

Summary of leachate session at 1st Intercontinental Landfill Research Symposia in Luleå, 11-13 dec 2000.

1st Intercontinental Landfill Research Symposium

Luleå, 11-13 December 2001

SESSION CHAIR REPORT OF LEACHATE MANAGEMENT

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AIM

The session aimed at discussing leachate management of today.

The focus was intended to be on sustainability of the leachate management. In connection to this the quality of leachate would be discussed linked to the requirements for treatment. Different treatment options were also of interest.

THE SESSION

The leachate session consisted of six different papers ranging from topics of long-term leachate quality, specific organic substances in leachate, an overview of leachate treatment options to examples of leachate treatment concentration and treatment techniques. The presentations were:

- The dependence of leaching ratio on leachate quality, by Katarina Kylefors, L. Andreas & A. Lagerkvist, Sweden.
- Pesticides in solid waste leachate in Norway, by Ketil Haarstad & T. Maehlum, Norway.
- Evaluation of leachate treatment methods in perspective of the character of specific organic compounds, by Cecilia Öman & O. Cerne, Sweden.
- Leachate treatment options for sanitary landfills, by Jeff Harris, D.E. Purschwitz & C.D. Goldsmith, USA.
- Efficiency of landfill leachate treatment by freeze crystallisation and natural process of snow metamorphism, by Janusz Szpaczynski, Canada.
- Full scale performance of biological leachate treatment at low temperature, Markuu Pelkonen, K. Mikko & W. Zengzhang, Finland.

After each presentation there was time for specific questions regarding the presentation. After all presentations there was about an hour for a more general discussion. The initial out-line of the discussion was as follows:

- Sustainability
 - Is the treatment of today sustainable?
 - What tools can we use to decide sustainability?

- Need for leachate treatment
 - Do we need leachate treatment?
 - What components need to be treated?
 - For how long time will leachate treatment be required?

- Treatment strategies and methods
 - What kinds of treatment are preferable? Why?
 - What criteria do we have for the choice of treatment strategy?
 - Will the requirements for treatment methods change over a landfills lifetime?

- Research needs
 - Where do we lack information?
 - What activities are ongoing?

THE DISCUSSIONS

Sustainability

The opinion seems to be that the leachate management of existing landfills from the 70's and 80's normally is unsustainable. Landfills with bottom liner and controlled leachate collection could have a sustainable leachate management, but they seldom have.

The definition of sustainability was not clear from the discussions. However, it seems as if sustainable has to alternative criteria:

- The period of time that leachate are generated and leachate treatment are required should be less than a certain number of years (that was not defined) or
- Systems, that are reliable for an unforeseeable period of time, should exist that passively can take care of pollutants released from the landfill.

Need for leachate treatment

Beside *sum of organic material*, *ammonia nitrogen* is one major constituent that needs treatment. The need for ammonia treatment is even more evident when bioreactor landfilling is used.

The members of the session did not agree on whether *specific organic substances* are focus for treatment. Different opinions were told as *e.g.*:

“They occur in such small amounts so they are no problem. Often they are hard to detect”

“Those substances may in very small amounts give large effects on *e.g.* animals and plants in the recipients”.

Metals may be a problem in the long term, but we do not have the problem right now. There may be needs for systems/barriers that can cope with metal increase in the leachate and that will not result in high effluent metal concentration to the recipients.

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We do not know for how long periods of time treatment will be required. However, it may be quite some time, probably longer than the requirements by laws. For new landfills with bottom liners and leachate collection systems it may be possible to enhance stabilisation of the waste. In existing landfills without these systems, e.g many of the landfills started in the 70's, enhanced stabilisation is hard to achieve. Some members of the session thought that we ought to find techniques to enhance stabilisation in those landfills too. Other members of the session were not that optimistic about the possibilities of such systems at those landfills. They thought it would be better to leave the landfill and instead put energy into finding barrier systems that can cope with expected and unexpected changes in leachate composition.

Treatment strategies and methods

The choice of treatment method is site specific.

The opinion was told that one should not only consider the effects in water quality when choosing method, but also take pollutant release to the air into consideration. Data are lacking regarding this aspect.

CONCLUSIONS – RESEARCH NEEDS

The conclusions of the discussions and presentations are given below as topics for future research needs.

Sustainability

- Tools for long term prediction
- Long term leaching characteristics from existing landfills
- Long term leaching characteristics from "new" waste compositions
- Techniques to steer leachate quality (e.g. the relation between nutrients as N and P in the long term)
- In situ stabilisation techniques of existing landfills
- Natural barriers that can cope with possible changes in leachate quality (in the situation of leachate migrating from landfills. There ought to be systems that makes the pollution release more safe for the surrounding environment)

Treatment needs

- Specific organic substances
 - What are the criteria for treatment requirement? Do we really need to treat those substances? If so – when?
 - Long term leaching of those substances
 - How is the leachate quality with focus on the occurrence of those organic pollutants affected by degradation phases?

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Treatment systems

- Robust systems – long term performance
- Leachate treatment in combination with bioreactor landfills
 - especially focus on ammonia-nitrogen

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