

# RECLAMATION

*Managing Water in the West*

TR-2012-09

## **Travel to Davis Dam for Modifications to Turbulence Research Test System and Lake Mead for Repairs and Documentation of the Quagga Research Boat**

**Dates of Travel: May 28-June 1, 2012**



**U.S. Department of the Interior  
Bureau of Reclamation  
Technical Service Center  
Hydraulic Investigations and Laboratory Services Group  
Denver, Colorado**

BUREAU OF RECLAMATION  
Technical Service Center  
Denver, Colorado

TRAVEL REPORT

Code: 86-68460

Date: June 7, 2012

To: Manager, Hydraulic Investigations and Laboratory Services Group

From: Josh Mortensen and Jimmy Hastings (86-68460)

Subject: Travel to Davis Dam for modifications to turbulence research test system, and Lake Mead for repairs and documentation of the quagga research boat

Travel period: 28 May 2012 – 1 June 2012

2. Places or offices visited: Davis Dam and Lake Mead Boat Marina

3. Purpose of trip: This trip was to follow up previous work for research projects as discussed in travel reports TR-2012-04, TR-2012-06, and TR-2012-07. Main objectives were to modify the turbulence research test system to release air within the test pipes at Davis dam (project 9829) and to repair fish screen controls on the quagga mussel research boat deployed at Lake Mead (project 4111).

4. Synopsis of trip:

**Davis Dam – Turbulence Mussel Control Research (project 9829)**

On Monday May 28<sup>th</sup> Josh and Jimmy travelled to Laughlin, NV to modify the turbulence pipe research test system, located on Davis Dam's unit 4 cooling line. Josh transported necessary tools and equipment in a government vehicle and picked up Jimmy at the Las Vegas airport. Work began Tuesday morning (29<sup>th</sup>) on unit 4's cooling system air insertion vent which draws airflow necessary for proper cooling system operation. An attempt was made to reduce the amount of airflow to the research test pipes at the downstream end of the cooling system by throttling the incoming airflow with a 6-inch butterfly valve (Fig. 1). Air velocity measurements in the vent before and after installation showed that the volumetric air flowrate was reduced by only 4 percent when safely throttling with the valve. The valve was left in place at 45 percent open (opening necessary to prevent water column separation for a sudden shutdown of cooling system) and then locked with a cable to prevent accidental closure by vibration (Fig. 1).



Figure 1. Butterfly valve (blue components) installed on 6-inch air vent to the cooling system

Tuesday afternoon (29<sup>th</sup>) through Thursday (31<sup>st</sup>) were spent installing an air-release and venting system to remove the air entrained in the test system (Fig. 2). The installation of this air-release system was a significant improvement over previous attempts to remove air from the test pipe. However, about 1-1/2 inches of air remained at the crown of the test pipe when the water surface elevation was high in the tale race (multiple units on) and about 4 inches when the tale race low (only a few units on). This will alter the hydrodynamics of the flow through the turbulence generator, possibly biasing test results. It was decided to continue with testing until preliminary results become available before planning any other modifications to the test system. The turbulence test system (includes pipe flow from cooling system and pressure pumps for flow to turbulence jet nozzles) was then left running for an extended period of time to verify long term operation before leaving the site.



**Figure 2. Turbulence test system with air capture chamber & vents, shown here after 20 hrs of continuous operation.**

The main concerns for long term operation of the turbulence test system are sufficient water supply to the pressure pumps and splashing water from the air-release vents onto the floor of the main walkway. These concerns were addressed by moving the pump water supply to a hose spigot connected to the cooling water inlet on the 2<sup>nd</sup> floor where there is more water pressure (clogging of filters is still of concern). Also, boards were installed near the vents to keep splashing water in the trench against the wall that leads to the floor drain (Fig. 2).

The test pipes and pressure pumps were allowed to operate continually for about 20 hours during which time there were no problems. Also, on Thursday (31<sup>st</sup>) Sherri Pucherelli arrived onsite to

install mussel settlement plates and set the proper flow through the bio-box coolers. She was instructed on test system operation and basic maintenance of the pressure pumps before leaving that same afternoon. She plans to visit the test system weekly to collect veliger samples and check the test system operation. Early Friday morning proper system operation was confirmed, oil was changed in both pumps and the entire test system was restarted before Josh and Jimmy left the site.

#### **Lake Mead Boat Marina – Research of mussel impacts to fish screens (project 4111)**

Josh and Jimmy arrived at the boat marina about 7:30 am on Friday (1<sup>st</sup>) to repair the fish drum screen ISI controller as well as document mussel growth on all of the fish screens under testing. The controller was repaired by replacing the DC power supply and installing an inline conditioner to regulate power going to the controller. The drum screen, which had not been cleaned for several weeks due to electrical problems, was raised above the water surface for photo documentation before cleaning (Fig.3, a) and after 3 cleaning cycles (Fig.3, b). All other screens were photographed and documented and a temperature logger was deployed at a depth of 10 ft. Correct operation of all components (Hydrolox screen, pump, and ISI screen) was confirmed before leaving the boat at about 10:30 am. At that time Jimmy dropped Josh off at the airport for a return flight and drove the government vehicle back to Denver.



**Figure 3. Photograph of ISI drum screen before cleaning (a) and after 3 consecutive cleaning cycles (b).**

#### **5. Conclusions:**

**Davis Dam:** An air-release system was installed on the turbulence test system to remove air entrained in the test pipes. A thin layer of air still existed at the pipe crown which may affect the results of the study. However, the study will still continue with Sherri Pucherelli collecting veliger samples weekly and Davis Dam personnel conducting a daily walk-thru of the test system in the draft tube discharge gallery. They will notify Josh of any problems or necessary shut-downs of the test system.

**Lake Mead Boat Marina:** The ISI drum screen controller was successfully repaired and regular cleaning operation (3 cycles per day) was resumed on Friday June, 1<sup>st</sup>. No other problems were encountered for continuous operation of the Hydrolox screens or propeller pump. Josh will provide photo and video documentation to Cathy Karp who is the team lead for this project.

6. Action correspondence initiated or required: None

7. Client feedback received: N/A

cc:

Leonard Willett (LCD-8200)

Sherri Pucherelli (86-68220)

Vince Lammers (LCD-D11)

John Sorace (LCD-D20)

Cathy Karp (86-68290)

Joseph Kubitschek (86-68460)

**SIGNATURES AND SURNAMES FOR:**

**Travel to:** Davis Dam, Bull Head City, AZ and Lake Mead, Boulder City, NV

**Dates of Travel:** May 28 – June 1, 2012

**Names and Codes of Travelers:** Josh Mortensen and Jimmy Hastings, 86-68460

**Travelers:**

  
Jimmy Hastings 6-6-12  
Hydraulic Investigations and Laboratory Services Group Date

  
Josh Mortensen 6/6/12  
Hydraulic Investigations and Laboratory Services Group Date

**Peer Review by:**

  
Jim Higgs 6-6-12  
Hydraulic Investigations and Laboratory Services Group Date

**Noted and Dated by:**

  
Robert F. Einhellig, Manager 6/6/12  
Hydraulic Investigations and Laboratory Services Group Date