



RESEARCH HIGHLIGHTS

DECEMBER 2003



DIRECTOR'S OFFICE (DENVER, COLORADO)

Provided an on-line demonstration of the research Proposal and Performance Contract Management System (PropC) to Michael Gabaldon, Director, Policy, Management, and Technical Services; and Randy Feuerstein, Chief Information Officer. PropC is the recently developed web-enabled database that automates the research proposal process from submission through funding. (Chuck Hennig, 303-445-2134)

The Research Office has released the funded research program for FY04. For the first time, the entire proposal submission, review, and funding process was conducted using the web-based Proposal and Performance Contract Management System (PropC) (see August 2003 Research Highlights). The successful development and use of the PropC System has generated interest in the Department of the Interior. In early January, a number of Department managers will be briefed on the capability of PropC. A cornerstone of the proposal review process is the invaluable guidance provided by the relevancy reviewers. Relevancy reviewers are subject matter experts in the Regional and Area Offices, and the Office of Policy and Program Services. They rated the proposals based on their potential for high impact and use in achieving Reclamation's mission. For FY04, a total of 191 proposals were submitted. Of these, 131 proposals were funded, and 17 proposals are under further consideration. Regional and Area Office researchers submitted about one-third of the funded proposals. On average, each proposal received four relevancy and four technical reviews. Funding decisions were

based on mission relevancy and technical merit, on program review, by the Research Office and Regional Research Coordinators, and on Steering Team and Administration priorities. The total requested funding was nearly \$16 million, and the total of all funded proposals is nearly \$8 million. The funded proposals include 521 funding partners for a nearly two-to-one leveraging of the Research Office's research dollars. The results are shared through the PropC System in a variety of ways. Each proposal submitter and reviewer sees a compilation of reviews and the basis for funding decisions related to the proposal they submitted or reviewed. Reclamation management will see the entire compilation of proposals submitted, relevancy and technical reviews, and the basis for funding decisions in an easy to read and searchable format. The general public will see an abstract of each funded proposal. Access to the results by reviewers, Reclamation management, and the public will be provided in January. Other PropC features under development and planned for implementation in FY04 include

- A research benefit calculator to track program goal accomplishments
- An Idea Hopper that will allow managers and stakeholders to submit their research needs into our data base
- A clickable map of research locations linked to research information
- News briefs, provided automatically to subscribers in the S&T Program Bulletin, and posted on the Research Office website. The call for proposals for FY05 research funding will be in

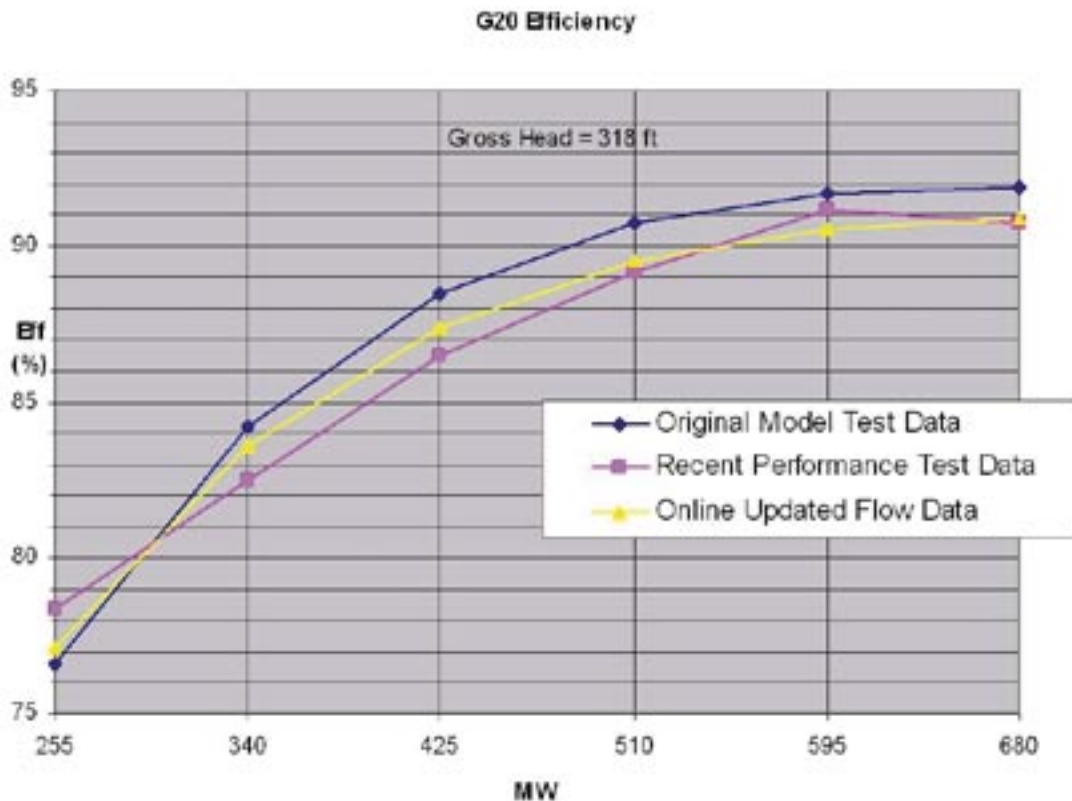
February 2004. Once again, the entire process will be performed through the PropC System. (Dan Levish, 303-445-3175)

IMPROVING INFRASTRUCTURE RELIABILITY

The abstract for a technical paper titled *A New Method for Detecting Hydro Turbine Rough Zone Operation* was accepted for presentation at the upcoming HydroVision Conference to be held in Montreal, Canada, August 16-20, 2004. The paper discusses an automated real-time monitoring system developed by the Bureau of Reclamation that detects turbine rough zones under varying head conditions. Turbine rough zone detection for remotely operated hydro generators is a major concern, especially as more powerplants are converted for unattended/remote operation. Operating

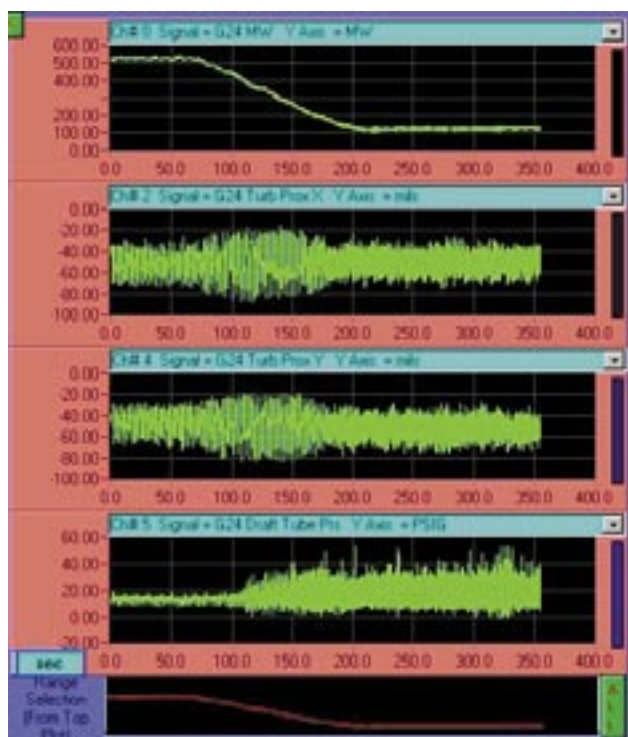
in the turbine rough zones over a period of months or years can cause extensive damage to the turbine runners. The monitoring system measures generator runout at the lower guide bearing, as well as the draft tube pressure, and uses this information to detect when the generator is operating in a rough zone. If rough zone operation is detected, a signal is sent to the dispatch center, where generator load can be adjusted to avoid turbine rough zone operation. The system has been deployed for the past 4 years. (George Girgis, 303-445-2310)

Recent installation of acoustic flowmeters at the **Grand Coulee** Third Powerplant has provided the opportunity to demonstrate that some of the present turbine characteristics vary from the flow curves obtained from the original turbine model tests. Preliminary results from Grand Coulee Unit G20 are shown below in terms of efficiency versus megawatts. The illustration below shows a



New curve developed from online data.

new curve developed from online data obtained during several days of operations following a performance test in November 2003. Note that the turbine efficiency appears to have degraded from the original model test performance by several percent at higher loads. Tests were also performed on units G24 and G20 in the Third Powerhouse at Grand Coulee to review the rough zones, which are zones where the units are subject to high levels of damage and are indicated by high levels of shaft deflection. The graph below shows both shaft deflection and draft tube pressure as G24 is unloaded from approximately 500 Megawatts to 100 Megawatts. The high amount of signal in the draft tube pressure at low loading values (about 100 Megawatts) together with high activity in a separate cavitation monitor provided by the Tennessee Valley Authority indicate that increased, and potentially more costly, turbine damage may be occurring. Further investigations are being performed to determine when the highest-cost damage is occurring and to adjust the unit rough zone limits as necessary. Plans for January include further testing and



Shaft deflection and draft tube pressure.

comparison of existing models with new data available from additional units at Grand Coulee. A final Grand Coulee Rough Zone report will be produced in January. (Steve Stitt, 303-445-2316)

Research efforts continue to decide the feasibility of the Doubly Fed Machine for **Mt. Elbert Pump-Generating Plant**. A contractor with experience in building equipment of this type has been contacted to help answer specific questions on cost, size, and efficiency gains and losses. These data are being analyzed, and options considered before progressing further. This research is being conducted in conjunction with the Mt. Elbert Powerplant rehabilitation project. The Doubly Fed Machine, if proven viable, would be an option for increasing efficiency at Mt. Elbert and other locations. (Gary Cawthorne, 303-445-2817)

IMPROVING WATER SUPPLY TECHNOLOGIES

Water resource managers must analyze the alternatives of managing sediment deposited in our reservoirs. Alternatives include mechanical sediment removal, releasing sediment downstream, or doing nothing. To decide upon the most beneficial and least cost alternative, we must understand the impacts associated with each. However, current sediment transport models that Reclamation is using were not designed for such problems. Therefore, the Sedimentation and River Hydraulics group of the TSC is conducting research for the Science and Technology (S&T) Program to develop better tools to assess the alternatives of reservoir sediment management. The tools developed will assist Reclamation in predicting such things as the efficiency of sediment sluicing and the water quality and deposition impacts associated with such activities. One project where these tools are being tested and calibrated is the



How will we prevent our reservoirs from looking like this? Dam is in upper left corner of the picture.

Matilija Dam Ecosystem Restoration Project in **Ventura County, California**. Matilija Dam now has approximately 6 million cubic yards of sediment behind it, and is considered obsolete. Since the dam no longer provides benefits, its removal is being considered. The main obstacle to its removal is the cost of the downstream impacts of the sediment release. The tools that Reclamation is developing will assist in predicting these impacts and designing appropriate mitigation measures for water diversions and flood protection as an option to remove dam safety risks and relieve ecosystem impacts. (Blair Greimann, 303-445-2563)

Polyacrylamide (PAM) is a polymeric powder that shows great promise for reducing canal seepage. Experimental applications in the **Grand Junction** area show short-term seepage reductions of 25 to 50 percent. Additional testing is being planned for **Williston, North Dakota** next spring to measure seepage reduction over the course of the entire irrigation season. Reclamation is pursuing cooperative agreements with PAM manufacturers, the U.S. Department of Agriculture's Agricultural Research Service (**Kimberly ID**), and the Natural Resources Conservation Service to develop this new technology. Contact Kathy Holley (**Western Colorado Area Office**)

or Jay Swihart (Denver TSC) for additional information. (Jay Swihart, 303-445-2397)

The study of integration of state-of-the-art geophysical logging technologies to create a groundwater quality resource inventory beneath wetlands in the **Grasslands Basin, California**, is still in the initial stages. The most significant obstacle to assessment of groundwater conjunctive use potential is inadequate data on the depth distribution of salts in the regional aquifer. A more thorough inventory and mapping of the depth distribution will help to develop sustainability estimates. This project will develop a field protocol and test the reliability of two state-of-the-art geophysical logging techniques that, in combination, could provide Reclamation with the data needed to perform vital project planning leading to increased water supply reliability for the **Central Valley Project**. Field reconnaissance was used to locate potential water wells for use in the study. A photograph of a promising well is shown below. (William Shipp, 916-978-5329; Nigel Quinn, 916-978-5079)



A promising well.

IMPROVING WATER DELIVERY TECHNOLOGIES

Technical Service Center (TSC) personnel are conducting thermal refugia research under the S&T Program for threatened coho salmon on the mainstem **Klamath River**. The study funded aerial infrared imagery along a 123-mile reach of the Klamath River in late July and early August, taken at two different flow releases from **Iron Gate Dam**. This provided a good characterization of thermal refugia. Four different thermal refugia underwent biological and physical monitoring during this same period to help determine how different Iron Gate Dam flow releases affect thermal refugia during the summer. This is a multiyear effort that may give decision makers more flexibility on how Reclamation operates Iron Gate Dam, as well as other dams that could adversely impact aquatic species on other river systems. (Ron Sutton, 303-445-2495)

Personnel from the TSC, Reclamation's **Upper Columbia Area Office**, Reclamation's **Yakima Field Office**, and the U.S. Fish and Wildlife Service collaborated to collect information on the effects of flow regulation on anadromous salmon in the **Naches River**, a major tributary to the **Yakima River** in **Washington**. The crew spent 2 weeks snorkeling and collecting habitat measurements. The information obtained from this study will help manage a recently acquired water right. In March 2003, Reclamation's Yakima River Basin Water Enhancement Program and Washington Department of Ecology purchased over 260,000 acre-feet of water from Pacific Power and Light, which used the water for power generation, causing extreme flow reductions during the late summer, fall, and early winter. Most of this water will now remain instream to enhance aquatic habitat; however, some will be used to help meet irrigation deliveries. Information from this research will help determine the distribution of water between the aquatic habitat and irrigation needs, and the necessity for irrigation improvements in an effort to provide all the water needed for instream flow improvements. View this link for further information: <http://www.yakima-herald.com/premium/279408263750583.news>. (Stephen Croci, 509-575-5848, x325)