RECLAMATION
*Managing Water in the West*
Issue No. 247–Fall 2018

# Water Operation and Maintenance Bulletin


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# Knowledge is Key

## What you need to know

***Also in this Issue:***

Issue No. 247–Fall 2018

## About this Bulletin

***Get the Water Operation and Maintenance Bulletin and subject index at:***

**www.usbr.gov/assetmanagement/WaterBulletins**

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***Thank you***



# CONTENT

# Message from Office of Policy

Reclamation's cadre of expert staff, including engineers, inspectors, and specialists, continuously strive to share their knowledge and experience with internal staff, Reclamation's customers, other domestic water supply organizations, as well as international agencies, with the goal to help promote more reliable and efficient water and power delivery in an environmentally and economically sound manner.

Reclamation experts provide countless presentations, articles, manuals, and other ways to share our knowledge and experiences, including training. This issue of the Water O&M Bulletin outlines some of the many training opportunities available at Reclamation.

We would be thrilled to hear from you:

- What do you need to know to operate facilities more reliably and efficiently?
- Where do you receive your water operations training from?
- Is there a training need you have? If so, how can we help?
- How can we work together to ensure that Reclamation, its customers, and operators have the expertise needed to address the complex and dynamic challenges in water operations and delivery?

*Chris Vick,*
*Manager, Asset Management Division,*
*Policy and Administration*


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*Chris Vick providing Canal Operator Training at the Dam Operator Training in Pasco Washington, December 2017.*

# WaterSMART Program Webinars

*Funding opportunities for WaterSMART programs are posted annually with a minimum 60-day application period. WaterSMART staff conduct webinars to describe the funding opportunities, answer questions and provide tips for writing a good application. Check out our website for more information on program funding opportunities and webinars:*

*www.usbr.gov/watersmart/*

**Quick tips for WaterSMART applicants:**

- **Copy and paste the evaluation criteria into your proposal and address each criterion and sub-criteria;**
- **Quantify the benefits of your proposed project and provide support;**
- **Check the page limit requirements and application deadline;**
- **Call the contact person in the funding opportunity with questions.**


**For more information contact:**

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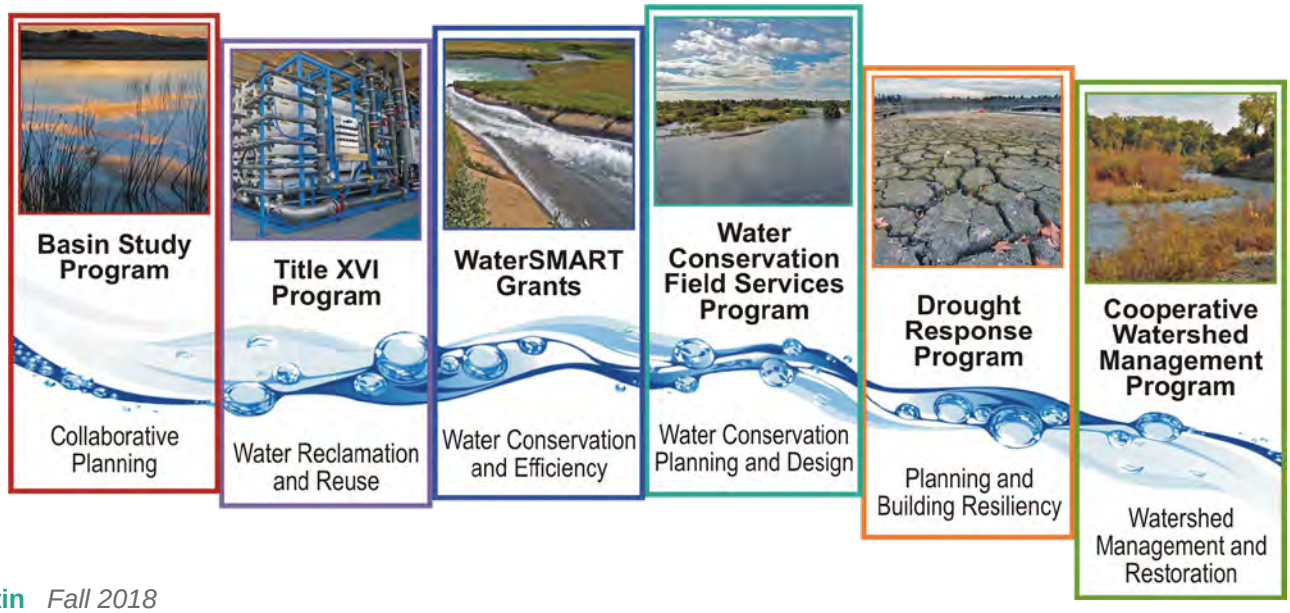
Through the WaterSMART Program works with stakeholders to improve water management, increase conservation, and stretch scarce water resources. We present webinars about each program:

- **Basin Studies** cost share with non-Federal partners to evaluate water supply and demand and help ensure reliable water supplies by identifying strategies to address imbalances in water supply and demand.
- **The Title XVI Program** funds planning, designing, and construction of water reclamation and reuse projects in partnership with local non-Federal entities.
- **WaterSMART Grants** includes three funding opportunties: Water and Energy Efficient Grants fund projects that conserve and use water more efficiently, increase the production of hydropower, and accomplish other benefits that contribute to water supply reliability; Small-Scale Water Efficiency Projects fund small-scale water management projects supported by planning efforts lead by the applicant; and Water Marketing Strategy Grants fund planning activities to develop water marketing strategies that establish or expand water markets or water marketing activities between willing participants.
- **Water Conservation Field Services Program** supports water conservation planning, development of system optimization reviews, designing water management improvements, and demonstration projects.
- **The Drought Response Program** includes funding opportunities for water managers to develop and update comprehensive drought plans, and to implement projects that will build long-term resiliency to drought.
- **Cooperative Watershed Management Program:** Funding opportunities include funding for entities to develop a local watershed group and conduct planning activities (Phase I); and funding for mature watershed groups to implement on-the-ground watershed management projects to address water supply, water quality, and restoration needs at the local level.

### *WaterSMART Program*

*Supports Reclamation's mission through collaboration with stakeholders to improve water management, increase conservation, and stretch scarce water resources*



# Operations and Maintenance—What you need to know to keep your facilities running smoothly

To keep water flowing to the over half a million acres irrigated with Reclamation project water, canal managers, inspectors, and operators need to be masters at repairs from machinery to embankments and at operations from watering up to drawing down. Reclamation shares our expertise through courses and guidebooks.

*South Canal of the Salt River Project, Arizona.*

*Derby Diversion Dam, Nevada.*

*New York Canal, Boise Project, Idaho.*

## Reclamation Water Management Workshops, February 11 to 14, 2019, Denver Colorado

The Water Management Workshop is a 4-day training seminar for supervisors, managers, water masters, and others responsible for or associated with the O&M of water systems. The workshop is held when field activities are generally at a minimum for the convenience of operating personnel. Reclamation has conducted these workshops since 1961.

Participants spend their time attending sessions in either a classroom setting or at Reclamation's research laboratories at the Denver Federal Center, Colorado. The focus of the workshop has evolved somewhat to include Reclamation's increased emphasis on efficient water management activities. Topics include:

- Water systems O&M
- Planning O&M
- Irrigation system efficiency
- Drainage
- Water measurement
- Electrical equipment maintenance, inspection, and safety
- Mechanical equipment maintenance and inspection
- Designing, installing, and maintaining pipe systems
- Security and law enforcement
- Environmental considerations
- Construction practices
- Concrete mixes, materials, maintenance, and repair
- Corrosion mitigation and protection
- Sediment management
- Seepage control
- Hazardous waste management
- Human relations and working with water users

Sessions in 2019 will address these topics as well as current issues related to other Reclamation programs. Leaders who are well qualified in their particular field present a summary of the material to be covered, emphasizing discussion and exchanging information with all session participants.

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## Canal Operations and Maintenance Training

Some canal operators have been riding their canals for decades, some only for a few months. But everyone needs to know why their job is vital to the health and safety of our water systems.

Reclamation offers Canal Operations and Maintenance (O&M) Training. This class provides Reclamation project staff and operating entities the knowledge and tools to efficiently and effectively maintain canals and their features to ensure delivery of project water. This training has successfully conveyed the ***Why*** underlying effective O&M practices.


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This four-hour course covers:

- Why Your Work is Important
- Embankment Breach Consequences
- Emergency Embankment Breach Response
- Operations: Running Smoothly
- Review of O&M Inspections
- Vegetation Control Methods
- Rodent Control Methods
- Concrete Maintenance
- Maintenance of Mechanical Equipment
- Embankment Maintenance Methods
- Seepage Repairs/Response
- People Impacts/Outreach/Education
- Public Safety Features
- Documentation
- "Who Ya Gonna Call?" Reclamation

Feedback from these courses showed that participants gained a great deal of knowledge, with consistently high ratings for the ease of understanding, the right amount of time, helpful discussions, and usable advice. Other positive comments on the course included:

- This training provides information and ties what we do to why we do it.
- This was a good introduction to operations.
- The half-day session is good. Group discussions were at a good level. Good real-world examples.
- Excellent manual, excellent first-hand experience.
- Just right discussion, outstanding advice—will use it!
- This helped spark additional discussions and collaboration with Reclamation.

Reclamation provides these courses to operating districts through our Regional and Area Offices. Contact Nick Casamatta to arrange for a course for your districts.

## Canal Operations and Flow Measurement Course

The Hydraulics Laboratory in Reclamation's Technical Service Center provides training on canal operations (a 5-day course usually at the end of January) and flow measurement (a 3-day course usually in mid-February). These classes are great for canal operators, district managers, water masters, and engineers involved in canal design and control.

*Participants work with the canal simulator at Reclamation's Hydraulic Laboratory in Denver, Colorado.*

## Modern Methods in Canal Operation and Control

Canal automation is widely used to improve the operation of canal systems and to conserve water. Most new canals have an automatic control system. Additionally, many older canals are being modernized with data collection, telemetry, and control equipment that helps canal operators better manage their water.

The Hydraulics Laboratory in Reclamation's Technical Service Center offers a 5-day course, which uses a lab model of a canal system to present modern methods for upgrading the operations of existing canals, including canal automation techniques and equipment. Students gain:

- A working knowledge of the basic hydraulic characteristics of open canals
- An understanding of alternative strategies for operating irrigation delivery systems and the advantages and disadvantages of different schemes
- An appreciation for the potential benefits of remote monitoring and local, remote, and supervisory control of canals
- A better understanding of instrumentation, control equipment, and communications systems that support canal automation programs

Canal operators, water masters, engineers, and other technical staff take part in classroom discussions, equipment demonstrations, and laboratory workshops. The workshop uses a small-scale canal model—like a flight simulator for canal operators—complete with water level and flow measurement instruments, remote-operated and automatic gates, and a simple Supervisory Control and Data Acquisition (SCADA) system.

Course topics include:

- Canal hydraulics
- Canal operation
- Flow measurement
- Instrumentation systems
- Automatic controls
- Communication systems
- Canal automation equipment and software

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## Basic Principles and Developments in Flow Measurement

This 3-day workshop provides more detailed exposure to the flow measurement concepts presented in our workshop on Modern Methods in Canal Operation and Control. The flow measurement class covers typical structures and equipment used to measure water flow in irrigation delivery systems, with special emphasis on the WinFlume computer program for designing and calibrating long-throated flumes and broad-crested weirs. We also address open channel and closed pipe measurement methods and instrumentation.

This course is designed for water conservation specialists, canal operators, managers, and design engineers who are interested in improved water measurement methods. Participants learn through active participation and "first hand" experience with the computer program and water measurement devices in the laboratory. Laboratory demonstrations and workshop sessions let students try their hands at hands-on flow measurement—using different techniques with various types of water measurement equipment.

Workshop instructors are engineers and scientists with extensive experience and knowledge in the areas of water measurement methods, computer programming, canal automation, operation, and control. The principal instructors are Tony Wahl, Bob Einhellig, and other staff members from the Hydraulics Laboratory in Reclamation's Technical Service Center. These instructors have conducted many training programs for Reclamation and other organizations.

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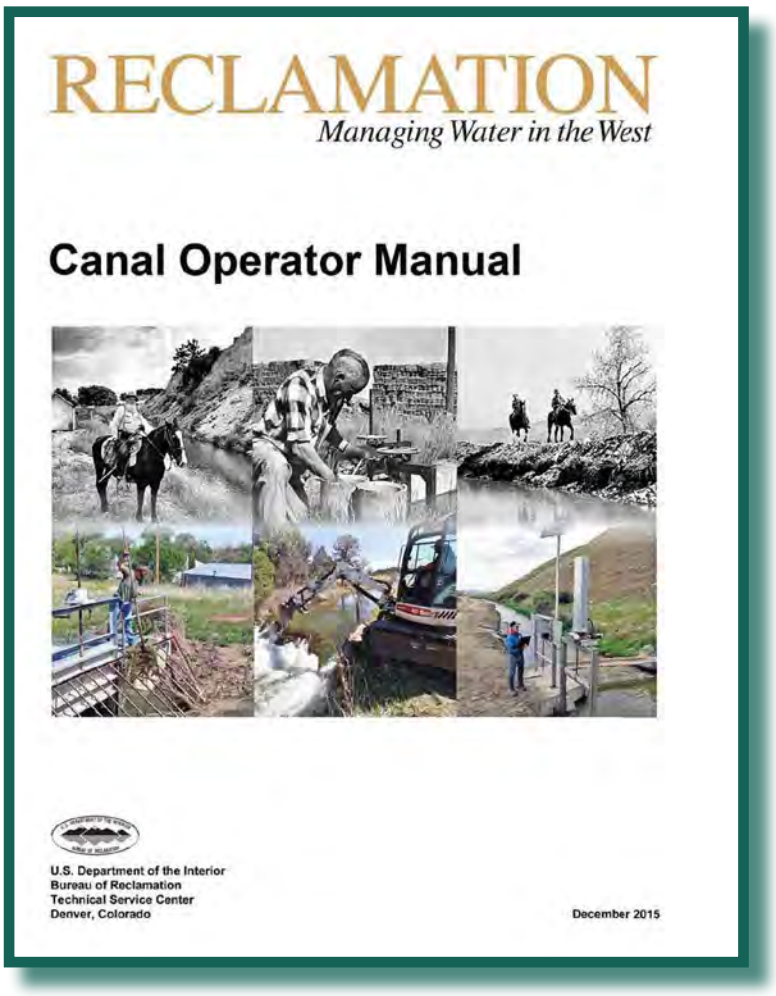


## Canal O&M Guidebooks

Our recent guidebooks for canal operations and maintenance are at www.usbr.gov/assetmanagement/canalOamM.html:

- ***Canal Operator Manual—a basic primer on O&M***

- ***Posters for your office***


- ***Vegetation management and control***
- ***Animal management and damage repair***
- ***Concrete lining and structures***
- ***Embankment seepage and repair***
- ***Mechanical equipment operations and repairs***


Also check out Reclamation's ***Water Measurement Manual*** at www.usbr.gov/tsc/techreferences/mands/wmm/WMM_3rd_2001.pdf.

# Corrosion—What you need to know to control rust

*Coated coupons.*

Keeping your infrastructure from corroding requires the right type of protection used the right way. While it is important to consult the experts for particular issues, having a grounding in cathodic protection and protective coatings to protect your infrastructure is indispensable.

## Coatings and Corrosion School

The Materials and Corrosion Laboratory (MCL) in Reclamation's Technical Service Center has developed a 3-day course to familiarize participants with issues relating to corrosion of metal and corrosion protection. Discussions include:

*Pit gauge measurements.*

- How corrosion occurs
- Types of corrosion
- Methods to minimize and prevent corrosion
- Corrosion inspection and coating condition assessment
- Protective coatings
- Cathodic protection
- New technologies
- Repair techniques for maintaining and repairing infrastructure

In addition to the classroom portions, this school provides hands-on experience, as participants can prepare steel panels, apply coatings, inspect and test those coatings, and test cathodic protection systems. The course will also discuss methods to control zebra and quagga mussels, with emphasis on antifouling coatings. Reclamation employees are given priority with any remaining slots being filled on a first-come-first-served basis. MCL also offers a traveling version of this course that can be tailored to individual facilities with a hands-on training for their staff and specific corrosion protection needs.


**For more information contact:**

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## Coatings and Corrosion Webinars

The 2016 NACE IMPACT study estimated that the total cost of corrosion in the USA is ~$450 billion annually, much of which could be prevented with periodic inspection and proper mitigation. Since 2013, the Materials and Corrosion Laboratory (MCL) has held twice-yearly webinars detailing aspects of corrosion control including protective coatings and cathodic protection. These 1-hour webinars are free and open to anyone—Reclamation, irrigation and water districts, other federal agencies, etc. The webinar slides are available online from the TSC training page at www.usbr.gov/tsc/training/training.html. MCL can also provide the recorded webinars at request. For more information or to receive notices for upcoming webinars, please contact Jessica Torrey.


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jtorrey@usbr.gov

## Intro to Corrosion

This webinar covers the basics:

- What is corrosion?
- How much does corrosion cost?
- Why is corrosion a major concern?
- How does corrosion occur?
- What techniques can be used to prevent corrosion of infrastructure?

Corrosion is a deterioration of a material caused by a reaction between a metal and an electrolyte.

## Corrosivity Testing and Intro to Corrosion Mitigation

This webinar will cover why we recommend corrosivity testing for soil and water and how we use this information. We will also explain the main methods of corrosion mitigation including materials selection, protective coatings, sacrificial anode cathodic protection, and impressed current cathodic protection.


*Technical Service Center (TSC) Corrosion staff presenting webinars.*

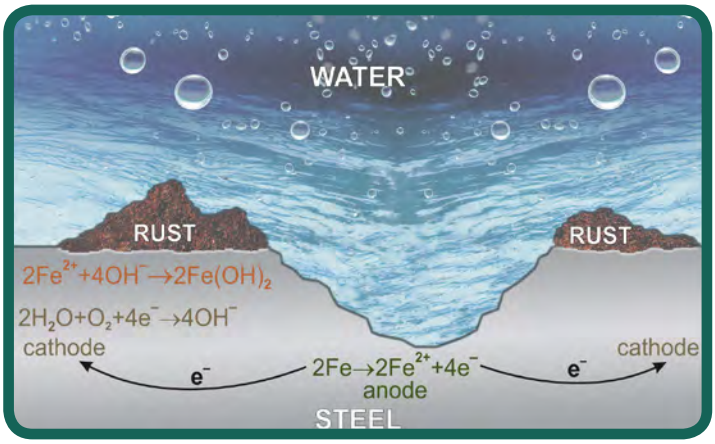
## Protective Coatings 101

This webinar provides an overview on protective coatings, surface preparation, application methods and equipment, and quality assurance/quality control (QA/QC) procedures.

## Cathodic Protection 101

This webinar gives an introduction to cathodic protection (CP):

- How CP helps to slow corrosion of steel structures
- How CP works with coatings
- Types of CP systems
- What structures should be considered for protection by CP
- Components of a CP system
- Basic installation and maintenance procedures for CP systems.




*Corrosion is a deterioration of a material caused by a reaction between a metal and an electrolyte.*

## Coatings Maintenance Assessments

Protective coatings are the first line of defense against corrosion and found universally across Reclamation projects. Aging structures and increased recoating costs make protective coatings condition assessments and maintenance more important than ever. This presentation addresses:

- Field inspection equipment and techniques
- Coating maintenance planning and options
- Coatings containing hazardous materials

This course is based on Reclamation's award-winning article: *Coating Maintenance Planning to Ensure Reliable Water and Power Delivery*. In the Journal of Protective Coatings and Linings May 2014, by Dr. Bobbi Jo Merten, Richard Pepin, PCS, Dr. David Tordonato, P.E., and Dr. Allen Skaja, PCS.

## Corrosion Mitigation of Gates

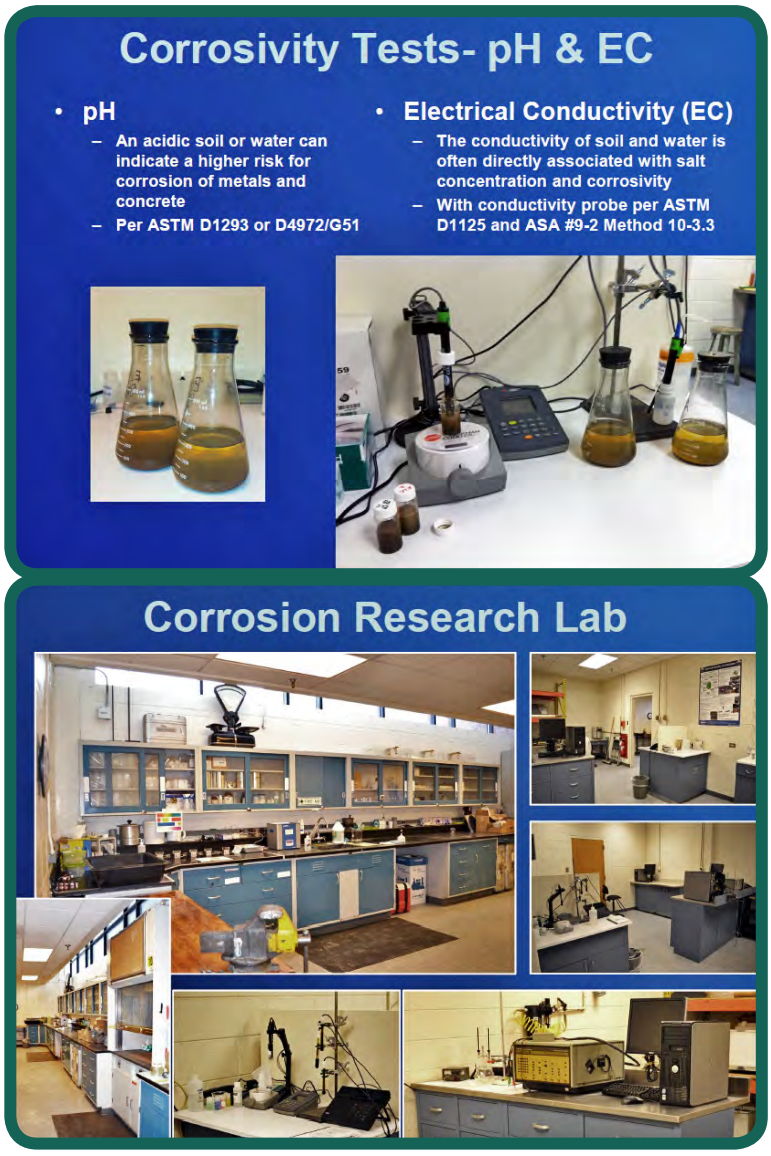
This webinar presents information on designing, installing, maintaining, and testing corrosion mitigation for gates.

## Cathodic Protection System Testing

This webinar provides a brief review of corrosion and cathodic protection, emphasizes safe testing, and covers how to test cathodic protection system components and potentials. Note that this course is only designed to familiarize you with system components, testing equipment, and techniques and does not qualify you to test CP systems. TSC corrosion experts are available for CP system testing, training, and diagnostics.

## Corrosivity Testing and Introduction to Cathodic Protection

This webinar covers using soil and water corrosivity testing to determine what type of corrosion protection may be needed in a given service environment. It also provides a brief introduction to cathodic protection.




*Reclamation's Corrosion Research Lab.*

## Corrosion Control System Construction Projects

Corrosion control systems (CCS), such as protective coatings and cathodic protection systems, will need to be repaired or replaced over the lifetime of a structure. This is often accomplished via a construction contract, and construction inspections are the best way to ensure a quality product is received. This presentation introduces:

- Types of CCSs and their specification/ submittal requirements
- Training options for construction inspectors
- Things to look out for during construction inspections
- Inspection techniques and tools

## Corrosion Mitigation for Tanks

This webinar covers corrosion protection for tank, including: above ground tanks such as forebay, regulating, and distribution, surge tanks, and air chambers. We discuss specific tanks applications for protective coatings and cathodic protection.

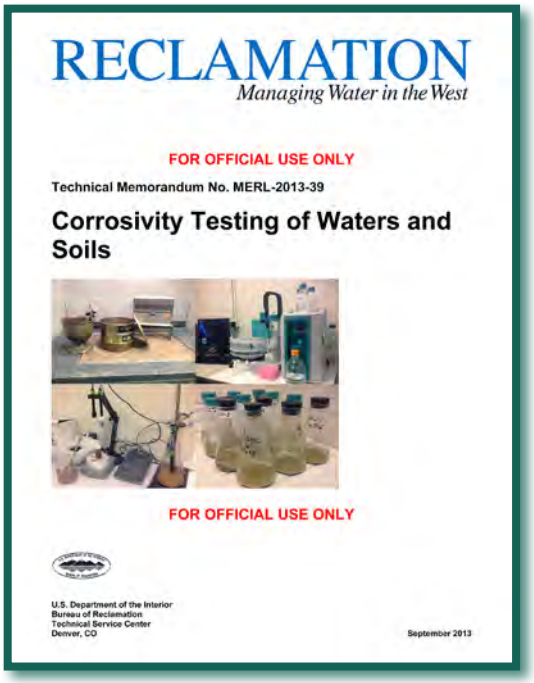
## Penstock Maintenance

This webinar covers the coating maintenance cycle of a penstock including: periodic condition assessments, lining material selection, specification development and construction support of rehabilitation projects.

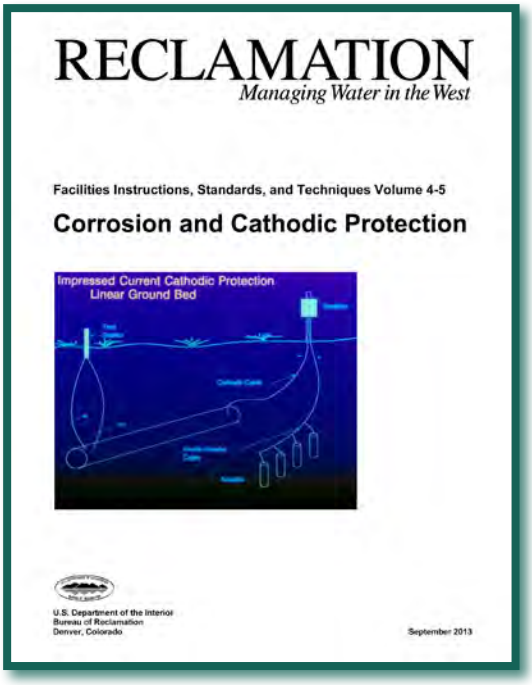
## Coatings and Corrosion Guidebooks

Check out Reclamation's series of guidebooks on coatings and corrosion materials:

- *Corrosivity Testing of Waters and Soils*

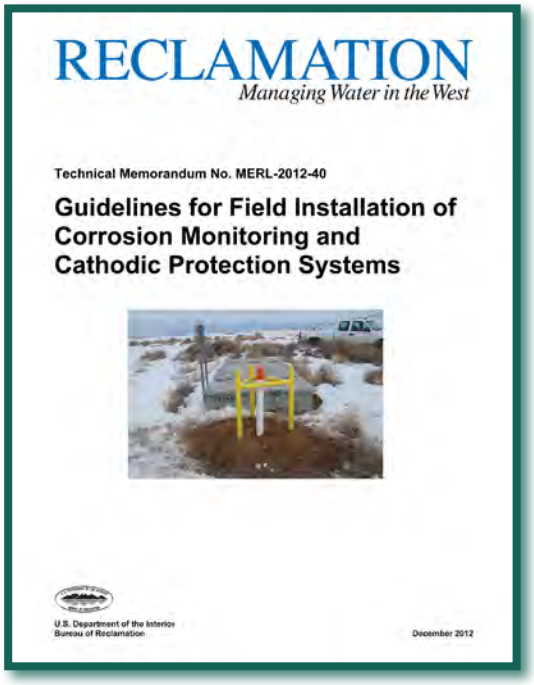



- *Facilities Instructions, Standards, and Techniques Volume 4-5: Corrosion and Cathodic Protection*




- *Guide to Protective Coatings, Inspection, and Maintenance*


- *Guidelines for Field Installation of Corrosion Monitoring and Cathodic Protection Systems*




- *Standard Protocol to Evaluate the Performance of Corrosion Mitigation Technologies in Concrete Repairs*

**For more information contact:**

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# Concrete—What you need to know to design or repair concrete structures

Reclamation has been designing and repairing concrete ever since we placed the first concrete in 1903. Unfortunately, even though the best available knowledge and materials were used, many repair failures have occurred since then. To help repair concrete successfully, Reclamation has developed a consistent, systematic approach to concrete repair, with training and guidebooks.

*Workers at the ceremony for the placement of the first concrete at Arrowrock Dam, November 11, 1912.*

## Concrete and Concrete Repair School

To address Reclamation's concrete repair needs, Reclamation developed a 1-day Concrete Repair School, featuring instruction and hands-on training on concrete repair. Participants attending the school learn about:

- Quality evaluation of concrete aggregates
- Concrete materials testing
- New construction practices
- Techniques for repairing existing concrete structures
- Causes of concrete damage
- Methods to identify causes of damage
- Familiarity with materials used

*Cracked concrete canal lining repaired with an elastomeric polyurea.*

*Hands on at the Concrete and Concrete Repair School, 2018.*

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## Concrete Design Webinars

Reclamation's Design and Construction Coordination Team (RDCCT) hosted a technical webinar series to refresh engineers and inspectors on concrete related topics. While these are not hosted on a website, contact Shannon Harrell to coordinate with the Reclamation's TSC's Concrete Geotechnical and Structural Laboratory to put these webinars on or to create other webinars to address other concrete-related topics. Here are two webinars that were offered to the RDCCT.

### Concrete for Engineers

This general webinar explains what materials go into concrete, the types of cement for the type of conditions, blended cements, aggregate specifications, concrete chemistry, storing and handling concrete-making materials, and much more. Katie Bartojay, Shannon Harrell and Scott Keim, all professional engineers with the Technical Service Center, gave this webinar on January 18, 2018.

*Mass Concrete Placement.*

## Mass Concrete Webinar

The bigger the concrete mass, the more complicated the design and construction considerations. With larger concrete placements, comes larger aggregate and more heat generation from hydration. Mass concrete is any volume of concrete large enough to require actions to cope with heat from the hydration of cement and to minimize cracking. The Concrete, Geotechnical, and Structural Laboratory developed a course, "Mass Concrete in the 21st Century,". Katie Bartojay and Shannon Harrell, gave this webinar on May 3, 2018. This course tells you what you need to know to design and construct a structure with mass concrete.

*Inspection of reinforcement prior to concrete placement.*

## Concrete Construction Special Inspector Training and Certification

Specialized training and instruction on concrete building techniques and quality concrete structures is hard to come by, so Reclamation partnered with the Colorado Ready Mixed Concrete Association to present a 5-day ACI Concrete Construction Special Inspector Training and Certification course. Reclamation engineers, technicians, specification writers, technical project managers, and other staff associated with construction and repair for water resources structures attended this course. This course helps

*—continued*

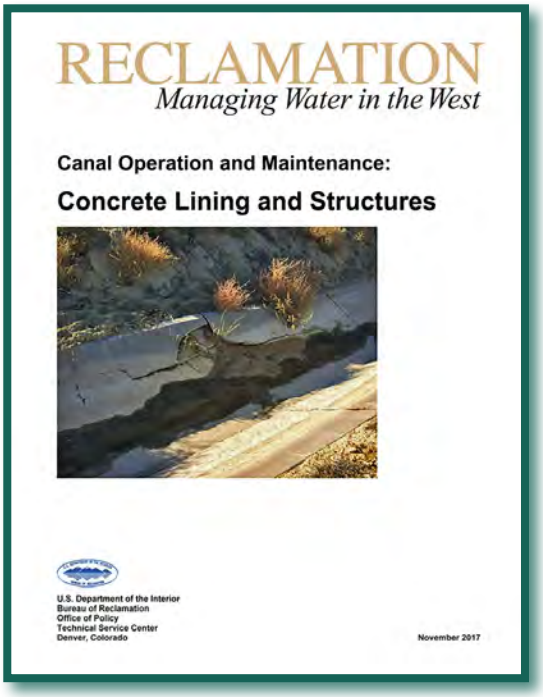
—continued

satisfy the International Building Code (IBC) special inspections for concrete construction and Reclamation Manual FAC 03-02 Directives and Standards which recommend specialized training of construction personnel in construction materials and methods utilized on Reclamation construction projects.

The course covered concrete terminology, conveying, placing, consolidating, and finishing concrete, as well as jointing, curing, and protecting concrete. The course also covered plans reading, and provided information on formwork installation and removal, reinforcement inspection, and concrete tolerances. Common concrete and construction problems were also addressed.

## Concrete Repair Guidebooks

Reclamation's ***Canal O&M Guide, Concrete Lining and Structures***, is a good introduction to concrete issues.
www.usbr.gov/assetmanagement/docs/Canal_Concrete.pdf





Reclamation's ***Guide to Concrete Repair*** can help guide you through repairs. This second edition of the Guide To Concrete Repair updates and revises the original guide to include much of the information gathered over the last 20 years through field work, international workshops, and collaborative research projects.
www.usbr.gov/tsc/techreferences/mands/mands-pdfs/Guide2ConcreteRepair2015_Final.pdf

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*Sedimentation, like heart disease builds over time. Don't be surprised by a heart attack or by a completely plugged dam outlet—plan ahead and take care of your infrastructure first.*

# Sedimentation—What you need to know about this slowly creeping problem

## Reservoir Sedimentation Webinars

Sediment enters reservoirs and normally doesn't leave. Over time, this sedimentation builds up and reduces storage capacities in reservoirs. One of the most obvious impacts from reservoir sedimentation is the loss of water-storage capacity, which will eventually lead to the reduced reliability of water and power supply. Sedimentation will eventually reach the lowest dam outlet (or other important dam or reservoir facility), and impair the operation of that facility.

*Plugged intake in Sumner Dam, New Mexico.*


*Dredging in Strontia Springs Reservoir, Colorado.*


*The photo is of Paonia Reservoir, near Paonia, Colorado and was taken in 2014. Detail photos on left shows 53 years of sediment build up around the intake tower.*

All dams have a sediment-design life, typically 50 or 100 years, where sediment reaches the lowest dam outlet. Most all Reclamation dams are in the second half of this sediment design life. O&M operators need to be aware of this issue to start planning for sustainable reservoir sediment management or the eventual retirement of the dam. For example, San Clemente Dam was removed in 2015 because the sedimentation filled the reservoir. Matilija Dam in California has also filled with sediment and plans are being made to remove that dam.

We have a series of free, one-hour webinars to introduce the problem and to provide sediment management solutions. To produce this series of six webinars. Reclamation participated on the National Reservoir Sedimentation and Sustainability Team. The Cooperative Institute for Research in Environmental Sciences (CIRES) recorded and hosts these webinars, which can be viewed anytime.

- Introductory Video about Sedimentation (6 minutes)


*Dr. George Annandale, P.E.*

- Frequently Asked Questions about Sedimentation https://acwi.gov/sos/faqs_2017-05-30.pdf
- Reservoir Sedimentation Management – Big Deal! Why should we even care about it? Dr. George Annandale, P.E. https://cires.colorado.edu/events/reservoir-sedimentation-management-big-deal-why-should-we-even-care-about-it

Other videos in the series cover sediment management alternatives, sediment management at multi-purpose reservoirs, permitting, monitoring, and the economics of sustainable reservoir sediment management. Access the full list of webinars on the CIRES web page at: https://cires.colorado.edu/news/announcing-reservoir-sedimentation-management-webinar-series.

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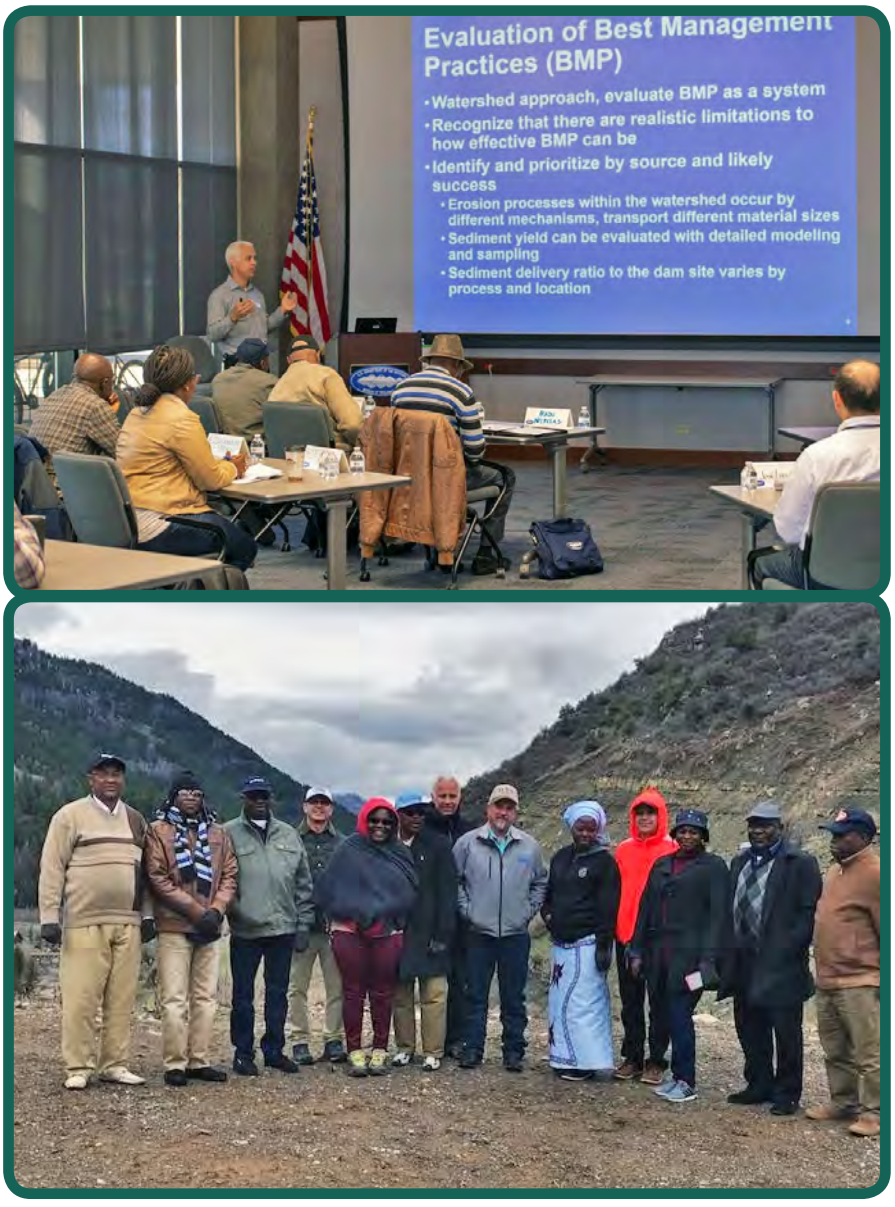
## International Reservoir Sedimentation and Sustainability Workshop

Information about reservoir sediment management for long-term sustainability isn't just important for Reclamation's reservoirs. Reclamation hosts an international workshop for participants to learn about reservoir sedimentation processes and rates and how to analyze and develop conceptual designs of reservoir sediment management systems. Water resource engineers and project managers involved in large scale water projects from all over the world participate in this workshop. The workshop covers:




*Participants in the International Reservoir Sedimentation and Sustainability Workshop.*

- Basic principles of sediment transport and reservoir sedimentation.
- How to compute sediment loads in rivers and the rate at which these sediments will accumulate in reservoirs and where they will accumulate. Practical examples will be given to participants using actual field data.
- More advanced numerical modeling that can be used to study alternatives for reservoir sediment management such as sluicing through low level outlets. The numerical models will be demonstrated on real reservoir sluicing studies.
- Additional case studies and site visits to reservoirs with active reservoir sediment management projects.

The course presenters are experts from Reclamation and U.S. Army Corps of Engineers, with extensive experience and knowledge in the areas of reservoir sedimentation processes, sediment transport and sedimentation impacts in rivers. They have been involved in many projects throughout the world assisting on the design and analysis of sustainable reservoir issues.

**For more information contact:**

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Senior International Affairs Specialist
Native American and International Affairs Office
Reclamation
303-445-2139, amedina@usbr.gov

## Sediment Guidebooks

While there are many academic works on sediment transport, engineers needed a manual to summarize sedimentation transport, scour, and deposition to effectively plan for sediment in Reclamation's facilities. ***Reclamation's Erosion and Sedimentation Manual*** covers basic theories, concepts, and approaches in erosion, sediment transport, river morphology, computer modeling, and field surveys.

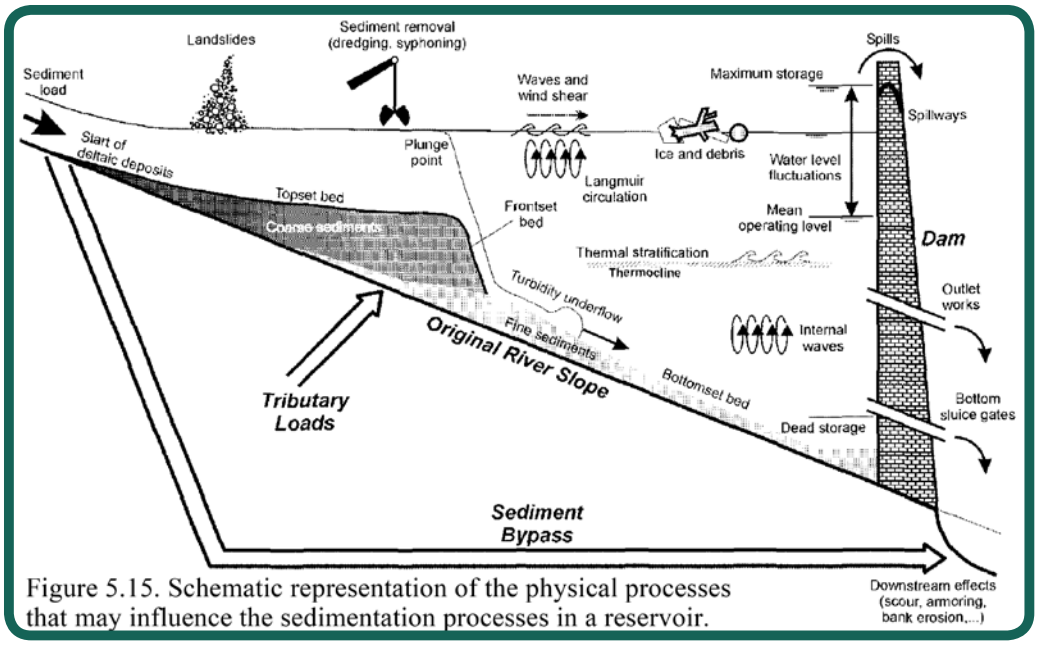
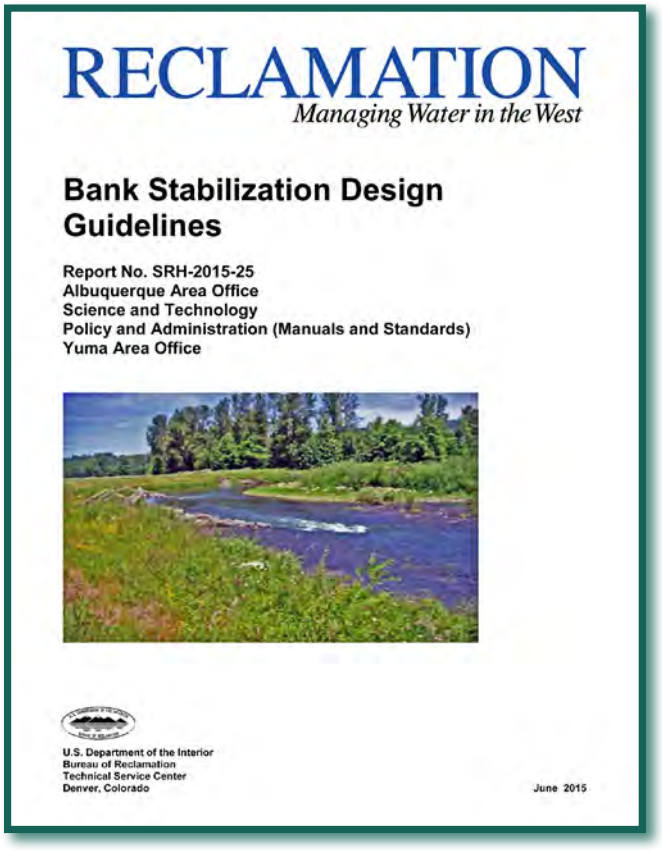


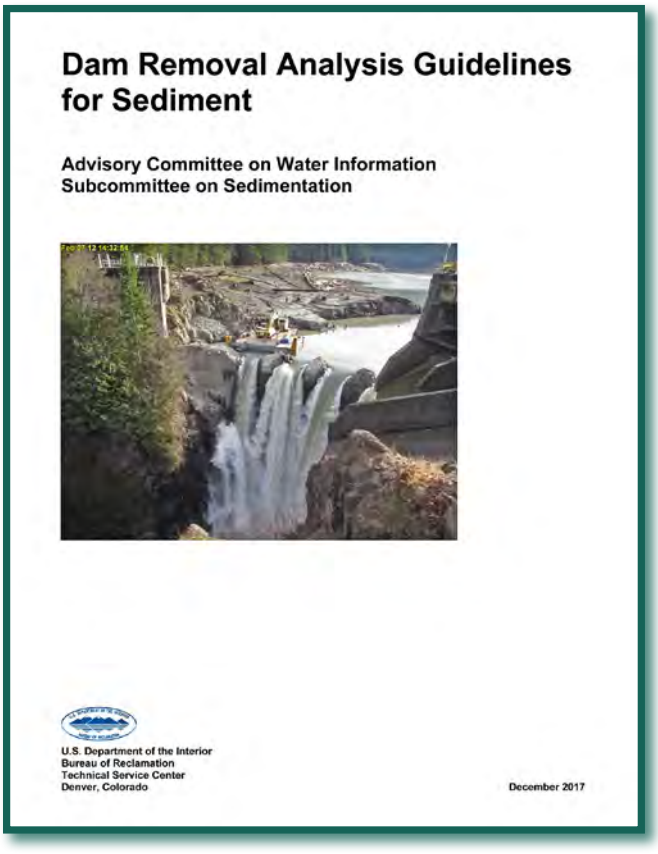

Figure 5.15. Schematic representation of the physical processes that may influence the sedimentation processes in a reservoir.

***Image representing the physical processes that may influence sedimentation processes in a reservoir, from* Chapter 5.5—Reservoir Sedimentation Modeling, *of* Reclamation's Erosion and Sedimentation Manual.**

Our ***Bank Stabilization Guidelines*** provide Reclamation personnel with updated guidance on deploying effective bank stabilization methods.




Reclamation worked with the Subcommittee on Sedimentation on the ***Dam Removal Analysis Guidelines for Sediment***.



*Geotechnical testing.*

# Soils

## Earth School

What is that soil going to do when you build a foundation? How will soils react within an embankment? Engineers classify soils according to their engineering properties to provide insights into how soil will behave and to provide a common description set for engineers, scientists, farmers, and more.

Reclamation presents a 3-day course on visual classification of soils for the complete range of soil types. The course focuses on learning the Unified Soils Classification System, laboratory and field soils testing methods, geologic logging, and common earthwork construction testing methods. Participants learn and practice standard techniques for classifying soils, so they can classify and recognize soils in civil engineering projects using visual observations and various hand tests. The course also covers various exploration methods and construction techniques using earth materials.

The last course was May 22 - 24, 2018 in Denver. Contact us for future courses.

**Rock Testing–Contact:**

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Concrete, Geotechnical, and Structural Laboratory
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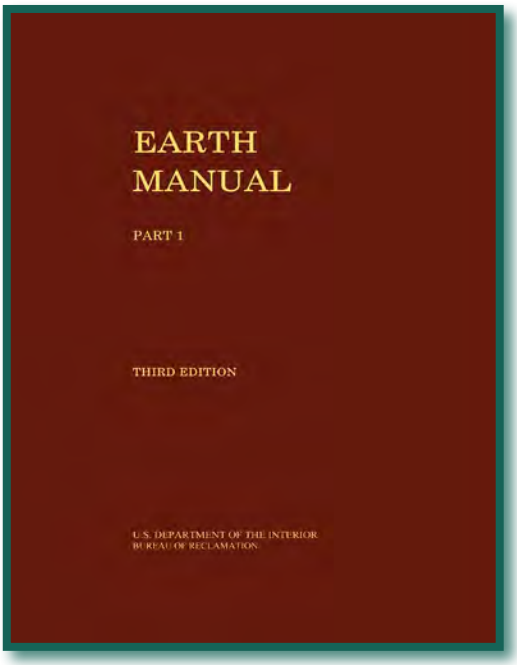
303-445-2395
rrinehart@usbr.gov

### *Earth Manual*

The Earth Manual provides technical information for field and laboratory investigations and construction control of soils used as foundations and materials for dams, canals, and many other types of structures built for Reclamation projects. It contains both standardized procedures for securing uniform results throughout Reclamation, and general guidelines intended to assist—but not to substitute for—engineering judgment.



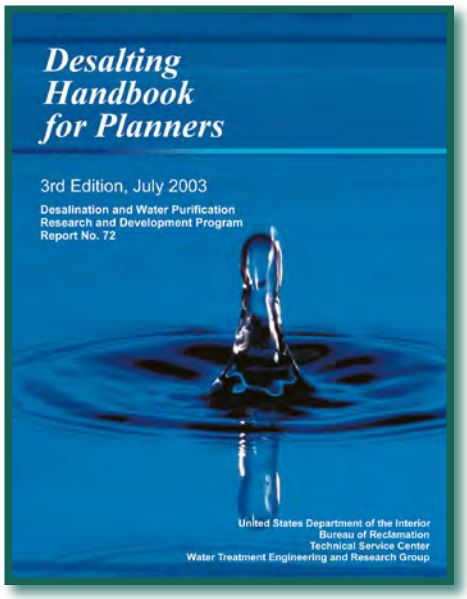

www.usbr.gov/tsc/techreferences/mands/mands-pdfs/earth.pdf

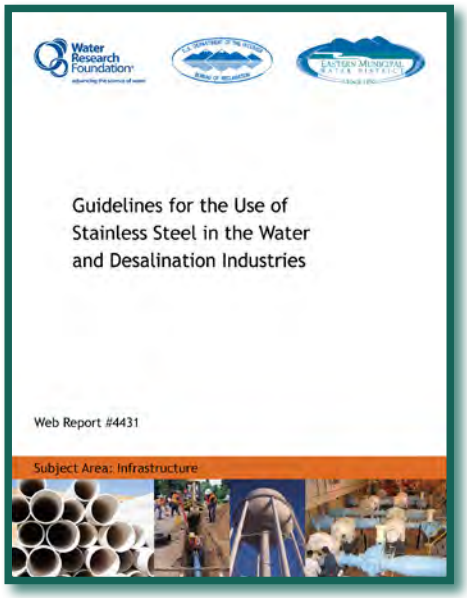
# Desalination and Water Treatment—What you need to know to treat and use brackish water and seawater

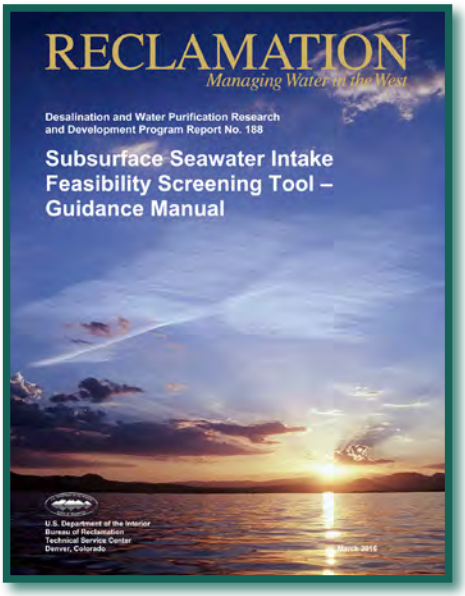
## Water Treatment Innovations and Networking, Alamogordo, September 19, 2018

Reclamation is proud to announce the First Annual Water Treatment Innovations and Networking (WIN) Workshop. The workshop will showcase researchers who have used Brackish Groundwater National Desalination Research Facility (BGNDRF). These researchers will share their work with a broader audience in a rich environment for networking with potential customers, investors, partners and other interested parties. Participants will have the opportunity to get a first-hand look at BGNDRF and what this Reclamation lab has to offer for technology development, validation testing, demonstration testing etc.

The event will be on Wednesday, September 19, 2018 at BGNDRF in Alamogordo, New Mexico. It will start at 8:30 am and end at 5:30 pm with a one-hour lunch break. A half hour will be set aside for 3-minute pitches from the audience. A social hour and dinner will be held at 6:30 pm at a local restaurant the evening following the event. Tours of the facility will be held from 4:00 - 6:00 pm on the day before the event and from 8:00 - 10:00 am on the day after the event.




### Research and Guidebooks for Water Treatment

The Desalination and Water Purification Research Program (DWPR) funds Reclamation researchers and partners to develop more innovative, cost-effective, and technologically efficient ways to desalinate water.

Research results are at: www.usbr.gov/research/dwpr/DWPR_Reports.html
Check these out if you are considering water treatment as an option. Some guidance stemming from the research includes:

- ***Desalting handbook for planners (Report 72)***
  www.usbr.gov/research/dwpr/reportpdfs/report072.pdf
- ***Determining the feasibility for seawater intakes (Report 188)***
  www.usbr.gov/research/dwpr/reportpdfs/report188.pdf
- ***Using stainless steel in water and desalination (WaterReuse Report, Project 171)*** www.waterrf.org/PublicReportLibrary/4431.pdf
- ***Using produced water from oil and gas (Report 157)***
  www.usbr.gov/research/dwpr/reportpdfs/report157.pdf
- ***Approaches to treating concentrate (Report 155)***
  www.usbr.gov/research/dwpr/reportpdfs/report155.pdf

**For more information contact:**

Randy Shaw, BGNDRF Manager
Brackish Groundwater National Desalination Research Facility
Reclamation, 575-443-6553, rshaw@usbr.gov

# Safety of Dams—What you need to know to keep our dams in good order

Being responsible for the proper operation, maintenance, and structural safety of more than 400 dams and distribution systems isn't easy. However, we share knowledge, research, and best practices wherever and however we can to help ensure that our facilities—and others around the world—safely deliver water and power. Reclamation has conducted dam safety training, seminars, and manuals for Reclamation staff as well as for more than 6,000 technical and administrative officials from other domestic and international agencies.

## Best Practices and Risk Methodology for Dam Safety

Understanding risks is the crucial underpinning for Reclamation's Dam Safety Program. Reclamation conducts risk analysis at different levels, from screening level analyses performed by an individual (with peer review) during a Comprehensive Facility Review (CFR), to full blown facilitated team risk analyses, which include participation by field personnel.

Risk analysis at Reclamation has evolved over the years and will continue to evolve. Moreover, procedures and data for dam safety risk analysis, can't be boiled down into a cookbook—every situation is unique in some way. Therefore, Reclamation provides an internal manual and training on the best practices for determining risk. These present useful information, tools, and techniques, while stopping short of a "cookbook" approach. The training is only open to Federal employees, but we welcome your input and ideas for future training sessions.

**For more information contact:**

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## Safety Evaluation of Existing Dams (SEED) Seminars

Because the often-catastrophic consequences of dam failure are unacceptable, the need for trained personnel is essential. This seminar provides a comprehensive instruction in dam safety examination and evaluation. While geared towards Reclamation's organizational procedures and units, the principles, concepts, and procedures are readily adaptable to any organization conducting a regulatory or in-house dam safety program for existing dams. The SEED seminar emphasizes the importance of dam safety and provides information and instruction in:

- Dam safety surveillance
  - ◊ Periodic review of pertinent records
  - ◊ Visual examination
  - ◊ Instrumentation monitoring
- Hydrologic considerations
- Engineering geology
- Evaluation and response to seepage and internal erosion
- Concrete repair
- Remedial measures for dams
- Emergency management and action planning

The seminar is suitable for engineers, technicians, maintenance personnel, and administrators responsible for dams. The seminar instructors are professional engineers and geologists who have a great deal of experience and knowledge in the areas of design, construction, operation, maintenance, instrumentation, and dam safety evaluation. Many of the instructors have conducted training programs for Reclamation and other US and foreign personnel involved in dam safety.

Registration for the course is open to Federal agency, Reclamation water district partners and tribal employees, but we welcome your input and ideas for this training.

**For more information contact:**

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Client Liaison
Geotechnical Engineering Group 3
Technical Service Center
Reclamation
303-445-3260
lsweeney@usbr.gov

www.usbr.gov/ssle/damsafety/trn_domestic.html

## Classroom Dam and Canal Operations Training

Dam operators for Reclamation facilities are required to have classroom training as outlined in the Reclamation Manual FAC TRMR-66. Contact your regional Dam Safety Coordinators for training schedules.

**Pacific Northwest Training**
**December 11 - 13, 2018,**
**Medford Oregon**

For example, the Pacific Northwest (PN) Region offers an annual 2-day training for dam operators, and last year we expanded it to a third day to cover canal operator training to make it easier to attend.

The dam safety courses cover a range of topics, including:

- Purposes of Reclamation projects
- Design and construction of safe dams
- Hydrology and reservoir operations
- Monitoring and instrumentation
- Dam inspections and testing and maintaining mechanical equipment
- Security and Emergency Action Plans
- Recognizing and reporting surveillance activities and terrorism trends
- Lessons from dam failures and performance monitoring and failure modes
- Standing Operating Procedures and record keeping
- Public Affairs
- Incident reporting

Watch for this course again in December 2019 in Idaho Falls, Idaho and in December 2020 in Yakima Washington. Get more information at:

www.usbr.gov/pn/programs/facilities.

| | |
|---|---|
| Great Plains Region | Dave Scanson<br>406-247-7781<br>dscanson@usbr.gov |
| Lower Colorado Region | Nathaniel Gee<br>702-293-8029<br>ngee@usbr.gov |
| Mid-Pacific Region | Nadiar Kabir<br>916-978-5328<br>nkabir@usbr.gov |
| Pacific Northwest Region | Chris Regilski<br>208-378-5335<br>cregilski@usbr.gov |
| Upper Colorado Region | Clyde Thomas<br>801-524-3690<br>cthomas@usbr.gov |


*Dam Operator Training for the Pacific Northwest Region, Dec. 2017 in Pasco, Washington.*

**For the PN course only, please contact:**

Suzanne Marinelli, MEP, Emergency Management Program Coordinator
Facilities O&M, Pacific Northwest Region
Reclamation
(208) 378-5204, smarinelli@usbr.gov

*2018 site visit for DOI Dam Safety and Security Training, Folsom Dam, California.*

## Dam Safety and Security Training

To care for Reclamation's nearly 500 dams and dikes requires cutting edge technology and training. To help maintain that edge, Reclamation hosts the 3-day Dam Safety and Security Training for the Department of the Interior (DOI) each year. This training lets dam tenders, operators, and inspectors hone those skills by providing information, enhancing engineering skills, and exchanging scientific knowledge on specialized topics relating to dam safety and security for the DOI and Tribal agency employees involved in dam safety and security programs.

We held this year's training in California, covering a wide range of topics, including:

- Spillways: types, designs, hydraulic models, inspections, failure modes, clogging, cavitation, and gates
- Oroville Dam, California: emergency response, spillway recovery, and the forensic investigation and report
- Guajataca Dam Spillway Breach during Hurricane Maria in Puerto Rico
- Risk based value management
- Emergency planning and response
- Dam safety activities and programs
- A site visit to Folsom Dam

**For more information contact:**

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Working Group for Dam Safety and Security
Security, Safety, and Law Enforcement
Dam Safety Office
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303-445-2690
ttochtrop@usbr.gov

## International Junior Researcher and Engineer Workshop on Hydraulic Structures (IJREWHS) – June 25 - 27, 2019

This workshop provides graduate students and entry-level engineers an opportunity to present and discuss their research in a friendly and constructive environment. The IJREWHS addresses conventional and innovative aspects in the hydraulic design, construction, operation, monitoring, maintenance and rehabilitation of hydraulic structures. Participants will openly discuss how to improve research papers and presentations during round table discussions with peers and senior-level researchers. Workshop topics include:

- Instrumentation and technology in laboratory experiments and field tests
- Intakes and outlets, spillways, energy dissipaters and fishways
- Pressurized and part-full flow in closed conduits
- Two-phase flow, aeration, cavitation, and vibration
- Hydrodynamic loads and fluid-structure interactions
- Environmental and ecological impact of hydraulic structures
- Interaction between sediment transport and structures
- Others (i.e., experimental, theoretical and numerical modeling)

More details on dates and registration can be found at www.usbr.gov/international/seminars.html.

**For more information contact:**

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Hydraulic Investigations & Laboratory Services
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303-445-2140
bheiner@usbr.gov

## Safety Evaluation of Existing Dams International Technical Seminar and Study

Dam safety is not just a Reclamation concern—it is worldwide. Aging dams, new hydrologic information, and population growth in floodplain areas downstream from dams has increased awareness of dam safety operations and maintenance and evaluations. People around the globe who are responsible for the safety of existing dams must implement policies and procedures that warrant public confidence. This demands professional practices that incorporate the lessons of the past and conform to the most advanced technical state-of-the-art. The need for trained personnel is essential.


*Participants at the International SEED Technical Seminar and Study Tour.*

Reclamation provides technical training and a study for international for managers, administrators, engineers, and geologists responsible for the design, construction, operation, maintenance, and safety of dams. Policymakers and planners, as well as those with technical responsibilities, may also benefit from the seminar. This seminar provides professional personnel with a comprehensive guide to establishing or enhancing a visual inspection/evaluation program and increase the technical capabilities of those responsible for safety evaluations.

In 2018, participants traveled to Pueblo, Colorado, and participated in an abbreviated simulated dam examination at Pueblo Dam. The post session study tour included site visits to Lewiston Dam, Trinity Dam, Keswick Dam and Shasta Dam, all part of Reclamation's Mid-Pacific Central Valley Project.

The next seminar will be hosted in June 2019.
See www.usbr.gov/international/seminars.html.

**For more information contact:**

Angela Medina,
Senior International Affairs Specialist
Native American and
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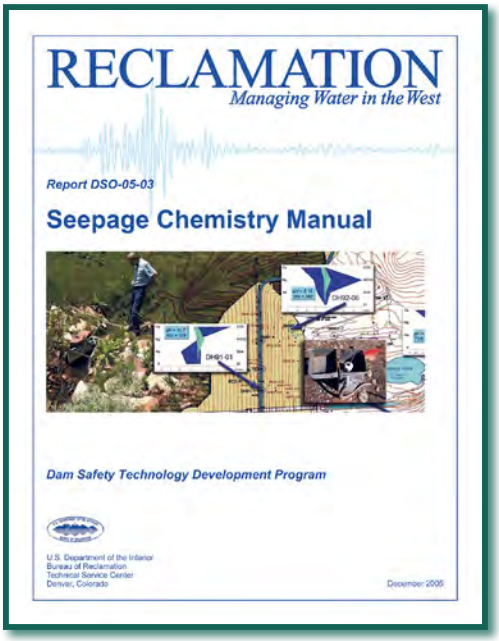
amedina@usbr.gov

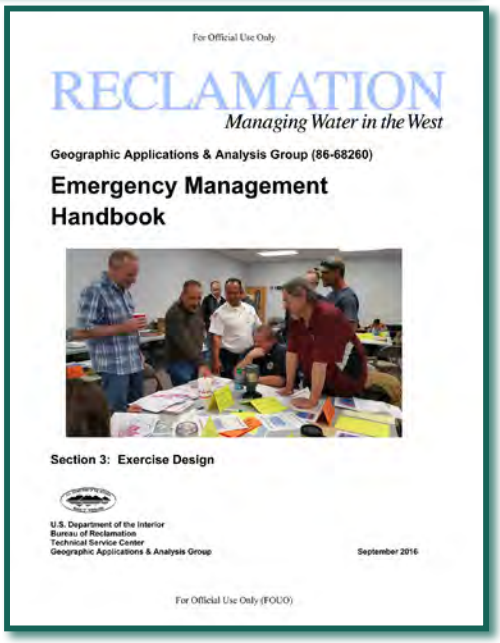



## Training Aids for Dam Safety (TADS): A Self-Instructional Study Course in Dam Safety Practices

TADS is a self-contained, self-paced training course consisting of 21 modules (workbooks and videos) for engineers, technicians, dam owners and operators, water resource managers, dam safety program managers, public officials, and the public. The Federal Emergency Management Agency (FEMA) consolidated these from technical experts from participating Federal and State agencies:

- Dam safety inspection
- Dam safety awareness, organization, and implementation
- Data review, investigation, analysis and remedial actions for dam safety

Order from www.fema.gov/media-library/assets/documents/13602?id=3308



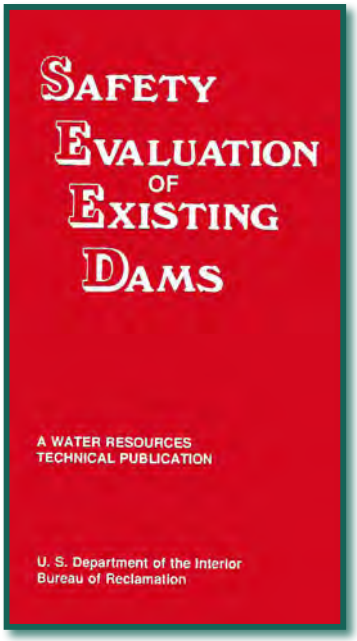

## Dam Safety Guidelines

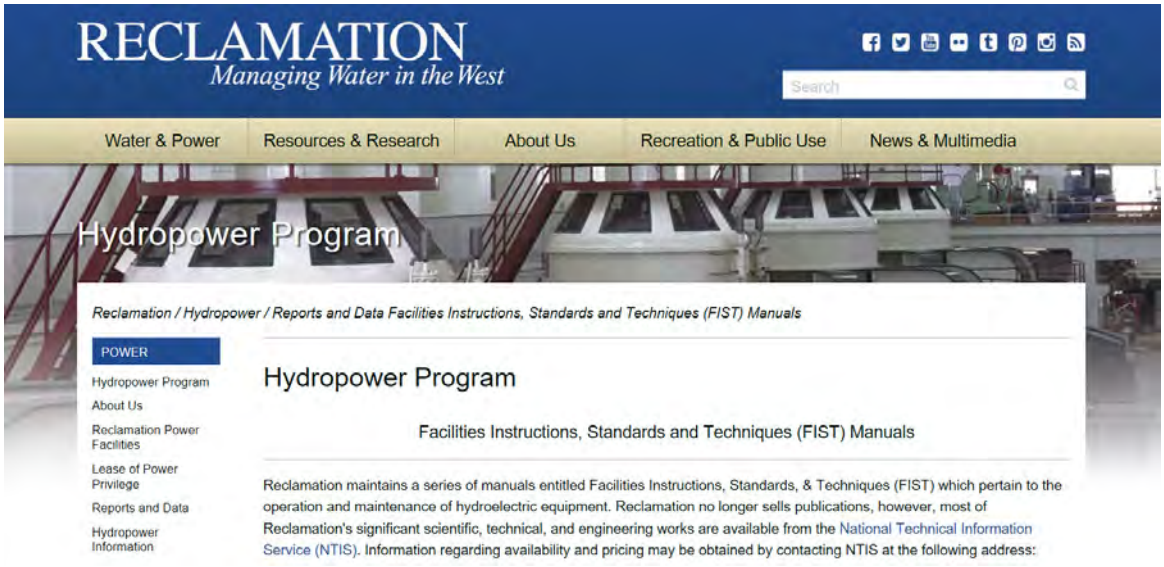
Dam Safety and Emergency Management guidebooks available to the general public include:

- ***Concrete Dam Instrumentation Manual***
- ***Embankment Dam Instrumentation Manual***
- ***Emergency Management Handbook***
- ***SEED Manual***
- ***Seepage Chemistry Manual***

Power Operation and Maintenance are in Reclamation's Facilities Instructions, Standards, & Techniques (FIST) which pertain to the operation and maintenance of hydroelectric equipment.

www.usbr.gov/power/data/fist_pub.html.



# Lands, Bridges, and Facilities—What you need to know to keep our underpinnings working

Canals and dams aren't the only things in Reclamation's repertoire. We need the rest of the components for an effective infrastructure, including lands, facilities, and bridges.

## Reclamation's Realty and Lands Training

The Reclamation Realty and Lands training promotes communication and collaboration throughout Reclamation while providing new and seasoned Reclamation staff with information and the knowledge needed to address various issues within a vast range of programs.


*Alex Morgan, Great Plains Regional Realty Officer, presenting on Land Interest Acquisitions.*

Reclamation's Policy and Administration Asset Management Division planned and facilitated the Reclamation-wide training for over 120 Reclamation staff with participation from all of Reclamation's directorates. In all, more than 15 topics and areas of interest were covered throughout the training, including: realty tasks, use authorizations, lands records, geographic information systems, law enforcement, project management, title transfer, and land withdrawals. The training also included regional breakout sessions to facilitate intra-regional coordination.

*2018 Lands and Realty Training participants.*

The 2018 training was held April 24 - 26, 2018 at the Bureau of Land Management National Training Center in Phoenix, Arizona. Many people within Reclamation and the Federal Government contributed to the success of the training, including subject matter experts from Reclamation, Bureau of Land Management (BLM), General Services Administration (GSA), and the Appraisal and Valuation Services Office (AVSO). Notably, keynote presentations by Austin Ewell, Deputy Assistant Secretary for Water and Science, and Lower Colorado Regional leaders, Jaci Gould, Deputy Regional Director, and Leslie Meyers, Phoenix Area Manager, discussed the importance of realty and lands work within the larger context of meeting Reclamation's mission. Both Jaci and Leslie set the stage for the importance of accomplishing Reclamation's realty and land management work, and explained the challenges associated with this work. Deputy Assistant Secretary Ewell built upon Jaci and Leslie's discussions by highlighting current administration priorities of ensuring access to hunting and fishing opportunities, and the Reclamation Title Transfer Act among other important topics.

The feedback from the training was overwhelmingly positive and demonstrated a clear need for the Asset Management Division to continue facilitating future trainings. The 2018 training will serve as a starting point to establish Reclamation-wide, Regional, and Area Office training to help address many of the complex issues inherent within Reclamation's lands and realty program. The training will reinvigorate further efforts in maintaining a well informed and educated staff. Reclamation's Asset Management Division plans to host Reclamation-wide realty and lands training biennially, while the regions will each offer more detailed training opportunities on the opposite years. We welcome your input and ideas for this training.

**For more information contact:**

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Asset Management Division
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## Bridge Training

Where there is water, there are bridges—and with nearly 1,500 bridges in Reclamation's inventory, we need effective ways to track operations, maintenance, repairs, and inspections. Reclamation Bridge Inventory training provides new and experienced Reclamation bridge inspectors with the latest tools in inventorying and inspecting Reclamation's bridges. It also provides a chance to comment on guidelines such as the new guidelines for inspecting bridge scour.

This course was held on June 6–7 2018. We welcome your input and ideas for future training sessions.

*A stop log is slowly transported across the tail bay to Hoover Dam's powerplant ramp on the Arizona side of the Colorado River. Photo by Kelly Conner.*

## Facility Review Workshop (Associated Facilities)

Reclamation holds a workshop for Review of Operations & Maintenance (RO&M) personnel, inspectors, water O&M personnel to learning how to inspect and review associated facilities such as:

- Low-hazard dams
- Bridges
- Roads
- Pumping plants
- Canals
- Buildings
- Mechanical equipment
- Levees
- Fish passage facilities

The Associated Facility Review Workshop for 2018 was in Sacramento, California, April 3-5, and featured a site visit to Nimbus dam to review canals, mechanical spillway gate inspections, spillway bridge inspections, and fish facility inspections.

We welcome your input and ideas for the next workshop.

**For more information contact:**

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O&M Structures
Program Manager
Asset Management Division
Office of Policy
Reclamation
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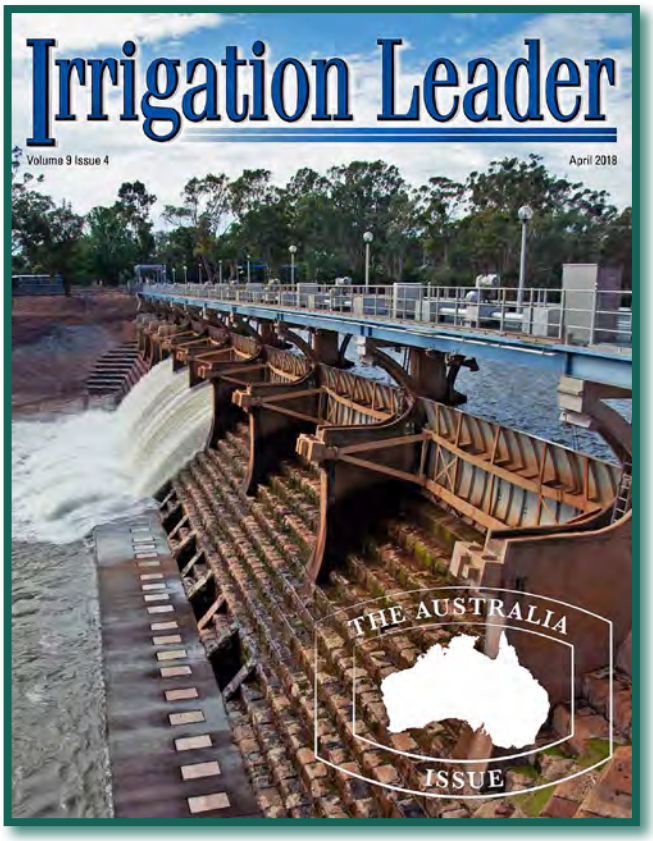
dstaton@usbr.gov

# Connections

## Irrigation Leader Tours




Irrigation Leader magazine, Rubicon Water, International Water Screens, and Alligare sponsors an annual international tour. This year, the tour returned to Victoria and New South Wales, Australia, to visit Goulburn-Murray Water, Coleambally Irrigation, and Murrumbidgee Irrigation. Stops on the tour included the Great Ocean Road, the Rubicon Water factory, a low energy pipeline installation, a dairy farm, and a irrigation demonstration farm. The tour highlighted how the latest in water delivery technology addresses the challenges of moving water and growing crops Down Under. The following participants shared their impressions of the tour and Australia.

For the armchair version, please read all about Australia in the Irrigation Leader's April issue at http://waterstrategies.com/assets/il-apr-18.pdf.

**For more information contact:**

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Water Strategies
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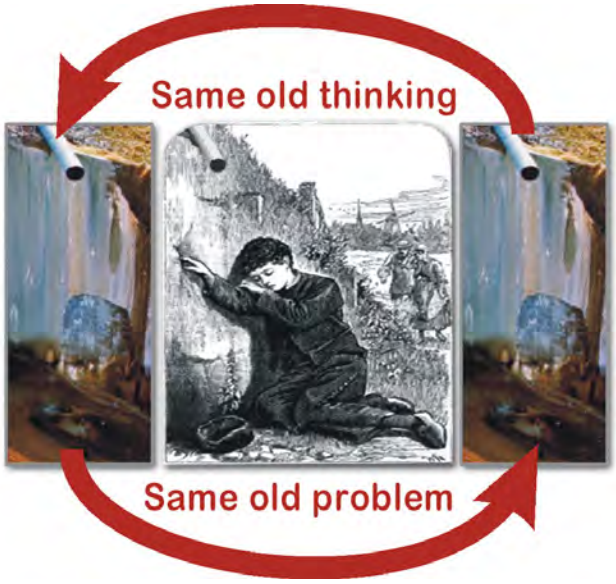
Washington DC 20003
202-698-0690
Kris.Polly@waterstrategies.com

# Training for Success . . .




**Break out of your rut!**


**Get trained for new ideas!**

**Solve the real problems!**

**Save time and money in the long run!**