

# AEROBISATION OF LANDFILLS (I)

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## **Background:**

A major problem in connection with landfills is the long lasting emissions, so that aftercare periods over many decades or even longer have to be envisaged.

In order to reduce the emission potential from landfills as early as possible the landfill should be operated as a bioreactor with enhanced degradation and elution processes during the operation and post-operation phase. Once the anaerobic processes have nearly come to an end, aerobic processes may be introduced in order to further degrade components that are not or not easy to degrade under anaerobic conditions. This can be done by a controlled artificial aeration. Another method – mainly from Japan- is the installation of a semi-aerobic landfill from the beginning of landfill operation. This concept includes natural aeration of a landfill by making use of the “chimney effect”.

## **Objective:**

The subject of this workshop is the discussion of the possibilities and limitations of an aerobisation of landfills. Results from laboratory scale investigations will be presented and discussed. In addition to the biological processes and their effects on the reduction of the emissions also questions as explosion control, air distribution and heat transfer in the landfill body will be raised. Another issue is the emission control of the air that leaves the landfill.

In particular, the following questions respecting landfill aerobisation arise:

- Leachate quality I:  
Which mechanisms are responsible for the Nitrogen (Ammonia) and Carbon removal in Aerobic landfills?
- Leachate quality II:  
Do we have to expect increasing Heavy Metal Mobility under aerobic landfill conditions? How to control the mobilisation / fixation processes?
- Prediction of operation durations by means of LSR experiments?
- Potentials and restrictions respecting the biological stabilisation of waste materials

- Balances of Carbon-emissions: A tool for defining landfill stability?

The session will be introduced by Prof. Stegmann and Prof. Cossu, giving a short overview on the session outline and stressing the open questions to be discussed in the course of the session.

Short statements (individual duration approx. 15 min.) will be given to the different related subjects. According to the subjects two statements will be discussed, giving the presenters the possibility to clarify or, if need be, to deepen specific aspects of their work.

The expected results are:

- a better and more precise understanding of processes occurring during aerobisation measures (with respect to the different emission pathways and the landfill body itself)
- Possibilities for an effective emission control
- Identification of further research needs with respect to the altering of leachate quality in the course of aeration measures

As it already became apparent during the last SARDINIA-Symposium, the joint presentation and discussion (also and especially at levels below publications) is essential for a target orientated further research on and application of Landfill aerobisation. Therefore it is planned to establish a working group mainly consisting of the sessions presenters, but open for external input.

## **PRELIMINARY PROGRAM (Session I):**

### **0:00 – 0:10 Introduction**

R. Stegmann / R. Cossu (Chair)

### **0:10 – 1:10 Results of Laboratory Experiments (I)**

Statements (15 min. each):

M. Ritzkowski, (Hamburg University of Science and Technology, Germany)

*Emission Behaviour of aerated Landfill Material (focused on Nitrogen and Carbon balances)*

N.D. Berge, D. Reinhart (University of Central Florida, USA)

*In-situ Nitrogen Removal in Aerobic Bioreactor Landfills*

DISCUSSION (30 min.)

### **1:10 – 2:40 Results of Laboratory Experiments (II)**

Statements (15 min. each):

R. Cossu (University of Padova, Italy)

*Application of the PAF Conceptual Model for the Prediction of future Landfill Emissions*

DISCUSSION (15 min.)

Y. Matsufuji (Fukuoka University, Japan)

*Simulating semi aerobic Landfills by means of Column Tests*

DISCUSSION and GENERAL DISCUSSION (45 min.)

### **2:40 – 2:50 Wrap up / Conclusions**

Chair: R. Stegmann / R. Cossu

An additional contribution respecting “The quantity of moisture generated from the biodegradation process in a semi-aerobic landfill” will given as a poster presentation by Hiroshi Matsugu