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To: Agriculture Water Use Efficiency
Subject: Potential Measurement Options

ASC,

This note will identify a potential problem with Option 2, Standard Based on Farm-Gate Accuracy Measured After Field Installation, that is inherent in random sampling.

Assumptions are standard for sampling and analysis of normally distributed populations:

- 1) no irrigation district will evaluate for accuracy all its measurement devices in a single evaluation campaign;
- 2) measurement devices will be periodically sampled on a random basis such that the same group of devices is not repeatedly sampled to represent the district's measurement accuracy.

The normality assumption is probably not a good one, but it will serve for the discussion below. Measurement devices, being arrayed along transmission systems, may also have spatially correlated error.

The range of individual accuracies comprising an average accuracy will be important, for it will suggest the probability that subsequent sampling campaigns may result in an average accuracy equal, better or worse than that required by regulation. We are concerned with meeting a standard. The greater the range, the more probable it will be that a district will generate in some future set of measurements an average accuracy that is non-compliant. Since the evaluations are assumed to be based on a random selection of measurement devices, any district could conceivably generate such a result. Also, any district may, with good fortune, produce a result that is better than their real accuracy.

Getting surprised by a poor average accuracy will please no one. If a district has been operating under an erroneous assumption of compliance, such a result will cause a crisis and may require unplanned expenditures. Districts that are in compliance in actuality may have to incur the costs of an additional round of sampling to demonstrate that fact. DWR, faced with a non-compliant result, will have to make decisions about an offending district's course of action that may seem arbitrary to one interest group or another.

This note is only cautionary. Districts that can use Option 1 are probably prudent to do so.

Regards,
Bob Siegfried