Canal Automation for Irrigation Systems: ASCE MOP 131

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Historic Perspectives

• US publications starting in 1968
  – American Society of Civil Engineers
  – Universities
  – World Bank
  – US Bureau of Reclamation
  – US Committee on Irrigation and Drainage

• Last formal publication in 1999
  – Research continued
Historic Perspectives

• Automation can … generally provide better service to the water users…” -- USBR 1973

• Flexible water supplies permit both irrigator and delivery system to be managed with more freedom and flexibility

Historic Perspectives

• US Bureau of Reclamation
  – Central Valley Project (California)
  – Central Arizona Project (CAP)
  – Hydraulic research lab in Denver (Colorado)

• US Department of Agriculture

• Rural Water Commission & Rubicon Water

• Irrigation Training and Research Center

• Others
Canal Automation for Irrigation Systems

- Task Committee for the American Society of Civil Engineers
  - Environmental and Water Resources Institute
  - Volunteer work (6 years to complete)
- Goal
  - Consolidate recent advances in canal automation
  - Globally focused
  - Recommend best practices
- Does not endorse specific vendors

Participant Countries

- USA
- Netherlands
- Australia
- France
- Spain
- Portugal
- China
- Mexico
What is Modernization?

- It is a process and not a task
- Improves resource utilization
- Combination of:
  - Technical upgrades
  - Managerial adaptations
  - Organizational modifications
  - Infrastructure upgrades
- Concentrates on inner workings of the district
- Unique to each project or system

Why Modernize?

- Population expected to increase
- Expanding irrigation acreage not feasible
- Expectation is that irrigated agriculture will meet the increased demand
- Question should be: Can you afford not to modernize?
Benefits of Modernization

• Supply-oriented vs. demand-oriented
• Improved deliveries for maximum production
• Allows for modernization of on-farm practices
• Improved in-stream & environmental flows
• Reduced spills
• Increased efficiencies & accountability
• Higher level of service
• Compliance with laws, rules & permits

Modernization Steps

• Define level of service
• Train staff in service-oriented operations
• Understand what causes poor deliveries
  • Select an appropriate canal operation strategy
• Improve communications
• Improve staff mobility
• Provide excellent flow rate control and measurement
Modernization Steps

• Construct buffering reservoirs
• Improve water level control
• Reorganize water ordering procedures
• Provide remote manual control
• Capture spills for re-use

• Plan, plan, plan
• When not to modernize

Select Appropriate Operations Strategy

• Questions
  – How is water provided?
  – How are water depths & flow rates controlled minute-to-minute?

• Water delivery mode
  – Function of physical infrastructure

• Control strategy
  – Local / distributed / centralized control

• Emergency responses & safeguards
Manual of Practice 131: Canal Automation for Irrigation Systems

- Modernization Process, Constraints and Concepts
- Physical Structures
- SCADA Systems
- Control Operation and Control Concepts
- Canal Hydraulic Properties
- Control Methods
- Verification of Controller Performance
- Implementation of Control Systems

Manual of Practice 131 is about state-of-the-art methods and equipment.
Covers planning, design, construction, installation, and commissioning of canal automation systems.
Not specific to any one vendor.
Read MOP 131 before beginning a canal automation or modernization project.
www.asce.org – search for “MOP 131”