

BUREAU OF RECLAMATION
Technical Service Center
Denver, Colorado

TRAVEL REPORT

PRJ-15

Code: 86-68140 Date: May 22, 2008
86-68460

To: David Edwards, Manager, Water Conveyance Group
Cliff Pugh, Manager, Hydraulics Investigation and Laboratory
Services Group

From: Chou Cha, Civil Engineer, Technical Service Center
Tony Wahl, Hydraulic Engineer, Technical Service Center

Subject: Amarillo Canal Flow Capacity Test Site Visit

Personnel on Site: See attached attendance sheet for meeting attendance prior to site
visit. Not everyone on attendance sheet was on the site visit.

1. Travel dates: April 22, 2008, through April 24, 2008
2. Places visited: Amarillo Canal, Farmington, New Mexico
3. Purpose of trip: Chou Cha and Tony Wahl from the Reclamation Technical Service Center (TSC) visited the Amarillo Canal on the Navajo Indian Irrigation Project to gain an understanding of project operations and issues related to canal deficiencies and to identify potential flow measurement sites to be used during an upcoming flow capacity test of the Amarillo Canal.

Background: Our visit stems from a long history of problems with the canal that may be related to construction deficiencies such as construction offsets in canal freeboard, canal check structures, and side pumping plants shutting off due to apparent low water levels in the pumping plant sumps. This interrupts deliveries and requires operators to make frequent visits to these plants to reset them after shutdowns. The project operators, Navajo Agricultural Products Industry (NAPI), have questioned the construction of the Amarillo Canal relative to its ability to convey the design flow rate. In July of 2006, TSC conducted a HEC-RAS computer model with canal cross sections extracted from survey data of the existing canal and identified locations where the canal would have conveyance freeboard encroachment. The Amarillo Canal lining from the siphon outlet at station 6+40 to the first check structure at station 45+82 had recently been extended to provide the required freeboard through a construction contract. Other reaches downstream as identified in the computer model with freeboard encroachments have not

NAPI manages project deliveries beginning at Cutter Dam. From Cutter Dam to the Gallegos Pumping Plant, Kutz Pumping Plant (200 cfs capacity) at MC 1523+10 is the first turnout on the Main Canal. There are numerous single and multiple unit pumping plants that draw water from the Main Canal before the canal system gets to the GPP (880 cfs capacity). It is noted the naming of the Main Canal changes to the Gravity Main Canal just before the canal system gets to the GPP. Mr. Robert Hanna, NAPI Region II Supervisor, and Ms. Jeannette Joe, NAPI Control Center Supervisor, explained that Reclamation presently operates GPP. And during the time since Gallegos came on line, operation of large units at GPP sometimes affects their downstream water deliveries.

On the whole, operation of the project is described by NAPI representatives as “by feel”, relying on operator’s experience and check-gate rating tables for the Gravity Main Canal and Amarillo Canal check gates kept in a 3-ring binder in the control room (600=Q tables). The origin and accuracy of these tables is unknown. Labeling of the tabulated columns and rows were unclear and required explanation from the NAPI operators. Check gates are currently operated in a semi-remote manner with a combination of remote gate adjustments, remote upstream depth reading, and field water operator verification. Operational decisions are made mostly with the objective of maintaining steady water levels at the upstream side of each check structure. When canal-side pumping plant turnouts on the Amarillo Canal shut down unexpectedly due to low water levels, operators must visit the turnouts in person to reset them. The lack of dedicated flow measurement structures in the Gravity Main Canal or Amarillo Canal creates operational problems, as expressed by Mr. Marvin Nez, NAPI O&M Manager.

Mr. Robert Hanna expressed concern that the radial gates at the Gravity Main Canal and Amarillo Canal bifurcation had been opened to the extent of the gate limits as marked on the gates, but NAPI had still had problems meeting irrigation water demands. NAPI has made modifications and operated the gates at larger openings than originally intended. Mr. Hanna also expressed a concern that during draining of the Amarillo Canal after the irrigation season there are two sections that do not drain downstream. These sections are between turnout pumping plant A3.1R to canal station 246+70 and A5.4R to A6.9R. These sections require pumping for final draining. Mr. Cha stated that the low sections would not interfere with the proper flow characteristics of the canal.

Mr. Chou Cha explained Reclamation’s objectives for the upcoming flow test. The flow test is designed to simply determine whether the Amarillo Canal can convey the adjusted design flow capacity. The adjusted design flow is lowered from the original design flow due to the fact that several originally planned turnouts were omitted from the Amarillo Canal construction. Water deliveries for these abandoned turnouts are serviced from Burnham Lateral West operated in conjunction with the Gallegos Pumping Plant. A second issue that is not being directly addressed by the flow test is the best method of operation for the Amarillo Canal. Although conveyance of the adjusted flow capacity is our primary concern, we will use the flow test as an opportunity to make observations that could lead to modifications of future operations of the Amarillo Canal. Implementing these modifications would need to be pursued as a separate issue after the canal capacity issue has been resolved. Mr. Thomas Roe stated that any flow



Figure 1. — Gravity wasteway at Sta. 604+00 on left side of canal.

The site visit continued further upstream toward the in-line pumping plant turnout A10.9. This reach is lined with a plastic liner and earth cover. Just upstream from A10.9 the canal changes to a concrete-lined trapezoidal section. Good reaches for flow measurement are available downstream from A10.9, or about 200 yards upstream. The canal is approximately 25 ft wide here with 4-5 ft flow depth. It is notable that in the reach between A10.9 and the wasteway, the water surface in the canal closely matches the elevations associated with the adjusted design flow, as surveyed in by Reclamation surveyor and Mr. Good prior to our visit. As we proceeded upstream, the operating water surface and high-water stain gradually deviate below the marks for the adjusted design flow. This was an indication that the canal on the day of the sight visit (and in general) was running below the design flow and the water surface as seen was at an elevation just slightly above the downstream check weir. Check gates at the check structures were closed and flows were being allowed to pass over the overflow weir walls of the check structure. This can be seen in Figure 2. A potential location for water flow measurement for the flow test was identified at the vehicle bridge crossing just upstream at Sta. 403+01. This measurement would indicate the total flow into Block 3 and the A10.9L pumping plant.

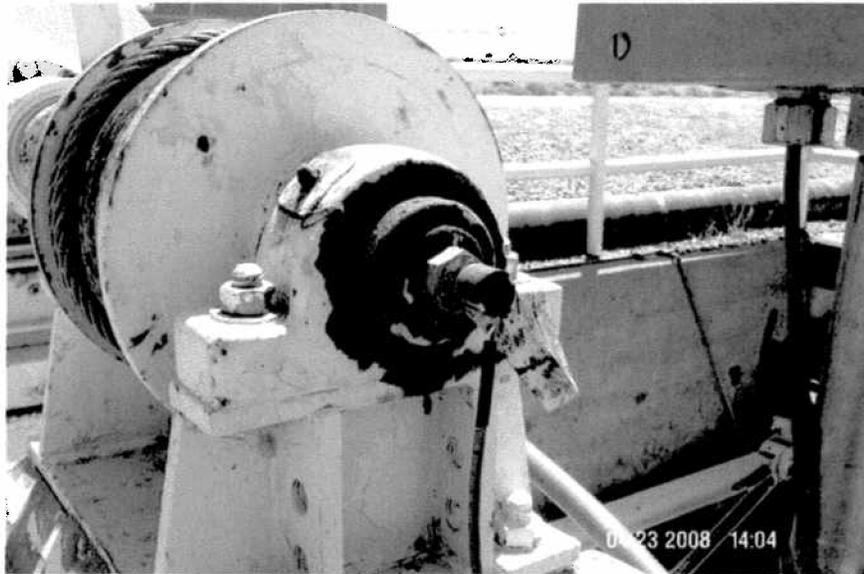


Figure 3. — Radial check gate position sensor.



Figure 4. — Radial gate position indicator.

The site visit continued further upstream to the bifurcation of the Amarillo Canal from the Gravity Main Canal. Again the radial gate was set to a minimal opening and water was bypassing the gate over the side weir walls. After passing through the control structure, the Amarillo Canal flow immediately enters an inverted siphon. A good

Travelers: Chou Cha, Tony Wahl

Date: May 22, 2008

SIGNATURES AND SURNAMES FOR:

Travel to: Amarillo Canal, Farmington, New Mexico

Date of Travel: April 22 through April 24, 2008

Names and Codes of Travelers: Chou Cha, 86-68140, Tony Wahl, 86-68460

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