



Biosolids Risks and Risk Management

Fact Sheet

This Fact Sheet has been prepared by the Australian and New Zealand Biosolids Partnership.

The intent of these Fact Sheets is to provide interested groups and individuals with information about aspects of the treatment and management of biosolids.

This Fact Sheet explains:

- What biosolids are
- What pollutants can be present in biosolids and how these are managed
- The environmental risks that could exist with regard to land application of biosolids and how these are managed
- The management of health risks that could exist through biosolids use and the ways these are mitigated
- The financial risks associated with land application of biosolids
- Other special categories of risk, such as that which might be associated with the presence of prions in biosolids

What are biosolids?

Biosolids are treated sewage sludges. Sewage sludge is the solids that are collected from the wastewater treatment process but which have not undergone further treatment. Sludge normally contains up to around 3% solids. Biosolids are a product of the sewage sludge once it has undergone further treatment to reduce disease causing pathogens and volatile organic matter significantly, producing a stabilised product suitable for beneficial use. Biosolids, normally contain between 15% to 90% solids. Biosolids are carefully treated and monitored and they must be used in accordance with regulatory requirements.

Are biosolids tested to ensure safety?

Biosolids must be analysed to ensure they meet the quality standards for land application, as defined in State, Territory and national Guidelines. These tests may include analyses for pathogens, nutrients, metals and any organic chemicals of concern (e.g. polychlorinated biphenyls or PCBs). The frequency of testing is based on the amount of biosolids generated by the treatment facility. In addition, biosolids producers must regularly monitor the treatment process.

Do biosolids contain pollutants?

As municipal wastewater treatment facilities and systems have improved during the past 20 years and as trade waste discharge licences have become increasingly strict, pollutant concentrations in biosolids have decreased dramatically and are typically well below national and State and Territory Guidelines.

Many of the trace metals in biosolids, including cadmium, lead, copper and zinc, enter wastewater from industrial drains and metal pipes in homes and businesses. Some of these metals, known as micronutrients, are essential in small amounts for plant survival. Others such as cadmium (which is a common ingredient in toothpaste) are monitored very closely in biosolids to ensure they remain well below the Guideline values.

Organic compounds, including pesticides, polychlorinated biphenyls (PCBs) and dioxins, can be found in some biosolids in concentrations near the lowest detectable limits. Studies have found the risks associated with these to be negligible and as many of these compounds are no longer used by the community the risk is diminishing.

In Australia and New Zealand biosolids guidelines developed or endorsed by State and Territory and national environmental and health-related departments define strict contaminant classifications for heavy metals to ensure sustainable, appropriate uses in Australia and New Zealand.

Will the metals and pollutants in biosolids enter the food chain?

Protecting human and stock health is a cornerstone of the various biosolids guidelines in place in Australia and New Zealand. These guidelines are usually endorsed by relevant Departments of Health or related regulatory authorities. The guidelines ensure there is no harmful build-up of metals or pollutants in the soil or in crops.

Many of the trace metals in biosolids are also present in conventional fertilisers and manure. These substances are non-toxic at the low concentrations and low rates at which they are applied.

Will land application of biosolids pollute ground or surface water?

When applied according to guidelines and good farming practices, biosolids will not impact on groundwater or surface water quality.

As with any fertiliser, the chief groundwater issues are nitrogen and phosphorous. Unlike many commercial fertilisers, about 85% of the nitrogen in biosolids is present in a slow-release organic form, making biosolids less likely to cause groundwater pollution from the release of nitrates (the mobile form of nitrogen) or phosphates. In addition, many guidelines ensure soil pH is taken into account and is managed in establishing the suitability of a site for land application to prevent movement of metals through the soil.

Guidelines for land application of biosolids usually specify site selection criteria, stormwater controls at the site as well as operating practices to minimise stormwater runoff under extreme events.

Will biosolids be carried in the air?

Biosolids generally will not generate dust or moisture droplets during handling or application. Because biosolids are high in organic matter, once on the ground, they dry and form a crusty material that is resistant to erosion. Dust generated during application of biosolids is usually generated by spreading equipment disturbing the existing soil layer, not from the biosolids being applied.



Can the health of native or domestic animals be affected if they come into contact with biosolids?

Typically the pathogens found in sewage are sourced from human waste and the vast majority are removed during processing of the biosolids. Most of these pathogens, in particular viruses, do not infect other animals as they are specific for humans. However, a few pathogens, such as some strains of the protozoan parasite *Cryptosporidium*, can infect certain domestic animals, including cattle and the bacterium *Salmonella* is known to infect young chickens. This is why the various biosolids guidelines recommend a withholding period of 30 days before stock is allowed to graze or domestic fowl allowed access to land once biosolids have been applied.

This withholding period is not required for domestic animals such as dogs and native wildlife as they cannot become infected with these human pathogens.

Does the application of biosolids pose a health risk?

Good hygiene practices are essential for persons coming in contact with biosolids. As in many other fertilisers and soil amendments, human sickness may result from exposure to chemicals, toxins or pathogenic organisms. Biosolids may contain some or all of these at various stages, particularly at the time of production. However, there are many barriers available to protect us from these.

The potential health concerns for users of biosolids are excessive levels of toxic metals or chemicals, or presence of potentially pathogenic micro-organisms (e.g. viruses and bacteria).

All producers of biosolids are required to monitor their product for contaminants. Guidelines published by State, Territory and national governments in Australia and New Zealand ensure that good practice is followed when biosolids are applied to agricultural land. In these circumstances, there is no danger to health from the resulting crop.



The wet material may provide a suitable environment for organisms, and care is required to ensure the health of workers during transportation and application of moist material. After application to farmland, the biosolids decompose quickly into the soil (exposure to sunlight and drying causing rapid die-off of any remaining pathogens) and naturally occurring bacteria become dominant.

Only the highest quality material is able to be used in circumstances such as composting or application to leaf crops. Generally, biosolids are applied to broadacre and grain crops where the time between application, sowing of seeds and harvesting of mature crops can be from three to six months. In the case of grain crops, the crop itself will be subject to further refinement to produce flour and other products.

As is the case with many other foods or products used in conjunction with food production, there are ongoing concerns that about various chemicals may be present in very tiny concentrations, or that their effects have not yet been identified. It is important to note there have been no identified cases of death or illness from exposure to biosolids that have been used appropriately, in line with relevant Guidelines.

Protecting human health is a cornerstone of the various Biosolids Guidelines in place in Australia and New Zealand. These Guidelines are usually endorsed by relevant Departments of Health or related regulatory authorities. Biosolids applied in accordance with Guidelines to grow crops or graze stock for human consumption presents a negligible risk to the consumer.

Is it safe to eat food that has been grown using biosolids?

This is one of the major factors considered in formulating State, Territory and national Guidelines. Provided that biosolids are used in accordance with the Guidelines there is no greater risk associated with biosolids application than with other commercial fertilisers.

The USA has conducted more than 30 years of scientific research including a US Environmental Protection Authority

risk assessment of biosolids use. These studies included the independent evaluation of how biosolids could directly or indirectly affect human health and the environment and established minimum safe concentrations for biosolids applications to land. It concluded that if correctly managed biosolids application to land has no adverse environmental or health impacts.

Similar research has been conducted throughout Australia in the past 15 years.

Will a land application site next to me impact my property value?

There is no evidence that land values in Australia or New Zealand have been negatively affected as a result of the application of biosolids on a neighbouring property. On the contrary, the use of biosolids on farmland helps improve crops and supports continued success of those farming operations, adding to the generally economic wellbeing of the region.

Successful land reclamation projects using biosolids have also raised land values at and around surface mine sites.

Do prions pose a risk in the management of biosolids?

Prions are small folded protein molecules containing no genetic information, which are made up of amino acids, the essential building blocks of all proteins. Prion-like proteins that are found naturally in many (perhaps all) plants and animals are folded differently than normal proteins due to slight amino acid changes in certain regions of the protein. The term prion is often used to refer to such abnormally folded proteins (also referred to as proteinaceous infectious particles), when they have the ability to affect other proteins, causing them to change from the normal form to the abnormal form.

In their normal, non-infectious state, prions are believed to be involved in cell-to-cell communications and other important cell functions. In their abnormal form prions have been linked to the transmission of Bovine Spongiform Encephalitis (BSE, or so-called 'Mad Cow' disease) and Creutzfeldt-Jakob Disease (CJD) and variant CJD. There has been discussion about the potential for prions to enter wastewater streams through the discharge of animal waste from abattoirs and similar facilities and thereby passed on to humans through either contact with treated wastewater or biosolids.

In their normal, non-infectious state, prions are believed to be involved in cell-to-cell communications and other important cell functions. In their abnormal form prions have been linked to the transmission of Bovine Spongiform Encephalitis (BSE, or so-called 'Mad Cow' disease) and Creutzfeld-Jakob Disease (CJD) and variant CJD. There has been discussion about the potential for prions to enter wastewater streams through the discharge of animal waste from abattoirs and similar facilities and thereby passed on to humans through either contact with treated wastewater or biosolids.

The US Water Environment Federation (WEF) reports the following in its Prion Fact Sheet:

“Based on a review of available information and assessments made to date (including a quantitative risk assessment for BSE in biosolids by Gale & Stanfield in the U.K.), it is unlikely that significant levels of prions enter the wastewater collection system and the risk of prion transmission directly to animals and indirectly to humans from biosolids management and effluent land application is extremely low (i.e. practically zero). Prion transmission via biosolids land application seems less likely than other potential food chain pathways.”

About the Australian and New Zealand Biosolids Partnership

The Australian and New Zealand Biosolids Partnership (ANZBP) is a collective of utilities, consultants, academics and government agencies committed to the sustainable management of biosolids. Since its formation in 2007, the ANZBP subscriber base has continued to grow and has developed a diverse range of research products and tools to support the objectives of the Partnership. More information on the ANZBP and its activities can be found on the website www.biosolids.com.au.



Australian & New Zealand
Biosolids Partnership

