

<b>DOCKET</b>	
<b>09-AAER-1A</b>	
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# Accurate WeatherSet

8217 Corbin Ave  
Winnetka, Ca 91306  
818.993.1449  
www.weatherset.com  
andrewdavis@weatherset.com

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Docket # **09-AAER-1A**

Response to Key Questions dated May 29.

The response to these key questions will be limited to irrigation controllers.

1. How do we define waste?

When consideration of waste is applied to controllers, I think that there are only 2 meaningful measures. The first is accuracy of the controller automatically adjusting its programs to track the weather. The second measure is how well the controller responds to seasonal changes in crop coefficients. This second measure is especially important when watering California Native plants which should be more common plants in the future. California Natives have evolved to hibernate (reduce their need for water) in the summer when ETo is usually highest and to increase their metabolic activity (need for water) in the winter when seasonal rains usually occur.

2. How are landscape controller expected to help reduce these wastes? How effective are they?

The best measure of waste reduction is found in the 315 page study of ET controllers installed under Prop 13.

3. Definitions of specific terms. What are the applicable performance metrics?

An industry consensus has formed around the SWAT testing. I think that this is a bad consensus that does NOT satisfy the need for a meaningful measure of water waste reduction. Since crop coefficients change over the course of the year and since ETo reduces by 2/3 from summer to winter, the performance metric must be measured over the course of at least 1 year.

4. How do we maximizing water savings with a standard? What are the applicable performance metrics must be included industry standard?

When an irrigation system is performing inefficiently with poor uniformity, leaks, etc., a smart timer will have a larger benefit in reducing water waster than when the irrigation system is performing efficiently.

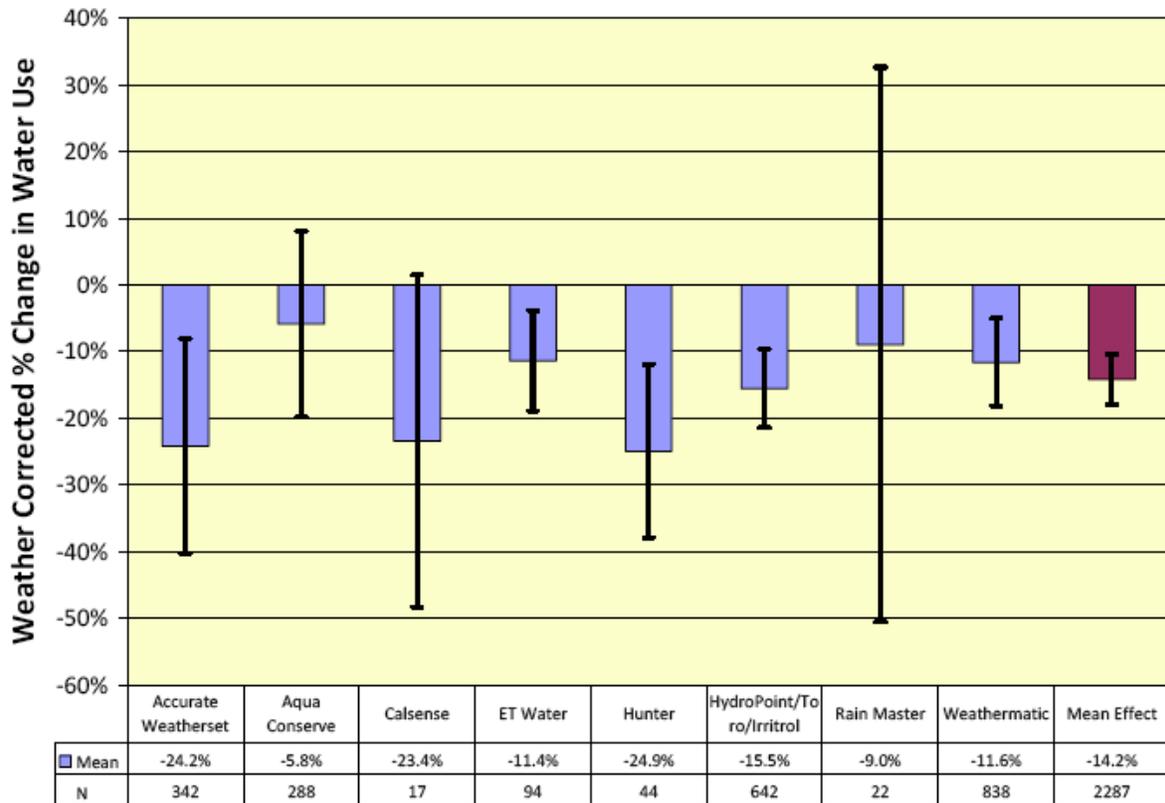
To maximize the water savings, the smart controller must track the weather closely. The performance metric included in this standard must rate the weather tracking performance of smart timers over time. All improvements and deteriorations in the efficiency of the irrigation system (leaks, etc.) will NOT obscure this metric of smart timers.

5. What measurements/protocols are used to verify these savings? Can these methods be applied to all types of controllers?

The industry consensus around the SWAT protocol is inadequate to measure water conservation. Below is chart of the SWAT testing results for most of the controllers found in the 315 page report on Prop 13 funded controllers. You will note from the SWAT test results, that all controllers performed nearly identically. So you would expect nearly identical results under Prop 13 study.

Product	Irr	Irr	Irr	Irr excess	Irr excess	Irr excess
	adequacy	adequacy	adequacy	minimum	maximum	average
	minimum	maximum	average	minimum	maximum	average
	6 zones	6 zones	of 6	6 zones	6 zones	of 6
			zones			zones
<u>Alex-tronic Enercon Plus</u>	100.0%	100.0%	100.0%	0.0%	3.6%	1.0%
<u>Alex-tronic Smart Cloc</u>	100.0%	100.0%	100.0%	0.0%	1.1%	0.2%
<u>AquConserve ET9</u>	100.0%	100.0%	100.0%	0.0%	1.3%	0.2%
<u>Calsense ET200e</u>	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
<u>Hunter ET System</u>	100.0%	100.0%	100.0%	0.0%	2.3%	0.5%
<u>IrriTrol SmartDial</u>	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
<u>Rainmaster RME Eagle</u>	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
<u>Toro Intellience</u>	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
<u>HydroPoint/WeatherTrak</u>	100.0%	110.0%	100.0%	0.0%	0.0%	0.0%
<u>Weathermatic</u>	100.0%	100.0%	100.0%	0.0%	2.3%	0.4%

Yet the second chart on the next page shows wide variation in multi-year field performance of these controllers. This chart is taken from page 25 (by Adobe Reader numbering) of the EVALUATION OF CALIFORNIA WEATHER-BASED “SMART” IRRIGATION CONTROLLER PROGRAMS funded by Prop 13. This study of Prop 13 provides test results that show meaningful water savings in the field when installed by homeowners and contractors across California. This metric is preferred over the short laboratory testing of 30 days in only one location.



**Figure ES.1: Weather-normalized % change in water use by controller manufacturer/brand with 95% confidence error bars**

6. Do we have definite measurements of water efficiency? How does this compare to add-on device to traditional timers? Could standard timers achieve similar savings?

Yes, we have definite measurement so water efficiency. See the study of Prop 13.

Add-on devices, which are not weather-based, to traditional controllers cannot match the water savings achievable by the best of the ET controllers. Any traditional controller can be programmed to duplicate add-on devices that are time-based. Add-on devices which are weather-based can save water with controllers manufactured by the same company that manufacturers the add-on devices. See the results above for Hunter adding-on their ET System to their controllers.

Standard timers could only achieve savings similar to ET controllers if they adjusted weekly. This weekly adjustment would require tremendous amounts of labor on the part of contractors and homeowners. In fact the study of Prop 13 charted above shows that, in practice, some ET controllers save as much as 24% over the previous water patterns of those properties.

7. Is there a common characteristic that can define the difference between “smart” and “dumb” controllers that could be the basis of a performance standard for water savings?

Yes. The common difference may be stated as “self-adjusting, weather-based irrigation.”

8. What are the mandatory elements of an irrigation system to ensure increased efficiency?

Self-adjusting, weather-based tracking of irrigation over the 12 months or more. A secondary element would be observance of changing crop coefficients over the course of a year.

9. Are new controllers or add-on devices compatible to existing irrigation systems?

Electrically, all irrigation systems standardized on 24VAC wiring to valves. So all new controllers and add-on devices are compatible to existing irrigation systems. Some new ET controllers that rely on broadcast signals may be reception problems in canyons or building where some irrigation control points are located.

10. Do we know whether the use of weather based controllers would result in net savings compared to current controller. How much? What should be the minimum expected water savings?

Yes. We know whether the use of weather base controllers will result in statewide net savings of water. Refer to the study of Prop 13 weather based controllers. I think that a savings of at least 15% should be required with a confidence range that is all positive. That would select Accurate WeatherSet, Hunter ET System and Hydropoint/Irritrol/Toro from the chart above.

11. What key elements should be required for labels of irrigation controllers?

An Irrigation Efficiency Rating (IER) should be placed prominently on the packaging and on the controller .

INITIALLY, the IER could be based on the Prop 13 study where IER of 100 be given for 24% water savings (maximum saved in practice) and 62 be give for 15% savings ( $15.24 = .625$  about equal to 62%)

On an ON-GOING BASIS, after the January 1, 2012 date, I recommend that the Energy Commission monitor and analyze the water consumption of new construction to verify that smart controllers installed in new construction track the weather. This on-going monitoring may encounter some regulatory problems to over-come privacy

restrictions to water bills. This on-going monitoring will also require extra reporting of the model and brand of the installed irrigation controller.

In this environment of analysis of water consumption on new construction, only weather based tracking with secondary concerns for varying crop coefficients will be meaningful since there will be no history of previous water consumption.

12. Is there adequate evidence to substantiate a specific standard of performance for all irrigation controllers?

YES. The study of Prop 13 weather based controllers shows the performance of irrigation controllers in the hands of homeowners and contractors which where water will be wasted to saved.

The only additional activity is to analyze water consumption over time on new construction as outlined in the previous answer. The statistical tools for such analysis has been defined the study of Prop 13.

13.The Energy Commission must do a cost benefit analysis as defined by statute. What costs should be used for unit of water saved?

The marginal cost of the purchase of new water.

14.What is the expected average life or irrigation controllers?

20 years.

**Docket Optical System - Docket Number 09-AAER-1A Irrigation Efficiency-Answer to Key Questions 6.15.2009**

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**From:** Accurate WeatherSet <andrewdavis@weatherset.com>  
**To:** Lorraine White <lwhite@energy.state.ca.us>  
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**Attachments:** Docket Number 09-AAER-1A Irrigation Efficiency-Answer to Key Questions.pdf

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FROM: Andrew Davis  
Accurate WeatherSet  
8217 Corbin Avenue  
Winnetka, Ca 91306  
818-993-1449  
FAX-0472  
[andrew.davis@weatherset.com](mailto:andrew.davis@weatherset.com)  
[www.weatherset.com](http://www.weatherset.com)

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