



METRO

WASTEWATER MANAGEMENT

DEPARTMENT

TREATMENT AND DISPOSAL OF SLUDGE AT

WASTEWATER TREATMENT WORKS

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Introduction

The purpose of this brief document is to describe, in broad outline, the alternative methods of treating and disposing of sludge from wastewater treatment works within the Durban Metropolitan area.

Sewage Sludge

Wastewater, which comprises domestic sewage and / or industrial effluents, contains certain quantities of solid particles in addition to the biological and chemical constituents.

On arrival at a treatment works, the wastewater is screened to remove intractable / inorganic solids such as stones, plastic bags and the like and is then passed through de-gritters to remove sand and grit. The quantity of screenings and sand / grit removed is relatively small and those solids are usually buried on site or transported to and disposed of at regional solid waste (refuse) sites.

The screened wastewater enters the primary and secondary treatment sections of the works and various processes are used to separate the primarily biological organic solids from the liquid. The liquid is treated to prescribed standards and discharged to the nearby river / watercourse or through a sea outfall. The solids (which are collectively referred to as sludge) are treated and disposed of in a number of different ways.

The sludge treatment processes can include gravity settlement and thickening, anaerobic digestion (whereby sludge is stored for extended periods of time and stabilised by means of natural biological processes without oxygen), followed by conditioning and dewatering by means of drying beds, belt and plate presses and centrifuges.

The basic options for the ultimate disposal of the treated sludge are:

- X Agricultural use including horticulture and forestry
- X Landfill and land reclamation
- X Marine disposal
- X Incineration and disposal of residue by landfill

Agricultural Use

Whilst sewage sludge contains nutrients such as nitrogen and phosphates, it is not a major fertilizer resource because the nutrients form a very small portion of the total mass of sludge which has to be loaded, transported, offloaded, and spread on the land.

If sewage sludge is to be used in agriculture, there must be benefits to both the farmers and the producer and there must not be any adverse environmental impacts such as pollution of surface or ground water or risk to agricultural workers. Precautions to minimise risk from contaminants such as toxic metals and pathogens are essential. Sewage sludge usually contains significant quantities of ascaris ova (eggs of an intestinal hook worm) and it is essential that these eggs are sterilised if the sludge is to be used to grow crops that are eaten raw or if there is a possibility of farm workers coming into contact with the sludge. There is a cost implication to sterilising the ascaris ova and this mitigates against the wide spread use of sewage sludge for agriculture. The medical authorities do not allow sludge to be utilised for agricultural purposes without adequate sterilisation.

Sewage sludge can be mixed with garden refuse and / or wood chips and then composted in windrows, eventually being bagged and sold. The techniques of this process are well-tried and tested and the heat generated in the composting process sterilises the ascaris ova. However the economic viability of sludge composting depends entirely on the market i.e. on the willingness of members of public and farmers to purchase and / or use the compost. Transport costs are not insignificant and can affect the economic viability of composting sewage sludge. In addition there is a limited market for compost and the sludge generated in the Metro Area is sufficient to produce a volume of compost that far exceeds the demand.

Landfill and Land Reclamation

This option is usually selected on economic grounds or because the degree of contamination of the sludge renders it unsuitable for agricultural use. Sludge is often disposed of on the treatment works site or in municipal landfill sites together with municipal refuse (co-disposal).

Sludge can be used for land reclamation and for surface dressing of completed refuse sites and the like but, in the Metro area, such disposal opportunities are limited.

Marine Disposal

Disposal of liquid sludge into the sea by properly designed and operated marine outfall pipelines can be an acceptable and economical method particularly where suitable landfill sites and/or agricultural land and other options are not available.

Incineration

Incineration of sewage sludge is often the selected option when alternative methods of sludge disposal are not available, are uneconomic and/or when the sludge contains excessive quantities of heavy metals and/or other toxic substances. The process is reliable and effective but has a relatively high capital and operating cost and careful consideration must be made prior to its implementation.

Incineration produces a much reduced volume of sterile, odourless and inorganic residue which can readily be disposed of in a landfill site. The incineration process could result in a certain amount of air pollution unless full air pollution prevention measures are instituted.

CURRENT EUROPEAN PRACTICE FOR THE DISPOSAL OF SLUDGE (Ref.1)

The current practice in Europe is as follows:

	<u>% of Sludge</u>
Controlled tipping and land reclamation	42%
Agricultural use	35%
Marine disposal	10%
Incineration	11%
Unspecified	<u>2%</u>
TOTAL	<u>100%</u>

A recent trend towards incineration has been taking place due to use in agriculture becoming less favoured as a result of heavy metal build up.

CURRENT PRACTICE IN RSA FOR THE DISPOSAL OF SLUDGE

Statistical information is not readily available but it is estimated that the figures are similar to those in Europe but with the exception that agricultural use is probably significantly less than 35% due to the ascaris ova problem and that the landfill method probably accounts for considerably more than 42% of the total volume of sewage sludge disposed of in RSA.

OBJECTIVES OF STUDIES

A main object of the strategic planning in the metro area is to identify the most practical, cost effective and acceptable method of dealing with the sludge generated. A number of alternative solutions will be investigated and these will include, inter alia, sludge treatment on a number of treatment works sites followed by disposal on landfill sites or marine disposal of sludge or other options.

Further studies on the agricultural use of sludge will not be carried out. It is envisaged that this will only be done as and when market conditions dictate as previous studies have enabled accurate costings and viability of such methods to be obtained.

SUMMARY

The disposal of sludge must be carried out in an environmentally friendly manner and at minimum cost to the ratepayers. Research and studies into alternative disposal methods are on-going to achieve the most effective and economic means in the Metropolitan Area.

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