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AN APPLICATION OF
VIROSEWAGE™ TECHNOLOGY

CASE STUDY: BIOSOLIDS TREATMENT
AND COMPOSTING AT
PINE RIVERS SHIRE COUNCIL

*“By accelerating the composting time, there can be
real economic savings... (and) ViroSewage™ Technology
reagents produce significantly less odour.”*



>>> CASE STUDY: PINE RIVERS

PROBLEM

An inherent problem with composting is the ability to obtain a chemically and physically stable end product. The objectives of performing composting trials at Pine Rivers Shire Council using ViroSewage™ Technology were to prove that organic, biosolid sludges may be stabilised through composting to reduce their impact on the environment by:

- a) Immobilising metal ions;
- b) Eliminating odour;
- c) Improving leachate quality;
- d) Increasing the rate of composting; and
- e) Producing an enhanced product for use as a fertiliser.

VIROSEWAGE™ TECHNOLOGY OUTCOMES

The following improvements were achieved using ViroSewage™ Technology in biosolids treatment and composting:

- > The bulk density and filterability of the sludge component of the biosolids were improved;
- > Odours from, and the development of odour in, biosolids used as an adjunct to composting were eliminated;
- > The rate of composting of the biomass was accelerated and the temperature of the composting mass was increased such that the pathogen content of the composted mass was substantially reduced;
- > The amount of carbonaceous matter required to produce suitable compost was reduced;
- > The water retention capacity of the composted mass was increased;
- > The development of odour during composting and the subsequent storage of the composted mass is eliminated; and
- > Metal ions in the composted mass were immobilised in a non-leachable form.



ViroSewage™ Technology treated biosolid sludges and biosolids may be reused as an environmentally friendly and odourless fertiliser.

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BACKGROUND

Pine Rivers Shire Council is situated approximately 20 minutes north of Brisbane, Queensland, Australia. The biosolids produced from the Pine Rivers sewage treatment plant are composted with green waste obtained from kerbside collection and other sources at a dedicated, large-scale composting facility operated by Pine River Shire Council at Narangba. The resulting composted mix is distributed on various Council parks and gardens throughout the Shire.

Several commercial advantages could be achieved by decreasing composting time, reducing the quantity of green waste used in the composting process and minimising the facilities impact on the environment. As a result of these commercial drivers, ViroSewage™ Technology was trialled for several months.

Initially, wastewater was treated at Pine Rivers Shire Council's Murrumba Downs sewage treatment plant with ViroSewage™ Technology reagents that were added to the biosolids liquor prior to de-watering on the belt press. It was found the resultant biocake had virtually no offensive odour. It was also evident that the treated biocake consistently had higher percent solids than the untreated material due to the presence of ViroSewage™ Technology reagents.

The resulting sewage sludge (biosolids) had a high phosphate content. A total of 494 kilolitres of biosolids were treated for use in composting trials.



Biocake treated with ViroSewage™ Technology had virtually no odour and had higher percent solids than untreated material.

TREATMENT METHODS

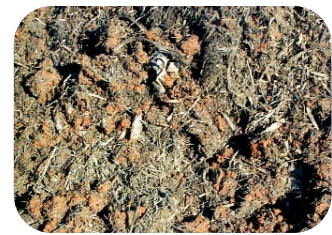
The biocake from Murrumba Downs sewage treatment plant is transferred by truck from the municipal treatment plant and then mixed in a 1:4 ratio by weight with imported green waste using a front-end loader. It is then composted in windrows for 11-14 weeks being turned regularly to aid in composting.

The ViroSewage™ Technology reagent addition may be made at any stage in the normal wastewater treatment process, either physicochemical or biological. Where the biosolids are intended for use in composting, the separated sludge-ViroSewage™ mixture is subsequently added to the biomass used in the composting process.

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The biocake from the ViroSewage™ Technology treatment at Murrumba Downs was unloaded into two heaps and then mixed with green waste in 1:2.25 and 1:3 ratios. The piles were turned regularly and observations recorded by the loader operator. Results were compared with control piles containing no ViroSewage™ reagents.

Composting cycles for the three scenarios were repeated several times to ensure that the data gained from the trial were reproducible.



ViroSewage™ Technology treated biosolids being mixed with green waste.

RESULTS

The temperature of all of the composting piles were monitored regularly. And were determined utilising standard thermocouple probes. Temperatures during the composting process had shown to exceed 75°C within the first 24 hours of composting with an average temperature of above 65°C. After a period of two weeks both ViroSewage™ treated piles were in excess of 60°C with no unpleasant odour. Temperatures recorded have all exceeded comparable results from standard biosolids composting procedures.

The ViroSewage™ Technology treated piles containing 1:2.25 and 1:3 green waste both stood up well and did not sag or collapse. Large clouds of steam were released from the two piles, during movement by heavy plant equipment whereas only small amounts of steam were generated from the control piles.

It was found that the control piles were regularly leaching, releasing poor quality leachate. During the trial, no leaching from either of the ViroSewage™ Technology treated piles were evident even after rain events. Additionally, there was minimal odour was detected throughout the process.

It was found that the coarse grade of the green waste significantly inhibits the bacterial composting process. As observed in other trials, when finer grade green waste was used, a better quality product was achieved in a shorter period.

After seven weeks the ViroSewage™ Technology treated biosolids/green waste mix had a pH of 7-8 and an average internal temperature of 50°C or less and the composting process was deemed to be complete and the product ready for use.

After over four months of repeating trials, none of the ViroSewage™ Technology treated biosolids composting piles have exhibited any offensive odours or leachate.

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The trial demonstrated that, in the presence of ViroSewage™ reagents:

- > The rate of composting increased markedly and the production time decreased from 11-14 weeks to seven weeks.
- > The temperature of the composting mass exceeded 75°C within 24 hrs and averaged 65°C. This temperature exceeds the normal pasteurising temperature required to destroy pathogens.
- > The ratio of biocake to carbonaceous waste (green waste) required to produce a satisfactory product was decreased from 1:4 to 1:2.25.

	Control	ViroSewage™ Technology Treated	ViroSewage™ Technology Treated
Green waste ratio	1:5	1:3	1:2.25
Peak Temperature	66	76	77
Average Temperature	60	66	67
Odour Level	High	Minimal	Minimal
Composting Time	11-14 weeks	7 weeks	7 weeks
Water Retention	Average	Very Good	Very Good
Release of Leachate	Constant	Minimal	Minimal
pH	7-8	7-8	7-8

The Table above summarises the results obtained using ViroSewage™ Technology treated biosolids during composting. The results quoted are averages for numerous observations made during the trials.

CONCLUSION

The ViroSewage™ Technology composting process can be applied to any method of composting and enhances the physical nature of the biosolids component of the biomass to;

- > Reduce odour emissions;
- > Reduce leachate emissions;
- > Improve leachate quality;
- > Increase the composting rate;
- > Decrease quantity of green waste required; and
- > Improve the overall quality of the end product.

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TESTIMONIAL

“Australian Innovations and Inventions have witnessed the commercial development of ViroSewage™ Technology for use in biosolids treatment and composting.

Previously the composting process has been limited by the natural time taken for the process to work. By accelerating the composting time, there can be real economic savings. Additionally, green waste requirements are significantly reduced and leachate monitoring is reduced results in additional economic drivers.

It has been demonstrated that composting piles treated with ViroSewage™ reagents produce significantly less odour, have minimal leachate and all leachates were of exceptionally high quality. This means that large composting facilities may be operated with minimal impact to the environment.

In summary, ViroSewage™ Technology has the ability to revolutionise the treatment of biosolids to ensure that Municipal Councils and other biowaste producers have the commercial technology to be economically viable and environmentally sustainable.”

DARRYL JOSEY

Director

Australian Innovations and Inventions

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