

# RESEARCH AND NATURAL RESOURCES HIGHLIGHTS

## March 2002

### Director's Office (Washington DC and Denver CO)

Participated in the formulation of the draft ethics standards for conduct of science and engineering; organized Bureau review of draft document. (Shannon Cunniff, 202-513-0682; Don Ralston, Sheila Venson)

Participated in Federal Agency Water Resources Research Directors' Coordination Meeting. Group reviewed draft charter and identified other coordination groups relevant to science and water. (Shannon Cunniff, 202-513-0682)

Participated in briefing for the National Institutes for Water Resources Annual Meeting on Federal research directions and priorities. Also participated in panel discussion on means to strategically coordinate water resources research. (Chuck Hennig, 303-4452134)

Negotiated a patent license with a Canadian company to manufacture a new device developed at the Technical Service Center (TSC) for providing more accurate and timely analysis of field test data to assess the stability of dams and foundations during earthquakes. The license calls for a royalty on each unit sold in the United States. Part of the royalties collected will be shared with the inventor as permitted by law. (Don Ralston, 202-513-0683)

#### Upcoming Events

April

**3-4** Desalination Research Roadmapping effort. Executive committee meeting.  
(See water supply section below)

**30** Research partnership exploration with Portland Cement Association.

May

**15-16** Science and Technology (S&T) Program Exhibit at Reclamation Managers Conference, Salt Lake City (Chuck Hennig, 303-445-2134, Siegie Potthoff)

**29-30** S&T Program Steering Committee Meeting, Denver, Colorado (Siegie Potthoff, 303-445-2136)

## Improving Infrastructure Reliability

**Central Valley Operations** staff have held several meetings with the funding power customers who have agreed to fund the Powerformer™ for **Folsom** Unit 1. Preliminary design work has started, and plans are to award a contract in September 2002, with unit commissioning to take place beginning in February 2004. This aggressive schedule is dependent on Reclamation's ability to accelerate procurement and installation with appropriations in advance of offsetting contributions. (Gary Osburn, 303-445-2297)

Work will continue under the S&T program to develop methods to assess and evaluate the Powerformer™ once operational. (Gary Osburn, 303-445-2297)

As part of the support to the Power Resources Office's effort to enhance hydropower reliability and dependability by providing decision-making tools to facility management, Hydro Quebec, the Corps of Engineers, and Bonneville Power Administration continued review and comment on the survey of current condition assessment testing methods developed by Reclamation. A conference call with these agencies took place in March to advance the cooperative effort to agree on standard condition assessment methodologies. Detailed transformer and turbine runner condition assessment tools have been reviewed, and a similar tool for generator condition assessment is being developed. (Gary Osburn, 303-445-2297)

A rough draft of the Powerplant Life Extension Guidebook has been partially accomplished, and work continues in understanding the risk assessment methods developed by the Corps of Engineers. (Gary Osburn, 303-445-2297)

Following a meeting with staff from the **Eastern Colorado Area Office**, investigation continues into potential funding for a pilot life extension assessment at **Mt. Elbert Pumped- Storage Powerplant** in Colorado in FY03. This plant is aging and has become vital to the local power system. A study that looks at the entire power train and generates economically justified alternatives for rehabilitation is desired. **Eastern Colorado Area Office** managers met with Western Area Power Administration and power customers recently to discuss this idea. (Gary Osburn, 303-445-2297)

Worked with personnel from Kinectrics to perform low-frequency dielectric spectroscopy and recovery voltage measurements on 12 hydrogenerator stator winding coils. The specified stator coils were purchased for a stator winding insulation research investigation and were deliberately manufactured with and without several types of groundwall insulation defects. A series of laboratory tests are being conducted on the subject coils to evaluate the effectiveness of different test methods in detecting the various insulation defects. (Lori Rux, 303-445-2307)

Malin Jacobs completed the final Report of Invention for our in-house developed microwave tunnel communication radios. This report has been submitted to Michael Messaros of Applied Design Corp. (recently hired consultant to assist the S&T Technology Transfer Program) to

continue the patent process and the search for a suitable commercial vendor. These radio communication sets provide a means for work crews, who are often 5 miles or more from the nearest tunnel exit, to communicate with persons on the outside. Providing this communication link greatly increases the safety of performing work in a tunnel by allowing Reclamation to meet confined space communication requirements. The resulting cost savings to Reclamation are estimated to be about \$100,000/year in labor saving and \$2,000,000/year in increased generation revenues (made possible by more frequent cleaning of tunnels that feed powerplants). (Phil Atwater, 303-445-2304)

Malin Jacobs and Phil Atwater will finalize a research report on laboratory test results and findings for a new method of measuring electrical resistance (continuity) of personal protective grounding cables. The method involves the application of high pulses of current through the cable to detect very low values of resistance. Cable resistance is a key parameter in assessing the physical condition of grounding cable and the level of safety afforded in applying the cable to a work site. (Phil Atwater, 303-445-2304)

Malin Jacobs completed a draft Cooperative Research and Development Agreement (CRADA) for partnering with the Colorado School of Mines for completing the prototype development of our winding fault detector. This CRADA will be submitted to the Colorado School of Mines by the end of March for their review and signature. The CRADA should be in place by the end of April. It is anticipated that Colorado School of Mines students will begin work during their summer "Field Session" beginning in May 2002. The winding fault detector has demonstrated the capability of pinpointing the location of electrical faults in the stator windings of large rotating machines. Reclamation currently experiences approximately five insulation failures a year. This device can save upwards of \$50,000 per failure and prevent associated downtime. Technology transfer of the prototype will be sought as part of this study. (Phil Atwater, 303-445-2304)

Additional design and implementation work was completed on new features and service modifications to the baseline automatic generation control (AGC) package. Reclamation-wide adoption of the modular SCADA concepts could make it possible to greatly reduce maintenance costs and take better advantage of operational optimization research that has already been completed under other research initiatives. These initiatives have shown positive economic benefits at pilot sites in the form of additional water and power revenue potential and improved operating flexibility. (Frank Skufca, 303-445-2329)

Paul Trujillo of the **Farmington Construction Office** was trained on running expansion and uplift tests of soils in the Earth Sciences and Research Laboratory (ESRL). The **Farmington** office was given one of ESRL's expansion and uplift testing machines so testing can be performed in their laboratory. A sample of expansive clay was tested from a section of the Main Canal which is slated for future repair. Expansive soils have been a persistent problem on the **Navajo Indian Irrigation Project** canal system. Concrete lined canals have heaved as much as 2 to 3 feet due to expansive clays and clay shales. Plans are underway to investigate a section of

Burnham Lateral - Reach 1, which was lime treated and still failed from soil expansion. This research will improve our ability to treat expansive soils in New Mexico and on other Bureau projects and to avoid future failures. Numerous sections of the canal are damaged and require repair. The repairs attempted to date have not been very successful. (Jeff. Farrar, 303-445-2333).

### **Improving Decision Support**

#### **Upcoming Activities**

April

**2-3** Members of the Reclamation and USGS Watershed and River Systems Management Program (WaRSMP) teams will meet in **Reno, Nevada**, to review progress on development and implementation of WaRSMP technologies and to plan activities for the next 6 to 12 months. Other partnering organizations and interested parties from offices not currently involved in the WaRSMP program will also be

### **Improving Water Delivery Reliability**

Saving water at **Klamath Falls** by lining canals with methods developed by the S&T Program and PN Region--Installed nearly 400,000 sq. ft. of exposed 45-mil EPDM geomembrane to line 2.3 miles of leaky canal on the **Tulelake Irrigation District (Klamath Falls, Oregon)**. Lining was purchased with PN drought funds and installed by the Irrigation District with technical assistance for the geomembrane manufacturer. This installation is featured on the cover of the Jan/Feb 2002 issue of the Geotechnical Fabrics Report. This lining system was developed and demonstrated on the **Deschutes Project** with PN and S&T Program funding. For more information, contact Jay Swihart at 303-445-2397 or Jack Haynes at 208-378-5225.

### **Improving Water Supply Technologies**

Met with Mike Delamore from the **Fresno Office**, representatives from **California Department of Water Resources**, and John Deiner of **Red Rocks Ranch (RRR)** southwest of Fresno, to plan a pilot test at the RRR. RRR is an experimental In Farm Drainage Management site in the **Westlands Water District**. The S&T Program will conduct a research study there this summer condensing the final irrigation drainage water with Reverse Osmosis or Nanofiltration and then test a method for precipitating selenium from the concentrate. The Membrane Test Stand built by this group for the **Port Hueneme, California**, water reuse facility will be moved to the RRR for these studies. (Michelle Chapman, 303- 445-2264, Scot Irvine)

Met with Dennis Watt and representatives of the town of **Mesquite, Nevada**, to plan a pilot study of treatment methods for a new well site they have developed near the Virgin River that has high TDS. The study will be co-funded by the town of **Mesquite**, the **Lower Colorado Regional Office** and the S&T's Advanced Water Treatment Research Program. (Michelle Chapman, 303-445-2264)

March was a busy month for the Desalination and Water Purification Research & Development (DWPR) Program. A pre-proposal announcement was advertised to determine possible sources for cooperative research agreements focusing on desalination research studies, pilot projects or a possible demonstration project. Based on the number of calls received, we expect an excellent pre-proposal response. Submittals will be reviewed in the first 2 weeks of April and feedback provided to the proposers. The actual solicitation(s) will be on the street by the end of April. In addition, three cooperative research agreements (two pilot projects, and one research study) were forwarded for award in late March; these are carryovers from our FY 01 solicitation. (Tom Jennings, 303-445-2130)

The partnership, requested by Congress, with Sandia National Laboratories is going well on both fronts of the project. The **Tularosa Basin (New Mexico)** feasibility study for a Desalination R & D Facility is progressing rapidly. The broad-based Executive Committee held an organizational meeting at the New Mexico Water Resources Research Institute in Las Cruces last month, followed by telephone conference meeting to start work. The next meeting will be in early April at Las Cruces with site selection and 30 percent design work report anticipated. The second aspect of the project, a desalination technology progress plan to map future research directions, is moving ahead as well. Reclamation/Sandia interviewed a number of experts from around the country this month, leading to the formation of a multi disciplinary Executive Committee. The Executive Committee will meet at Northwestern University's Kellogg Graduate School of Management to begin work on developing a desalination technology roadmap, which extend to the year 2020. Northwestern is a world leader in technology road mapping. Following the April meeting, a larger group of experts(30-50) will be selected to meet one month later to complete the technology roadmap. This group will be multi-disciplinary and represent the private sector, government, universities, and users. The product will be delivered to Congress this summer along with the **Tularosa Basin** Feasibility Study. (Tom Jennings, 303-445-2130)

Work has also begun on the design of a National Desalination Center Website. This project was directed by Congress and will be housed within the Bureau of Reclamation.. Project completion is scheduled for this summer. (Tom Jennings, 303-445-2130)

## Upcoming Events

April

**3-4** Executive Committee Meeting at Northwestern University's Kellogg Graduate School of Management to begin work on developing a desalination technology roadmap extending to the year 2020. (Tom Jennings, 303-445-2130)

August

**6** The DWPR Program is sponsoring a pre-conference Concentrate Disposal

## Regional Reports

### Mid Pacific Region

A study on the use of artificial dens by San Joaquin kit foxes was conducted by Dr. Brian Cypher. The purpose of the study was to determine if kit foxes have a preference for style or material used in artificial dens. These artificial dens are used to mitigate and prevent impacts caused by Reclamation facilities in California, but no data is available as to the success of styles and types of dens. A total of 31 artificial dens have been established in **Bakersfield, California**, an area with abundant kit foxes. The designs include simple escape (covered pipe), and more complex dens which would be suitable for raising pups. A variety of materials was used, including plastic, metal, and cement.

Since study inception, kit foxes have used 10 of the 31 dens in 4 of the 11 den complexes. Kit foxes have investigated (but not used) 21 dens in 8 complexes. All den designs and all types of material have been used by kit foxes. Results to date on use of the artificial dens by kit foxes were presented in a paper at the Annual Conference of the Western Section of The Wildlife Society in Visalia, California. Additional dens will be established in Spring 2002. (Rosalie Faubion, 559-487-5138)