Are we ready for a SLUDGE REVOLUTION?

VIP sludge is being buried in trenches at a disused oxidation pond at Umlazi, south of Durban.

Jay Bhagwan

Sludge is collected from households near the site.

Jay Bhagwan

Sludge arrives at the site in Umlazi.

Jay Bhagwan

The covered trenches after the first trees have been planted.

Jay Bhagwan

Hans Salisbury of the University of KwaZulu-Natal demonstrates the groundwater monitoring equipment. Groundwater is monitored regularly.

Jay Bhagwan

The first Eucalyp
appearance aft

New innovative research being funded by the Water Research Commission (WRC) aims to assemble a much-needed arsenal of knowledge to improve operation and maintenance of ventilated improved pits (VIPs) specifically regarding the management of pit latrine sludge. Lani van Vuuren reports.

Jay Bhagwan

The sludge being buried. The project has created quite a number of jobs for the surrounding community.

Jay Bhagwan

The site's fluctuating water table has been a significant challenge. The water table comes up to the surface after a few days of rain, and then drops down quickly after the rain stops. The municipality has assisted in digging a cut-off drain around the site.

Jay Bhagwan

otus saplings have made an er planting.

Jay Bhagwan

The soil at the Umlazi site is basically pure river sand and should prove interesting for the tree growth trials, as it is practically devoid of any natural fertility.

Jay Bhagwan

The sludge is covered with soil immediately after offloading on site to prevent possible odours.

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VIPs have long been viewed as an acceptable minimum level of sanitation, and over two million VIPs have been built around South Africa since 1994. However, sooner or later the toilet pits fill up. The challenge is then how to empty the pits, and what to do with the sludge. If these questions cannot be answered satisfactorily, then all the existing VIP toilets will have to be replaced after ten years (or less) and government's massive investment will have come to nought.

Previous research funded by the WRC found that the disposal of pit sludge to wastewater treatment works is neither acceptable nor economical both from a transport and a waste handling point of view. A simpler, more economical and probably more beneficial option appears to be the burial of pit sludge.

A new WRC project, being undertaken by Partners in Development (PID) in conjunction with the Pollution Research Group at the School of Chemical Engineering of the University of KwaZulu-Natal (UKZN), assisted by the School of Bioresources Engineering also from UKZN, with support from eThekwini Municipality and Irish Aid, is investigating the disposal of pit latrine sludge. "In the East, human waste has been used since time immemorial as a form of fertiliser, however, in South Africa, this is not accepted due to the health risk," reports project leader David Still of PID. "We believe that if the waste is buried in the ground and used as a form of fertiliser for trees, this health risk is negated, and this is what we are testing currently."

Evidence in the literature shows that sludge from wastewater treatment plants works effectively as a form of slow release fertiliser in conjunction with agroforestry, with timber yields improving by up to 50%. The WRC project is unique in that trials are being carried out with pit latrine sludge (which is less processed than wastewater sludge) and also because the sludge contains a certain amount of domestic solid waste, which is not encountered in wastewater sludge. Trials have started with Eucalyptus and will soon move onto wattle and then paw-paw trees. The project team is also hoping to try poplar and willow species.

There are three test sites, two for the burial of VIP sludge and one for wastewater sludge. The sites differ in terms of soil type and climate. At each site the sludge is being buried in trenches and trees are being planted either on top or alongside the trenches. Some trenches are being dug and backfilled without the addition of sludge to act as controls.

"The work has generated some employment, which helped to get community acceptance, and there is some interest in how the trial will turn out."

The rate of tree growth will be monitored as well as tree health and wood density. The project team will also observe the root growth and rate of penetration into the sludge. Still reports that groundwater in and around the sites will also be monitored regularly to check for any negative effects from the buried sludge. Finally, the die-off rate of pathogens contained in the sludge will be recorded. "In addition, some 24 trees will be planted in large pots (0,75 in diameter by a metre deep) at the UKZN campus in Durban where they can be monitored more intensely. Some of these pots will be cut up at the end of the study to investigate the root patterns under different circumstances," Still tells ***the Water Wheel***.

The first site is a disused oxidation pond at Umlazi, south of Durban. The sludge being buried is sourced from pit-emptying operations by the eThekwini Metro in the surrounding area. According to Still, the community was at first somewhat concerned that the proposed test site would cause bad odours, however, this fear has proved to be unfounded as the waste is covered with soil immediately after offloading. "The work has generated some employment, which helped to get community acceptance, and there is some interest in how the trial will turn out. "This is the largest site of the project (5 000 m^2).

The second site is situated on farmland belonging to the municipality. There is no domestic settlement near the site and eThekwini has given permission for the work to go ahead. Burial of sludge will only start on this site this winter, with tree-planting scheduled for spring. The third proposed site is on a research farm near Curry's Post. Again there is no effect on any nearby settlement. These two sites are both around 1 000 m^2 in size.

The trees will have to be monitored for two growing seasons before any preliminary conclusions can be reached, notes Still. "Ideally, the trees will be monitored for up to five years to get more complete evidence of the success of the trials. However, it is envisaged that faster-growing trees, such as paw-paws, will also be used to allow for more rapid results."

In the end, the project team hopes to add significantly to the body of knowledge to operate and maintain VIPs successfully. "We hope that instead of pit sludge being viewed as a problem and as a waste product, it may come to be regarded as a useful resource. This will make more funds available for emptying of VIPs," concludes Still.