



NATIONAL LIME ASSOCIATION

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Biosolids Market

Preliminary Investigation

**"Lime Stabilization of
Municipal Wastewater Sludge"**

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List of Sources

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Market Brief: Biosolids Treatment

Definition: Market Focus

Biosolids is the new term to refer to municipal wastewater sludge. It is a term developed by Water Environment Federation along with a public awareness campaign to stress the environmental attributes of this valuable and reusable natural resource. In this investigation, when we refer to biosolids, we are only considering the sludge that is dewatered and applied to land either as a fertilizer, soil amendment or landfill cover after it is treated to either class B or class A process requirements for land application mandated by the EPA.

Land application is the use of sludge or sludge derived products as a soil conditioner or fertilizer on large land tracks, or as a fill material in land reclamation projects. It is distinguished from surface disposal, a means of disposing sludge by spreading it on dedicated and controlled access land, but not using the sludge for its soil conditioning benefits.

Land application currently represents the most common method of sludge management in the U.S., handling more than 40% of the volume generated.(EPA 1990 survey)

This investigation is only concerned with sludge created at municipal WWTP's and does not take into consideration sludge created at federal facilities or industrial WWTP's.

What created an improved market place for Biosolids treatment:

*Mainly, the final promulgation of the U.S. EPA part 503 regulations for land application of municipal sewage sludge put into effect February 19, 1993. This federal law single handedly propelled the the growth of the biosolids treatment market. This was regulatory encouragement for development of beneficial reuse strategies by the municipalities in dealing with their wastewater sludge.

*Final passage of the Clean Water Act of 1990 (CWA) which required municipalities to cleanse their wastewater prior to discharging into the environment. Part of the CWA required more stringent treatment levels and municipalities, in order to meet these treatment levels, had to install secondary and tertiary process treatment trains. These additional treatment processes in turn created more sludge.

- *Federal ban on ocean dumping was mandated to end 31 December 1991 through the Ocean Dumping Ban Act of 1988 hence diverting significant volumes of sludge disposal by other methods.
- *The declining use of incineration as a disposal method both because of public persuasion against it and more stringent air treatment standards that made this method much more costly.(FTS94survey)
- *The growing number of states such as Rhode Island, New Jersey, North Carolina and Florida banning the landfilling of sewage sludge. Landfilling, once a low-cost sludge disposal method has become more impractical due to landfill closures and higher tipping fees. In Massachusetts , 600 landfills will face closure by the end of the decade.
- *With shrinking tax revenues basis and yet increasing sludge volumes due to population growth and more stringent treatment requirements, municipalities have had to develop sludge management strategies that have low capital costs, short start up times and great flexibility to retrofit existing facilities as either a backup system or tertiary treatment. Lime stabilization has been the sludge treatment technology that fits this need .

Current Market Conditions

The current upheaval at the EPA due to severe budget cuts (FY97 budget has almost been cut in half to 3.5 billion) has definitely had an effect on the enforcement of the 503 regulations and has caused a short term slowdown in some states. Also looming in the very near future is the question of primacy for enforcement of the regulations and if the states are given authority to enforce the 503 regulations, where will the funding come from for personnel and resources to implement the regulations. Two states already have applied for primacy.

In Washington DC there is a movement by the GOP, (in the H.R. 961 1995 Clean Water Amendments awaiting debate before the senate) to end funding for many clean water programs. This bill would also roll back standards for industrial and municipal wastewater treatment by:

- lowering treatment standards on toxic substances
- resuming ocean dumping of partially treated sewage
- permitting increased water pollution in exchange for decreased air pollution or solid waste

This pending legislation although unlikely to pass in its current form could have an effect on the continued and moderately progressive growth of the sludge treatment market.

There is a realization, even among Democrats that the EPA with all the scare of its severe budget cuts "is out of control". The most visible sign of this is the Clean Water Act. The EPA already has approved the discharge at sea of sludge from San Diego's Point Loma Plant, and California's Democratic senators support the agency's waiving restrictions on the plant.

Another pitfall that hinders growth is the self implementing nature of the 503 regulations. Compliance is not actually consummated until the NPDES permit is filed. In the meantime, when samples are taken they may not be representative and maybe out of compliance. A majority of sludge stabilization systems are aerobic digestors. Sampling is usually done in the spring and summer when they are in compliance but typically all winter they are out of compliance. The EPA in their current status does not monitor this closely and therefore many facilities are actually out of compliance. Compliance to the 503 regulations was required by February 19, 1994. However, many states seem to be ignoring them because of lack of enforcement on both the federal and state level.

Predicted Growth in the Biosolids Treatment Market

While there are short term barriers that could slow down the growth of the Biosolids market for Lime stabilization over the next two years, overall the outlook for the market is good through the year 2002. The Lime industry currently supplies approximately 350,000 tons to this market and forecasts predict this to triple by the year 2002 to a 1,000,000 ton year market.

This prediction draws from the following data:

There are 16,000 municipal wastewater treatment facilities in the U.S. producing roughly 8.5 million dry tons of sludge a year. The increase in land application of treated sewerage sludge has grown significantly from 24.6% in 1990 to 45.4% in 1996 and is expected to grow to 70% beyond the year 2000.

In a recent survey (FTS94) of sludge management engineers, Lime stabilization of sewage sludge was considered to be one of the top three treatment methods.

There is a growing tendency for facilities to switch to Class A treatment to avoid paperwork & stringent land monitoring procedures. Through a survey (FTS94) it was predicted that class A (PFRP) stabilization technologies would increase to 29% of the market share of land application by 2000.

There is not a detailed list of how many of the 16,000 wastewater treatment facilities are currently complying with the 503 regulations. About 5000 of those facilities are Anerobic digesters which vary in and out of compliance and will need a backup system. In a survey of a prominent EPA official, his opinion was not to assume every facility was in compliance by 1995--the final cutoff for those facilities under construction when the 503 regulations were promulgated.

Conclusion

On a macroscale the market for sludge treatment in North America for the disposal and treatment as well as operations and maintenance is expected to grow from \$800 million in 1991 to \$1.2 billion in 2000. On a microscale, the Lime industry should also see this growth. It appears that the lime industry should also see increased tonnage and at the very least double their current supply to this market by the year 2000.

To help nurture this growth, the Lime Industry must continue to educate the public on the beneficial reuse of lime stabilized biosolids. This is evident by a survey (FTS94) that asked municipal managers what factors would contribute most significantly to growth in sludge management equipment and services market. The number one answer was "Public perception that recycling is positive for the environment".

Market Brief

Biosolids Treatment Market

Potential Lime Tonnage

Senario 1: Current 1996 Biosolids Market

Factual Data:

45.4% of the dewatered sludge is Land applied

Assumptions:

8.8 million dry tons of sludge is produced each year (see attachment)

Lime stabilization of wastewater sludge has 33.3% of the market share

Lime dosage is 25% for every ton of sludge treated

Calculation:

8,800,000 tons sludge x .454 land applied = 3,995,200 tons sludge are land applied

3,995,200 tons sludge x .333 = 1,330,402 tons of sludge that are lime stabilized

1,330,402 tons sludge x .25 lime dosage = 332,600 tons of lime per year

Scenario 2: Predicted Biosolids Market

Assumptions:

It is predicted that the output of sludge by municipal wastewater facilities will increase to 14 million dry tons by year 2000 (EPA survey 1990).

Land application of sewerage sludge will increase to 68% by the year 2000.

Lime stabilization maintains 33.3% of market share for sludge treatment.

Calculation:

14,000,000 tons sludge x .68 land applied = 9,520,000 tons sludge will be
land applied

9,520,000 tons sludge x .333 = 3,170,160 tons of sludge that will be lime
lime stabilized

3,170,160 tons sludge x .25 lime dosage = 792,540 tons of lime per year

Note:

For 1996 estimate of total sludge output, a survey was conducted with 10 industry experts. The average of their estimates was then used for calculations. Confidence levels were asked for but not considered into the calculations. In contrast, the EPA survey for 1990 was 8.5 million dry tons. It is the opinion of this analyst that the 8.8 million dry tons is an extremely conservative low number and should be more around 11.0 million dry tons. Similarly, the predicted 14 million dry tons total output for the year 2000 is an extremely conservative low number. This was derived from 1984 EPA data and should be more around the 18 million dry tons of sludge.

Lime dosage average was assumed to be 25%. Actual dosage requirements can range from 20 to 40 % depending on solids content of the dewatered sludge.

The calculations were based partly on the figure that 45.4% of sludge is land applied. The array of conflicting percentages leads this analyst to believe that the actual percentage is more in the 50 percentile range.(53%)

Addendum

Background

Information

Survey: Conducted via phone conversation

Question: What is the total sludge output on a dry ton basis from wastewater treatment plants in the USA and what basis did you derive your figure from.

Respondent Answers:

- 1.) 8.5 million Dry tons
US EPA Survey in 1990
Adding for population growth
confidence level: 80%
- 2.) 8.8 million Dry tons
Survey conducted on WWTP in 1992
confidence level: 90%
- 3.) 7.5 million dry tons
US EPA Survey in 1990
confidence level: 70%
- 4.) 10 million Dry tons
Total MGD treated in U.S. POTW's
1 Dry ton per 1 MGD treated
confidence level: 90%
- 5.) 9.5 million Dry tons
Total Population of the US
related to gallons created per day per person
confidence level: 85%
- 6.) 9.1 million Dry tons
Total MGD treated in the U.S.
related to sludge created per MGD treated
confidence level: 80%
- 7.) 8.625 million Dry tons
Total wet tons of sludge created
land application of dewatered sludge is certain percentage
confidence level: 80%
- 8.) would not make a statement on opinion
- 9.) 8.0 million Dry tons
Federal register 1993 EPA public release
confidence level: 90%
- 10.) 8.8 million Dry tons
listing of wastewater treatment plants total MGD
factor for sludge created per MGD
confidence level: 90%