European Water Association

Secure disposal routes for sewage sludge?
Conclusions from the EWA/ÖWAV conference on 10 and 11 September in Vienna

On 10 and 11 September the Austrian Water and Waste Management Association (ÖWAV) organised together with the European Water Association (EWA) a conference in Vienna about "Sewage Sludge Disposal - Sustainable and/or Reliable Solutions". More than 60 European experts followed the lectures and shared their experiences with this issue. Main focus was the security of disposal for wastewater treatment plant operators. The use of sewage sludge in agriculture, still the most important way of disposal in many European countries, is now critically reviewed, becoming a very controversial issue and leading to changes of environmental policies in several European countries. In the following Prof. Dr. Helmut Kroiss, chairman of the EWA task group "Sewage Sludge", draws several important conclusions from the conference about the future of the disposal of sewage sludge.

Every sludge disposal option has to be reliable for the treatment plant operator at any time as sludge production is a necessary by-product fulfilling the legal requirements for waste water treatment.

If a disposal option is not reliable over long periods of time (15 to 20 years) different options have to be provided simultaneously in order to have reliable disposal at any time. As a consequence the investments for adequate sludge treatment and disposal facilities will markedly increase.

The costs for different sludge treatment and disposal options strongly depend on the size and the regional context of the treatment plants.

In the context of regional materials management sewage sludge has a low resource potential and a low pollution potential despite the fact that it can be characterised as a sink, concentrating the waste water compounds. The mass flow of nutrients (N, P) in the sewage sludge is comparatively small as compared to the losses of nutrients in agriculture.

The most valuable compound in the sludge is phosphorus. If phosphorus removal from the waste water is required up to 90% of the phosphorus discharged to the waste water can be recovered in the sludge at relatively low costs. The availability of phosphorus for the production of low cost mineral fertiliser is limited. The easiest way of P-recycling is agricultural sludge application.

The recovery of phosphorus from the sludge is the topic of international research. Sludge incineration does not inhibit P recovery in the future. P recovery from the sludge is a technological and an economic problem.

The nitrogen content of sewage sludge normally is low as compared to the nitrogen flow in the waste water and very low as compared to the losses of nitrogen in agriculture. Nitrogen is

not a limited resource. The nitrogen contained in the sludge is important if sludge is put to landfill as it will result in long term ammonia leaching.

The organic material of the sludge is very low as compared to the organic material flows in agriculture. The value of the organic material in the sludge can only play a local role mainly in hot arid climates.

Agricultural use of sewage sludge can be seen as the option with the lowest loss of valuable compounds of the sludge, especially phosphorus, and the lowest increase of entropy. The reliability of this disposal route for the treatment plant operator depends on several major pre-requisites:

- Reliability in regard to hygiene
- Reliability in regard to long term soil protection
- Public acceptance (politicians, media)
- Acceptance by all parties involved in sludge application and its consequences (farmers, farmer unions, land owners, food industry, food trade, retailers, consumers, consumer associations, NGOs, etc.)

Only the first two prerequisites can be based on scientific research and risk assessment. As a consequence only for these two aspects quality criteria and adequate procedures can be developed and introduced into a legal framework and quality assurance procedures. The other two have to be tackled by sociology, psychology and political science and have a strong educational aspect.

The rate of sludge application in agriculture (t/ha/a) normally is limited by the P-requirements of the agricultural soils. Therefore a relation of the heavy metal limit concentrations to the P-content of the sludge is reasonable for soil protection considerations.

As long as sludge is a “waste” and “waste” is linked with negative aspects in public opinion it will be difficult to convince all people that agricultural use of sludge is a sustainable way of disposal. The connotation of “waste” and “hazard” has a reasonable educational aspect, this has to be kept in mind.

Practical experience with sludge disposal in different European countries (S, DK, G, F, CH) can be summarised as follows:

- Different countries have developed different strategies and have changed their strategy during the last decade
- Policy aspects as decision making procedures and continuity in political strategy play a key role in the different countries. There is also a strong relation between these political factors and the costs for sludge disposal.
- Even very elaborated legal frameworks with very stringent quality criteria can have detrimental effects on agricultural use of sludge if they are not based on consensus and confidence of all parties involved.
- A comprehensive legal framework for soil protection including all materials applied on land seems to be much more efficient in regard to sludge recycling than separate requirements for sewage sludge, mineral fertiliser, manure, compost etc.
- Hygienic problems with controlled sewage sludge application in agriculture are much less with application on arable land than on grass land. Even the application on arable land the salmonella problem could need special attention. BSE and MFD seem not to represent an elevated hygienic risk.
- For large treatment plants in agglomerations sludge disposal after incineration can be an economically and ecologically sound solution. The development of low cost small incineration plants meeting advanced off gas standards is in progress.
- Co-incineration of sludge with cement and solid waste can result in economically sound solutions. In regard to P-recovery it does not represent a sustainable solution.

- For the very large number of small treatment plants (e.g. <20.000 PE) agricultural use of sewage sludge seems to be the most economical and sustainable solutions as long as source abatement of possibly hazardous substances is successful.
- The concentrations of heavy metals and other hazardous substances in most of the sewage sludges in the countries with a high standard of source control are very similar and far below the actual European standards. These concentrations are excellent indicators for the progress in water protection by source control. Sludge analysis remains an important monitoring tool for source control even the sludge is not used in agriculture or on soils.
- Sludge disposal of dewatered sludge in landfills should be avoided as it results in long term monitoring requirements especially for ammonia leaching.
- Changes in sludge disposal technology need time for the adaptation process which often exceeds several years (design, permitting, construction).