



## CANAL REHABILITATION IN THE SPOTLIGHT

Photos courtesy N Knoetze, J Matthee and K van Deventer

Following a request from an Mpumalanga irrigation board, SABI organised a discussion forum on the rehabilitation of canals to take place directly after the SAAFWUA meeting on 8 June 2010 in Groblersdal.

The purpose of the forum was to share experiences and knowledge on practices and lessons learnt, so that money can be saved and the desired results achieved. Four speakers were invited to present an overview of requirements, experiences and cost of repairing canals. Thirty-eight SABI members and WUA representatives attended.

The forum was opened by Orange-Riet WUA (ORWUA) CEO Nic Knoetze with a realistic look at the state of canals on irrigation schemes due to the age thereof and lack of previous maintenance.

He emphasized that the function and profile of the canal must be taken into consideration together with the state of deterioration and funds available in the approach to find a canal-specific rehabilitation solution for your specific canal. (Figure 1)



Figure 1

### REHABILITATION METHODS INCLUDE:

- Replacement of concrete slabs, which economical and effective but only used if the extent of damage is limited
- Different plastering methods can be applied where the whole concrete lining has deteriorated. Ordinary plaster mix can be applied or more modern epoxies or techniques can be applied, especially if the concrete has become brittle from age. Either way, preparing the concrete surface is critical in the success of the process as well as application thickness.
- Complete relining of the whole canal is the alternative to plastering.



Figure 2



Figure 3



Figure 4



Figure 5

If one has to decide between PLASTERING OR RELINING; plaster rather as it is cheaper and effective in the medium term, although life span and durability may be unknown. Plastering a trial section in the select way can provide some indication of expected results. Relining is expensive but more effective, resulting in a live span similar to that of a new canal. Experiences at ORWUA has shown plastering costs approximately R30/m<sup>2</sup> and concrete relining approximately R92/m<sup>2</sup>.

### MAINTENANCE CRITICAL

In conclusion, he stated that maintenance is critical in postponing rehabilitation but if it becomes necessary, a WUA should rather start early with rehabilitation than wait until it is too late, as by starting early you can budget over time and every year repair a part of the canal. Lower Olifants River WUA (LORWUA) CEO Johan Matthee, provided a very practical overview of the devastating effects of canal failure as well as costs of different repair methods. The LORWUA canals were built from 1917 to 1930, the main canal being 260km in length with a further 60km of secondary canals and furrows.

According to DWA canals have a life expectancy of 40 years, which has obviously been exceeded long ago. The LORWUA took over the canals from DWA in 2001, and the poor condition of the canals is limiting the supply of water to the scheme. Annual maintenance of R4m is budgeted for, and R1m has been spent on experimental sections. In 2010, approximately R11m is to be spent on plastering. The water users understand the importance of rehabilitation, especially as a recent canal failure damaged vineyards, interrupted water supply and were expensive to repair (Figure 2 and 3).

### RELINING

The LORWUA experiences have shown that relining of canals can cost between R150/m<sup>2</sup> (for 15 mm thick plastering) to R776/m<sup>2</sup> (for 100mm thick relining).

To provide a local perspective, Joppie Graham from the Hereford Irrigation Board outside Groblersdal, discussed the process of lining their previously earth canal using fibre cement.

Previously the unlined canal suffered as much as 80% of water losses, and the irrigation board made the decision to line the canal. They decided on Hyson Cells, a mat comprising of square, hollow geocells fabricated from thin plastic film, which is then filled with the concrete to provide a canal lining. The cost of their project to line the 1.25m x 1.3m x 1.25m trapezium shaped canal was R171/m<sup>2</sup>, with labourers covering about 80m of canal length per day.



## **DIFFERENT COMPONENTS**

The last speaker was Kobus van Deventer, an experienced design engineer from the Department of Water Affairs who covered all the different components of a canal system and discussed common design mistakes that are made.

He emphasized the importance of maintenance as surface roughness increase due to the presence of algae and water-grass, exposure of coarse aggregate in concrete and sediment collecting on canal bed, which all contributes to reduced canal capacity. Bridge pillars also collect debris to clog up the flow area (Figures 4 & 5).

He reminded the audience that the canal lining serves not only to prevent erosion of sides of cross section profile and control seepage from the canal, but also to promote seepage into the canal. Subsurface drainage may be necessary to control the hydrostatic forces that groundwater may exert on the lining of a properly sealed canal, using a system of longitudinal and sometimes also lateral strip-filters.

He concluded his talk by saying that technical solutions alone are not enough - operating rules must support canal management.

**Contact details of the speakers and copies of their presentations are available from [isobel@sabi.co.za](mailto:isobel@sabi.co.za).**