REGIONAL BIOSOLIDS STRATEGY
LOWER NORTH ISLAND

FACT SHEET 4:
COMPOSTING SLUDGE

WHAT IS COMPOSTING?

Composting is the process of transforming organic material through microbial processes into a nutrient rich soil conditioner.

Ordinarily this takes place under thermophilic (heat generating), aerobic conditions, at temperatures of greater than 55°C due to heat released by biochemical transformations. Composting processes must achieve time-temperature requirements as specified in NZS 4454:2005 for pasteurisation, stability and maturity for the product to be defined as a compost[1]. There are three main types of composting processes that are commonly used for organic materials:

- Windrows;
- Aerated static piles; and
- In-vessel systems.

This fact sheet discusses windrow systems whereby mixtures are placed in long rows and turned periodically to reduce moisture levels, improves oxygen flow and maintain even temperatures.

COMPOSTING SLUDGE - ADVANTAGES

Through composting, sludges can be transformed from undesirable waste products to organic amendments with potential for beneficial use[2]. Sludges are carbon-rich and contain high concentrations of valuable nutrients (N, P, trace elements) that can have fertiliser value. Biological activity in compost generates heat, aiding in nutrient cycling (mineralisation and nitrification). In addition, blending sludges with organic material (such as green waste) results in dilution of potentially harmful contaminants.

POTENTIAL ISSUES AND MITIGATION

As a by-product of human excreta and household waste (greywater) sludge can be a vehicle for numerous contaminants such as trace metals, organic contaminants and human pathogens.

Through composting it is possible to yield products that are considered safe for use on land (i.e. biosolids Grade Bb-Aa[3]) and that can improve soil productivity. Commercial composting can effectively stabilise sludge, eliminating potentially pathogenic microbes, and diluting metal contaminants to levels considered safe for animals and the environment. There are three primary considerations when looking at composting as a means to 'treat' sludge.

TIME	TEMPERATURE	DILUTION
Adequate time must be given to allow for attenuation of microbial contaminants and for nutrient cycling processes to occur.	Pasteurising temperatures must be achieved (above 55°C) to adequately stabilise the compost and reduce pathogens.	Composting does not degrade metals and reduction is via dilution with green waste or other sludge. Dilution should take into account that the material volume decreases during composting.

TECHNICAL APPLICATION

Under windrow systems, composting of sludges involves mixing with a co-product such as green waste to provide a source of carbon and improve oxygen flow (porosity) within the pile. Obtaining sufficient green waste can be a limiting factor if large-scale sludge composting is to be undertaken[4].

A sludge to green waste ratio of 1:4 has been shown to be successful with a range of sludge types[2], meaning that for every tonne of sludge to be treated, 4 tonnes of green waste is required. Other factors to consider include:

- Space requirements – windrows are large, taking up approximately 5.2 m^2/tonne dry solids, for long periods of time;
- Mechanical equipment – turning piles requires front-end loaders and/or windrow turners;
- Monitoring equipment – such as moisture meters and temperature probes;
- Transport – significant costs are involved in transport of sludge from WWTP to composting site depending on the distance, and transport of the final product is higher than for biosolids alone because of the increased bulk;
- Consenting – operations for composting of sludge may require an application for council consent depending on Regional or District Plans[4]; and
- Monitoring – effective composting requires monitoring of many factors including temperature, moisture and stabilisation of the product. Additionally, the final product must be tested and meet criteria for compost as set out in the New Zealand Standard: Composts, Soil Conditioners and Mulches (NZS 4454)[1].

END-PRODUCT

After composting, a sludge is likely to achieve stabilisation and dilution of contaminants to the point that it can be classed as a Grade Aa biosolid[1,3]. Under the Resource Management Act 1991 (RMA) and many Regional Plans a Grade Aa biosolid is deemed safe for beneficial use[1,4].

BACKGROUND

The Regional Biosolids Strategy – Lower North Island is a collaborative project funded by the Waste Minimisation Fund. Ten lower North Island Councils have worked in partnership with Lowe Environmental Impact and research partners to develop a biosolids strategy that includes the potential collective management of sludge, focussing on beneficial use.

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1. NZS 4454 (2005). New Zealand Standard: Composts, Soil Conditioners and Mulches
2. Report 9 of the Regional Biosolids Strategy: Biosolids Processing Trials; Biosolids composting trial final report.
3. NZWWA. (2003). Guidelines for the safe application of biosolids to land in New Zealand. Ministry for the Environment (New Zealand Water and Wastes Association)
4. Fact Sheet 7 of the Regional Biosolids Strategy: Regulation and Consenting
5. Report 13 of the Regional Biosolids Strategy: Potential End-Use Options for the Lower North Island