Presentation Abstract

ESTIMATE OF SEEPAGE LOSSES FROM CANALS IN THE PASO DEL NORTE REGION USING PONDING TESTS

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The El Paso Del Norte Region, composed of the cities of El Paso, Texas; Las Cruces, New Mexico in the United States; and Ciudad Juarez, Chihuahua, in Mexico, is facing a severe drought and, as a result, a significant reduction in surface water allotments is forecasted for the upcoming irrigation season. Water conservation strategies have become even more urgent. Preliminary studies have shown that there was a great potential for improvement of water delivery efficiency (water savings or reduction in water diversions for a given level of surface water diversion) through lining of canals within this region. Through canal lining, water losses in the conveyance system due to seepage losses will be minimized, thereby maximizing delivery for the available diversion amount. Since canal lining is a project that requires a significant investment of money, water losses need to be determined prior to the execution of the project. This paper presents a study of seepage losses in Elephant Butte Irrigation District (EBID) and the El Paso Count Water Improvement District No. 1 (EPCWID). This study was conducted by TA&MU and NMSU scientists and engineers in collaboration with El Paso County Water Improvement District No. 1 in Texas, and with The Elephant Butte Irrigation District, in New Mexico.

Authors first selected several canal sections with large seepage losses based on the Districts' operation experience and previous studies. Three ponding tests were conducted in Franklin Canal, El Paso, Texas. The canals were blocked into several sections by earth dams, and water was fed into the blocked sections. Canal banks were allowed to saturate for over 48 hours before the measurement of water level started. The water level was measured with a pre-installed staff gage. Water level measurements were taken for 2 or 3 days. The water levels in the ponding sites dropped at a rate ranging from 0.11 ft/day to 0.35 ft/day, which includes an evaporation rate of 0.006 ft/day on average. Based on geometry of the canal and water level changes, seepage rates were estimated. The results indicated that the seepage rate for the Franklin Canal ranged from 0.85 to 3.03 gal/sq. ft/day (0.11385 to 0.40261 cubic feet per day per square feet of the wetted area). The results also indicated that seepage rates changed from one location to another, and the seepage rate tended to reduce with drop of water levels in the canal. Authors concluded that there would be a great potential for improvement of delivery efficiency by lining canals. Preliminary results from inflow-outflow tests in EBID’s main canals indicate losses of 3 to 7 cfs per mile. Work is continuing to provide replication, greater detail, and to measure additional canals.