

# Asset management Refurbish, replace

*During early 2003 the Umgeni Water Operations Division experienced difficulties in coordinating water balancing checks in the Ntabaskop and Insiminya areas due to severe water leakages in most of the ferrocement reservoirs within the reticulated network. In a combined attempt to investigate and resolve the situation, the Umgeni Water Design Support Division was tasked to prepare a comprehensive report together with recommendations of repair, refurbishment or replacement. This month, **Water&Sanitation Africa** takes a look at this investigation and its results.*

**NTABASKOP** is situated in the Ndwedwe magisterial district located approximately 40km north-west of the town of Verulam, KwaZulu-Natal (KZN) and falls within the jurisdiction of the Ilembe District Municipality. The original reticulation scheme was constructed in 1994 as part of a labour-intensive project funded by the then Port Natal-Ebdwe Joint Services

Board. The second phase was undertaken in 1998 as part of the Reconstruction and Development Programme (RDP) funded by the Department of Water Affairs and Forestry (DWAF).

The reservoirs were of varying sizes ranging from break pressure tanks of 1000l, 50kl and a number of 100kl and



Original ferrocement reservoirs showing extensive leaks, cracks and sprawling of reinforcing internally

# Or repair?

200kl structures. The basic construction method of all the ferrocement reservoirs was the same – they were circular with dome-shaped roof designs; wall heights of 2.1m and 80mm, thick reinforced with 3.6mm x 100mm mesh placed two layers back to back. The reservoir floors were of 5.6mm x 200mm square mesh covered to form a 100mm thick concrete floor slab.

## Poor workmanship

Close investigations of the reservoirs revealed that their failure was largely attributed to substandard and shoddy workmanship, characteristic of many labour-intensive RDP projects of the time. The larger cracks over the entire structure could have been due to weak concrete mixes. The very difficult terrain, hills and poor site access, compounded by very limited access to good clean water and raw materials are



Installation of Galaxy Reservoir inside the 'old reservoir' footprint  
– panels had to be carried up the hill to final location

## Reasons why Galaxy Reservoirs were the recommended option

- i) Being the most economical option, more than R450 000 cheaper than prefabricated concrete and as much as R930 000 cheaper than pressed steel.
- ii) Only option to offer a ten-year, non-leak guarantee, which was welcomed by the Ilembe District Municipality who had seen the limited reliability of the reinforced ferrocement reservoirs, which had lasted less than ten years.
- iii) The Galaxy reservoir was constructed on the existing ferrocement floor, requiring minimal site preparation and concrete work to be done.
- iv) Ease of assembly and construction facilitated that all reservoirs could be replaced with no additional roads needing to be constructed.
- v) Short contract period and speedy delivery times.
- vi) Should the end user so desire, the reservoirs could be increased in volume or dismantled and reassembled elsewhere.



Above pictures show demolishing of reinforced ferrocement reservoirs, walls demolished to floor level, leaving concrete base only

guaranteed to have contributed to these failures. The urgency to repair these reservoirs was further compounded by a need to transfer ownership of the reservoirs from the Local Water Committees (LWC), supported by Umgeni Water to the newly

appointed Water Services Authority (WSA) and Water Services Provider (WSP), Ilembe District Municipality. Before any transfer could be undertaken, the reservoirs had to be presented in a fully operational and leak free condition to the Ilembe District Municipality.

### Outcomes

The results of the investigation done by Umgeni Water were made known and included many thoroughly researched options, which included amongst others:

- the use of cementitious repair products
  - the use of bituminous torch-on and paint-on methods of repair
  - bladder-type liners to be installed inside ferrocement tanks.
- All the above were deemed 'temporary' and 'unsatisfactory' as they provided no lasting warranty/guarantee.

The idea of replacing the reservoirs was then proposed as a longer term, more proactive method of approach including:

- Pressed-steel tanks – these were found to be exorbitantly expensive and required the tank to be positioned on base supports which were too difficult to achieve given the difficult terrain and limited space available on some sites.
- Prefabricated concrete reservoirs – this particular construction method comprises installing a series of in situ vertical concrete columns interspaced with precast concrete walling on a concrete base, with all joints sealed with a bitumen sealant to make the tank waterproof. These are usually roofed with galvanised roof sheeting. Firstly, these tanks need high-load access roads to site leading to considerable extra project expense with construction, possibly hampered by difficult terrain; secondly, the need to undertake the ongoing maintenance required by these reservoir types and; thirdly, the need to always have water in the tank led to this reservoir design not being considered.

After it was decided that these options were not feasible, the team looked elsewhere and came across Galaxy Reservoirs. These reservoirs, supplied, installed and commissioned by SBS Water Systems of Pinetown, KZN, offered an affordable, safe and efficient water storage solution to the Ntabaskop and Insiminya Community Water Supply Scheme's increasing water loss problems.

### Fast track to success

In a record period of less than three months the failing ferrocement reservoirs, totalling 17 units were demolished, the existing floors levelled where necessary and new Zinalume Galaxy panel reservoirs with Aqualiner were installed and commissioned.

Thanks to using Galaxy Reservoirs the stakeholders were able to bring the project in on time and within the limited budget available to them. As a direct result of this successfully completed project, the Ilembe District Municipality now use Galaxy Reservoirs on numerous of their water supply projects. **35**