

# The Australian and New Zealand Biosolids Partnership: Creating New Frameworks for Biosolids Management

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## ABSTRACT

The Australian and New Zealand Biosolids Partnership (ANZBP) is a collective of 49 members across both countries that have come together to provide responsible, credible data about biosolids and to develop communication tools to explain to the community generally the value of biosolids and the measures in place to ensure their safe use. Members also exchange data and ideas about improvements and opportunities in biosolids management and collectively problem-solve.

The Partnership has initiated a range of research projects directed to achievement of its objectives. This paper will report on two of these: *A Review of Biosolids Guidelines in Australia and New Zealand* and a *Community Attitudinal Survey*. Combined, these initiatives will work towards rationalisation of biosolids guidelines to reduce inconsistency, increase community confidence in the efficacy of guidelines and promote outcomes-based regulation, over processed-based approaches. The project outcomes will also improve responsiveness to community concerns and needs for information, including an understanding of the level of anxiety the community has about biosolids use, the issues causing the greatest anxiety and the steps that might be taken to ameliorate that anxiety; and in New Zealand assist an enhanced understanding of the impacts for biosolids use of Tāngata Whenua views and attitudes.

## KEYWORDS

**Biosolids, Community Attitudes, Biosolids Guidelines and Biosolids Partnership.**

## 1 INTRODUCTION

The Australian and New Zealand Biosolids Partnership (ANZBP) is a subscription based program, formed in 2007 by the Australian Water Sector, to place the beneficial use of biosolids on a sustainable footing across Australia and New Zealand. The ANZBP resides with the Australian Water Association (AWA) which has taken responsibility for implementing the program, and its agreed business plan.

The objectives of the ANZBP are to:

- Support public engagement with respect to the sustainable management of biosolids in both Australia and New Zealand
- Support the Australian and New Zealand water industry on technical components of biosolids management
- Establish a global network of parties interested in the sustainable management of biosolids.

As the ANZBP's primary purpose is to support the water industry in informing both the industry and the wider community on appropriate biosolids management, the water industry provides the majority of the financial support to enable the ANZBP to undertake the many components of the program outlined above. Fees support the management of a website and research projects. Membership of the program has steadily grown since inception and now numbers forty-nine organizations, including four New Zealand based members.

The effective management of biosolids is an imperative. In Australia and New Zealand a number of emerging challenges are putting pressure on biosolids producers and managers, including:

- Increasing volumes of biosolids, arising from improved treatment processes, as well as significant quantities of stockpiled materials;
- Rising landfill costs which make disposal of biosolids increasingly expensive. These costs are likely to increase further if a price is imposed on carbon emissions;
- Restrictions on the ways in which biosolids may be used and the qualities that must be achieved for various applications;
- Community pressure to manage waste streams sustainably juxtaposed with anxiety about the impacts of biosolids use on community and ecological health, and, in New Zealand particularly;
- Cultural concerns about the use, transport and disposal of human-derived waste materials outside the catchment of origin (Tāngata Whenua issues)

Coupled with the above are the particular concerns of biosolids managers to act sustainably and to attempt to use biosolids productively rather than dispose of biosolids as a waste. Of increasing importance will be the need to recover the nutrient values present in biosolids as the volumes of inorganic fertiliser decline and prices of fertilisers derived from such sources increase.

Thus, the particular concerns of biosolids managers are to:

- Manage biosolids efficiently. This means that managers will seek less costly ways of treating, storing, transporting and using biosolids and will encourage regulators to develop regulations and guidelines that protect the environment and human health but which are targeted and minimise transaction and compliance costs.
- Manage biosolids sustainably. Biosolids managers will seek to ensure that the value of biosolids as a source of fertilizer, for their soil conditioning properties and site remediation potential is captured and that this is done with minimal negative environmental, social and economic impact.
- Engage with the community in developing biosolids management plans. This requires a genuine understanding of community issues and concerns, and honest, straightforward communications and activities to respond to these.

To support the management of the above matters, the ANZBP has commissioned and delivered a number of key research projects. Projects that have recently been completed including:

- *A Review of Biosolids Guidelines in Australian and New Zealand* which includes recommendations for development of a model regulation.
- *A Community Attitudinal Survey* to identify matters of critical concern to affected and general communities, who they see as the most credible sources of information and general perception issues.
- *A Legal Register* documenting all of the regulatory and legislative requirements for biosolids management Australia-wide.
- *A Literature Compendium* of current and future research in biosolids and biosolids management.

Each of the above is available exclusively to Biosolids Partnership members, with summaries available on the ANZBP's website ([www.biosolids.com.au](http://www.biosolids.com.au)). This paper provides an overview of the Partnership and information on the two projects, a *Review of Biosolids Guidelines in Australia and New Zealand* ("the Review") and a *Community Attitudinal Survey*.

The outcome of these projects, and other research initiatives will be examined in light of the need to create better management frameworks for biosolids management which are efficient, targeted and designed with the general community in mind.

## **2 THE COMMUNITY ATTITUDINAL SURVEY**

### **2.1 OVERVIEW**

The ANZBP Community Attitudinal Survey was undertaken to identify community attitudes such that communications from the biosolids management community can be meaningful and so that the issues of greatest concern to affected parties can be taken into account in decision-making.

It is true that biosolids managers across Australia and New Zealand have decades of experience in planning and executing biosolids management plans, taking into consideration impacts on the community. These have often been successfully delivered, but not always. While there are lessons to be learned from the successes, we must also learn from the failures. Frequently these have related to a misunderstanding of the levels of community anxiety or a lack of understanding of community concerns.

During the design of the Community Attitudinal Survey project some parties suggested that the work was unnecessary, as general attitudes were already known. This would appear to be a false assumption. One only need look at controversies in the United States and Europe – some of which have led to bans on the use of biosolids or even the transport of biosolids through a particular region – to know that community attitudes can be out of kilter with the objectives held in mind by biosolids managers. Williams et al (1991) – one of the few peer reviewed papers in Australia that looks specifically at community attitudes to sludge management – includes the following quote

“One simple point which must be made, however, is that for the planning of any successful information and/or public involvement program, it is imperative for the planner to know the level of knowledge and the beliefs about sludge management in the community. Too often, public discussions on issues such as this are confused because the concerns of the public and the professionals are different and neither end up helping each other”.

While this observation was made almost 20 years ago a similar observation was made in a report, Public Perception of Biosolids Recycling: Developing Public Participation and Earning Trust, prepared more recently by the United States based Water Environment Research Foundation (WERF 2004).

A national level survey may not reveal local issues of concern. A national-level survey will not, for example, reveal that a particular community will be opposed to construction of a biosolids storage facility because of the community's concern about the location of that facility. It will, however, reveal the community's level of awareness of biosolids, the extent to which they are disposed to accept, say, land application of biosolids over landfill disposal, what they would consider appropriate uses for biosolids, who they would trust to deliver biosolids-related information and whether their perception is that current guidelines and regulations are appropriate or too lax among other things. It is to these ends that the current research was directed.

Most people have little awareness of what biosolids are. In WERF (2004) it is reported that knowledge of the term 'biosolids' is limited with just 3% of respondents accurately defining the term only another 11% having a 'fairly good' idea of what 'biosolids' are. Asked general and untargeted questions about the reasonableness of biosolids usage, most people will likely either have little understanding of the issue and not be able to respond meaningfully, or will support in broad terms a project that appears to be promoting the use of a material that would otherwise go to waste. Moreover, those who have weak opinions about biosolids may be fickle in their attitudes - that is, with little knowledge of biosolids or no exposure to the issue - those questioned may be mildly in favour. Once a controversy emerges, however, attitudes harden and may turn from positive to negative virtually overnight.

## 2.2 METHOD

The ANZBP Community Attitudinal Survey was structured as two key components: identification of key biosolids issues through dialogue with primary stakeholders (Stage 1); and identification of more general community attitudes (Stage 2).

Because community attitudes can change quickly, the starting point for this research project was to understand the attitudes of key decision makers rather than the community broadly. Groups approached included:

- Health and Environmental Community-based Groups
- Horticultural and grain growers
- Environmental and health regulators
- Industry regulators (e.g. agencies other than environmental and health regulators which have responsibility for regulation of utilities who generate or manage biosolids or their contractors)
- Retailers of biosolids-derived products
- Researchers in the field of biosolids management or environmental or health protection
- Political representatives
- Proponents of non-processed foods

The criteria for selection of interviewees for Stage 1 were that they were involved in or responsible for biosolids management and that their position was one of influence. Such influence might be direct, as in the case of a regulator, or indirect, as in the case of a retailer of products derived from sites on which biosolids might be applied, who could choose to reject such products if controversy arises. The stakeholders interviewed came primarily from Australia and New Zealand. However, these groups were supplemented by information gleaned from stakeholders in the UK due to difficulties in recruiting a sufficiently large sample size in Australia and New Zealand.

The Stage 2 work sought community respondents from Australia and New Zealand. These groups were broken down into two subcategories, affected and unaffected communities. The term ‘affected’ was not intended to have any pejorative connotations. Rather, the term was used to describe those communities that had some experience with biosolids production, transport or application and who might be expected to have a higher degree of awareness of biosolids or more firm attitudes to biosolids use.

## 2.3 RESULTS

Stakeholders were interviewed, primarily by telephone using structured discussion guides followed by expert interviewers. Among other approaches, comments provided by stakeholders in each country were categorised, as far as possible, into strengths, weaknesses, opportunities and threats (SWOT). Notably, particularly when compared to the results of the broader community survey that was undertaken in Stage 2 (and which is reported below), stakeholders linked biosolids more strongly with threats and weaknesses than opportunities and strengths. This is not to say that stakeholders perceived biosolids as being threatening or risky, but that they perceived the general community as likely to see issues surrounding biosolids as negative.

There was, nevertheless, consistency among stakeholders’ attitudes to and perceptions of biosolids management, with most being supportive of the use of appropriately managed and regulated biosolids for a range of purposes (depending on quality). However, possibly because of the high sensitivity on the part of key stakeholders to community perceptions of the ‘threats’ associated with biosolids, communication between stakeholders and the general community is scant. While findings from Australia, New Zealand and the UK point to the need to exercise caution when conducting community consultation so that an issue is not raised where one does not exist, there would appear to be scope to develop positive communications programmes to educate the general

public about the opportunity to use biosolids sustainably, particularly as is shown below, the community is more supportive of biosolids use than the experts consulted perceived them to be.

The Stage 1 work, led to identification of a range of issues worthy of further investigation in Stage 2 of the survey, which dealt with the community generally. Among these were:

- Ascertaining the perceived differences in attitudes and perceptions of rural and urban communities
- Identifying the groups community members perceived as providing the most credible information on biosolids management
- Determining the uses to which biosolids should be allocated
- Exploring how confident consumers would be in purchasing foodstuffs grown on land to which biosolids had been applied.

Respondents in Stage 2 came from Australia (1020 respondents) and New Zealand (201 respondents). Over all, there were 600 respondents in the affected category and 621 in the unaffected category. Key results included:

- That 33% of respondents had heard of the term biosolids, with a majority of these being from an affected community, although many could not accurately define the term.
- That, generally, the affected group is more positively disposed toward biosolids use than the unaffected community. This might relate to the fact that the affected community has become used to biosolids use and has not experienced any negative impacts, or has experienced positive benefits. This is borne out by the results detailed below
- That farmers – a group which might be taken to be a surrogate in this instance for rural dwellers – are notably more likely to buy products grown on land on which biosolids are applied than the rest of the community. That said the majority of both groups are very likely or likely to buy such products.
- That most sources of information about biosolids are not perceived as being particularly credible, aside from CSIRO in Australia and the relevant Crown Research Institutes (CRI) in New Zealand. For example, CSIRO/CRIs are seen as ‘knowledgeable’ by 40.8% of respondents and ‘trustworthy’ by 42.5%. University researchers, the next most strongly supported group were only seen as knowledgeable by 11.2% of respondents and trustworthy by 13.7%. Federal/National health departments were rated as 10.8% for both categories; these are perceived to be the most knowledgeable and trusted government/regulatory sources of information.
- That all uses of biosolids referred to in the survey were agreed to be or strongly agreed to be appropriate uses of the product. The table below gives some examples:

Table 1: Attitudes to appropriate fertilizer use – Affected vs. Unaffected

<i>Appropriate Fertiliser Use</i>	<i>Affected</i>	<i>Unaffected</i>
<i>For gardens</i>	82.2	68.2
<i>To grow trees</i>	90.6	79.9
<i>For growing non-food products</i>	89.5	78.4

- That 73.2% of affected community respondents and 60.6% of unaffected respondents would be very likely to buy or fairly likely to buy dairy/meat products (where cows/cattle/sheep have grazed on land treated with biosolids). 16.5% and 19.6% would be fairly or very unlikely to buy such products.

## **2.4 IMPACT ON COMMUNICATION**

The results presented above are only a snapshot of a handful of data from the study. Thinking about community receptiveness however, it would appear that there is generally strong support for sustainable biosolids use and that there is room to improve community perceptions of biosolids though the provision of credible experiential information about the efficacy and sustainability of biosolids. It is the view of the ANZBP that more targeted and consistent regulation will help to provide the community with confidence that the product can be used sustainably. Data emerging from the Survey also suggests that provided with good information the community supports the sustainable management of biosolids.

## **3 THE REVIEW OF BIOSOLIDS GUIDELINES IN AUSTRALIA AND NEW ZEALAND**

### **3.1 OVERVIEW**

The Review of Biosolids Guidelines in Australian and New Zealand examines biosolids guidelines in place in all Australian state and territories, federally and in New Zealand. In addition, the project team reviewed the US EPA's biosolids guideline, the 40 CFR Part 503 rule, the European Union's Sludge Directive 86/278/EEC and the UK's Safe Sludge Matrix to give context to the ANZ biosolids rules. The USA and the EU were chosen as the key biosolids regulations outside of ANZ to which comparison of local regulations was relevant.

Biosolids are regulated differently in the Australian States and Territories and federally and in New Zealand. The multiplicity of regulatory environments causes inconsistency and uncertainty. Such inconsistency has the potential to generate suspicion and community concern. Despite significant effort by the Australian water industry during the 1980s and 1990s the one nationally applicable document is a generic, philosophical approach that leaves the detail to the individual states and territories. New Zealand has independently developed its own regulatory mechanisms. The purpose of the Review is therefore to identify gaps, overlaps and inappropriate or inefficient regulatory approaches that exist currently, with a view to presenting a coherent case to governments for the reform of biosolids-related regulation.

In Australia, agricultural application accounts for 60% of the biosolids used. This is a high level compared to the EU (approx. 45%) and the US (approx. 45%). Significant benefits will flow to the nation if agricultural use can be continued or expanded, so long as these objectives are achieved sustainably and in concert with community attitudes. Approximately 450,000 tonnes of biosolids are produced annually in Australian and New Zealand.

### **3.2 DRIVERS FOR THE REVIEW**

The key driver for developing guidelines and regulations is to control substances and pathogens which might be present in biosolids and have the potential to impact human health or pollute the environment. It is very important to recognise that many of the regulated substances, such as the chemicals used in fly sprays and shampoos, are a fundamental part of modern life. Many substances essential to life can also be toxic or pollute when present in larger quantities and it is therefore important to ensure they don't build up in the environment.

The key drivers for developing biosolids guidelines and regulations are therefore to:

- Protect human health (particularly with regard to pathogens and contaminants);
- Protect environment (from excessive nutrients, contaminants and pathogens);
- Protect food quality;

- Encourage a more sustainable approach to resource management (recycling nutrients and organic matter); and
- Maintain community confidence and encourage public acceptance.

Inconsistency in regulation can work against community acceptance of biosolids use and can significantly increase costs. Most biosolids managers who have participated in community consultation activities have heard participants express concern that something is prohibited in another state that is now being proposed for their own. In some cases, these inconsistencies can be explained. For example, they might relate to the soil type or to the type of crop to be grown. In other cases there does not seem to be a scientific basis for the inconsistency and, naturally, this raises community concern about the efficacy of the various guidelines.

Inconsistency in regulation also causes confusion for the industry. Different classifications, monitoring requirements and the like can make biosolids management difficult and more costly, particularly in border areas. Unnecessary regulation too can increase costs.

### **3.3 RECOMMENDATIONS**

The Review developed a series of Findings, and 14 key recommendations for improvement. A summary of these Findings and Recommendations includes:

- Guidelines across Australia and New Zealand should be consistent, be based on science and should support the sustainable use of biosolids
- The current guideline structure which addresses contaminant and pathogen levels in biosolids along with management practices and sampling and reporting requirements should be maintained;
- Odour reduction standards should be improved;
- The list of regulated compounds should be reviewed and can be significantly reduced for most circumstances. It is likely that only six compounds need regular monitoring (cadmium, copper, chromium, zinc, chlordane and dieldrin) and possibly only four (cadmium, copper, chromium and zinc);
- Existing guidelines set out grades for contaminants and pathogens. These vary significantly between jurisdictions, with some having only two grades and some a multiplicity. The nomenclature also differs from place to place. The Review recommends only two grades for contaminants and two for pathogens (A and B), with any biosolids unsuitable for use or ungraded remaining unclassified;
- Pathogen reduction requirements should be performance-based as opposed to process-based. The requirement to prove pathogen destruction performance of unknown processes should be retained;
- Guidelines should recognise the need for accountability to the community as well as statutory reporting requirements. As a result, initial screening of a broader range of contaminants and intermittent monitoring of unregulated compounds should be carried out where appropriate on a semi-regular basis (say, annually) and be used to define which compounds should be subject to ongoing analysis;
- Sampling requirements should be streamlined where it can be demonstrated higher quality biosolids are produced which do not exceed certain ‘trigger’ levels of regulated chemicals;
- Management restrictions and guidance should be reduced and be more performance-based rather than descriptive (e.g. instead of limiting storage time at the farm, rely on a performance objective for prevention of fly strike, odour, groundwater pollution or the like);
- Allowable end uses and associated controls should be rationalised on the basis of practicality and operating experience gained over the past 20 years.

As a result of the Review consideration will now be given by the ANZBP to developing, in partnership with the Australian Government, a ‘model regulation’ or ‘best practice manual’ to set out the idea conditions for biosolids management in Australia and New Zealand. It is hoped that this will become a reference document for regulators and others as existing guidelines are reviewed periodically. Indeed this is already occurring, with a number of recent Australian State reviews of biosolids guidelines making use of the Review.

## **4 FUTURE RESEARCH DIRECTIONS**

In future, the ANZBP intends to operate on a leveraged funding model, where project alliances enable co-contribution of funds (or effort) to complete projects. Funding and project contribution may therefore be sought from Government, through forming partnerships with Research Institutions/Universities and linkages with International biosolids management bodies.

To date the ANZBP has focused on undertaking research to develop a better understand of the environment in which it must operate, including regulatory considerations, perception of biosolids and an awareness of existing technical research. These projects will informed the ANZBP communication strategy and have identified further gaps in knowledge within the biosolids management community.

The ANZBP is now keen to establish a solid base of technical understanding, which will further provide input to a communication strategy. Research themes identified by the ANZBP as priorities for the future include the following technical projects:

- **Odour Generation from Biosolids:** Investigation of the sources of, and ability to control odour generated while treating and storing biosolids. Odour has been identified as a key risk factor for public acceptance in the use of biosolids. Guidelines are also deficient in the way they address odour management issues.
- **Organic Compounds in Biosolids:** This research will help to determine the presence of trace organics in biosolids and whether they pose any risk to human health or the environment. This project may be able to leverage off the research into trace organics being undertaken by the Water Environment Research Foundation.
- **Alternative Uses for Biosolids:** Exploration the suitability of biosolids products beyond current beneficial uses. Outcomes of this project may further inform Marketing of Biosolids products.
- **Volatile Solids Destruction in Storage Lagoons Description:** Determination of the volatile solids destruction, which occurs in liquid biosolids (sludge) lagoons as a function of storage time and other key parameters (temperature, configuration, mixing). This project could be expanded in future to examine solids destruction in dewatered biosolids (sludge) storage.
- **Industrial Contaminant Inputs to Biosolids:** This research will help to determine the sources, levels and impacts of Industrial contaminants in biosolids and identify means to better manage contaminant inputs.

The ANZBP recognizes the need to pursue greater involvement with NZ biosolids management bodies and intends to undertake this by delivering targeted projects of more relevance to the NZ water industry, including reviewing the needs of NZ biosolids production facilities and an improved understanding of Tāngata Whenua issues.

## **5 CONCLUSIONS**

Sustainable biosolids management is an imperative. The research described above shows a high level of support for the sustainable application of biosolids to land. There is a gap between the perception of ‘leaders’ and the community generally about the extent of support for sustainable biosolids management. This may suggest that the leaders group perceives the community to be more reluctant to accept the practice that it actually is. While communications strategies should be carefully planned so as to not create an issue where there isn’t one, there is



a degree of goodwill that can be capitalised on. Community confidence will be boosted if there is consistent and targeted regulation representing world's best practice.

Similarly, inconsistency in regulation can work against community acceptance of biosolids use. Inconsistency in regulation also causes confusion and increase costs for the industry. Different classifications, monitoring requirements and the like can make biosolids management difficult and more costly, particularly in border areas. Guidelines across Australia and New Zealand should therefore be consistent, be based on science and should support the sustainable use of biosolids. The current typical guideline structure - which addresses contaminant and pathogen levels in biosolids along with management practices and sampling and reporting requirements - should be maintained.

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