

RECLAMATION

Managing Water in the West

TR-2014-05

Travel to Roza Canal and Powerplant

Travel to Roza Canal and Powerplant for field testing of hydrokinetic characterization and impacts to existing canal hydraulic operation (S&T project 7317).

Date(s) of Travel: May 11 - 16, 2014



**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 18, 2014

To: Manager, Hydraulic Investigations and Laboratory Services Group
From: Josh Mortensen, Hydraulic Engineer

Subject: Travel to Roza Canal and Powerplant for field testing of hydrokinetic characterization and impacts to existing canal hydraulic operation (S&T project 7317).

1. Travel period: 11 May – 16 May 2014

2. Places or offices visited: Yakima Field Office (Roza Main Canal and Powerplant).

3. Purpose of trip: The purpose of this trip was to collect hydraulic field data from Instream's hydrokinetic (HK) unit in the Roza Main Canal. Water levels and Acoustic Doppler Current Profiler (ADCP) velocities were measured both up and downstream of the HK unit. These data were collected by Reclamation while most ADCP data downstream of the HK unit were collected by Sandia National Laboratory (SNL). Physical data from the field will be used to develop and calibrate numerical models for HK performance and impact predictions. This test was the first of two planned for the 2014 irrigation season. The second site visit will occur in August.

4. Synopsis of trip:

Sunday, May 11: Josh Mortensen, Tracy Vermeyen, and Kylie Fink flew into Seattle, WA and rented a car to drive to Yakima, arriving Sunday evening. Test setup began Monday the 12th.

Monday, May 12: Josh, Tracy, and Kylie met with Ron Moores at the powerplant to review the job hazard analysis (JHA), acquire safety and survey equipment, and check out a government work truck for the week. A new pressure transducer was installed in the powerplant to accurately measure penstock pressure. Also, tag lines for ADCP measurements were set up (6 upstream and 6 downstream of the HK unit), and Hobo water level loggers were launched and deployed at 24 locations along the main canal. The Rio Grande ADCP was assembled with an Ocean Science River Boat and deployed to make shakedown flow measurements.

Tuesday, May 13: ADCP shakedown testing continued. This included comparing velocity data collected using the Rio Grande and QLiner at location T1 (165 ft upstream). Measurements were then made at location 8 (32 ft downstream of turbine) with and without the HK rotor operating. These measurements were compared to those made by SNL at the same location for consistency. Quality data was obtained by both ADCP setups despite the rough water surface. After assisting with setup and shakedown testing, Tracy Vermeyen left the site around noon to return to Denver.

Wednesday, May 14: Data were collected for both baseline and HK operating tests.

Reclamation made ADCP measurements upstream at locations T1 (165 ft upstream) and T5 (32 ft upstream), while SNL made measurements at locations T8, T9, and T10 (32ft, 64 ft, & 98 ft downstream respectively). Measurement attempts were made at T11 (131 ft downstream), but were mostly unsuccessful due to high shear velocities and a rough water surface in the transition of the canal.

Thursday, May 15: SNL personnel left Thursday morning to return to Albuquerque. Josh and Kylie stayed on to collect more ADCP data at a higher canal flow as it had increased from Wednesday. Data were collected upstream at location T5 at multiple operating points as well as locations T8 and T9 downstream. Measurements were repeated at location T5 with the rotor out of the water for a baseline. Baseline data were not collected at any other upstream locations as results from previous baseline measurements showed little difference in spatial variation of velocity characteristics.

Thursday afternoon was spent taking down test equipment and preparing to return home. With the exception of the ratchets, tagline ropes were left in place for testing in August. The Hobo loggers were removed from the canal to download water level data throughout the week. Two loggers were missing as they had vibrated loose from their end caps in the flow (T8 and #18). Powerplant data were recorded throughout the week and will continue to be logged over the summer. Powerplant data will be downloaded at the conclusion of the August test.

Friday, May 16: Josh and Kylie returned to Denver. Equipment which will be used again in August (Rio Grande ADCP, River Boat, Hobo loggers, and Qliner ADCP) was left at the Yakima Field Office and was stored by Roza Powerplant personnel.

5. Conclusions: Baseline and HK operating water level and ADCP velocity data were collected at different canal flows. Test photos as well as preliminary data are presented in Figures 1-11. These data will be analyzed to further characterize HK unit performance and develop the numerical model for impact predictions.

6. Action correspondence initiated or required: All data from the May field test will be sent to Instream and SNL.

7. Client feedback received: N/A

cc:

Ron Moores (YAK-5230)

Tom Glover (YAK-5210)

Chuck Garner (YAK-5100)

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SIGNATURES AND SURNAMES FOR:

Travel to: Roza Canal & Power Plant, Yakima, WA

Dates of Travel: 11 May – 16 May 2014

Names and Codes of Travelers: Josh Mortensen, 86-68460, Tracy Vermeyen 86-68460, & Kylie Fink, 86-68140

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6/17/14
Date

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Noted and Dated by:



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6/17/2014
Date

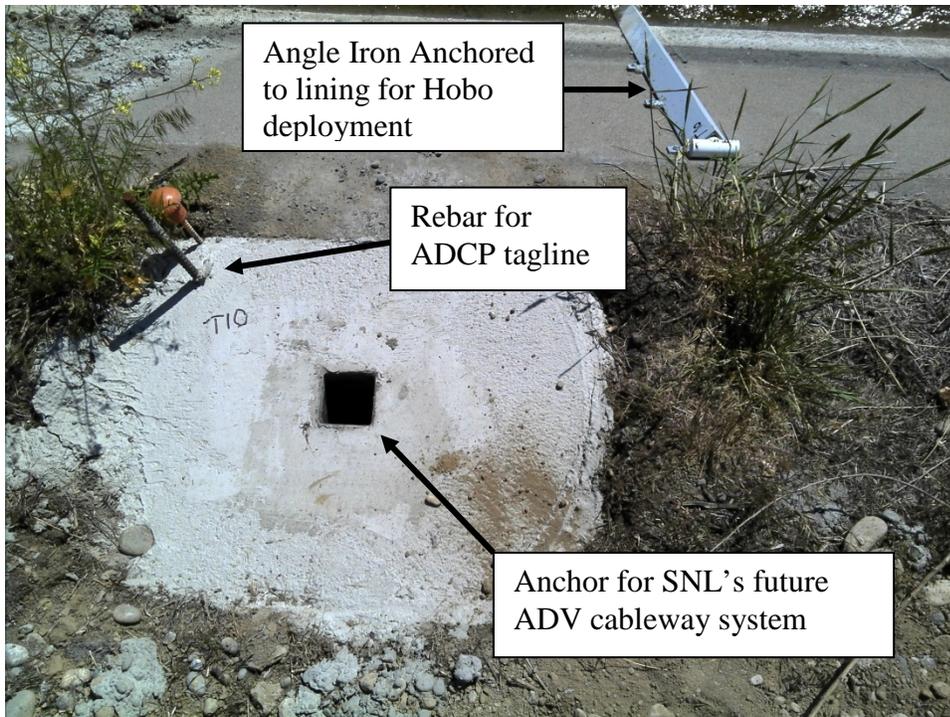


Figure 1 Typical setup for water level and ADCP instrumentation deployment at 12 measurement cross-sections.



Figure 2 Reclamation's Rio Grande ADCP with the Ocean Science River Boat. Location is 32 ft upstream of the HK unit.



Figure 3 Reclamation's Rio Grande ADCP with the Ocean Science River Boat. Location is 32 ft downstream of the HK unit in the wake caused by the rotor.



Figure 4 SNL's Rio Grande ADCP with the Z-Boat. Location is 32 ft downstream of the HK unit in the wake caused by the rotor.

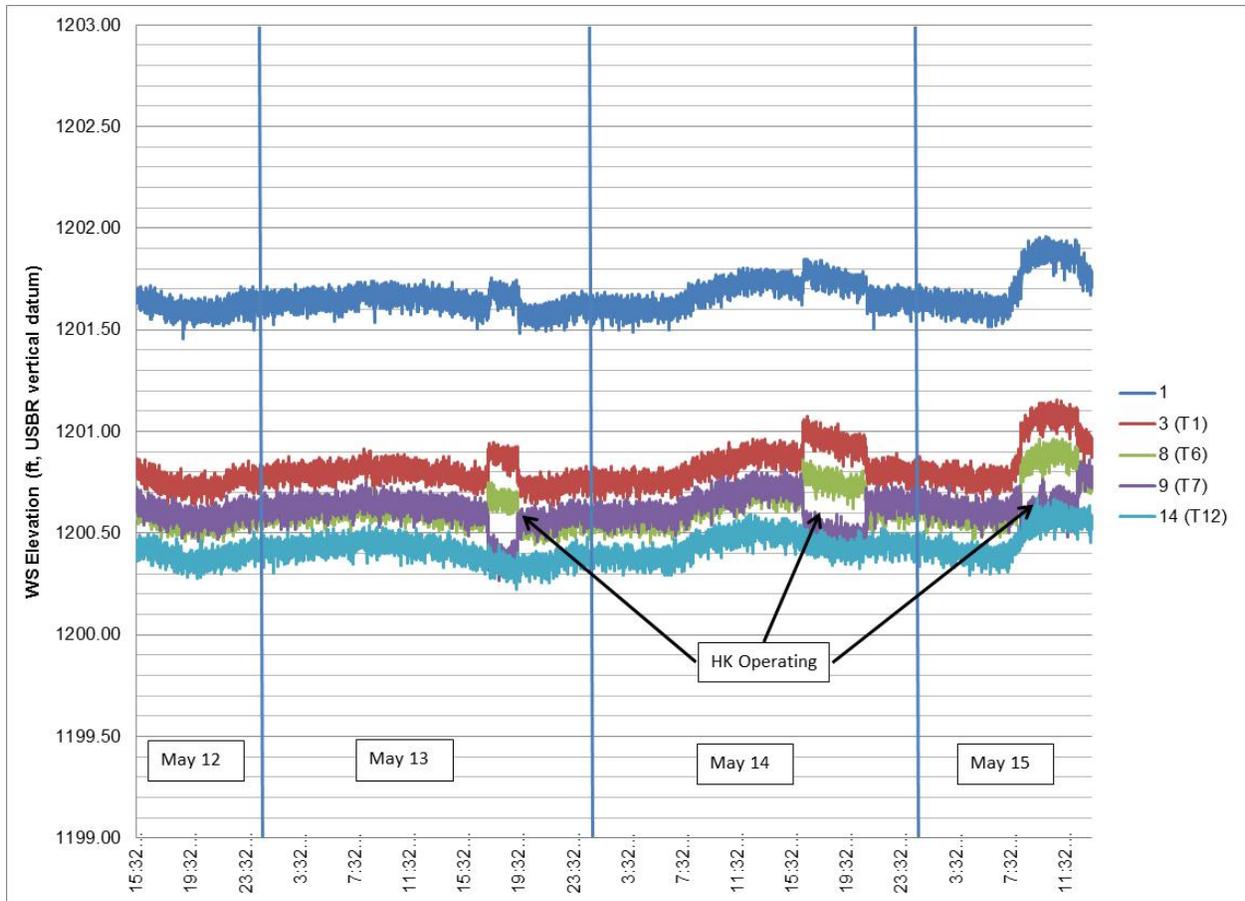


Figure 5 Water level data throughout the test week. Data are from logger locations 1, T1, and T6, (2400 ft, 165 ft, and 16 ft upstream of the HK unit respectively) as well as T7 and T12 (16 ft, and 165 ft downstream of HK unit respectively).

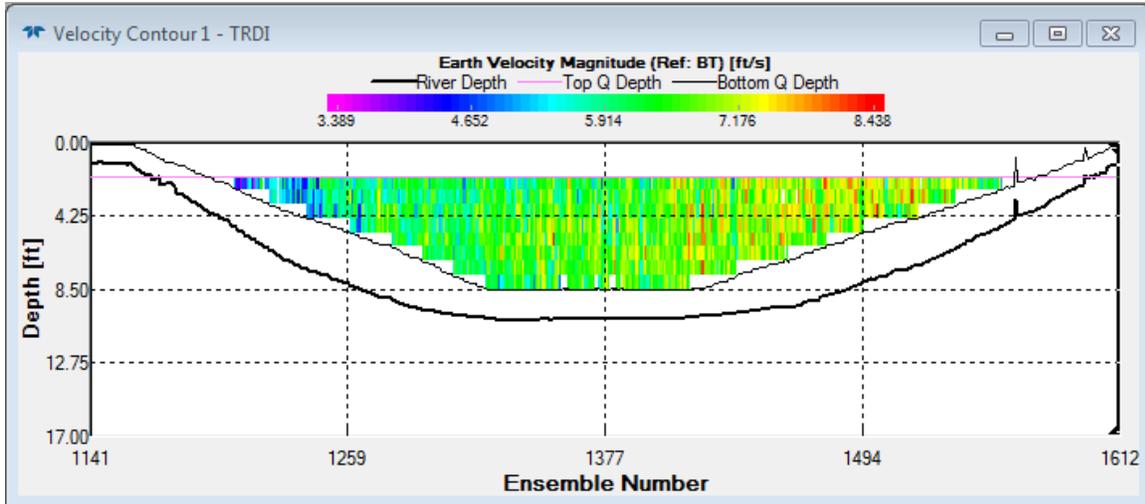


Figure 6 Baseline ADCP data at T1 (165 ft upstream of HK unit) looking downstream.

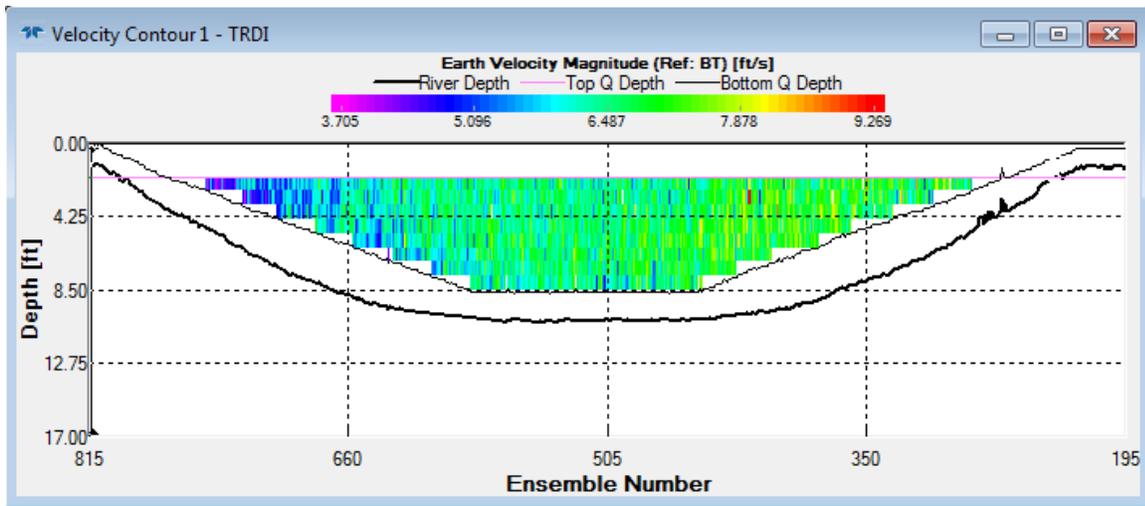


Figure 7 Baseline ADCP data at T5 (32ft upstream of HK unit) looking downstream.

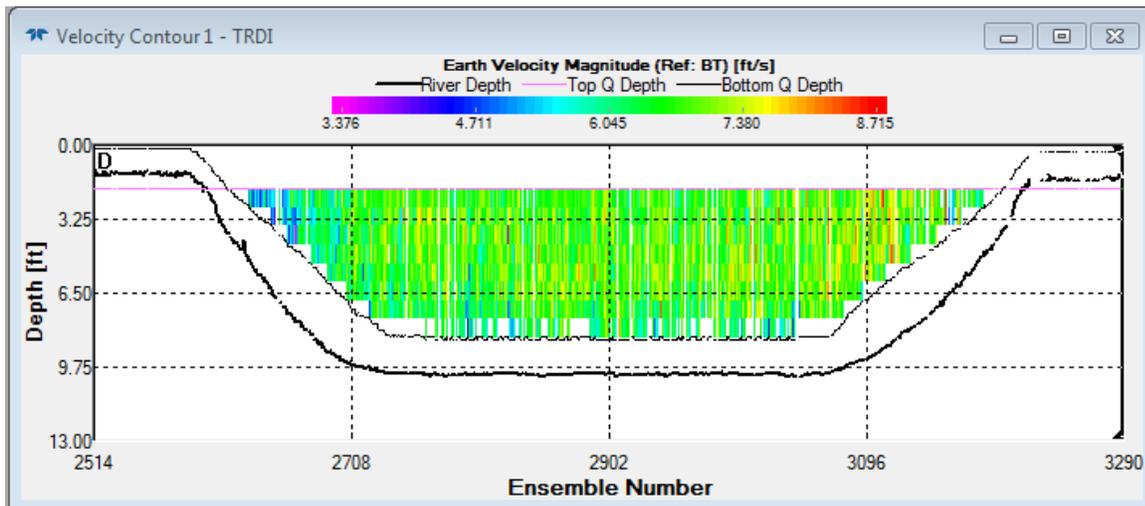


Figure 8 Baseline ADCP data at T8 (32 ft downstream of HK unit) looking downstream.

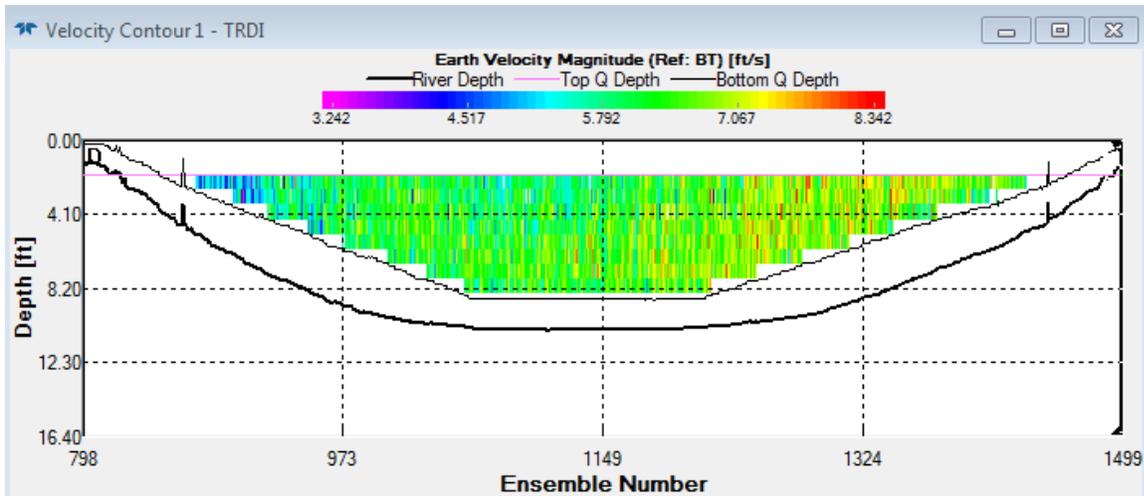


Figure 9 ADCP data with HK unit operating at location T1 (165 ft upstream) looking downstream.

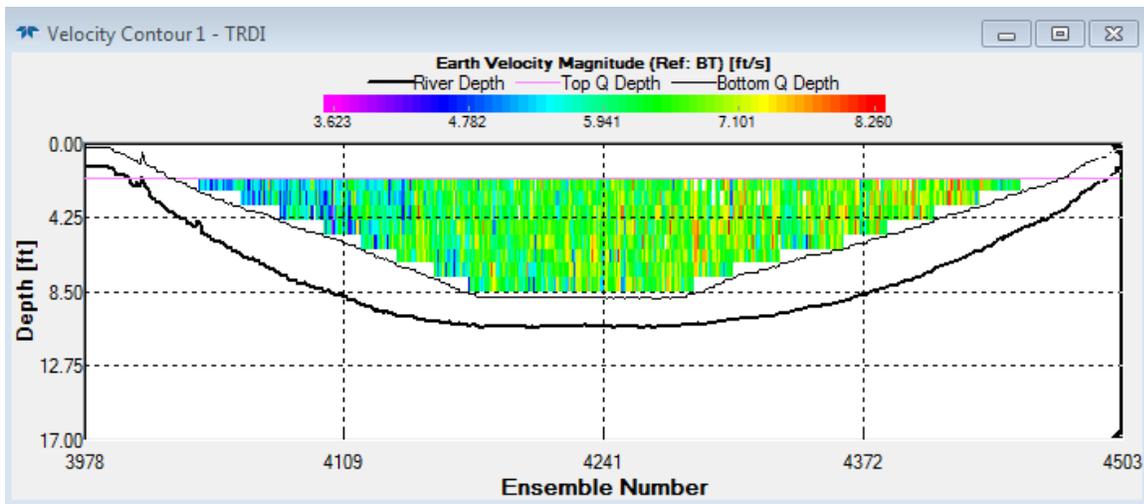


Figure 10 ADCP data with HK unit operating at location T5 (32 ft upstream) looking downstream.

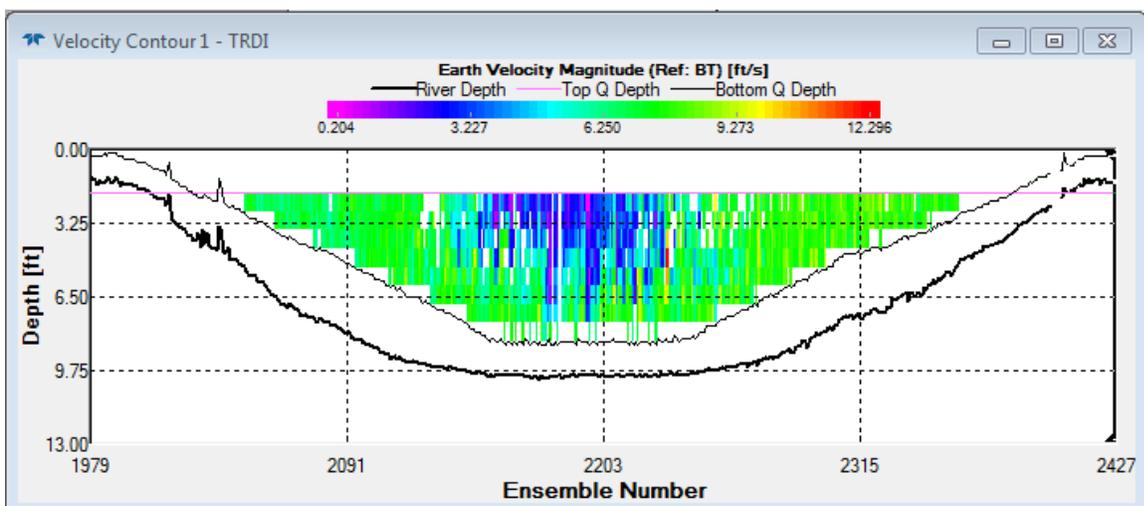


Figure 11 ADCP data with HK unit operating at location T8 (32 ft downstream) looking downstream. The wake is evident on both sides of the canal with lower velocities near the center line downstream of the rotor.