Agricultural Measurement Range of Options
Agricultural Stakeholders Advisory Committee*

SBX7 7 – Water Conservation
May 6, 2010
Final Draft

Bill Language

10608.48. (a) On or before July 31, 2012, an agricultural water supplier shall implement efficient water management practices pursuant to subdivisions (b) and (c).

(b) Agricultural water suppliers shall implement all of the following critical efficient management practices:

(1) Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 [….."An agricultural water supplier shall submit an annual report to the department that summarizes aggregated farm gate delivery data, on a monthly or bimonthly basis, using best professional practices].

(2) Adopt a pricing structure for water customers based at least in part on quantity delivered.

10608.48. (i) (1) The department shall adopt regulations that **provide for a range of options** that agricultural water suppliers may use or implement to comply with the measurement requirement in paragraph (1) of subdivision (b).

Measurement

Measurement of agricultural water is recognized to be complex, entailing unique design features foreign to municipal, industrial and environmental water management. Unlike other types of water delivery systems, irrigation methods and infrastructure can vary depending on the region, crops, age, water supply, and topography, amongst other things. Some systems are gravity fed, while others are pressurized. Some irrigation supplies are surface water dominated while others rely on groundwater or a combination of both. Ultimately, each system was designed to meet local irrigation conditions. The unique nature of irrigation infrastructure and operational constraints can make water measurement a challenge. For example, open canal systems often have aquatic weed growth that can break loose and interfere with the functionality of propeller meters. However, propeller meters have been shown to work well in pressurized systems, with little or no debris to interfere with the metered flow. These and many other irrigation system characteristics make each delivery system unique. As a result, it is difficult, if not impossible, to identify a one-size-fits-all approach to agricultural water measurement.

It is also recognized that it is not possible for all districts to fully implement a measurement program immediately, and will require a period of time to implement. Each agency that does not already meet the legislative requirement must identify appropriate measurement

and recording method(s) for their system, make needed structural modifications, and purchase and install the equipment required to implement the measurement program. It is anticipated that Districts will use the most cost effective means of water measurement for their agency that meets the legislative requirements.

Measurement Methodologies Options

At an agricultural stakeholder's meeting on January 19, 2010, the importance of complying with the new legislative requirements was addressed, along with the various methods by which districts measure water deliveries/service to customers. The group discussed accuracy requirements and infrastructure/operational constraints and how they may influence measurement options along with specific methods currently employed by districts. Different measurement programs, each designed and evolving over generations to meet the needs of different regions or districts throughout the state, were found to exist. Considering the wide variety of distinct water management scenarios districts face, no uniform application of a single measurement system is feasible. Those present discussed their district's unique methods, recognizing that what is appropriate and feasible for one region is often inappropriate in another. Methods mentioned by districts attending included ET_0-based use, submerged orifice plates, sidegate measurement and propeller meters.

One consideration, which many districts seemed to agree on, is that Districts do not have the ability (legal or otherwise) to install, maintain, or monitor physical measurement structures beyond the boundaries of the District's conveyance system. As a result, each of the following measurement options are designed to measure flows as they leave District-owned facilities. For the purposes of this exercise, that point is considered the farm gate. From the delivery point, it is assumed the water is the customer's, whether it is irrigated directly onto a field, or must travel through a private or community conveyance facility to reach the field.

Measurement Options

Discussion regarding measurement resulted in the suggestion to consider developing a suite of measurement options to meet those varied and diverse needs of agricultural water management in California. A suite of measurement options would help to encompass the many different requirements made of those entrusted with the management of agricultural water in California. During discussion of various forms of measurement, four alternatives were identified by water agencies as methods being used in the field today to meet the metering/measurement requirements. Each is a generalized approach, which could be tailored to meet individual needs.

1. Basinwide analysis, service area balance
2. At water agency laterals, which would contain multiple turnouts
3. At farmer/end customer turnout, instantaneous/cumulative
4. Metering which meets the requirements of CVPIA 3405(b)

Approved methods to comply with SB7X-7 and Details (to be provided by discussion group volunteers)

1. Basinwide Analysis, Service Area Balance

METHOD OF BASINWIDE/SERVICE AREA BALANCE:
This analysis combines the total developed/dedicated supplies, uses, and operational characteristics and can be evaluated for a service area that has similar characteristics, a water agency, or a hydrologic basin. The benefit of this analysis is that it evaluates the efficiency of entire surface and groundwater system providing an overall assessment, whereas, a field assessment or a turnout measurement cannot. Such an approach is also consistent with the water management planning process, which requires a water balance be developed and analyzed. For 2009 California Water Plan Update, the Department of Water Resources is now evaluating water supply and demand for the state and regions, using a water balance approach (see Page 4 http://www.waterplan.water.ca.gov/docs/cwpu2009/1009prf/highlights_pre-final_draft_spread2-101609.pdf)

2. Lateral

PURPOSE OF LATERAL MEASUREMENT:
This method will quantify the volume of water used in a specific reach of canal or pipeline system where there is a specified beginning point (head gate) and an end point (spillway or terminus) and link such water supply with the on-farm user of water. With a means to measure such volume of water, volumetric pricing of water can also be implemented. This form of measurement should be cost effective and allows an agricultural water supplier time to begin taking steps to ultimately measure water at the farm-gate level within a reasonable period of time, i.e. five years.

METHOD OF LATERAL MEASUREMENT:

Daily measurements would be taken of water to and from each lateral, i.e., canal or pipeline. By comparing such use with evapotranspiration (ET) and a factor for in-lieu recharge, depending on soil type, a measured volume of water can be determined. Individual unmeasured turnouts would need to be linked to parcels that receive surface water. There would need to be a daily accounting for water deliveries to turnouts, thus determining what parcels were using water. As a result, measured water use per day, per parcel could be accounted for on a daily basis. Such measured water would need to be reconciled with crop consumptive-use on a seasonal basis to validate reasonable crop use rates with measured applied rates prior to billing for water use and reporting of aggregate water use as required under current law. Landowners shall be noticed of annual water use with a thirty-day protest period and public hearing to address concerns prior to billing and reporting.

3. At turnout, instantaneous / cumulative

Purpose of Turnout Measurement
This method of measurement quantifies volumes of water delivered to customers at the farmgate through calculation or direct measurement of flow.

Methods of Turnout Measurement

Method 1: Flood Irrigation Delivery
Flood irrigation pipeline turnouts off the surface water distribution system are generally set up as metergates. Under this method of measurement, the difference between the water level on the upstream side of a canal gate, and the water level immediately behind the downstream side of the gate, is measured in order to establish the head pressure across the gate opening. Each canal gate manufacturer has developed discharge tables based on the gate opening (usually measured as a gate stem height), based upon gate diameter and head pressure differential. A gate stem height setting is established, and the start and stop times for each irrigation event, is recorded by field personnel. The elapsed time (duration) is then multiplied by the instantaneous flow rate (determined from the discharge table readings for that particular flow structure) to determine the volume of water delivered for that particular irrigation event.

Method 2: Pressurized Irrigation Delivery
New pressure irrigation systems installed by growers can be equipped with a flow meter. The vast majority of these installations are propeller type flow meters that are installed on the downstream side of the system's filter in order to avoid clogging the propeller with material present in the unfiltered surface water. These meters measure both instantaneous flow (typically in GPM) and volume (typically in acre-feet). In some cases, deliveries to these types of systems also use the method described above (Method 1).

4. Measurement required by Bureau contract
Central Valley Project Improvement Act section 3405(b) mandates the measuring of water use. Specifically the section states:

> "All Central Valley Project water service or repayment contracts for agricultural, municipal, or industrial purposes that are entered into, renewed, or amended under any provision of Federal Reclamation law after the date of enactment of this title, shall provide that the contracting district or agency shall ensure that all surface water delivery systems within its boundaries are equipped with water measuring devices or water measuring methods of comparable effectiveness acceptable to the Secretary within five years of the date of contract execution, amendment, or renewal, and that any new surface water delivery systems installed within its boundaries on or after the date of contract renewal are so equipped. The contracting district or agency shall inform the Secretary and the State of California annually as to the monthly volume of surface water delivered within its boundaries

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