

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com





Advancing Landscape Irrigation Efficiency

SWAT

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Chair, SWAT Promotions Working Group

The Challenge

- Improving irrigation efficiency is difficult
- Supply (and other) issues related to landscape water waste
- Irrigation efficiency is crucial
- SWAT: Advancing landscape irrigation efficiency



SWAT

- Smart Water Application Technologies
- Mission Focus – Advancing Landscape Irrigation Efficiency to Save Water
- Water Provider & Irrigation Industry Partnership – Our success relies on your support



Join the effort to maximize outdoor irrigation efficiency through the use of "Smart" Water Application Technologies™

Smart Water Application Technologies, or SWAT, is a national partnership initiative of water purveyors and irrigation industry representatives created to promote landscape water use efficiency through the application of state-of-the-art irrigation technologies. This website will help you discover how "smart" irrigation technologies are changing the face of landscape irrigation and the benefits of taking part in promoting efficient water use.



Landscape Contractors

Find out how "smart" irrigation technologies can help you grow your business and improve client satisfaction.

[learn more](#)

Manufacturers

Join the "smart" irrigation technologies revolution by supporting Smart Water Application Technologies efforts.

[learn more](#)

New Home Developers

Learn how "smart" irrigation technologies add value and maximize limited water resources to help meet growing water demands.

[learn more](#)

Water Purveyors

Irrigation Designers and

Specialty Distributors



A Partnership for Change

- Water providers – suppliers, water districts
- Irrigation and landscaping industry: manufacturers, distributors, designers and specifiers, contractors, developers and related professional industry associations
- Residential and light commercial customers



Volunteers Drive SWAT Efforts

- **Technology Working Group**
 - Testing protocols
- **Promotions Working Group**
 - Marketing & Fundraising
 - SWAT Administration
- **Executive Committee**
 - Oversight
 - Communication with EPA & other groups

What SWAT Does:

- **Technology**

- Identify Irrigation technology categories – issues
- Developing benchmark technology testing

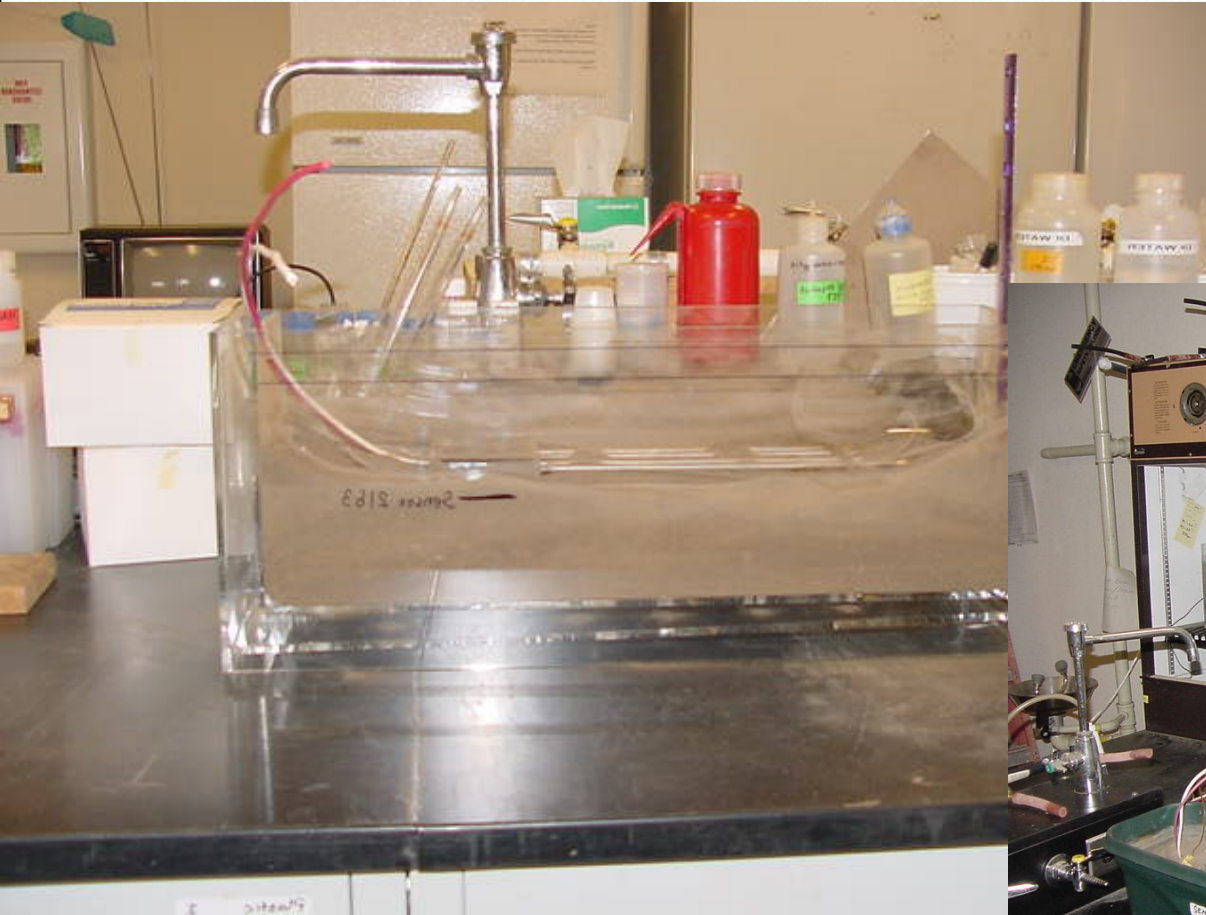
- **Promotions**

- Research market & stakeholder barriers to develop outreach materials
- Promotions
 - Performance reports
 - Technologies with marketing materials
 - Collaborations – IA and EPA
- Provides all administration and management of SWAT activities

Climate-based Controllers



Soil Moisture Sensors



Rain Sensors



SWAT Testing Updates

- **Smart climate-based controllers - CIT**
 - Weather-based or ET controllers
 - 15 controllers tested, posted online
- **Soil moisture sensor-based controllers - CIT**
 - Phase 1, 6th draft (sensor performance)
 - Phase 2, 3rd draft (sensor regulation of controller)
- **Rain sensors (rain-shutoff devices) – UF**
 - Phase 1 draft



SWAT Protocols

- Standard
- Developed by the IA, public and independent testing agency
- Public review every three years

**Smart Water
Application Technologies
SWAT**

Turf and Landscape Irrigation Equipment
CLIMATOLOGICALLY BASED
CONTROLLERS

Review
7th Draft Testing Protocol

90-day public comment period
Begins: March 4, 2008
Ends: June 2, 2008

Developed by



6540 Arlington Blvd
Falls Church, VA 22048-6638
www.irrigation.org

SWAT Protocol Example

- Climatological controller “bench” test
 - Using real-time weather data should produce efficient irrigation schedule for a variety of hypothetical soil types, slopes and plant materials
 - Test must meet requirements including time period, minimum rainfall and ETo
 - No pass or fail score – only performance results
 - Test is confidential between lab and manufacturer until manufacturer releases results to SWAT

Reporting Format



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Falls Church, VA 22042

Tel: 703-536-7080
www.irrigation.org

- One page - Performance Summary

Smart Water Application Technology™ (SWAT™) Performance Report	
Testing Agency: Center for Irrigation Technology	www.californiawater.org
Product: Hunter ET System with Pro-C 300 Controller	
Product Type: Climatologically Based Controller	
Product Description: ET SYSTEM is an onsite ET sensor suite with outdoor interface ET module, for direct connection to Hunter SmartPort® enabled controllers.	
SWAT™ Protocol™: Turf and Landscape Equipment Climatologically Based Controllers 7 th Draft Testing Protocol (November 2006)	
The concept of climatologically controlling irrigation systems has an extensive history of scientific study and documentation. The objective of this protocol is to evaluate how well current commercial technology has integrated the scientific data into a practical system that meets the agronomic needs of turf and landscape plants. The evaluation is accomplished by creating a virtual landscape subjected to a representative climate to evaluate the ability of individual controllers to adequately and efficiently irrigate that landscape. After initial programming and calibration the controller is expected to perform without further intervention during the test period. Performance results indicate to what degree the controller maintained root zone moistures within an acceptable range. If moisture levels are maintained without deficit, it can be assumed the crop growth and quality will be adequate. If moisture levels are maintained without excess it can be assumed that scheduling is efficient.	

*All SWAT™ Protocol may be viewed at www.irrigation.org

Hunter ET System with Pro-C 300 Controller SWAT™ Performance Summary	
Irrigation Adequacy Minimum of 6 test zones: 100% Maximum of 6 test zones: 100% Mean/Average of 6 test zones: 100% Irrigation Adequacy represents how well irrigation met the needs of the plant material. This reflects the percentage of required water for turf or plant material supplied by rainfall and controller-scheduled irrigations. Research suggests that if this value is between 80% and 100%, the acceptable quality of vegetation will be maintained.	Irrigation Excess Minimum of 6 test zones: 0% Maximum of 6 test zones: 2.3% Mean/Average of 6 test zones: 0.5% Irrigation Excess represents how much irrigation water was applied beyond the needs of the plant material. This reflects the percentage of water applied in excess of 100% of required water according to data from CIMIS station #80 Fresno State, Fresno County during the test period.

Product Detail Supplied by Manufacturer					
Hunter ET System		www.hunterindustries.com			
Installation	Data Source	Data Link	Initial Purchase	Additional Hardware	Additional Fees
Retrofit to Hunter SmartPort® enabled controllers.	ET System onsite sensor suite	Direct low voltage wiring into Hunter SmartPort®	ET System must be purchased separately from compatible Hunter controller model: SRC, Pro-C and ICC	<input type="checkbox"/> ET WIND is an optional anemometer for measuring wind speed	None
Additional Features					
Zones	Time of Day	Day of Week	Other	If Data Link is Discontinued	
The original Hunter controller may have up to 48 zones depending on the model.	Separately programmable start times for ET controlled zones. NOTE: ET System WiltGuard™ will override time of day restrictions.	ET System has day of week, even/odd date, and interval Day scheduling (up to 31 days). NOTE: ET System WiltGuard™ will override day of week restrictions	<input type="checkbox"/> WiltGuard™ technology Enables it to trigger protective watering when extreme conditions threaten your plants <input type="checkbox"/> ET information combines with each zone's particular plant, soil, sun, and sprinkler data <input type="checkbox"/> Easily upgrades most Hunter controllers to weather-based control with no high voltage AC wiring required <input type="checkbox"/> Non-volatile memory	If wiring to on-site ET System sensor is removed, system displays fault message and operates on last full 24 hour ET average. Traditional controller schedules may be selected manually if sensor service is required.	

Reporting Format

- Irrigation adequacy and excess section

Smart Water Application Technology™ (SWAT™) Performance Report

Irrigation Adequacy

Minimum of 6 test zones: 100%

Maximum of 6 test zones: 100%

Mean/Average of 6 test zones: 100%

Irrigation Adequacy represents how well irrigation met the needs of the plant material. This reflects the percentage of required water for turf or plant material supplied by rainfall and controller-scheduled irrigations. Research suggests that if this value is between 80% and 100%, the acceptable quality of vegetation will be maintained.

Irrigation Excess

Minimum of 6 test zones: 0%

Maximum of 6 test zones: 2.3%

Mean/Average of 6 test zones: 0.5%

Irrigation Excess represents how much irrigation water was applied beyond the needs of the plant material. This reflects the percentage of water applied in excess of 100% of required water according to data from CIMIS station #80 Fresno State, Fresno County during the test period.

Reporting Format



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- Full Technical Report

Smart Water Application Technology™ (SWAT™) Performance Report	
Testing Agency: Center for Irrigation Technology	www.californiawater.org
Testing Date: October-November 2005	Weather Station: CIMIS 75 Irvine, Orange
Product Type: Climatologically Based Controller	Reference #: 100588
Product: Toro Intelli-Sense [Model Number TIS-12-OD, Serial # 100588]	
Product Description: Toro Intelli-Sense climatological adjustment uses WeatherTRAK ET Everywhere™ ET/rainfall data and WeatherTRAK Scheduling Engine™ to provide custom schedules.	
SWAT™ Protocol*: Turf and Landscape Equipment Climatologically Based Controllers 6 th Draft Testing Protocol (Dec 3, 2005)	
The concept of climatologically controlling irrigation systems has an extensive history of scientific study and documentation. The objective of this protocol is to evaluate how well current commercial technology has integrated the scientific data into a practical system that meets the agronomic needs of turf and landscape plants. The evaluation is accomplished by creating a virtual landscape subjected to a representative climate to evaluate the ability of individual controllers to adequately and efficiently irrigate that landscape. After initial programming and calibration the controller is expected to perform without further intervention during the test period. Performance results indicate to what degree the controller maintained root zone moistures within an acceptable range. If moisture levels are maintained without deficit, it can be assumed the crop growth and quality will be adequate. If moisture levels are maintained without excess it can be assumed that scheduling is efficient.	
*All SWAT™ Protocol may be viewed at www.irrigation.org	

Toro Intelli-Sense Full Technical SWAT Performance Report						
Input Data: CIMIS #75 reference crop is turfgrass using the Penman-Monteith formula						
For more information: www.cimis.water.ca.gov						
Parameters: For field installation, these values would normally be collected during a landscape audit.	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6
Soil Type: Affects how water is absorbed and amount of water storage in the soil reservoir	Loam.	Silty Clay	Loamy Sand	Sandy Loam	Clay Loam	Clay
Vegetation: Determines the crop coefficient and therefore the water required for healthy plant growth	Fescue 75% Shade	Bermuda Full Sun	Ground Cover Full Sun	Woody Shrubs 50% Shade	Trees & Ground Cover Full Sun	Bermuda Full Sun
Crop Coefficient: Defines water required for healthy plant growth (see detail on last page of report)	0.45	0.57	0.55	0.40	0.61	0.57
Slope, %: Affects run-off potential	6%	10%	8%	12%	2%	20%
Root Zone Working Storage (inches): Affects water available to plant and watering intervals	0.85	0.55	0.90	2.00	2.25	0.55
Precipitation Rate (inches/hour): Affects duration of watering time	1.60	1.60	1.40	1.40	0.20	0.35
Application Efficiency, %: The percent of water applied by irrigation distribution system that is absorbed in to the root zone working storage and is not lost due to spray drift and pattern loss	55%	60%	70%	75%	80%	65%
Area (square feet): Frames a virtual yard. Is not used in efficiency calculations.	1000	1200	800	500	650	1600
Soil Intake Rate (inches/hour): Affects watering duration & soak intervals of watering time	0.35	0.15	0.50	0.40	0.20	0.10
Allowable Surface Accumulation (inches): Affects watering duration & soak intervals of watering time	0.25	0.16	0.26	0.24	0.26	0.10
Maximum Allowable Run Time (minutes): Limits run time options to avoid potential runoff	12.0	6.6	17.3	14.4	N/A	24.0

Performance results are only valid if the controller must make adjustments for varying weather conditions such as rain and evapotranspiration (Eto). Therefore actual time undergoing testing may be longer than one month. Valid performance data is then downloaded from the 30 consecutive day period exhibiting the required minimum 0.40 of gross rainfall and minimum 2.50 inches of ET_o.



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Reporting Format

- Full Technical Report

Toro Intelli-Sense Controller Full Technical SWAT Performance Report						
<p>Overall Irrigation Efficiency Evaluation</p> <p>The efficiency of an irrigation system is a function of four considerations: efficient irrigation controls, efficient application hardware, well-designed irrigation installation, and consistent maintenance. If all considerations are optimal in these four areas the irrigation system can be considered to be efficient over all.</p> <p>Scheduling Efficiency is the only criteria tested by the Climatologically Based Controller protocol. This value is listed in the Performance Parameters part of this report.</p> <p>Application Efficiency listed in the input parameter takes into account application hardware, installation and maintenance. This value is listed in the Input Parameters part of this report. These values are generally representative of industry norms and do not relate directly to any specific manufacturers product.</p> <p>Overall Efficiency,% = [Schedule Efficiency,% x Application Efficiency, %]</p>						
<p>Performance Parameters: Total inches for the test period are listed for each zone/crop</p>	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6
<p>Schedule Efficiency,%: Reflects how well irrigation cycles avoided direct, soak runoff and exceeding the root zone working storage capacity. Scheduling Losses (in.) = Direct Runoff (in.) + Soak Runoff (in.) + Surplus (in.)</p> $Sch.\,eff\ (\%) = \left(\frac{Irr.(Net,in) - Sch.\,losses\ (in.)}{Irr.(Net,in)} \right) 100$	100%	100%	100%	100%	100%	100%
<p>Application Efficiency,%: The percent of water applied by irrigation distribution system that is absorbed in to the root zone working storage and is not lost due to spray drift and pattern loss</p>	55%	60%	70%	75%	80%	65%
<p>Overall Irrigation Efficiency,%:</p>	55%	60%	70%	75%	80%	65%
<p>Details on Crop Coefficients</p> <p>The crop coefficient defines water required as a percent of total evapotranspiration rate downloaded from the data source. Water requirements have been thoroughly researched for many years. More information regarding this research is available from the Irrigation Association.</p> <p>The WeatherTRAK scheduling engine used by Toro Intelli-Sense has default crop coefficients listed as plant names in the scheduling engine. Custom crop coefficients may be programmed into any station. Appropriate schedule development includes assessment of the plants within the zone to be watered and selecting from a list of default values based on the plant type, or if preferred, entering the crop coefficient for that plant material.</p>						

Tested Technology Benefits

- **To water purveyor**
 - First step in identifying technologies
 - Rebates or other incentives
- **To manufacturers**
 - Validate product claims
- **To EPA WaterSense**
 - Technologies for product labeling
- **To irrigation industry**
 - Tools for efficient irrigation



SWAT Outreach Tools

- Market Research: barriers to change
- Identify target audience
- Create and test tools
- Deliver message
- Raise funds and repeat for new category

SWAT Tools for Water Providers

- **Marketing toolkit**

- Smart controller statement stuffers
- Homeowner smart controller direct mail package, self-mailer and jumbo postcard
- Contractor smart controller self-mailer and jumbo postcard

- **Customizable web template**

- Web pages to promote smart technologies
- Website resources – www.swatirrigation.org

SWAT Tools for Water Providers

Are you giving your landscape too much of a good thing?

Too much water can be as harmful to your landscape as too little. "Smart" sprinkler controllers monitor site conditions to automatically provide just the right amount of water to keep your landscape healthy and beautiful.

Get a \$250 rebate on any qualifying "smart" controller

>> See other side for details

LIMITED TIME OFFER



Statement Stuffer
Homeowner

Enhance the health and beauty of your landscape with a new, "smart" sprinkler controller.

Did you know that overwatering is often the most common cause of garden problems during hot weather? Excess watering suffocates plant roots and washes away fertilizers and soil nutrients, causing plants to look stressed, rot and turn yellow. Installing "smart" controllers in place of traditional timers can help solve this problem by applying just the right amount of water to your landscape to maintain optimal growing conditions.

How do "smart" controllers work?

"Smart" controllers use water more efficiently than traditional timers by monitoring your specific site conditions—including plant and soil type, slope, soil moisture, weather conditions and more—and automatically adjusting the watering schedule on an ongoing basis to provide the right amount of water for each part of your landscape each day.

To learn more about "smart" controllers, please visit our website at www.websitegoeshere.com

Take advantage of our \$250 limited time rebate offer on any qualifying "smart" controller.

Get a \$250 rebate when you upgrade your outdoor sprinkler system with a qualifying "smart" controller by Month X, 2006. For more information, including a program description, restrictions and eligibility requirements, or to download a rebate application, go to www.waterdistrictname.com/smartrebate



SWAT Tools for Water Providers

Keep your yard looking great and save hundreds of dollars a year on your water bill.

Install a "smart" sprinkler controller today.

Get a \$250 rebate on any qualifying "smart" controller.

Visit www.waterdistrictname.com/smart for details.



Water District Logo Here

Jumbo Postcard Homeowner



Save water—and money—by upgrading to a "smart" sprinkler controller.

"Smart" sprinkler controllers are a new, proven, easy-to-use way to improve outdoor watering efficiency while saving you money each month on your water bill. Unlike traditional sprinkler timers, which turn the water on and off based on a pre-set schedule, state-of-the-art "smart" controllers work by monitoring actual on-site conditions and automatically applying the right amount of water to your landscape to maintain ideal, healthy growing conditions.

Limited time offer:

Get a \$250 rebate when you upgrade your outdoor sprinkler system with a qualifying "smart" controller by Month X, 2006. Details about this special offer, as well as information about the benefits of "smart" controllers are available at our website: www.waterdistrictname.com/smartrebate. Or you can call the WATER DISTRICT Conservation Office at XXX-XXX-XXXX for more information.

LIMITED TIME OFFER

Water District
3456 Front Ave
Somewhere, XX 11111

First Name Last Name
123 Main Street
Anytown, XX, 99999

Third Class
U.S. Postage
PAID
City, ST
Permit No. XX



SWAT Tools for Water Providers

Water District
3456 Front Ave
Somewhere, XX 11111

Water District
3456 Front Ave
Somewhere, XX 11111

Water District
3456 Front Ave
Somewhere, XX 11111

Water District
3456 Front Ave
Somewhere, XX 11111

Self-mailer Contractor

"Smart" irrigation controllers are where your business is headed. ARE YOU READY? See inside for details.

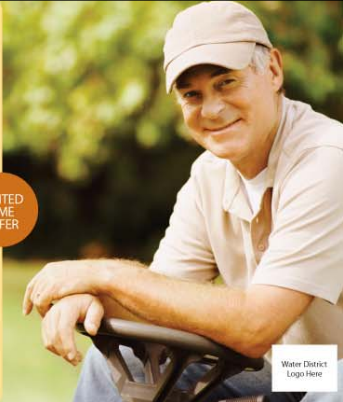
LIMITED TIME OFFER

First Name Last Name
123 Main Street
Anytown, XX, 99999

Grow your business with "smart" controllers.


LIMITED TIME OFFER

Discover how "smart" irrigation controllers and special incentives from <Water District> offer new, exciting growth opportunities for your business.



Water District Logo Here

Grow your business while helping <Water District> reduce outdoor water use.



Reducing outdoor water use has become a top priority in communities across the U.S., including ours. As a landscape professional, you have an important opportunity—and a vested interest—in helping to conserve our water resources for the future, and "smart" irrigation controllers are a key part of the solution.

What are "smart" irrigation controllers?

"Smart" controllers are a relatively new type of irrigation controller that work by monitoring and using information about site conditions (such as soil moisture, rain, wind, slope, soil and plant type, and more) to apply just the right amount of water to the landscape to maintain optimal growing conditions. And studies have proven that this reduces outdoor water use, often by as much as 30%.

Even better, "smart" controllers don't require ongoing monitoring and manual adjustments like traditional irrigation timers. Once a "smart" controller is installed and initial testing has assured the accuracy of

settings, the "smart" controller automatically takes care of seasonal weather/site specific adjustments. So you don't have to.

How "smart" irrigation controllers help you grow your business.

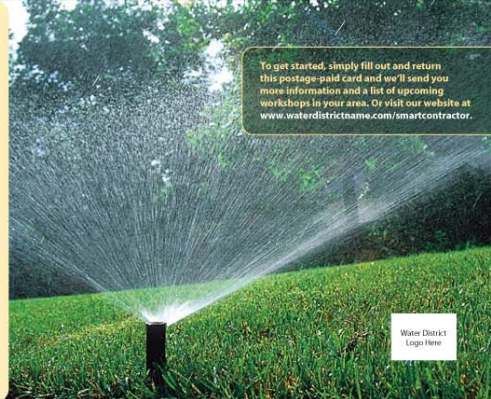
"Smart" irrigation controllers provide an exciting opportunity for landscape and irrigation professionals to expand and differentiate their service offerings in the growing area of water use efficiency and conservation. And right now, WATER DISTRICT is offering our customers special limited time incentives when they install a "smart" irrigation controller in place of their conventional timer.

The proper installation and initial set-up of "smart" irrigation controllers generally require an in-depth knowledge of soils, precipitation rates, slope measurements and related factors. WATER DISTRICT is strongly recommending to our customers that they work with a licensed landscape contractor who is specifically experienced and certified in the installation of "smart" irrigation controllers. That "Smart" Certified Irrigation Contractor could be you!

It's easy to become a <Water District> Certified "Smart" Irrigation Contractor. All you need is to be a state-licensed landscape or irrigation contractor and attend a WATER DISTRICT "Smart" Irrigation Contractor Workshop in your area.

In this workshop you'll learn about the different types of "smart" controllers, which models have been tested and approved for this program, how to properly install them, the importance of a full system audit, special "smart" controller discount incentives currently available to qualified customers, and more.

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To get started, simply fill out and return this postage paid card and we'll send you more information and a list of upcoming workshops in your area. Or visit our website at www.waterdistrictname.com/smartcontractor.

Water District Logo Here

Please send me more information about becoming a <Water District> Certified "Smart" Irrigation Contractor and a list of upcoming training workshops.

Name _____

Company _____

Title _____

Address _____

City _____ State _____ Zip _____

Phone (____) _____

Email Address _____

For faster response please visit our website at www.waterdistrictname.com/smartcontractor Or call the WATER DISTRICT Conservation Officer at XXX-XXX-XXXX.

SWAT Tools for Water Providers

Sample: Municipal Water District of Orange County

Are you giving your landscape too much of a good thing?

Homeowners, too much water can be as harmful to your landscape as too little. "Smart" sprinkler controllers monitor site conditions to automatically provide just the right amount of water to keep your landscape healthy and beautiful.



SMARTIMER
REBATE PROGRAM

LIMITED
TIME
OFFER

Homeowners:
Get up to a \$400 rebate
on any qualifying "smart" controller

See other side for details >





HOMEOWNERS

BUSINESSES



Save money and water with "smart" sprinkler controllers

Did you know that more than 50% of the water used by households goes to maintaining landscapes and lawns? You can help reduce your outdoor water use, keep your landscape more attractive and healthy—and save money every month on your water bill—by upgrading your landscape sprinkler system with a "smart" controller.

What makes smart controllers so "smart"?

[learn more](#)

Homeowners

"Smart" sprinkler controllers can keep your yard looking great and save you hundreds of dollars a year on your water bills.

[learn more](#)



Businesses

Maintain the appearance and enhance the value of your property with "smart" controllers.

[learn more](#)



Did you know?

>> Increasing population density and unpredictable weather patterns are putting ever-increasing demands on limited water resources.

Sample Web Template

SWAT Tools for Water Providers

**Sample:
Seattle Public Utilities**



Keep your yard looking great and save hundreds of dollars a year on your water bill.

Upgrade to a "smart" sprinkler controller.

Get up to \$450 off a qualifying "smart" controller.



How do "smart" sprinkler controllers work?

"Smart" sprinkler controllers use water more efficiently than traditional sprinkler timers by monitoring your specific landscape conditions and automatically adjusting the watering schedule to apply the right amount of water to maintain ideal growing conditions.

Benefits of "smart" controllers

Save money: Reduce outdoor water use by up to 30%—which can add up to significant savings on your summer water bills

Healthier, more beautiful landscaping: "Smart" controllers reduce stress on plants from over-watering and under-watering, helping them stay healthy and disease-free.

Easy to use: "Smart" controllers automatically adjust the watering schedule, eliminating the need for manual adjustments.

Good for the environment: "Smart" controllers make efficient use of limited water resources. They also help prevent landscape run-off that carries urban pollution into nearby creeks, lakes and the Puget Sound.

Limited time offer:

Get a \$300-\$450 rebate from the Saving Water Partnership when you upgrade your sprinkler system with a qualifying "smart" controller by December 2007. For rebate details and eligibility requirements ask your irrigation professional or go to:
www.savingwater.org/outside_sprinklers.htm



The Saving Water Partnership is a consortium of local utilities that fund water conservation programs in Seattle and King County.



SWAT Benefits

- Benchmark tested irrigation technologies
- National standard
- Effective water conservation tools
- Outreach and marketing materials
- Partnerships – direct access to the industry

Your Support Will Help

- Encourage water efficiency
- Reduce outdoor water use
- Promote conservation partnerships
- Increase environmental awareness among customers



SWAT Support

- Add new product categories to its testing program
- Evolve irrigation market behaviors and attitudes
- Get the word out
- Accelerate the move from traditional irrigation components to smart water application technologies

We're off to a great start ...



What you can do ...

- Annual donations
- Volunteer
- Participate in meetings or protocol review activities

**Learn more and find a donations form at:
www.swatirrigation.org**

Questions



jenna.smith@seattle.gov

SWAT History

- SWAT began in 2001
- 2002 – Smart controller meeting at CIT
- 2003 – IA Show, Smart Controller Protocol
- 2004 – IA Show, Smart Controller Protocol and \$100,000 donation from Hillsborough, Fl.
- 2005 – Smart Controller Market Research & IA Show
- 2006 – SWAT Website Launched and IA Show, Rain Sensors Selected
- 2007 – Rain Sensor Meeting in Gainesville, Florida and EBMUD tests SWAT Marketing Materials (1,500 rebates processed)
- 2008 – Soil Moisture Sensor Meeting at CIT