Courtesy Heidi Snyman

Study Confirms Benefits of Sludge Reuse

The latest set of sludge management guidelines, developed with funding from the Water Research Commission (WRC) in collaboration with the Department of Water Affairs & Forestry, can play a significant role in growing the status of wastewater sludge as a valuable resource, a recent investigation has found.

The study, undertaken by Frost & Sullivan, focused on the potential impact of the ***Guidelines for the Utilisation and Disposal of Wastewater Sludge***. The first two volumes of this five-volume set of guidelines have already been published while the remaining three are awaiting final government approval. The latest project was aimed at quantifying the potential impact of the guidelines on South African society by analysing current examples of wastewater sludge best practice that are aligned with the new sludge guidelines.

FROM WASTE TO RESOURCE

The management of sludge (the solid, semi-solid or liquid residue generated during the treatment of domestic sewage in a treatment works) is the responsibility of local authorities. Wastewater sludge management in South Africa has been governed through a series of wastewater sludge guidelines over the past three decades. Each of these guidelines has aimed to assist stakeholders with management aspects of wastewater sludge handling. The latest initiative was launched in 2003, with the first volume of guidelines being published in 2006.

The initiative to develop new guidelines for sludge management was launched after it was found that the previous guidelines were overly restrictive, which impacted negatively on sludge management practices. The guidelines limited the extent to which wastewater managers could dispose of and manage their sludge. For example, overly restrictive sludge metal limits created the situation where certain wastewater sludge was classified as a hazardous material and needed to be disposed of at a hazardous landfill site, which was both expensive and a waste of valuable landfill space. Since many wastewater treatment plants could not comply with these strict guidelines, sludge ended up either being dumped within the precinct of the treatment facility or on land adjacent to the facility.

Wastewater treatment facilities were historically located on the outskirts of

urban areas. However, with increasing population levels and high urbanisation rates cities and towns have expanded and encroached on these facilities as land has become increasingly scarce. This fact, along with increasing international trends to view sludge as a resource rather as a waste material, have underlined the importance of finding new, safer ways of managing wastewater sludge sustainably.

Mismanaged wastewater sludge can have a considerable negative impact on the environment and human health. The new guidelines provide guidance on the selection of appropriate disposal options, but also create an understanding of operational and legal requirements for different disposal options. In addition, the guidelines recommend the beneficial use of the sludge where possible and sludge disposal is seen as a last resort.

An important difference between previous sludge guidelines and the present sludge guideline series is the principle of risk management. High pathogen levels within wastewater sludge present definite risks for wastewater sludge managers and end-users. Previous guidelines managed this risk by ensuring that wastewater sludge was treated to a particular specification by wastewater sludge managers. This treated wastewater sludge was then released for reuse by end-users. The challenges with this approach was that if reused sludge was not treated to adequate levels there was no control over the management of this sludge and the potential exposure to its high pathogen levels once reused.

The latest guidelines have adopted an additional line of defence when managing these risks. Not only does wastewater sludge need to be treated to adequate specifications, but the latest guidelines also include specific sludge handling and management practices for when wastewater sludge is being reused, which ensures a barrier is created between the pathogen-containing sludge and potential receptors. For example, when sludge is used for land application the latest sludge guidelines insist that the sludge is ploughed into and covered with soil immediately to reduce the risk of contact.

SAVING MONEY, CREATING JOBS

To date, there has been limited application of the new sludge management principles by local authorities across South Africa, and little beneficiation is taking place outside the large metropolitan areas. This made identifying impacts that have arisen as a result of applying these guidelines quite challenging. However, closer examination of incidences where this has occurred reveals that the new guidelines show great promise in improving the management of wastewater sludge.

The City of Cape Town is one such South Africa municipality which has adopted wastewater sludge management best practices that are aligned with the new sludge guidelines. The unsustainable method of wastewater sludge landfill disposal coupled with the limited availability of landfill space in the city encouraged the municipality to actively pursue alternative applications for their wastewater sludge.

At present, the city uses its sludge for composting, land application, and pelletisation. In the year during which the study was conducted (June 2003 to July 2004), Cape Town used 26 172 t or 40% of all produced sludge for useful application. This has resulted in significant cost savings for the city, for example, in Cape Town it costs R680 per dry ton to dispose of wastewater sludge to landfill sites, but only R388 per dry ton to dispose of wastewater sludge through composting.

The application of wastewater sludge to arable land is an effective method to dispose of wastewater sludge, and there are existing examples in South Africa where this is not only proving beneficial to the municipalities concerned, but also to end-users. In the Swartland, in the Western Cape, farmers have struggled to produce profitable yields because of the soil's low nutrient levels. However, the land application of wastewater sludge has significantly improved the nutrient and moisture content of the soils and farmers have been able to realise profitable yields from previously unprofitable areas.

The cost-benefits of using wastewater sludge for brick-making and fertiliser manufacture were also studied. The reuse of sludge in this way could not only have environmental and human health benefits but also assist in the creation of much needed jobs, specifically for semi-skilled people.

The study concluded that wastewater sludge management practices that are aligned with the new sludge guidelines have a significant impact across economic, social and environmental areas of South African society.

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The reuse of wastewater sludge for, for example, land application, is encouraged.