Irrigation Training and Research Center

California Polytechnic State University
San Luis Obispo
Flow Measurement Update
by Dr. Stuart Styles
26 January 2012

- Introduction
- USBR water management plan update
- “Accuracy” defined
- Devices
- Documentation requirements
- Other agencies and new guidelines
- Summary
Flow Measurement Update

• **Introduction**
  - USBR water management plan update
  - “Accuracy” defined
• Devices
• Documentation requirements
• Other agencies and new guidelines
• Summary
Cal Poly Water Resource Facility
New Hydraulic Equipment
NIST Traceable Weigh Tank
Student Hours
Over 12,000 per year
Flow Measurement Update

• Introduction
• **USBR water management plan update**
• “Accuracy” defined
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• Summary
Water Conservation
Standard Criteria for Evaluating Water Management Plans

Reference:
USBR – New Guidelines

• Water measurement – documentation in support of verifying measurement accuracy (e.g. +/-6%) must be submitted.

• Note: “Documentation is what is the new item. The +/-6% has been in place for 20+ years.”
Flow Measurement Update

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Accuracy

The percent shall be calculated as:

\[ 100 \times \frac{\text{measured value} - \text{actual value}}{\text{actual value}} \]

Example: Metergate reading – 10.3 CFS
Current meter reading – 10.6 CFS

\[ \text{Flow Rate Accuracy} = 100 \times \frac{10.3 - 10.6}{10.6} = -2.8\% \]
Accuracy

Flow Rate Accuracy is not the same as Volumetric Accuracy.

Volumetric Accuracy must take into account the time that water was delivered using one of 2 options:

- Propeller meters (or any meter with a totalizer)
- Any calibrated measurement device equipped to make flow rate measurements at frequent intervals
Gas Station 5-Gallon Accuracy
+/-0.5%
ITRC Weigh Tank – Accuracy +/-0.1%
NIST Traceable
USBR: BMP Language

Measure the volume of water delivered by the Contractor to each customer with devices that are operated and maintained to a reasonable degree of accuracy, under most conditions, to +/- 6 percent.
# Accuracy

## Potential Flow Rate Accuracy Assuming Proper Installation and Maintenance

<table>
<thead>
<tr>
<th>Device Category</th>
<th>Example Types</th>
<th>USBR - Lab (Flow Rate)</th>
<th>ILRI20 - Lab (Flow Rate)</th>
<th>Reference &amp; Notes (See footnotes for links to references)</th>
<th>ITRC - Field (Flow rate)</th>
<th>Reference &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipelines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propeller meters</td>
<td></td>
<td>2%</td>
<td>5%</td>
<td>USBR - Section 14-4, Pg. 14-12. ILRI20 - Table 3.1, Section 9.7. Must have at least 8-10 diameters upstream and 4 diameters downstream. Meters must be maintained and checked for accuracy at least every 5 years. See the link below from the USBR-MPR for the maintenance and protocol requirements. ITRC note: It is possible to place customized flow conditioning upstream that minimizes errors due to rotating flow and non-symmetric flow. Propeller meters are sensitive to trash accumulation. Some models have serious bearing problems with sand/silt.</td>
<td>5%</td>
<td>Estimated by ITRC</td>
</tr>
<tr>
<td>Magnetic meters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full bore</td>
<td></td>
<td>1%</td>
<td></td>
<td>USBR - Section 14-6, Pg. 14-18. Recommended to have at least 2 diameters upstream and 1 diameter downstream. Major differences between manufacturers. Some have built-in flow conditioning. One of the most accurate flow measurement devices.</td>
<td>3%</td>
<td>Estimated by ITRC</td>
</tr>
<tr>
<td>Insert</td>
<td></td>
<td>---</td>
<td>---</td>
<td>ITRC notes: Insert meters must have an excellent straight section of pipe upstream and downstream; accuracy is limited. Not recommended for turnouts.</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td><strong>Acoustic Meters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transit-Time</td>
<td></td>
<td>2%</td>
<td></td>
<td>USBR - Section 11-1, Pg. 11-3. ITRC notes: Results with &quot;dry&quot; transducers can be variable.</td>
<td>5%</td>
<td>Estimated by ITRC</td>
</tr>
<tr>
<td>Doppler</td>
<td></td>
<td>2%</td>
<td></td>
<td>USBR - Section 11-8, Pg. 11-15. Highly dependent on the canal section to obtain good accuracy. ITRC note: There are huge differences in quality among the manufacturers. Some are excellent; some are very undependable and have been abandoned by irrigation districts.</td>
<td>5%</td>
<td>Estimated by ITRC</td>
</tr>
<tr>
<td><strong>Differential head meters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venturi</td>
<td></td>
<td>1%</td>
<td></td>
<td>USBR - Section 14-3</td>
<td>5%</td>
<td>Estimated by ITRC</td>
</tr>
<tr>
<td>Orifice</td>
<td></td>
<td>1%</td>
<td></td>
<td>USBR - Section 14-3. ITRC notes: Few orifice meters used in agricultural irrigation turnouts because of narrow range of flow rate accuracy, head loss, and difficulty in measuring the difference in head. Not recommended for turnouts</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td><strong>Electricity KWH meter</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metergates</td>
<td></td>
<td>2.5%</td>
<td>6%</td>
<td>USBR - Section 9-14, Pg. 9-23. ILRI20 - Table 3.1, Section 8.6. Main issue is that the standard conditions used to create the flow tables must be met. In addition, the following specific conditions must be met: &quot;Zero&quot; height is when the gate starts to leak and must be verified for each gate. Always pull up on shaft to take a reading. Keep the bottom of the gate entrance clean/clear to maintaining a constant flow characteristic. A water level in the downstream pool is not same as a properly set stilling well 12-in behind the gate. Eddies or vortexting at the gate entrance will generally cause an overestimation of the flow rate. The accuracy is poor if the gate is more than 70% open. If installed according to a manufacturer's specifications, with a well-calibrated chart provided by the manufacturer, results can be good.</td>
<td>5%</td>
<td>Estimated by ITRC</td>
</tr>
</tbody>
</table>
## Accuracy

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Calibrated</th>
<th>Estimated by ITRC</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibrated slide or sluice gates</td>
<td>2%</td>
<td>5%</td>
<td>Estimated by ITRC. ITRC notes: Numerous conditions for calibration must be met, as with metergates. Standard textbook calibrations are rarely satisfactory. Calibration must correspond to the specific dimensions and inlet/outlet conditions. Must constantly be in either free flow or submerged conditions.</td>
</tr>
<tr>
<td>Constant Head Orifice</td>
<td>3%</td>
<td>5%</td>
<td>USBR - Section 7-17. ILRI20 - Table 3.1, Section 5.1. ITRC notes: In general, there is insufficient head in California for widespread usage of these.</td>
</tr>
<tr>
<td>Weirs</td>
<td>Rectangular</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>V-notch</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Cipoletti</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>Acoustic Meters</td>
<td>Transit Time</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Doppler</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Doppler with control section</td>
<td>---</td>
<td>3%</td>
</tr>
<tr>
<td>Flumes</td>
<td>Parshall</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Replogle Flumes, aka &quot;Ramp flume&quot;, &quot;broadercrest weir&quot;</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>Cutthroat Flumes</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Radial gate</td>
<td>---</td>
<td>5%</td>
</tr>
</tbody>
</table>

**USBR Reference (9mB):**
http://www.usbr.gov/pmts/hydraulics_lab/pubs/wmm/wmm.html

**ILRI 20 Reference (18.6 mB):**
Note: Most of the accuracy values are from Table 3.1 - Column 14

**USBR-MPR Maintenance and Protocol Requirements for Flow Rate Measurement:**
Flow Measurement Update

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- **Devices**
- Documentation requirements
- Other agencies and new guidelines
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USBR Turnout Devices

Category I
The first category includes devices with totalizers that measure volume. These devices might measure velocity, flow rate or volume directly. All of these devices will provide a direct volumetric reading. The devices in Category I include:

- Propeller meters
- Venturi meters with flow recorders
- Magnetic meters
- Acoustic meters

These have a high level of accuracy with proper installation and periodic maintenance and calibration.
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Traditional Flow Measurement Device for Pipelines: Propeller Meters
Propeller Meters

• Advantages
  - Easy to use
  - Relatively low cost

• Disadvantages
  - Sensitive to plugging
  - Sensitive to turbulence
  - Inaccurate at low velocity (less than 1 fps)
Most popular
Saddle-type Propeller Meter
Propeller meters are used in the vast majority in the irrigation districts of California.
Propeller Meter with weir box

Cordua ID
Trash Problem on a Open Propeller Meter
Venturi Meter
TCCA – Venturi Meters
Magmeters

• Various sizes available

• Range up to 100:1

• Accurate (+/- .5%)
Advantages of Magmeters

- No moving parts
- Good for highly erosive and corrosive fluids
- Not impacted by sand, sediment, algae
ITRC Testing in Poor Hydraulic Conditions
Magnetic meters in Patterson Irrigation District
Acoustic Meters

- Transit Time
- Doppler
Transit Time Acoustic Meter

Fluid Flow

Ultrasonic Signal Path
Transit Time Acoustic Meter
TCCA, DEID – Sontek SW Doppler Meter
New Sontek IQ Doppler Meter
Trash Problems on Dopplers
Category II

The second category involves devices used for open channels. The second category includes:

1. Standard flow measurement devices that measure flow rate and also require accurate measurements (hourly or more frequently) of water level or,

2. The same standard devices combined with excellent canal water level control using positive means such as flap gates, long-crested weirs, or properly designed PLC-controlled water level control gates.
Weirs
Cipolletti Weir
TCID - Rectangular Weir
Replogle Flumes
Turlock Irrigation District
2,100 CFS
Firebaugh Canal Water District
100 CFS – Redwood Flume
Westlands Water District

Small Flumes
WinFlume
USBR-Denver
WinFlume Set-up Screen
Replogle Flume at Gila Gravity Main Canal
Replogle Flume at Gila Gravity Main Canal
New Device by ITRC
Subcritical Contraction with Doppler
USBR Turnout Measurement

Category III

The third category includes non-standard, individually calibrated flow measurement devices. These are often special measurement devices developed by an irrigation project. Typically, there are no published standard dimensions or flow tables for such devices. Requirements for acceptability would include:

• Consistent dimensions and installations
• Accurate determination of delivery time
• Local calibration and a verification of accuracy, based on a representative sample number of devices measured over time (see guidelines later in this document)
• A proposed schedule for maintenance and calibration
USBR Turnout Measurement

Category III

Devices in this category also require:

- Accurate measurements of water level (taken hourly or more frequently), or
- Excellent water level control using positive means such as flap gates, long-crested weirs, or properly designed PLC-controlled water level control gates, along with delivery time to determine volumes, or
- Adequate delivery pools for accurate deliveries (demonstrated with a verification procedure)

This category also includes calibrated pumps in cases where the suction-side water level fluctuation is small when compared to the total lift (+/- 5 percent) and the discharge pressure does not change with time.
Metergate
Metergate
Metergate
Key:
Location of the differential head measurement
### 8" Armco Metergate - Model 101

<table>
<thead>
<tr>
<th>Head (mm)</th>
<th>Net Gate Opening (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30 1.31 1.32 1.33 1.34 1.35 1.36 1.37 1.38 1.39 1.40 1.41 1.42 1.43 1.44 1.45 1.46 1.47 1.48 1.49 1.50 1.51 1.52 1.53 1.54 1.55 1.56 1.57 1.58 1.59 1.60 1.61 1.62 1.63 1.64 1.65 1.66 1.67 1.68 1.69 1.70 1.71 1.72 1.73 1.74 1.75 1.76 1.77 1.78 1.79 1.80 1.81 1.82 1.83 1.84 1.85 1.86 1.87 1.88 1.89 1.90 1.91 1.92 1.93 1.94 1.95 1.96 1.97 1.98 1.99 2.00</td>
</tr>
</tbody>
</table>
Submerged Orifice
Upstream Water Level

Gate Opening

Downstream Water Level

Measurements for Flow Rate
USBR Turnout Measurement

Category IV

A fourth category includes using rough estimates of flow rate or volume, such as flow-rate estimates at check structures or the sum of siphon tubes (or other methods of measurement not specified here). These approaches are NOT acceptable since they do not provide a documented reasonable degree of accuracy.
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1. *Turnout calibration equations*

If all similar turnouts (such as meter gates of a specific size) use the same equation of discharge, provide a description of all such similar groups along with their discharge equations and calibration coefficients.

If turnouts have been individually calibrated, provide a list of turnouts and locations and the equations and various calibration coefficients that have been developed.
2. Standardization of inlet and valve conditions

Provide photos of at least 10 devices of each of the same design showing verification that the inlet, valve placement, etc. conditions are the same within each group (e.g., if there are four different designs (not sizes), there would be four groups of photos, each group with 10 turnouts).
3. Procedures and equipment for flow rate verification

Provide documentation of field procedures and equipment used to verify instantaneous flow rates for discharge equation calibration purposes, through at least 15 turnouts that span the range of possible designs and conditions of turnouts in the district. This verification procedure has to be conducted with accurate flow measurement verification equipment to avoid errors.
Calibration

CRIT Main Canal

Mean Velocity, fps

Argonaut SL Index Velocity, fps

$V_m = V_{SL}(1.995 - 0.080H) - 0.192$

$r^2 = 0.99$

10 Points using multiple regression required for +/-5% accuracy
Calibration

Uncertainty Based on:
1 Standard Deviation

“Excellent” means $\leq 2\%$
“Good” means $\leq 5\%$
“Fair” means $\leq 8\%$
“Poor” means $\geq 8\%$
Current Meters
Current meter
Price AA
Current meter
Price AA
Current meter
Price AA
## Truckee-Carson Irrigation District

### Discharge Measurement Notes

<table>
<thead>
<tr>
<th>Station</th>
<th>Angle coef</th>
<th>Dist. from initial point</th>
<th>Width</th>
<th>Depth</th>
<th>Observation</th>
<th>Revo</th>
<th>Time in second</th>
<th>Mean in</th>
<th>hor angle</th>
<th>Area</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1-8-4-T1</td>
<td>1.0</td>
<td>0.00</td>
<td>1.2</td>
<td>.50</td>
<td>2.94</td>
<td>1.61</td>
<td>1.61</td>
<td>1.47</td>
<td>2.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>7/7/99</td>
<td>Party Watkins</td>
<td>2.0</td>
<td>.90</td>
<td>2.98</td>
<td>1.68</td>
<td>1.83</td>
<td>2.68</td>
<td>4.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge</td>
<td>25.73</td>
<td></td>
<td>3.0</td>
<td>1.00</td>
<td>3.00</td>
<td>2.13</td>
<td>1.94</td>
<td>3.00</td>
<td>5.82</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Gage Readings

<table>
<thead>
<tr>
<th>Time</th>
<th>Recorder</th>
<th>Inside</th>
<th>Outside</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:19</td>
<td>Bay reference @ L1-8</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>12:15</td>
<td>&quot;</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>11:21</td>
<td>L1-8 stem overall</td>
<td>1.70</td>
<td></td>
</tr>
<tr>
<td>12:16</td>
<td>&quot;</td>
<td>1.70</td>
<td></td>
</tr>
<tr>
<td>11:30</td>
<td>Bay reference @ L1-8-4</td>
<td>2.52</td>
<td></td>
</tr>
<tr>
<td>12:11</td>
<td>&quot;</td>
<td>2.54</td>
<td></td>
</tr>
<tr>
<td>11:31</td>
<td>L1-8-4 stem overall</td>
<td>3.74</td>
<td></td>
</tr>
<tr>
<td>12:12</td>
<td>&quot;</td>
<td>3.74</td>
<td></td>
</tr>
</tbody>
</table>

### Water Order #

- Meter #: 784 Flomate 2000

### Remarks

- L1-8 headgate measurement
- U-2.40, D-3.00, G-3.65, S-4.97, L-5.10 = 29.28 cfs.
- O.T.B. @ the check next to the L1-8 headgate
- U-92, B-1.98, L-7.05 = 26.93 cfs.

The bay at the L1-8-4 headgate was up to the top of the structure. There was water going over the top of the L1-8 spill flashboards, as well as the L1-8-T10 gate.
Doppler on a boat
New ITRC Portable Calibration Device
4. Equations for flow measurement verification

Provide well-explained computations and equations used for verification of flow measurement accuracy for each type of turnout (e.g., what % accuracy, on what percentage of delivered volumes).
KEY

Combine the flow rate accuracy with the inaccuracy in volume measurement that is inherent with varying canal water levels or pipeline pressures to compute the overall accuracy of the volumetric measurements of the district. Show all equations and values in a neatly organized, well-explained procedure.
## Volumetric Accuracy

<table>
<thead>
<tr>
<th>Initial Head across the turnout, ft.</th>
<th>AVERAGE rise in the pool water level after the initial flow measurement, ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>32.0</td>
</tr>
<tr>
<td>0.2</td>
<td>17.6</td>
</tr>
<tr>
<td>0.3</td>
<td>12.2</td>
</tr>
<tr>
<td>0.4</td>
<td>9.3</td>
</tr>
<tr>
<td>0.5</td>
<td>7.6</td>
</tr>
<tr>
<td>0.6</td>
<td>6.4</td>
</tr>
<tr>
<td>0.7</td>
<td>5.5</td>
</tr>
<tr>
<td>0.8</td>
<td>4.8</td>
</tr>
<tr>
<td>0.9</td>
<td>4.3</td>
</tr>
<tr>
<td>1.0</td>
<td>3.9</td>
</tr>
<tr>
<td>1.2</td>
<td>3.3</td>
</tr>
<tr>
<td>1.4</td>
<td>2.8</td>
</tr>
<tr>
<td>1.6</td>
<td>2.5</td>
</tr>
<tr>
<td>1.8</td>
<td>2.2</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>2.5</td>
<td>1.6</td>
</tr>
<tr>
<td>3.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>
Volumetric Accuracy

Example: Metergate reading – 10.3 CFS
Current meter reading – 10.6 CFS

Flow Rate Accuracy =
100 x \(\frac{10.3 - 10.6}{10.6}\) = -2.8%

Volumetric Accuracy =
Table value for 3 ft drop and 0.25 ft fluctuation = -3.3%

Combined \% error = \(\sqrt{\text{(% flow meas. error)}^2 + \text{(% volumetric error)}^2}\)

Combined Accuracy = \((2.8^2 + 3.3^2)^{0.5}\) = 4.3%
Volumetric Accuracy

- Strong link between Volumetric Accuracy and Modernization
- Automation and SCADA = constant pools

**SCADA System**

1. Monitoring Computer
2. Phone, Radio, etc.
3. PLC/RTU
4. Sensors/switches

**ITRC**

*moving water in new directions*
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USBR-TCID Agreement
75% of the delivered volume to be measured within +/-10%

Truckee Carson Irrigation District
50 CFS
DWR – New Guidelines
SB7x7

- Ag plans accepted by USBR also comply with State Water Management Plan requirements

- Note: Not approved as of 26 January 2012
DWR – New Guidelines

1) An existing measurement device shall be certified to be accurate to within **±12% by volume**.

2) A new or replacement measurement device shall be certified to be accurate to within:
   
   A) **±5% by volume** in the laboratory if using a laboratory certification;
   
   B) **±10% by volume** in the field if using a non-laboratory certification.
NOTICE OF OPPORTUNITY TO COMMENT
GUIDANCE FOR COMPLYING WITH WATER DIVERSION MEASUREMENT REQUIREMENTS
FOR STATEMENT HOLDERS

• Starting January 1, 2012, all diverters of surface water or pumped groundwater from a known subterranean stream must measure their water and submit a monthly report
Examples of Alternative Measurement Methods

- **Propeller Meter/Turbine Meter:** A device that uses an internal propeller or turbine to determine the inline flow rate.
  - www.mccrometer.com
  - www.netafimusa.com/agriculture
  - www.watermeters.com

- **Acoustic Meter:** A device that uses a sensor to transmit an ultrasonic sound signal into a pipe.
  - www.mccrometer.com
  - www.elsteramcowater.com
  - www.macemeters.com
  - www.usabluebook.com

- **Flow Totalizer:** A device that totalizes measured flow through a flow meter.
  - www.mccrometer.com
  - www.netafimusa.com/agriculture

- **Slide/Sluice Gate:** A gate valve opening that has been calibrated to measure flow.
  - www.watermanusa.com

- **Weir:** An overflow dam with a designed edge or notch.
  - www.water.siemens.com

http://www.swrcb.ca.gov/waterrights/water_issues/programs/diversion_use/wm_vendors.shtml
Examples of Alternative Measurement Methods

http://www.swrcb.ca.gov/waterrights/water_issues/programs/diversion_use/wm_alt_mthds.shtml

All methods discussed below require that a daily log book or other recording device be maintained.

- Electricity Records Dedicated to the Pump
- Total Facility Records minus Estimated Non-Pump Electricity
- Staff Gage and Storage-Capacity Curve
- Pressure Transducer and Storage Capacity Curve
- Power Generation Estimates
- Remote Satellite Imaging
- Crop Duty Estimates/Consumptive Use Estimates
- Other Water Duty Estimates Other than for Crops
- Pipe/Trajectory Method
- Modeled/Estimated Flows
- **Bucket and Stopwatch**
- Engine Fuel Use
- Staff Gage and Floodable Acreage
- **Float and Stopwatch**

Note: There is no accuracy requirement with the new guidelines from the SWRCB (yet)
Flow Measurement Update

- Introduction
- USBR water management plan update
- “Accuracy” defined
- Devices
- Documentation requirements
- Other agencies and new guidelines

Summary