

# ***MOBILE IRRIGATION LAB***

*2011 4<sup>th</sup> Quarter & Annual Report*

***COLLIER SOIL AND WATER CONSERVATION DISTRICT  
NATURAL RESOURCES CONSERVATION SERVICE  
BIG CYPRESS BASIN***



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## **Abstract**

The Collier County Urban Mobile Irrigation Lab (MIL) completed twenty six evaluations for the fourth quarter of project year 2011. These evaluations produced Potential Water Savings (PWS) of 33.3 million gallons of water per year (102.3 acre-feet). Of the twenty-six evaluations, no follow-up evaluations were performed for an Actual Water Savings (FAWS). But with changes to the homeowners' controllers, the Collier MIL had Immediate Actual Water Savings (IAWS) of 9.0 million gallons of water (27.5 acre feet) just by reducing long run times and multiple programs on irrigation controllers.

The Collier MIL was acknowledged during the evaluations and the numerous Rookery Bay Best Management Practices (BMP) training courses and the Waterwise and Other Irrigation Concepts course available to the contractors of Collier County at Rookery Bay. The MIL is also working with Collier TV channel 97 on a running TV banner so the residents of Collier County can take full advantage of the free public service. The MIL has contacted Florida Gulf Coast University in efforts to conserve our natural resource and awareness of the MIL. The MIL also reaches the community through PowerPoint presentations and conservation expositions. Most recently, the MIL had a booth at the Annual Citrus Exposition in Fort Myers and gave a presentation to the Marco Men's Club on Marco Island. The MIL had an article in the Naples Daily News about irrigating on a rainy day.

## **Annual Summary**

The Collier County Urban Mobile Irrigation Lab (MIL) completed 110 evaluations for the project year of 2011. These evaluations produced Potential Water Savings (PWS) of 128.3 million gallons of water per year (394.0 acre-feet). Of the 110 evaluations, 10 were follow-up evaluations. The follow-up evaluations produced a Follow-up Actual Water Savings (FAWS) of 5.4 million gallons per year (16.7 acre-feet). But with changes to the homeowners' controllers, the Collier MIL had Immediate Actual Water Savings (IAWS) of 72.8 million gallons of water (223.4 acre- feet) just by reducing long run times and multiple programs on irrigation controllers.

- MIL Completed 110 evaluations
- MIL Completed 10 follow-up evaluations
- MIL gave 7 PowerPoint presentations
- MIL had 2 conservation expositions
- MIL wrote 2 water conservation articles
- MIL had 3 data trainings with FDACS
- MIL media Collier TV Channel 97 and FGCU Broadcasting

## **Introduction**

The Collier Soil and Water Conservation District Urban Mobile Irrigation Lab's mission is to promote water conservation through on-site evaluations of irrigation systems and conservation education.

## **Evaluation Methods**

There are three levels of evaluation: visual inspection; pressure and flow check; and the efficiency test. Visual inspections are conducted first to determine if the system is in disrepair or has poor coverage. If the system is found to be in poor condition, the other levels of evaluation are not carried out. Pressure and flow checks on individual sprinkler heads or emitters are conducted next. If pressure and flow are found to be uniform, a catch can test is performed to determine optimum run times for the zones in the system.

## **Common Problems**

The average operator is unaware of watering restrictions and what the proper irrigation schedule should be for their lawn and landscape. Most systems evaluated this year were using municipal sources that are expensive to operate or dual systems that have limitations on usage. The main concerns were saving money and water. Most of the evaluations requested this year were from other customer referrals and MIL flyers. The Mobile Irrigation Lab and evaluation report gives system operators and managers a realistic view of what their systems can do and how to improve their system to save water. The major problems were blocked sprinklers and wrong settings and times on the controllers. Homeowners often have multiple programs running and overlapping other programs. Many rain sensors are bypassed and set too high. Unmatched precipitation rates with rotors on the same zone were found almost on every site. Residents have lawn and landscaping zones watering together and overwatering landscaping areas.

## **Conservation Education/Outreach**

For the fourth quarter of 2011, the Collier Soil and Water Conservation District Big Cypress Basin MIL has written articles, given presentations, and had booths at conservation expositions to homeowners associations and other interested groups. These presentations and conservation articles are documented in Attachment 3.

## **Training**

The training of the City of Naples irrigation staff continues with conservation as the main objective in median strips and parks. The MIL is also working on a data entry project with the Florida Department of Agriculture and Consumer Services.

**Attachment # 1: BCB MIL 2011**

**MIL ID:** BCB      **FY:** 2011      **Qtr** 4

[illegible]

2. Distribution uniformity
4. Potential Water Savings
5. Follow up actual water savings
6. Instant actual water savings

**MOBILE IRRIGATION LAB CONSERVATION EDUCATION REPORT ATTACHMENT 3  
COLLIER SOIL & WATER CONSERVATION DISTRICT URBAN MIL  
4TH QUARTER 2011**

[illegible]

**54 hours 4th Quarter**

NOTES: MOST ICC MEETINGS ARE GREAT FOR THE MILS TO GET FAMILIARIZED WITH NEW PRODUCTS AND NEW INNOVATIONS IN THE IRRIGATION INDUSTRY.

## Appendix A Definitions

### AWS and PWS Definitions

The goal of an irrigation evaluation is to determine the capacity and efficiency of an irrigation system. This information is then used to develop a sound Irrigation Management Plan in which, irrigation water is applied only when needed and only in amounts which can be fully utilized by healthy plants.

Properly managed irrigation is used to supplement natural rainfall. The amount of irrigation required annually is the Net Irrigation Requirement (NIR) and is defined as;

$$\text{NIR} = \text{Crop water requirement} - \text{Effective rainfall}$$

The efficiency of an irrigation system is defined in terms of Distribution Uniformity (DU) for sprinklers and Emission Uniformity (EU) for microirrigation. These terms are defined in the **USDA-NRCS Irrigation Guide**. These numbers, in the form of percentages, are used to calculate the run times of irrigation events. The annual water use of a properly managed irrigation system is;

$$\text{Gross application} = \text{NIR/DU or EU}$$

Potential Water Savings (PWS) – The total amount of irrigation water that can be saved annually by following the recommendations derived from an irrigation system evaluation.

$\text{PWS}_{(\text{management})}$  - The amount of irrigation water that can be saved annually by schedule changes (run time and frequency) alone.

$$\text{PWS}(\text{man}) = \text{measured water use} - \text{projected water use}$$

$\text{PWS}(\text{design})$  – The additional amount of irrigation water that can be saved annually by improving the performance of the system and readjusting the schedule.

$$\text{NIR/DU}_{(\text{present})} - \text{NIR/DU}_{(\text{projected})}$$

Actual Water Savings (AWS) - The total amount of water which is saved for a period of x years as a direct result of following the recommendations derived from an irrigation system evaluation.

Instant AWS can be achieved if repairs are made, resulting in quantifiable water savings or if the controller settings are adjusted (schedule change) at the time of the evaluation or when the report is delivered.

AWS schedule changes can be documented in person or by phone and AWS design and repairs can be documented by follow-up evaluations.

The following definitions and formulas are taken from the “Mobile Irrigation Laboratory Urban Irrigation Evaluation & Troubleshooting Training Manual” (Mickler1998).

### 1. Determine average application rate

**Meter records water use in gallons**

$$\text{Average application rate} = \frac{\text{Volume}}{\text{Area} \times \text{Time}} \times 5775.4$$

Where *Average application rate* = Inches per hour (iph)

*Volume* = Volume required for needle in water meter to make one complete revolution (gal)

*Area* = Irrigated area (ft<sup>2</sup>)

*Time* = Time required for needle in water meter to make one complete revolution (s)

**No water meter present**

$$\text{Flow rate} = \frac{\text{Volume}}{\text{Time}} \times 0.01585$$

Where *Flow rate* = Gallons per minute (GPM)

*Volume* = Volume collected (ml)

*Time* = Time that water was collected (s)

### 2. Determine distribution uniformity

$$DU = \frac{\text{Low quarter average}}{\text{Total average}} \times 100$$

When *DU* = Distribution uniformity in percent

*Low quarter average* = Average volume in the 25% of cans that received the least water (ml)

*Total average* = Average volume of all cans (ml)

### 3. Determine the effective application rate

$$\text{Effective application rate} = \text{Average application rate} \times DU$$

### 4. Calculate operating time

$$\text{Watering time} = \frac{\text{Plant water requirement}}{\text{Effective application rate}} \times 60$$

Where *Watering time* = Suggested time that a zone should be operated (min)

*Plant watering requirement* = 0.5 or 0.25 depending on location (in)

*Effective application rate* = From step 3 (iph)

### 5. Determine water used per operating cycle

When used per operating cycle is calculated by the following equation:

$$\text{Current usage} = \text{Flow rate} \times \text{time}$$

Where *Current usage* = Total water used for a given zone per irrigation cycle (gal)  
*Flow rate* = Determined from equations below (gpm)  
*Time* = Time a zone is operated during a scheduled irrigation cycle (min)

If water meter records units of gallons, use the following equation:

$$\text{Flow rate} = \frac{10 \text{ gallons}}{\text{Time}} \times 60$$

Where *Flow rate* = Flow through a particular zone (gpm)  
*Time* = Time required for the needle on the meter to make one complete revolution(s)

If no water meter is present, determine the flow rate from each sprinkler within one zone and add them all together.

$$\text{Flow rate} = \frac{\text{Volume}}{\text{Time}} \times 0.01585$$

Where *Flow rate* = Gallons per minute (gpm)  
*Volume* = Volume collected (ml)  
*Time* = Time that water was collected



## Appendix B Problem Descriptions

**Problem Descriptions** - Problems are irrigation system or management factors that limit irrigation system performance or efficiency. Problems are noted during the site visit, system evaluation, and/or through discussions with the operator.

| Code  | Description of Problems   |
|---|---|
| <b>Pressure / Application Rate</b>            |   |
| 1   | Under-sized pump for number and type of sprinkler heads or emitters               |
| 2   | Pressure loss between pump and sprinklers/emitters due to inadequate pipe size    |
| 3   | Higher pressure than manufacturer's specifications                                |
| 4   | Lower pressure than manufacturer's specifications                                 |
| 5   | Low pressure due to water supply  |
| 6   | Different pressure between manifolds  |
| 7   | Small wetted area   |
| 8   | Application rate > soil infiltration rate (ponding)                               |
| 9   | Air in pipelines  |
| 10  | Turf and landscape area irrigated in the same zone                                |
| 11  | Pressure variation due to elevation differences                                   |
| <b><u>Emitters / Sprinklers</u></b>           |   |
| 20  | Mixed sprinkler/emitter sizes & unmatched precipitation in the same zone          |
| 21  | Mixed sprinkler/emitter brands or types in the same zone                          |
| 22  | Poor emitter/sprinkler uniformity due to worn orifice                             |
| 23  | Poor overlap due to improper sprinkler/emitter alignment or spacing               |
| 24  | Various riser heights in same zone  |
| 25  | Emitter/sprinkler spacing varies in same zone                                     |
| 26  | Missing/malfunctioning emitters or sprinklers                                     |
| 27  | Missing/malfunctioning pressure gauge/regulator/filter                            |
| <b><u>Maintenance – Irrigation System</u></b> |   |
| 30  | Leaks and broken valves, pipe, laterals lines (Poly-tubing), emitters, sprinklers |
| 31  | Clogged filter or filter screen   |
| 32  | Sprinkler heads not properly adjusted, causing overflow on paved areas            |
| 33  | Clogged emitters/nozzles (due to biological, chemical or physical factors)        |
| 34  | Leaning sprinklers/emitters causing non-uniform distribution                      |
| 35  | Malfunctioning valves   |
| <b><u>Maintenance – Landscape</u></b>         |   |
| 40  | Stream of water blocked by vegetation   |
| 41  | Variable crop spacing and stage of growth   |
| 42  | Poor drainage, requiring water control  |
| <b><u>Operation / Management</u></b>          |   |
| 50  | Operating time too long   |
| 51  | Operating time too short  |
| 52  | Operating time too frequent   |
| 53  | No rain shut-off device   |
| 54  | No soil moisture measuring device or rain gage                                    |
| 55  | No irrigation water management plan   |

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