

# Biosolids

Land Application of Biosolids

24 February 2012

**Q What are biosolids?**

**A** Biosolids are a nutrient rich organic material that is a by-product of the wastewater treatment process.

**Q How are biosolids produced?**

**A** Wastewater collected from homes, offices and industry in Sydney, the Illawarra and the Blue Mountains are treated at Wastewater Treatment and Recycled Water Plants. During the wastewater treatment process the liquids and solids are separated. The solids are further treated through for example a digestion process, dewatered and transported off site for beneficial use as biosolids.

**Q What types of biosolids are produced?**

**A** Generally there are three types of biosolids produced - dewatered biosolids, lime amended biosolids and composted biosolids. Dewatered biosolids contain significant levels of organic matter and many plant nutrients, such as nitrogen and phosphorus, making them an ideal soil conditioner. Lime amended biosolids are dewatered biosolids that have had lime added to them. Lime amended biosolids are used as an alternative to agricultural lime. Composted biosolids are dewatered biosolids that have been blended with organic wastes such as green waste and composted as per the *Environmental Guidelines: Use and Disposal of biosolids products (NSW EPA 1997)*. This process produces a high quality biosolids product that as classified in *the Guidelines* has "unrestricted use".

**Q Why do we beneficially use biosolids?**

**A** In 1989 there was a directive from the NSW Government to cease ocean disposal of biosolids. Biosolids are a good soil conditioner, containing organic matter which can improve the soil structure as well as plant essential nutrients such as nitrogen and phosphorus which can improve plant growth. In 1989 Sydney Water commenced applying biosolids to agricultural land and reprocessing biosolids through composting for horticulture. If not beneficially used biosolids will be disposed to landfills which can cause greenhouse gas emissions. The beneficial use of biosolids is better for the environment. Sydney Water does not dispose any biosolids to the ocean or to landfill site.

**Q Does Sydney Water test biosolids before they are used?**

**A** Sydney Water monitors all biosolids they produce and tests them to comply with the requirements of the *Environmental Guidelines: Use and Disposal of biosolids products (NSW EPA 1997)*. About

800 samples are tested for a range of parameters each year. The level of treatment and reprocessing will determine the testing that is required and where the biosolids are able to be beneficially used. The Guidelines include testing biosolids for a range of heavy metals, organic compounds and nutrients. All biosolids are monitored for pathogen and vector reduction requirements. If a higher grade product is being produced, in addition to this testing and process monitoring, they may be tested for E. coli, faecal coliforms and salmonella sp (Stability Grade A).

Sydney Water provides summary reports each year to the Environment Protection Authority (EPA) on the amount of biosolids produced, where they were used (eg. agriculture or horticulture) and the biosolids grade.

**Q How are Sydney Water biosolids made safe from pathogens for beneficial land use?**

**A** Sydney Water treats its biosolids to remove pathogens (Grade A) or reduce them to low levels so that by following the Guidelines they are safe to use (Grade B).

**Q How are biosolids transported to beneficial use sites?**

**A** The biosolids are transported from the treatment plants to beneficial use sites using bulk transport trucks. Transportation is carried out by experienced contractors.

The trucks loaded with biosolids are covered with specially designed tarpaulin covers fixed to each truck to minimise impacts during transportation. The covered trucks are washed before leaving the treatment plants and again after unloading at the application or reprocessing site/s.

The trucks after unloading are not permitted to backload with any food materials such as grain or other food stuffs.

**Q How are Sydney Water’s biosolids managed?**

**A** Sydney Water provides under contract, biosolids for beneficial use in accordance with the *Environmental Guidelines: Use and Disposal of biosolids products (NSW EPA 1997)*. Sydney Water manages and monitors these contracts. Sydney Water conducts regular audits of these contractors to ensure compliance with environmental and safety requirements.

Sydney Water assesses the quality of its biosolids and provides the quality data to the contractors. Regular reports are provided to Sydney Water on the Contractor’s operations, which include quality data for composted biosolids, including pathogen data.

**Q Are Sydney Water biosolids safe for beneficial land use?**

**A** Sydney Water treats and manages its biosolids as required by the *Environmental Guidelines: Use and Disposal of biosolids products (NSW EPA 1997)*. These guidelines use a multi barrier approach. This means the biosolids are tested and classified based on the chemicals and meeting the requirements for pathogen and vector attractant reduction. This classification determines where these biosolids can be used. There are additional requirements on how these biosolids are applied and managed when applied to land to protect public health and the environment, such as water courses. These include an environmental assessment of the application sites prior to biosolids being applied. In addition the biosolids that are spread are incorporated into the soil prior to sowing.

For more information please go to:

[http://www.health.nsw.gov.au/resources/publichealth/environment/water/summary\\_expert\\_panel\\_use.pdf.asp](http://www.health.nsw.gov.au/resources/publichealth/environment/water/summary_expert_panel_use.pdf.asp)

<http://sydneywater.com.au/WhoWeAre/MediaCentre/documents/biosolids.pdf>

**Q Is it safe to handle biosolids?**

**A** When working with biosolids or any soil or potting mix product, appropriate personal protective equipment such as gloves should be used. When handling biosolids good personal hygiene practice should be followed such as hand washing. Exposure to dust can be reduced if required by wetting down the biosolids (if dry) and wearing a dust mask.

**Q Where does Sydney Water apply biosolids for beneficial land use?**

**A** A majority of biosolids are applied to broad-acre farms in the Central West and South West of NSW. About 20 NSW farms use biosolids provided by Sydney Water each year. Sydney Water keeps records of every paddock that has had biosolids applied. The farms have been assessed as per The *Environmental Guidelines: Use and Disposal of biosolids products (NSW EPA 1997)* requirements prior to biosolids being applied to this land.

Composted biosolids are further treated to a high level and tested to ensure that they are suitable to be used in the same way as any other composted product.

The Guidelines specify areas where the biosolids can be applied and the contractors comply with these requirements.

**Q What crops are grown using biosolids?**

**A** Generally dewatered biosolids are applied to large broad-acre farms that grow canola, wheat, oats, barley and pastures.

The biosolids are spread and incorporated into the soil prior to sowing. The harvested components of these crops don't come into contact with the soil/biosolids mixture. These crops are also mostly reprocessed e.g. into flour. Dewatered biosolids are not applied to vegetables or root crops.

Some animals such as sheep and cattle may graze on crops and pastures grown in biosolids. There are withholding periods for grazing animals on biosolids treated pasture.

The *Environmental Guidelines: Use and Disposal of biosolids products (NSW EPA 1997)* specify waiting periods prior to some crops being grown. The Guidelines specify crops that cannot be grown in biosolids and animals that cannot graze on biosolids treated land. They also specify waiting periods for crops and animals, once biosolids have been applied to agricultural land.

**Q What portion of Sydney Water's biosolids is beneficially used each year?**

**A** Sydney Water has beneficially used 100% of its biosolids every year since 2003.

**Q Who monitors what Sydney Water does with biosolids?**

**A** The *Environmental Guidelines: Use and Disposal of biosolids products (NSW EPA 1997)* were prepared and are regulated by the Environment Protection Authority (EPA).

These *Guidelines* were developed with the assistance of a Biosolids Subcommittee, which included representatives from Government Departments (including Health and Agriculture), Water Utilities (including Sydney Water) and other related industries.

The *Guidelines* provide a multi-barrier approach to risk management including managing the risk of pathogens in biosolids. The *Guidelines* stipulate the permissible end use applications based on the level of treatment. Sydney Water requires its contractors to meet these *Guidelines* and provides information to the EPA annually.

**Q Are biosolids used in other countries?**

**A** Biosolids are beneficially used in many countries around the world. In the United Kingdom, United States and Canada the majority of the biosolids are applied to agricultural farms. Some countries use biosolids as a fuel source or in cement manufacture and others incinerate.

In Australia, research has been undertaken to determine a safe framework for biosolids use and Sydney Water follows this framework to ensure public safety. Other countries such as the United Kingdom and United States follow a similar framework for biosolids use.

International studies have shown that biosolids, when treated and managed in accordance with guidelines such as those used in NSW, biosolids are safe.

In 2002 the US National Research Council reviewed that country's experience with biosolids use, current science and the US EPA's biosolids regulation, called the 40CFR Part 503 rule, and concluded that:

*"There is no documented scientific evidence that the Part 503 rule has failed to protect public health".*

In 2011 an expert advisory group convened by NSW Health considered the risk to human health from biosolids was negligible if the biosolids management and operations complied with the *Environmental Guidelines: Use and Disposal of biosolids products (NSW EPA ,1997)*.

**Q What are Blastocystis hominis, Dientamoeba fragilis and Salmonella?**

**A** *Blastocystis hominis* and *Dientamoeba fragilis* are parasites. Some subtypes of these parasites can cause gastrointestinal illness. Dr Damien Stark of St Vincent's Hospital and Professor John Ellis of the University of Technology Sydney who are experts on these organisms, advised that there is no scientific evidence linking properly managed biosolids to the transmission of these parasites to people. Current best knowledge is that these parasites are transmitted by the faecal-oral route from person to person. This means personal hygiene such as food and hand washing is paramount to preventing transmission. These are not Third World parasites and have been reported to be circulating at a low level in the population of Sydney for at least 30 years.

**A** *Salmonella* is a group of bacteria that includes types that are pathogens. Some types cause gastroenteritis and some can cause blood poisoning.

**Q What test results were referred to in the media?**

**A** *Dientamoeba fragilis*

Reference was made to the St Vincent's Hospital team currently in the early stages of researching methods for detecting *Dientamoeba fragilis* in wastewater. They requested that Sydney Water assist the research by supplying wastewater samples. Five samples were provided, three untreated wastewaters, one primary treated and one secondary treated sample. *Dientamoeba fragilis* was detected in only one of the untreated wastewater samples and not detected in either of the treated wastewater samples.

**A** *Blastocystis hominis*

Reference was made to finding of *Blastocystis hominis* in type B biosolids by a Brisbane laboratory. There is no standardised, accredited method for the detection of *Blastocystis* in biosolids. However, it is not unexpected that low levels of this organism would be detected in Grade B biosolids. There are different types of *Blastocystis hominis*. Only one type is a known pathogen. Expert molecular biological testing is required to confirm the presence of this type.

**A** *Salmonella*

Reference was made in the media that Salmonella was detected in Grade B biosolids. While there is an accredited method for testing for the Salmonella group in biosolids, not all Salmonella are pathogens and further testing is required to confirm that those found are pathogens. That said, it is not unexpected that low levels of any type of Salmonella might be found in Grade B biosolids. The important fact is that the processes used to produce Grade B biosolids reduce the levels of Salmonella to levels safe for the specified uses.

**Q What information is available about biosolids?**

**A** Sydney Water has further information on its website at:

<http://www.sydneywater.com.au/Sustainability/Biosolids/index.cfm>

<http://www.sydneywater.com.au/OurSystemsandOperations/WastewaterTreatmentLevels/index.cfm>

<http://sydneywater.com.au/WhoWeAre/MediaCentre/documents/biosolids.pdf>

*The Australia & New Zealand Biosolids Partnership* supports public engagement in sustainable management of biosolids in Australia, supports the Australian and New Zealand water industry on technical and regulatory components of biosolids management, and is part of a global network on the sustainable management of biosolids.

The following links provide further information:

*The Australia & New Zealand Biosolids Partnership*

<http://www.biosolids.com.au/what-are-biosolids.php>

<http://biosolids.com.au/q-a-aust-nz.php>

NSW Health

[http://www.health.nsw.gov.au/resources/publichealth/environment/water/summary\\_expert\\_panel\\_use.pdf.asp](http://www.health.nsw.gov.au/resources/publichealth/environment/water/summary_expert_panel_use.pdf.asp)

NSW Department of Primary Industries

[http://www.dpi.nsw.gov.au/data/assets/pdf\\_file/0018/231066/Boosting-plantation-growth-using-organic-wastes.pdf](http://www.dpi.nsw.gov.au/data/assets/pdf_file/0018/231066/Boosting-plantation-growth-using-organic-wastes.pdf)

<http://www.dpi.nsw.gov.au/agriculture/farm/recycling-waste-mgt/recycled-organics/biosolids>

<http://www.dpi.nsw.gov.au/agriculture/resources/soils/improvement/recycled-organics-manures-cropping>

NSW Environment Protection Authority

<http://www.environment.nsw.gov.au/resources/water/BiosolidsGuidelinesNSW.pdf>