

Public acceptance and independent certification of biosolids in Canada

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Abstract: Reclamation of biosolids through land application generally meets 2 key components of Sustainable Development: environment and economics. Unfortunately, societal acceptance is the weakest part of it, despite the scientific evidence that risks with biosolids are low or lower than with farm manures. Beside unacceptable odor problems in some areas – that have to be dealt with – there is a general pre-conception that biosolids are at risk. This pre-conception has to deal with modern urban culture, beliefs, values and taboos. Communication must therefore be an important part of every biosolids strategy. However, since some actors of the private and public sectors are not always trustworthy in the minds of the general public, it is necessary to have some kind of independent organization that states that a given biosolids is safe. Therefore, third-party standardization and certifications of biosolids appear to be a key component to Sustainable Development. However, it is important that the certification label is well known and trustworthy by stakeholders. Pro's and con's of the Canadian voluntary certification of biosolids will be presented.

Keywords: Biosolids, certification, public perceptions, Sludge Diet, trust

INTRODUCTION

Defecation is one of the “vital needs” of humans and animals, just as breathing, drinking and eating. This reality never changes. The product of this excretion – fecal matter – is also perfectly adapted/designed to sustain soil fertility, by providing organic matter and nutrients to soil biota and plants in the natural environment/ecosystem. These beneficial properties of animal and human fecal matter and urine have been used by men to sustain food production and population growth in old times. The Bible accounts for the use of manure for fruit production in Old Israel. According to Scott (1968): “*In Antique civilizations where agriculture was advanced, human excreta were considered as a powerful fertilizer that must be entirely recovered... (in China) it was considered very impolite when a guest didn't go to the latrines before leaving the house*”.

Unfortunately, fecal matter also plays an ecological function at risk for humans, by propagating germs of diseases (pathogens), especially in urban areas. Fecal matter also produces a smelly odor. 600 years B.C. a sewer system was built in Rome to increase public hygiene: the *Cloaca Maxima*. 2500 years later, in the 19th century AD, big cities in England, France and in USA also built sewer systems for the same purpose. At the beginning, wastewaters were just sent into rivers, creating pollution. Then, wastewater treatment plants were built to clean the effluent, producing “sewage sludge”. Western countries entered a new era of the use of human fecal matter in agriculture.

In Canada, most people lived on farms in the beginnings of the 1900's. There are anecdotal accounts that residuals from the *bécosses* (or “backhouses” latrines) were mixed with farm manure to be used as fertilizer. Now, most people live in urban areas, and most of the cities have sewer systems with wastewater treatments, with some exceptions.

In the province of Québec (7,4 million people, North of New-York State), the use of biosolids (treated sewage sludge) as soil fertilizer and amendment began in the early 1990's. Currently, 18 % of the biosolids are used for soil fertilization, while 82 % is being landfilled or incinerated. In 1996, there were public hearings of population and stakeholders on the use of municipal residuals. The conclusions of the Bureau d'audiences publiques du Québec (BAPE, 1997) were as follows: “*We should favor reclamation of sludge for agriculture,*

sylviculture and horticulture, rather than thermal reclamation, if sludge characteristics are appropriate. Landfilling should be authorized only as the last solution These conclusions were based on science and success stories developed in many parts of Europe, USA and the province of Ontario.

Following these public hearings and conclusions, the Québec government established a policy to prompt cities to recover municipal residuals, such as biosolids, rather than landfilling (Québec, 2000). A key component of this policy is the adoption of a “green tax” of 10 \$ per ton when municipal residuals such as biosolids are landfilled or incinerated. In the other hand, the Québec Ministry of Développement durable, de l'Environnement et des Parcs developed a set of stringent criteria and regulations to allow only the use of high quality biosolids on soils (MDDEP, 2004). These criteria are considered to be amongst the most stringent in North America (Van Coille and Laquerre, 2003).

Even though biosolids recycling in Québec is relatively new and small – less than 0,2 % farm land receives municipal biosolids every year – and in spite that biosolids recycling had been discussed in public hearings, Québec population is generally uncomfortable with this management approach when it has something to do with their backyard or their food. A recent survey (Léger Marketing, 2006) indicated that 70 % of the population would not eat food grown on soils receiving biosolids.

Further to this survey, the Québec population has been alerted in April 2006 by a powerful movie called “*Taboue!*” (Productions Thallie, 2006). The French title is a play on words with “sludge” (*boue* in French) and “Taboo”. The English version is titled “*Sludge diet!*”. This movie, using testimonies of anti-sludge advocates, such as David Lewis and Caroline Snyder, was arguing that biosolids are toxic wastes that caused death in USA, soil contamination in France, and disease/odor problems in Ontario. The movie was also arguing that governments team up with the private sector and therefore are not trustworthy.

After the movie, a debate was performed on a public television, involving many stakeholders and scientists from universities. At the end of the debate, the television organizer made the following remark: “*Is there really something to worry about? Even the Québec National Institute for Public Health is comfortable and doesn't consider (significant) risks... a call to cautiousness, yes, but nothing that supports Mr. Desmarais's movie!*” (Télé-Québec, 2006; translation by the author).

Despite this debate and conclusions, the movie received a great support from the press. In two major newspapers, there were even reports that biosolids land application was responsible of 7 deaths in the city of Walkerton (Ontario) in 2000 (actually caused by cow manure contamination of drinking water – not by biosolids). In September 2006, after the California spinach outbreak, that killed 3 people, many informations on the Web were arguing that spinach had been tainted with biosolids. Once again, the outbreak was scientifically linked to untreated cow manure – not treated human manure. Why were biosolids “presumed guilty” rather than “presumed innocent” when this outbreak happened?

The Québec Ministry of Développement durable, de l'Environnement et des Parcs posted on its Website a questions/answers document about the movie, based on scientific reports and regulation enforcement statistics (MDDEP, 2006). However, it was not enough to secure the population since more and more rural cities in Québec are voting bylaws to ban/restrict land application of biosolids, as in California, Virginia and Ontario. Hence, Québec policy of biosolids recycling is challenged, even though alternatives such as incineration and landfilling are still unpopular.

LESSONS FROM A MOVIE

Even though the movie *Taboue!* had many bias, and therefore could not be considered as a scientific documentary, it was well received by the general public and the press. This is probably because the movie is in accordance with many people's perceptions, beliefs, values, paradigms... and taboos, whatever they are true or false, apropos or not.

Here are some of these perceptions highlighted by the movie:

- Sludge contains chemicals, thus it is not natural;
- Sludge contains toxic chemicals, thus it is toxic;
- Sludge contains pathogens, thus it is dangerous;
- Sludge has odors, thus it is at risk;
- Sludge is land applied by private sector to make money, so it is suspicious;
- Scientists who support biosolids are also suspicious;
- Governments promote sludge application, so they are also suspicious;
- Governments do not pay enough attention to protect people against pollution, as in Walkerton;
- I have been educated not to touch a pooh (fecal matter), so biosolids are bad;
- No scientist could guarantee there is no risk at all, so there are risks;
- I should take no risk;
- Not in my backyard, not in my food.

We can see why “human manure” finds much more opposition than natural animal manure, even though 10 deaths were scientifically associated with cow manure land application in North America in the 7 last years – none with biosolids. In UK and France, there is the same conclusion: no human outbreak has been linked to land application of biosolids (Crathorne, 2006; Rat, 2006)

To make biosolids recycling sustainable, we have to address these perceptions in a way that will really secure the general public. Beecher et al (2004) pointed out the importance of biosolids certification and independent oversight.

CERTIFICATIONS AND STANDARDS

In USA, the National Biosolids Partnership (NBP, 2007) put in place a private certification label. To be certified, a wastewater treatment plant has to enter an audit process conducted by an independent firm. The biosolids must respect federal rules for biosolids quality (USEPA, 1993) and must respect other criteria developed by NBP. If audits are satisfying, NBP issues a certificate that may be shown to prove the environmental management system is efficient. Currently, 14 major cities in U.S.A received the NBP certification. This independent certification appears to be successful in helping wastewater facilities to improve management and make sure biosolids respect federal standards. However, the NBP label is not known by farmers and by the general public. Also, certification is based on federal legislation, particularly metal and pathogen limits of US 503 regulation, which are not endorsed by some stakeholders in USA.

In France, another type of certification was developed by SYPREA (2007), an association of private professionals. SYPREA developed a code of best practices in collaboration with the government and a farmer's union. The standard meets or exceeds governmental regulations. Then, an independent organization, Qualicert, performs audits with wastewater plants and haulers. A certificate is issued when audits are satisfactory. Currently, 8 urban organizations are certified in France, including Paris region. One advantage is that Qualicert label is much more known to the general public in France, than NBP certification label in USA, since Qualicert certifies enterprises in many areas (telecommunications, automobile, insurances, food, trade, etc.). Also, the code of best practices was endorsed by the main farmer's union in France.

In the United Kingdom, the “Safe Sludge Matrix” is another type of voluntary standard and consensus reached between many UK stakeholders, including the food industry (Crathorne, 2006). The consensus will eventually be transposed into UK regulations.

THE CANADIAN VOLUNTARY STANDARDIZATION AND CERTIFICATION APPROACH

During the last ten years, Canada developed three commercial standards for fertilizing residuals:

- Composts (CAN/BNQ 0413-200, 1996, revised 2005);
- Liming Materials from industrial Processes (BNQ 0419-090, 1997, revised 2006);
- Granulated Municipal Biosolids (CAN/BNQ 0413-400, 2002).

These voluntary consensual standards for pathogen-free fertilizing residuals were developed by committees composed of 3 categories of stakeholders:

- Those who sell or produce the product (cities/generators/haulers);
- Those who use the product (farmers unions, horticulturists, ngo's);
- Scientists and governments.

The committees were managed by the Bureau de normalisation du Québec (BNQ) under strict rules of the Standards Council of Canada (SCC) and ISO. The committees took 2-3 years to reach consensus on the following items:

- Agronomic properties;
- Trace elements;
- Pathogens;
- Foreign matter (plastics, glass, etc.);
- Odors;
- Labelling (including spec's, warnings, and use of the BNQ certification mark of conformity - label).

The whole process cost about 100 000 \$ per standard, plus in-kind travelling expenses by stakeholders (Canada is a wide country).

Once consensus-based standards were developed, wastewater treatment plant or industries could perform audits in order to certify if the product really meets the standard. This is the certification process that is also performed by the BNQ, as an independent third party organization, and according to SCC and ISO procedures. Currently, 8 fertilizing residuals are certified in Québec:

- 1 granulated biosolids
- 3 composts (including 2 biosolids composts)
- 4 lime-like residuals (including cement kiln dust and lime mud).

The certification process involves audits of in-house quality control and independent sampling of biosolids twice a year. Here are some pro's and con's of this certification process.

Pro's

- Recognized organization. The BNQ mark of conformity is well known and valued by farmers and stakeholders in Québec.
- Independent control. BNQ is an independent third party organization under SCC supervision.
- A certified product may be used without certificates of approval by the provincial government, reducing costs both for the producers and government (tax-payer).
- The standards used for biosolids quality are consensus-based.
- These consensus based voluntary standards may eventually be enforced by governments in regulations.

Con's

- Standards do not cover class-B biosolids containing pathogens.
- Costs: about 15 000 \$ per year to maintain certification (internal/external costs).
- Mark of conformity not known outside the province of Québec for fertilising residuals.

FUTURE OF CERTIFICATION IN QUÉBEC AND CANADA

The Québec Ministry of Développement durable, de l'Environnement et des Parcs considers that consensus-based standards and independent third party certification are necessary in order to achieve societal acceptance of biosolids recycling. BNQ certification and quality mark of conformity could help counterbalance pre-conceived ideas that biosolids would be toxic wastes.

Thus the Ministry gave a grant to the BNQ in order to re-open the Canadian biosolids standard and achieve new consensus to improve what would be considered safe and acceptable for a majority of Canadian stakeholders, as the Safe Sludge Matrix in U.K. This process began in March 2007 and should be completed by the end of 2009. The revision will cover the inclusion of other pathogen-free biosolids, such as those with advanced alkaline treatment (composts have already been dealt within the compost standard).

In the mean-time, the Ministry may possibly modify its farm nutrient management regulation in order to forbid the land application of biosolid for food crops fertilization (for direct human consumption), unless biosolids are certified by the BNQ. It will then be up to the BNQ committee of stakeholders to establish what is acceptable or not for food production.

Since BNQ certification never applies to residuals containing pathogens, such as class-B biosolids, the Ministry will continue to control the quality of these residuals under a certificate of approval. In order to make sure that the quality of these other biosolids will be monitored correctly, the Ministry created a list of accredited sampling organizations, most of them being third-party. Samples must also be analysed by certified laboratories.

When further consensus will be achieved with the new BNQ committee, the consensus may eventually be adopted in Ministry's guidelines and regulations. The Ministry will also try to promote the adoption of these consensus-based standards by other provincial governments through the Canadian Council of Ministers of the Environment (CCME), as was the case with the compost standard. Hopefully, in the coming years, more residuals will also be certified by the BNQ or other independent third parties in Québec and the rest of Canada. Eventually, the Canadian Standardizing Association of Canada (CSA) could also certify biosolids according to CAN/BNQ standards.

CONCLUSIONS

The future of biosolids land application will be dictated by its acceptance by the general public. This is a real challenge for cities and governments, since the public generally fears the idea of recycling human waste in the food chain. Some people base their fear on the chemical or synthetic inputs in sewers. Others fear the natural components of fecal matter (pathogens, odours). The fear is accentuated by the fact that the subject of human fecal matter is almost taboo in many modern occidental cultures. Despite the large number of scientific publications, and many governmental records showing that public health is not at risk when regulation is followed, fear still remains in the minds of many. Another problem is that the general public does not always feel the governments really make sure that regulations are enforced. So, the question with public acceptance seems to be sometimes one of trust, and symbols of trust (or mistrust), rather than a question of real risks, science and enforcement.

To counterbalance these negative perceptions, many countries or professional associations are looking for certification by an independent third party organization that would be trustworthy to farmers or to the general public. Some are looking at process certification, like SYPREA in France, or the National Biosolids Partnership in USA. Others are developing commercial product certification, as for other manufactured goods.

In Canada, two national standards were developed for commercial biosolids products (composts and pellets). These standards were developed through specifications of ISO and the Standards Council of Canada (SCC). For each product standard, quality criteria and labelling were developed through consensus between many interest groups in Canada. This consensus-based approach tends to develop very stringent criteria. In the other hand, it helps reaching common grounds with most stakeholders from many parts of the country.

Once a voluntary standard is set, a given product may be certified by an independent third party organization. Currently, three municipal biosolids products are certified in Québec by the Bureau de normalisation du Québec (BNQ). This “third party” certifying organization is well known in Québec to farmers and many stakeholders like ngo’s and farmer’s unions.

However, third party certification is costly and is not available for all biosolids. For these other biosolids and residuals, the Québec Ministry of Développement durable, de l’Environnement et des Parcs established its own certification program, involving certified laboratories and certified sampling organizations. One of Ministry’s goals is to make people know that biosolids and composts that are land applied in Québec are controlled and really meet governmental requirements. The Québec Government makes also mandatory that fertilization plans are done by certified agronomists. Thus, certification of products and professionals becomes a very important tool for efficient risk management and risk communications with stakeholders and the general public.

Another important condition to public acceptance in North America and elsewhere is odor control. That’s why Québec government recently forbid the land application of the smelliest biosolids and residuals, such as those that combine anaerobic digestion and high speed centrifugation, unless they are further deodorized (MDDEP, 2007).

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