FLOW MEASUREMENT CLASS
DR. STUART STYLES

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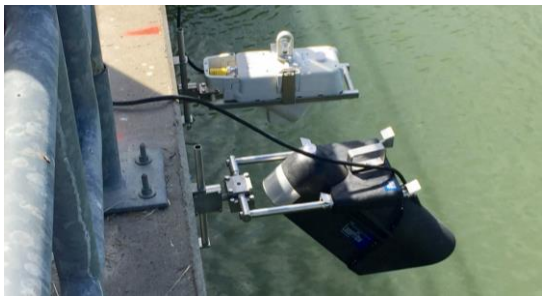
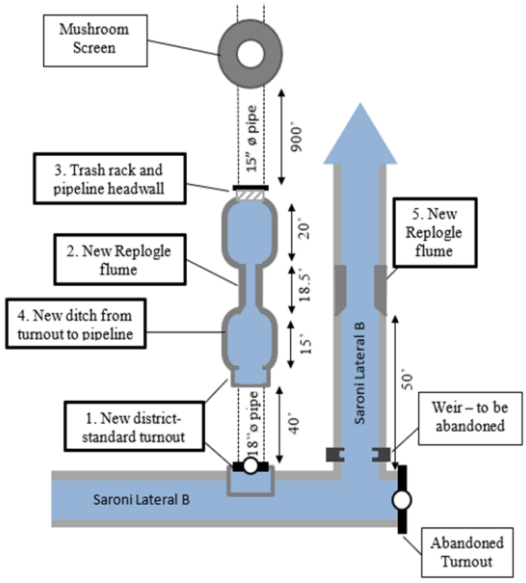
The Irrigation Training & Research Center (ITRC) at Cal Poly State University, San Luis Obispo, will be presenting a 3-day field course for staff, field operators, engineers, and board members of agricultural irrigation/water districts. This will be a custom class for operators can be designed for the conditions at northern Nevada irrigation districts.





Course Topics

Flow Measurement – Pipelines

Principles of flow measurement for open and closed systems; common measurement devices: propeller, magnetic meters, venturi, metergate; how to take accurate readings; address common accuracy issues. New material on magnetic meters.

Flow Measurement – Canals

Equations for canals; weirs and flumes; corrections for common problems; current metering techniques using traditional equipment as well as the new dopplers. New material on using gates for measurement.

Canal Operations

The service concept, including farmer constraints and needs; purposes of different check structures; water level vs. flow rate control; minimizing tail ender problem while still achieving good service; how to get more water through various structures; introduction to SCADA; interaction between canals and turnouts.

Custom Class:
September 10-12, 2024 at the
Walker River Irrigation District
8am - 3pm with breaks at 10:30 and Noon

*Fee: $100/person for all U.S. irrigation districts;
$600/person for participants from outside the U.S.
All fees include class materials and software.

Registration:
In Person: WRID Office 410 N Main Street, Yerington, NV
Phone: (775) 463-3523
Email: water@wrid.us

ITRC
moving water in new directions

IRRIGATION TRAINING & RESEARCH CENTER
California Polytechnic State University
San Luis Obispo, CA 93407-0730 www.itrc.org

Principles of Flow Measurement at Walker River Irrigation District

Stuart Styles - Irrigation Training and Research Center
Cal Poly State University San Luis Obispo

Day 1

8:00 **Start/Introductions**

8:10 **Overview of Class and Terminology**

- Overview of devices used for flow rate measurement
- Basic equations and units
- Basic types of devices: velocity and head principles

8:30 **Details on Devices – Open Channel**

Weirs

- Types of weirs (rectangular, trapezoidal, v-notch)
- Advantages (low cost, simple)
- Installation details (vertical, crest, zero reference, measurement point)
- Submerged flow and slanted weir measurements
- Velocity of approach
- Contracted vs. suppressed (weir tables)
- Common questions about weirs (aeration of nappe, submergence, slanted weir)
- Model demonstration

Flumes

- Types of flumes
- Advantages (lower head, pass trash, fit into existing channels)
- Installation details (ramp, sill, zero reference, construction tolerances)
- Measuring the head

Metergates

- Unique rating tables
- Installation details (location of whistle pipe - 12 in, pipe dimensions, submerged flow, gate opening - 70%, “zero height”, change of pipe material)
- Measuring the Head (differential head)
- Model demonstration

Orifice Gates

- 4 flow conditions
- Submerged, free flow conditions

12:00 Lunch

1:00 **Field Flow Rate Measurements – Saroni Lateral B**

Current meters, FlowTracker II, ITRC weir stick, weir board, Parshall Flume, Replogle Flume

3:00 End of Day 1

Principles of Flow Measurement for Open and Closed Systems

Stuart Styles - Irrigation Training and Research Center
Cal Poly State University San Luis Obispo

Start of Day 2

8:00 **Review from Day 1 field work**

8:00 **Doppler Measurements**

- M9 Sontek Boat
- Flow Tracker II
- Non-Contact Meters

11:00 **Basic flow measurement concepts for pipelines**

- Overview of pipeline applications
- Velocity and area measurement
- Head measurement
- Need for full pipe flow
- Turbulence issues and how to resolve
- Accuracy of devices
- Typical errors and how to correct them

Details on devices - pipelines

Propeller meter

- Needle vs. totalizer readings
- Meter location in pipe
- Maintenance of the meters

Magnetic Meter

- No obstructions in pipe
- +/- 0.5% accuracy

Venturi

- Traditional pipeline measurement device

12:00 Lunch

1:00 **M9 Boat Demonstration – Snyder Lane**

3:00 End of day 2

Start of Day 3

8:00 **Overview of Operations and control options**

- Changing role of irrigation district
- Changing on-farm irrigation methods
- Viewpoints of district vs. farmer
- Single economic unit
- Service concept
- Water Level Control Options
    - Long crested weirs
    - ITRC Flapgate
    - Automatic computer controlled gates
- Reservoirs
- Pumps – VFDs
- SCADA/Automation

12:00 Lunch

1:00 **SCADA and Automation Demonstration – Spragg Headworks**

- Water level measurement options
- SCADA Field Units

3:00 End of day 3