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wrote Johnson Bowie, Associate AD,
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Answer to John Mascaro's Photo Quiz on Page 33
include: ET (actual plant evapotranspiration); rainfall; site properties (soil texture, rootzone depth, water holding capacity); and MAD (managed allowable depletion).

The IA SWAT committee has proposed an equation for calculating this water balance. For more information, see the IA's website: http://irrigation.org.

**TESTING PERIOD**

The controllers were set up and allowed to run from April 11 to May 29, 2011 and from August 8 to November 20, 2011. Controller performance is reported over seasonal periods. For the purposes of this report, seasons are defined as follows: Spring: April 11 to May 29 (48 Days);

Summer: August 8 to September 4 (28 Days); Fall: September 5-November 20 (76 Days).

ETo was computed from weather parameters measured at the Texas A&M University Golf Course in College Station, which is a part of the TexasET Network. The weather parameters were measured with a standard agricultural weather station that records temperature, solar radiation, wind and relative humidity. ETo was computed using the standardized Penman-Monteith method.

**CONTROLLER PROBLEMS**

Four controllers experienced problems during the course of the study.

1. Controller A had a capacitor leak during the course of the study. This resulted in the controller software operating but not being able to turn valves on.

2. Controller C had a sensor module failure that was discovered during a routine check of controller status (power), the manufacturer was notified and a replacement was installed.

3. Although programmed and installed correctly, the Controller F failed to operate 4 out of the 6 programmed stations. The controller is currently being analyzed for a possible software or hardware malfunction.

4. Controller H experienced communication problems multiple times throughout the study.

Controller alerts (beeping) occurred on at least two occasions during the evaluation period.

The manufacturer was notified of the problem and a signal amplifier was installed on the controller. However, it was later determined that the problem was a result temporary poor signal service by the signal provider company in the testing area (a bad tower).

5. Controller D had a recall issued in late 2011 due to possible sensor malfunctions. As a result this model was discontinued and will be replaced with a newer for the 2012 year test.

**CONCLUSIONS**

Over the past 5 years since starting our "end-user" evaluation of smart controllers, we have seen improvement in their performance. However, the communication and software failures that were evident in our field surveys conducted in San Antonio in 2006 (Fipps, 2008) continue to be a problem for some controllers. In the past 4 years of bench testing, we have seen some reduction in excessive irrigation characteristic of a few controllers.

Our emphasis continues to be an "end-user" evaluation, how controllers perform as installed in the field. The "end-user" is defined as the landscape or irrigation contractor (such as a licensed irrigator in Texas) who installs and programs the controller.

Although the general performance of the controllers has gradually increased over the past 4 years, we continue to observe controllers irrigating in excess of ETc. Since ETc is defined as the ETo x Kc, it is the largest possible amount of water a plant will need if no rainfall occurs.