RESEARCH HIGHLIGHTS
MARCH 2003

DIRECTOR'S OFFICE (WASHINGTON, DC AND DENVER, COLORADO)

During the past 2 years, the Science and Technology (S&T) Program has made significant changes in its business practices to ensure it is sharply focused on stakeholders needs. Among the most significant changes are:

- Converting to a Reclamationwide open competitive proposal process
- Involving regional and area office staff in reviewing the relevancy of proposals and obtaining an objective technical review from both within and outside the **Technical Service Center (TSC)**
- Implementing performance measures that emphasize partnering, outreach, and communication with stakeholders and others, who can make strong contributions to western water issues
- After the initial year of implementation in FY2003, the **Research Office** made adjustments and refinements to the new S&T Program Business practices to ensure greater efficiency, effectiveness, and simplicity. Before the program practices were rolled out for FY2004, the TSC and the Research Office conducted a facilitated workshop to closely examine every aspect of the program practices. The workshop included about 50 individuals, most of whom were TSC staff who traditionally received S&T Program funding. Others included two regional staffs, several TSC staff members who have not traditionally received S&T funding, and Shannon Cunniff and Chuck Hennig from the Research Office. No significant changes to the new practices were identified, and the overall conclusion about the S&T Program business practices were that they are fair, reasonable, and comprehensive. The TSC created an eight-person committee to implement the new S&T Program practices throughout the TSC.
- The workshop was also used as an opportunity flesh out meaningful goals and performance measures for the program as well as for the researchers. This will help further focus the program, ensure accountability, provide a means to show annual progress and contributions from the program, and prepare the S&T Program for the Office of Management and Budget (OMB) Program Assessment Rating Tool (PART) analysis. Significant progress was made toward meeting this objective. (Chuck Hennig, 303-445-2134)

Our online *S&T Program Proposal and Performance Contract (S&T PropC)* management system for direct entry and submittal of your FY 2004 proposal will be rolled out on the intranet in April. Only Reclamation employees can submit proposals. When you are ready to enter your proposal, contact one of our system administrators for a user name, password, and the URL to the online system. All proposals must be submitted by June 10, 2003. Complete instructions are on our web site at www.usbr.gov/research. You can also view a PDF version of our proposal form at our web site to become familiar with the format and input requirements. Our system administrators are:

Primary: Siegie Potthoff
spotthoff@do.usbr.gov
303-445-2134

Alternate: Cheryl Rieniets
crieniets@do.usbr.gov
303-445-2150

Our new online system is a Reclamationwide data base application and will greatly simplify the proposal process. All proposals will now be submitted, reviewed, and awarded through our online data base. The data base will also make it much easier to obtain feedback on your proposal and to check status.

The S&T proposal data base will also help to eliminate paperwork and increase the efficiency of the program and the research process. The ability to share information with Reclamation internal and external stakeholders about your research will also be greatly improved through our proposal data base. (Chuck Hennig, 303-445-2134)

IMPROVING INFRASTRUCTURE RELIABILITY

The Materials Engineering and Research Laboratory recently completed the first Protective Coatings course with the Metropolitan Water District (MWD). The course is designed for Reclamation and water district personnel, and is an outcome of the partnership we established with MWD to advance protective coatings technology. (Kurt von Fay, 303-445-2399)

For the first time, as a result of our studies of new concrete technologies, Reclamation specified the use of "self consolidating concrete." This type of concrete is specially formulated to make placements in difficult conditions easier, to reduce associated costs, and to improve concrete quality. We also just completed a cooperative round robin testing program of procedures to measure alkali-reactivity of aggregates, sponsored by the Colorado Ready Mix Association. (Kurt von Fay, 303-445-2399)

We recently launched the Federal Center for Durability of Civil and Mechanical Structures. The first activity of the Center was to launch a program with the Strategic Development Council of the American Concrete Institute that will demonstrate new concrete and concrete repair technologies on Reclamation facilities. (Kurt von Fay, 303-445-2399)

Kurt F. von Fay, William F. Kepler, and Alice I. Comer recently were awarded United States Patent 6,541,106 for *Hydrophilic Polyurethane Impregnated Rubber for Sealing Water Leaks*. (Kurt von Fay, 303-445-2399)

Work begun last year continued for system identification of generator control systems. Software incorporating new optimization techniques was written and applied to a test case using frequency response data obtained during field tests. The next steps are to fine tune the solution process, apply it to more complex models, and enable the use of time domain data. A near-term benefit of these tools is reduced effort both in model development for power system studies and in optimal tuning of controllers during commissioning and realignment. A longer-term target is to integrate these tools into machine condition and power system monitoring systems to detect and predict operational problems and measure system performance. Cost benefits are expected from reductions in the frequency and duration of field trips as well as pre- and postwork analysis. (J. C. Agee, 303-445-2309, Shawn Patterson, 303-445-2311)

For the stator winding fault detector, a functional review of the software for the fault detection logic was conducted, and the software design was modified to accept and process data in a field environment. The new core flux probes are presently undergoing tests in the lab. After the system has been proven in the lab, field tests will be scheduled starting in April and continuing through the fiscal year. When these field tests occur depends upon machine availability at our facilities. (Phil Atwater, 303-445-2304)

For the Ramp Tester Cooperative Research and Development Agreement (CRADA), after addressing the issues discovered during the first round of laboratory tests, Adwel International (our CRADA partner) returned the prototype ramped voltage test set to Reclamation for further testing. In addition, Adwel sent an engineer to Reclamation to help deal with any new issues that might be discovered. Consequently, the prototype test set has passed the required Reclamation laboratory tests, and is now ready for validation testing in the field. The next step is to contact the field to locate machines that can be made available for these validation tests. (Phil Atwater, 303-445-2304)

An independent attorney reviewed United States Patent No. 6,437,554 B1, "High Current Measurement System Incorporating an Air-Core Transducer," issued August 20, 2002, and found it to be valid and defensible. At this time, and through our technology transfer efforts, a commercial product is available which is covered by this patent. A licensing agreement will now be established between Reclamation and two companies that have jointly produced equipment using the air-core transducer. (Phil Atwater, 303-445-2304)

The conversion of the **Hoover Powerplant** ancillary services monitor to execute on the new SCADA platform was completed. During April, work will be initiated to develop a method of scheduling and optimizing generation regulation services from a powerplant with a daily water release schedule. (Steve Stitt, 303-445-2316)

Basic concepts were developed for an online scheme to monitor hydroelectric performance. During April, work will be initiated to develop the performance monitoring scheme for laboratory testing. **Hoover Powerplant** will eventually be used as a demonstration site. The performance monitor will also be used to determine a basic penstock loss model. (Steve Stitt, 303-445-2316)

IMPROVING DECISION SUPPORT

Attended the **Pacific Northwest** Weather Workshop 2003 in Seattle, Washington, and gave a presentation on a new collaborative research project with the National Aeronautics and Space Administration's (NASA) Goddard Space Flight Center, Hydrologic Sciences Branch, for "The Use of NASA Land Data Assimilation Products to Improve Flood and Drought Risk Analysis and Forecasting for Water Resources Management." The primary study area for this research will be the **Yakima River Basin**. However, the goal of the project is to develop products to improve water supply and demand forecasts within the 17 western states. Funding for this research is from a NASA grant and the S&T Program's Water Budget ET Toolbox Enhancements project. (Curt Hartzell, 303-445-2482)

The **Columbia Basin Project** Watershed and River Systems Management Program (WaRSMP) study team held a conference call to review progress on development and deployment RiverWare, MMS, AWARDS-ET Toolbox, and related forecasting technologies within the project area. Significant progress was reported in all of these areas, and successful completion will result in improved reservoir management capabilities. (Don Frevert, 303-445-2473)

Draft documentation of the hydrologic data set being used in the RiverWare deployment on the Truckee River basin was completed and distributed for review. (Don Frevert, 303-445-2473, Jeff Rieker, 303-445-2484)

WaRSMP team members met with visitors from South Korea to discuss RiverWare, Hydrologic Data Base, and MMS capabilities and their possible application in South Korea. (Don Frevert, 303-445-2473)

April 7-11, Curt Hartzell (86-68510) will make a presentation on the "AWARDS ET Toolbox Decision Support System" at the Integrated Water Resources Management International Workshop on the Denver Federal Center.

IMPROVING WATER SUPPLY TECHNOLOGIES

Two new continuous flow measurement (CFM) demonstration sites were calibrated and set up for operation on University of Arizona research farms in the **Yuma, Arizona** vicinity with funding assistance through the **Yuma Area Office** Water Conservation Field Services Program. Also, two demonstration sites in the **Bard Water District** in **California** (just north of Yuma) feature the automated farm turnout (AFT) units developed under the S&T Program, which are now commercially produced by MetOne. The flow level sensor at the **Ypsilanti** site was recalibrated, and the gate was successfully operated in automatic mode for a short observation period. An extended observation time period is planned, to be coordinated with availability of District personnel. (Tom Gill, 303-445-2201)

A "table-top" mini scale model has been fabricated in the laboratory shop as the vehicle to demonstrate feasibility of developing automated delivery systems compatible with improved efficiency application of irrigation water. Work is ongoing in cooperation with the TSC to select and integrate automation components of the model. (Malin Jacobs, 303-445-2306)

A flat bottomed subcritical Venturi flume is being investigated as an alternative to critical-flow measurement structures in settings where high velocities or potential jumps during low flow conditions might present barriers to fish passage. In initial work, a limited-scope numerical modeling investigation was performed using Flow 3D software. A physical modeling study will follow as laboratory facilities become available. (Tom Gill, 303-445-2201)

A meeting was held in Phoenix between the **Payson** Water Department, Black and Veatch, Payson's engineering firm, the **Phoenix Area Office**, and the TSC to discuss phase 2 of membrane treatment of effluent dominated waters for reinjection (**Payson, AZ**). It was decided that Black and Veatch will loan Payson a reverse osmosis pilot unit to treat effluent from the ultrafiltration unit installed last summer. The pilot unit will be set up in **Payson** at the **Green Valley Pump House**. The objective of this phase will be to compare performance of nanofiltration and reverse osmosis membranes. Test parameters will be total organic carbon rejection, power consumption, and stabilization requirements. (Michelle Chapman, 303-445-2264)

Met with several representative of the **Phoenix Water Department**, **Phoenix Area Office**, and others to plan the Concentrate Minimization Project. The project will treat effluent from the 24th Street Wastewater Treatment Plant with microfiltration and reverse osmosis to create a concentrate stream that will be further treated with the DewVaporation process developed by Dr. Jim Beckman of the University of Arizona with assistance from the S&T Program. We are working with the Tank Automotive Command in Michigan to borrow one of their prototype tactical water purification systems (TWPS) to provide the concentrate stream. Product water from this system can be reused for irrigation or industrial purposes. (Michelle Chapman, 303-445-2264)

The annual Interagency Consortium for Desalination and Membrane Separation Research meeting was held in **Oxnard, California**. Representatives attended from several offices of the Defense Department, two offices of the

Environmental Protection Agency, Indian Health Service, and National Institute of Standards and Technology. This meeting is important for comparing notes with other government offices concerned with water issues. Two outcomes from the meeting especially benefit S&T Research Projects. One is the deal for borrowing the TWPS from the Army's Tank-automotive and Armaments Command. The other is an interagency agreement with the Office of Naval Research to prepare a summary of research needs and technology ripe for application in the development of a new expeditionary water purification unit to produce 100,000 to 500,000 gallons per day for peacekeeping and disaster relief situations. (Michelle Chapman, 303-445-2264, or Kevin Price, 303-445-2260)

For Selenium Remediation Using Hybrid Chemical and Membrane Processes for the **Central Valley Project** (**Red Rock Ranch, CA**), we set up the pretreatment system for the reverse osmosis unit at Red Rock Ranch. We tested the pretreatment system and started up the reverse osmosis (RO) system. A visiting scientist from the University of New South Wales assisted in the chemical precipitation tests to remove selenium from the concentrate from the RO system, using a process patented by Andrew Murphy in the early 1990s. (Michelle Chapman, 303-445-2264)

IMPROVING WATER DELIVERY TECHNOLOGIES

The Saltcedar Biological Control Consortium (SCBCC) met in **Albuquerque, New Mexico**. The SCBCC, cochaired by Reclamation and the Department of Agriculture's Agricultural Research Service, was organized in November 1998 and is represented by some 40 federal and state agencies, environmental and user groups, universities, and other organizations. The meeting provided an opportunity for research cooperators to compare data and exchange information concerning saltcedar biological control research. Discussions were held with the Fish and Wildlife Service, concerning coordination with southwestern willow flycatcher recovery efforts. Locating the meeting in **Albuquerque** availed locally based agencies and general public the opportunities of attending technical and public outreach meetings. (Fred Nibling, 303-445-2202) 264)

The California Botanical Society has accepted a study, *Insects on* Pholisma sonorae (Lennoaceae) *flowers and their conspecific pollen loads*. The study will improve mitigation for this sensitive plant, found along the **All American Canal**, by identifying potential pollinators and suggesting measures for their conservation. (William Wiesenborn, 702-293-8699)