</td>
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<td>9</td>
<td>Ground Cover/Shrubs</td>
<td>Spray/Drip</td>
<td>20</td>
<td>30</td>
<td>600</td>
<td>Brown Spots</td>
<td>Yes</td>
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</tbody>
</table>

Total Weekly Water Usage 2,466

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 12510 Pacato Circle, South.

Zone #: 1

-Type of landscape: Shrub/Flower
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 12510 Pacato Circle, South.

Zone #: 2

-Type of landscape: Turf

-Supply line leaks? None

-Heads leaking around pop-up seal? None

-Heads need replacement? No

-Heads clogged or spraying improperly? None

-Zone capacity issues? No

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 12510 Pacato Circle, South.

Zone #: 3

- Type of landscape: Turf
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No.

- Low Pressure Issues?: No.
- Distribution Uniformity Issue?: No.

- Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  12510 Pacato Circle, South.

Zone #: 4

-Type of landscape: Turf
-Supply line leaks? None
-Headers leaking around pop-up seal? None
-Headers need replacement? No
-Headers clogged or spraying improperly? None
-Headers capacity issues? No
-Headers Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  12510 Pacato Circle, South.

Zone #: 5

-Type of landscape: Flower
-Supply line leaks? None
-Heads leaking around pop-up seal? N/A
-Heads need replacement? N/A
-Heads clogged or spraying improperly? N/A
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: N/A.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 12510 Pacato Circle, South.

Zone #: 6

- Type of landscape: Ground Cover
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No.

- Low Pressure Issues?: No.
- Distribution Uniformity Issue?: No.

- Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 12510 Pacato Circle, South.

Zone #: 7

-Type of landscape: Ground Cover
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.
-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 12510 Pacato Circle, South.

Zone #: 8

-Type of landscape: Ground Cover

-Supply line leaks? None

-Heads leaking around pop-up seal? None

-Heads need replacement? No

-Heads clogged or spraying improperly? None

-Zone capacity issues? No

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 12510 Pacato Circle, South.

Zone #: 9

-Type of landscape: Ground Cover and Shrubs
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? Yes
-Head Layout issues? Yes

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes (also mixing spray with drip)

-Low Pressure Issues?: Yes, Spray heads will not pop up properly
-Distribution Uniformity Issue?: Yes, 45% on ground cover.

-Alternate Solution Options?: None.
**Spray Smart Upgrade Summary:**
Property Address: 12510 Pacato Circle, South.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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<tbody>
<tr>
<td>1</td>
<td>No</td>
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<td>9</td>
<td>Yes</td>
<td>Low Pressure, Mixed Landscape, Low DU</td>
<td>10 MP Rotator</td>
<td>Drip and micro-spray</td>
<td>Added one head to ground cover for proper coverage.</td>
</tr>
</tbody>
</table>

12
Zone Upgrade Details: (For each upgraded zone)
Property Address: 12510 Pacato Circle, South.

Zone #: 9

Type of problem(s) being addressed: Mixed Landscape, Low Pressure, Low DU

Upgrade Completed By: Blue Watchdog Systems

Total number of Spray Smart Valves used on this zone?: 11

"A" Zone Details:
   - Landscape Type: Ground Cover
   - Type and Number of heads: 9 MP Rotator Spray

"B" Zone Details:
   - Landscape Type: Shrubs
   - Type and Number of heads: 2 Supplies, Drip and micro-spray

Additional Changes Required: (list all additional changes including repairs and new equipment)
### Post Upgrade Audit Summary:
Property Address: 12510 Pacato Circle, South.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
<th>Notes</th>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Yes</td>
<td>600</td>
<td>5</td>
<td>14</td>
<td>7.5</td>
<td>10</td>
<td>435</td>
<td>28%</td>
<td>165 gal/wk</td>
</tr>
</tbody>
</table>

| Total  | 2,466       |                     |              |                 |              |                 |                     |                |       |
| Total  | 2,301       |                     |              |                 |              |                 |                     |                | 6.7%  |
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 12510 Pacato Circle, South.

Zone #: 9

-Supply line leaks fixed? N/A
-Head maintenance issues fixed? Yes
-Zone capacity issues fixed? Yes
-Head layout issues fixed? Yes

Spray Smart Improvement Details:

"A" Zone Details:
-Approximate percentage of zone area: 50%
-Flow Rate (GPM): 5
-Operating pressure after Spray Smart (if pressure problem): 30 psi
-DU (if DU was addressed) 96%
-Suggested Weekly Run Time (100% Eto): 20
-Actual Weekly Run Time (Set by operator): 14

"B" Zone Details:
-Approximate percentage of zone area: 50%
-Flow Rate (GPM): 7.5
-Operating pressure after Spray Smart (if pressure problem): 20 psi
-DU (if DU was addressed) N/A
-Suggested Weekly Run Time (100% Eto): 13
-Actual Weekly Run Time (Set by operator): 10
Post-Upgrade Audit Report:
Property Address: 12510 Pacato Circle, South.

System Level Maintenance Issues Repaired?: N/A
All Zone Maintenance Issues Repaired?: Yes

Summary Of Changes: Used 12 Spray Smart valves to split shrubs from ground cover.

Measured Water Savings (As installed and programmed by water manager):

165 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):

165 x 52 weeks x 54% = 4,633 gal/yr.

Confidence that water manager will utilize product properly:
High.

Opportunity for additional savings with existing installation (e.g. re-program)?
None

Projected Annual Water Savings (For properly programmed and maintained upgrade):

4,633 gal/yr.

Opportunity for additional upgrades on this site:
None

Issues/Comments:
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:

Property Address:

9670 Caminito Pudregal
San Diego, CA 92131

Property Type: Residential

Water Meter Size: 3/4  Supply Static Pressure: 60

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

0.5 acre

Number of active irrigation zones: 7 (Ten total, 1 capped, 2 non-functional)

System Level Maintenance Condition:
  -Leaks on main supply to irrigation? None
  -Leaky control valves? None

Controller Type:
  -Brand and model? Two controllers, Orbit Watermaster
  -Weather based? No  Weather adjustable? Yes
  -Multi-cycle capable? Yes

Landscape Health: Good
### Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Shrub</td>
<td>Spray</td>
<td>22</td>
<td>35</td>
<td>770</td>
<td>No</td>
<td>No</td>
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<tr>
<td>1-2</td>
<td>Shrubs (Road, North)</td>
<td>Inactive</td>
<td>0</td>
<td></td>
<td></td>
<td>?</td>
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<tr>
<td>1-3</td>
<td>Shrubs (Front, North)</td>
<td>Spray</td>
<td>30</td>
<td>42</td>
<td>1260</td>
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<td>Shrubs (Pool)</td>
<td>Spray</td>
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<td>1-5</td>
<td>Shrubs (Front, South)</td>
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<td>1-6</td>
<td>Turf (Front, North)</td>
<td>Spray</td>
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<td>49</td>
<td>735</td>
<td>Very Wet</td>
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<td>2-1</td>
<td>Turf (Front, Left)</td>
<td>Spray</td>
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<td>70</td>
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<td>2-2</td>
<td>Turf, Shrubs, Citrus</td>
<td>Spray</td>
<td>23</td>
<td>70</td>
<td>1610</td>
<td>Very Wet</td>
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<td>Turf (Rear, Large)</td>
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<td>Very Wet</td>
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<td>2-4</td>
<td>Citrus</td>
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</tbody>
</table>

|                               | Total Weekly Water Usage | 7,350 |

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 9670 Caminito Pudregal

Zone #: 1-1

-Type of landscape: Shrub

-Supply line leaks? None

-Heads leaking around pop-up seal? Minor

-Heads need replacement? No

-Heads clogged or spraying improperly? Minor

-Zone capacity issues? Minor

-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 9670 Caminito Pudregal

Zone #: 1-3

-Type of landscape: Shrub
-Supply line leaks? None
-Heads leaking around pop-up seal? Minor
-Heads need replacement? No
-Heads clogged or spraying improperly? Minor
-Zone capacity issues? Minor
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
**Pre-Upgrade Audit Details: (for all active zones)**
Property Address: 9670 Caminito Pudregal

Zone #: 1-4

-Type of landscape: Shrub

-Supply line leaks? None

-Heads leaking around pop-up seal? None

-Heads need replacement? No

-Heads clogged or spraying improperly? Minor

-Zone capacity issues? None

-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 9670 Caminito Pudregal

Zone #: 1-6

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? Minor
-Heads need replacement? No
-Heads clogged or spraying improperly? Minor
-Zone capacity issues? None
-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 9670 Caminito Pudregal

Zone #: 2-1

-Type of landscape: Turf
-Supply line leaks? Minor
-Heads leaking around pop-up seal? Major
-Heads need replacement? Yes
-Heads clogged or spraying improperly? Major
-Zone capacity issues? Minor
-Head Layout issues? None

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No.

-Low Pressure Issues?: No.

-Distribution Uniformity Issue?: Yes, clogged heads.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 9670 Caminito Pudregal

Zone #: 2-2

-Type of landscape: Turf, Shrubs, Citrus

-Supply line leaks? Minor

-Heads leaking around pop-up seal? Major

-Heads need replacement? Yes

-Heads clogged or spraying improperly? Minor

-Zone capacity issues? Minor

-Head Layout issues? Minor

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: Yes, 15 psi.

-Distribution Uniformity Issue?: Yes, 40%.

-Alternate Solution Options?: Possibly mix drip and spray with no Spray Smart
**Pre-Upgrade Audit Details: (for all active zones)**

Property Address: 9670 Caminito Pudregal

Zone #: 2-3

- Type of landscape: Turf
- Supply line leaks? No
- Heads leaking around pop-up seal? No
- Heads need replacement? No
- Heads clogged or spraying improperly? No
- Zone capacity issues? No
- Head Layout issues? No

**Spray Smart Improvement Opportunities:**
- No
  - Mixed Hydrozones?: No
  - Low Pressure Issues?: No
  - Distribution Uniformity Issue?: No

- Alternate Solution Options?: N/A
**Spray Smart Upgrade Summary:**  
Property Address: 9670 Caminito Pudregal

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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<tr>
<td>1-1</td>
<td>No</td>
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<tr>
<td>2-2</td>
<td>Yes</td>
<td>Mixed Landscape, Low pressure, Low DU</td>
<td>16 MP Rotator</td>
<td>100' Drip line</td>
<td>Turf heads changed from spray to MP Rotator. 2 pressure regulators for drip.</td>
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<tr>
<td>2-3</td>
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</table>
Zone Upgrade Details: (For each upgraded zone)
Property Address: 9670 Caminito Pudregal

Zone #: 2-2

Type of problem(s) being addressed: Mixed Landscape, Low pressure, Low DU

Upgrade Completed By: Blue Watchdog Systems

Total number of Spray Smart Valves used on this zone?: 18

"A" Zone Details:
- Landscape Type: Turf
- Type and Number of heads: 16 MP Rotator

"B" Zone Details:
- Landscape Type: Shrubs
- Type and Number of heads: 100' drip, 2 sources

Additional Changes Required: (list all additional changes including repairs and new equipment)

Pop-up bodies changed to accommodate MP Rotator. Were worn out.

Added rain bird pressure regulators to two sources for drip lines.
## Post Upgrade Audit Summary:
Property Address: 9670 Caminito Pudregal

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
<th>Percent Savings</th>
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<tr>
<td>2-2</td>
<td>Yes</td>
<td>1610</td>
<td>10</td>
<td>90</td>
<td>3</td>
<td>30</td>
<td>990 39% 620 gal/wk</td>
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<td><strong>Total</strong></td>
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</table>

|                | Total       |                           |              |                           |              |                           | **Total** 6,730 8.4% |                 |       |
Post-Upgrade Audit Details: (for each upgraded zone)
Property Address: 9670 Caminito Pudregal

Zone #: 2-2

-Supply line leaks fixed? Yes
-Head maintenance issues fixed? Yes
-Zone capacity issues fixed? Yes
-Head layout issues fixed? No

Spray Smart Improvement Details:

"A" Zone Details:
- Approximate percentage of zone area: 70%
- Flow Rate (GPM): 10
- Operating pressure after Spray Smart (if pressure problem): 35 psi
- DU (if DU was addressed) 70%
- Suggested Weekly Run Time (100% Eto): 90
- Actual Weekly Run Time (Set by operator): 90

"B" Zone Details:
- Approximate percentage of zone area: 30%
- Flow Rate (GPM): 3
- Operating pressure after Spray Smart (if pressure problem): 40 psi
- DU (if DU was addressed) N/A
- Suggested Weekly Run Time (100% Eto): 30
- Actual Weekly Run Time (Set by operator): 30
**Post-Upgrade Audit Report:**
Property Address: 9670 Caminito Pudregal

System Level Maintenance Issues Repaired?: Yes
All Zone Maintenance Issues Repaired?: No

Summary Of Changes: Used 18 Spray Smart valves to split turf from shrubs. Installed MP Rotator heads in turf and drip in shrubs.

Measured Water Savings (As installed and programmed by water manager):
620 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):
620 x 52 weeks x 54% = 17,410 gal/yr.

Confidence that water manager will utilize product properly:
High.

Opportunity for additional savings with existing installation (e.g. re-program)?
Weather Based irrigation controller.

Projected Annual Water Savings (For properly programmed and maintained upgrade):
17,410 gal/yr.

Opportunity for additional upgrades on this site:
Additional Spray Smart zones
Weather Based Irrigation Controller

Issues/Comments:
Site Report
for
Low Cost Outdoor Irrigation Optimization
using the Spray Smart™ Valve

Pre-Upgrade Audit Results:
Property Address:

2960 Babbling Brook Rd.
Chula Vista, CA 91914

Property Type: Residential

Water Meter Size: 3/4
Supply Static Pressure: Not available

Approximate Irrigated Area: (Total square feet of irrigated land, estimated by eyeball)

0.75 acre

Number of active irrigation zones: 9

System Level Maintenance Condition:
- Leaks on main supply to irrigation? None
- Leaky control valves? None

Controller Type:
- Brand and model? Hunter Pro-C
- Weather based? No
- Weather adjustable? Yes
- Multi-cycle capable? Yes

Landscape Health: Good
### Pre-Upgrade Audit Summary:

<table>
<thead>
<tr>
<th>Zone #</th>
<th>Landscape Type</th>
<th>Spray/Drip Equipment</th>
<th>GPM</th>
<th>Run Time (100% Eto) Per week</th>
<th>Total gal. per week</th>
<th>Landscape Health Issues? (e.g. dry spots)</th>
<th>SS Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turf and Rock Island</td>
<td>Spray</td>
<td>15</td>
<td>27</td>
<td>405</td>
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<td>Yes</td>
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<td>2</td>
<td>Turf</td>
<td>Spray</td>
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<td>27</td>
<td>405</td>
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<td>3</td>
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<td>5</td>
<td>Ground Cover</td>
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<td>Turf and palms</td>
<td>Spray</td>
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<td>27</td>
<td>405</td>
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<td>Yes</td>
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<td>7</td>
<td>Ground Cover</td>
<td>Spray</td>
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<td>8</td>
<td>Turf and Ground Cover</td>
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</tbody>
</table>

|                         | Total Weekly Water Usage | 4,554               |

Equipment=Spray heads, stream rotors, multi-stream, drip, mix (list types)
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 2960 Babbling Brook Rd.

Zone #: 1

-Type of landscape: Turf and Rock Island
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: Yes.

-Low Pressure Issues?: No. 40 psi.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: None.
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 2960 Babbling Brook Rd.

Zone #: 2

-Type of landscape: Turf
-Supply line leaks? None
-Heads leaking around pop-up seal? None
-Heads need replacement? No
-Heads clogged or spraying improperly? None
-Zone capacity issues? No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-No
-Mixed Hydrozones?: No

-Low Pressure Issues?: No. 50 psi.

-Distribution Uniformity Issue?: No.

-Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 2960 Babbling Brook Rd.

Zone #: 3

-Type of landscape: Turf

-Supply line leaks? None

-Heads leaking around pop-up seal? None

-Heads need replacement? No

-Heads clogged or spraying improperly? None

-Zone capacity issues? Yes

-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?: No

-Low Pressure Issues?: Yes. 20 psi.

-Distribution Uniformity Issue?: Yes.

-Alternate Solution Options?: Low flow heads
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  2960 Babbling Brook Rd.

Zone #: 4

-Type of landscape:  Turf and Queen Palms
-Supply line leaks?  None
-Heads leaking around pop-up seal?  None
-Heads need replacement?  No
-Heads clogged or spraying improperly?  None
-Zone capacity issues?  No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?:  Yes

-Low Pressure Issues?:  No. 43 psi.

-Distribution Uniformity Issue?:  No

-Alternate Solution Options?:  None.
**Pre-Upgrade Audit Details: (for all active zones)**

Property Address:  2960 Babbling Brook Rd.

Zone #: 5

- Type of landscape: Ground Cover
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No

- Low Pressure Issues?: No. 63 psi.

- Distribution Uniformity Issue?: No

- Alternate Solution Options?: N/A
**Pre-Upgrade Audit Details: (for all active zones)**

Property Address: 2960 Babbling Brook Rd.

Zone #: 6

- Type of landscape: Turf and Palm Trees
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- Yes
- Mixed Hydrozones?: Yes

- Low Pressure Issues?: No. 73 psi.

- Distribution Uniformity Issue?: No

- Alternate Solution Options?: None.
**Pre-Upgrade Audit Details: (for all active zones)**

Property Address: 2960 Babbling Brook Rd.

Zone #: 7

- Type of landscape: Ground Cover
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No

- Low Pressure Issues?: No. 43 psi.

- Distribution Uniformity Issue?: No

- Alternate Solution Options?: N/A
Pre-Upgrade Audit Details: (for all active zones)
Property Address:  2960 Babbling Brook Rd.

Zone #: 8

-Type of landscape:  Turf and Ground Cover
-Supply line leaks?  None
-Heads leaking around pop-up seal?  None
-Heads need replacement?  No
-Heads clogged or spraying improperly?  None
-Zone capacity issues?  No
-Head Layout issues? No

Spray Smart Improvement Opportunities:
-Yes
-Mixed Hydrozones?:  Yes

-Low Pressure Issues?:  No. 60 psi.

-Distribution Uniformity Issue?:  Minor.  58%.

-Alternate Solution Options?:  None.
Pre-Upgrade Audit Details: (for all active zones)
Property Address: 2960 Babbling Brook Rd.

Zone #: 9

- Type of landscape: Ground Cover
- Supply line leaks? None
- Heads leaking around pop-up seal? None
- Heads need replacement? No
- Heads clogged or spraying improperly? None
- Zone capacity issues? No
- Head Layout issues? No

Spray Smart Improvement Opportunities:
- No
- Mixed Hydrozones?: No

- Low Pressure Issues?: No. 70 psi.

- Distribution Uniformity Issue?: No

- Alternate Solution Options?: N/A
**Spray Smart Upgrade Summary:**
Property Address: 2960 Babbling Brook Rd.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Applied</th>
<th>Type of Problem</th>
<th>&quot;A&quot; Zone Equip and qty</th>
<th>&quot;B&quot; Zone Equip and qty</th>
<th>Additional Changes</th>
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<td>Yes</td>
<td>Mixed Landscape</td>
<td>11 Spray</td>
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</table>
Zone Upgrade Details: (For each upgraded zone)
Property Address: 2960 Babbling Brook Rd.

Zone #: 8

Type of problem(s) being addressed: Mixed Landscape

Upgrade Completed By: Blue Watchdog Systems

Total number of Spray Smart Valves used on this zone?: 28

"A" Zone Details:
- Landscape Type: Turf
  - Type and Number of heads: 11 Hunter Pro Spray

"B" Zone Details:
- Landscape Type: Shrubs
  - Type and Number of heads: 17 Shrub Spray

Additional Changes Required: (list all additional changes including repairs and new equipment)

Added swing joints to make room for Spray Smart valve under pop-ups.
Post Upgrade Audit Summary:
Property Address: 2960 Babbling Brook Rd.

<table>
<thead>
<tr>
<th>Zone #</th>
<th>SS Upgrade?</th>
<th>Orig. gal. Per week</th>
<th>&quot;A&quot; Zone GPM</th>
<th>&quot;A&quot; Zone Run Time 100% Eto</th>
<th>&quot;B&quot; Zone GPM</th>
<th>&quot;B&quot; Zone Run Time 100% Eto</th>
<th>Upgrade gal. per week.</th>
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</table>

Total 4,554  
Total 4,329  5.0%
**Post-Upgrade Audit Details: (for each upgraded zone)**

**Property Address:**  2960 Babbling Brook Rd.

**Zone #:** 8

- Supply line leaks fixed?  N/A
- Head maintenance issues fixed?  N/A
- Zone capacity issues fixed?  N/A
- Head layout issues fixed?  N/A

**Spray Smart Improvement Details:**

"A" Zone Details:
- Approximate percentage of zone area: 15%
- Flow Rate (GPM): 3
- Operating pressure after Spray Smart (if pressure problem): 41 psi
- DU (if DU was addressed) 82%
- Suggested Weekly Run Time (100% Eto): 30
- Actual Weekly Run Time (Set by operator): 30

"B" Zone Details:
- Approximate percentage of zone area: 85%
- Flow Rate (GPM): 15
- Operating pressure after Spray Smart (if pressure problem): 41 psi
- DU (if DU was addressed)  N/A
- Suggested Weekly Run Time (100% Eto): 12
- Actual Weekly Run Time (Set by operator): 12
Post-Upgrade Audit Report:
Property Address: 2960 Babbling Brook Rd.

System Level Maintenance Issues Repaired?: N/A
All Zone Maintenance Issues Repaired?: N/A

Summary Of Changes: Used 28 Spray Smart valves to split turf from shrubs.

Measured Water Savings (As installed and programmed by water manager):

225 gal/wk

Projected Annual Water Savings (As installed and programmed by water manager):

225 x 52 weeks x 54% = 6,318 gal/yr.

Confidence that water manager will utilize product properly:

High.

Opportunity for additional savings with existing installation (e.g. re-program)?

Weather Based irrigation controller.

Projected Annual Water Savings (For properly programmed and maintained upgrade):

6,318 gal/yr.

Opportunity for additional upgrades on this site:

Additional Spray Smart zones (1, 3, 4, 6)
Weather Based Irrigation Controller

Issues/Comments:

Unexplained performance problem at installation. 8 Spray Smart valves installed with check valves heads were unreliable and were replaced.