Joint Report on Sessions:

C. Landfill Emissions: New data from multi-year and multi-landfill studies in the northern hemisphere, including barometric pressure effects and methane mass balance studies

D. Methane Oxidation at Various Scales: laboratory studies to field scale optimization.

Intercontinental Landfill Research Symposium
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Respectfully submitted:

Jean Bogner, Chair

These sessions provided a forum for interchange of data and discussion of methods among those actively working in landfill gas emissions and methane oxidation. Both methane and non-methane trace components were discussed, with the major emphasis on field measurements of surface emissions with supporting laboratory and field studies. Speakers presented results of new measurements of gaseous emissions from landfill surfaces into the atmosphere in a number of European countries, including arctic regions, and larger area ("whole landfill") studies. Also presented were new approaches for quantifying and optimizing methane oxidation at various scales, new work on attenuation of non-methane trace components in landfill cover soils, and new approaches to modeling of methane emissions.

The Landfill Emissions(C) Session included 6 papers as follows:

C. Landfill Emissions: New data from multi-year and multi-landfill studies in the northern hemisphere, including barometric pressure effects and methane mass balance studies

1. Methane emissions from landfills: options for measurement and control.
Borjesson, G., Galle, B., Samuelsson, J., and Swensson, B.H.

2. Factors governing lateral gas migration and subsequent emission in soil adjacent to an old landfill.
Christophersen, M., and Kjelsen, P.

3. Landfill gas emission measurements using a mass-balance method.
Oonk, H., and Boom, T.

4. Emission measurements as a tool to improve methane emission estimates.
Scharff, H., Oonk, H., and Hensen, A.

COFFEE BREAK (30 MINUTES)

5. Landfill gas emissions measurements: qualification and quantification of the pathways of emitted methane.
Diot, M., Moreau le-Golvan, Y., Bogner, J., Burkhalter, R., Chanton, J., Spokas, K., Tregourès, A., Saint-Bonnet, P., Thoby, D., and Schaegis, L.

6. LFG emission measurements in arctic climatic conditions: seasonal variations and methane emissions mitigation.
Maurice, C., and Lagerkvist, A.

GENERAL DISCUSSION (60 MINUTES +)

The Oxidation Session (D) included 6 papers as follows:

D. Methane Oxidation at Various Scales: laboratory studies to field scale optimization.

1. Methane oxidation in simulated landfill cover soils.
Bajic, Z., and Zeiss, C.

2. Kinetics of methane oxidation in mixed culture.
Dote, Y.

3. Methane oxidation and degradation of halogenated organic compounds in landfill gas affected soil.
Scheutz, C., and Kjeldsen, P.

4. Field investigation of methane oxidation in soil adjacent to an old landfill.
Christophersen, M., and Kjeldsen, P.

COFFEE BREAK (30 MINUTES)

5. Methane oxidation in optimized landfill cover layers under different seasonal conditions.
Humer, M., and Lechner, P.

6. New technology to enhance methane oxidation at landfills.
Ettala, M., and Väisänen, P.

GENERAL DISCUSSION (60 MINUTES +)

Note that two speakers that had been listed in the preliminary program were not able to attend, one from Session C (Peter Czepiel from the U.S) and one from from Session D (Catherine Fischer from Switzerland). Their papers were entitled:

A multi-year study of gas emission to the atmosphere from a single landfill in the northeastern United States.
by Czepiel, P., Shorter, J.H., Mosher, B., Allwine, E., Lamb, B.K., Kolb., C.E., and Harriss, R.C.

Microbial oxidation of landfill methane in a biofilter.
Fischer, C.M., and Bichsel, M.

With regard to Peter Czepiel, he called me after the meeting to express his disappointment with not being able to come and also indicated that his conclusions regarding multiple whole landfill measurements at a single site in New Hampshire, before and after the installation of active gas recovery, have been since submitted to a refereed journal. So this information should be available in the open literature in due course.

There was a diverse mix of volunteered papers with high quality presentations and stimulating discussions following. Those in attendance indicated that they had benefited from the wide perspective of research experience, monitoring expertise, and site-specific issues from various climatic regions.

The following countries were represented among the speakers and active participants in discussions: Sweden, Netherlands, Denmark, Norway, France, Canada, Japan, Austria, Finland, UK, USA, Germany.

Although some progress has been made in measuring and modeling landfill methane emission and methane oxidation, discussions in these sessions identified the following research needs:

1. A more “quantitative” understanding of the differences and incompatibilities among various methods, when applied to landfill measurements. These include scaling issues, recommendations for methodologies for sites not yet measured, and realistic understanding of the limitations and strengths of chamber, tracer, and micrometeorological methods. More comparative studies of techniques, more whole landfill emissions measurements representative of various climatic regions and management strategies, and better understanding of convective vs. diffusive fluxes in landfills are needed. These will contribute to a critical mass of landfill emissions data comparable to data from other area sources of atmospheric methane (wetlands, rice production). Also, better recommendations can be made for the application of more standardized techniques in a given setting for a specific purpose.
2. Quantification of the landfill methane balance at a larger number of representative field sites. At present, there is a relatively poor understanding of the partitioning of methane among emissions, oxidation, lateral migration, and gas recovery pathways.
3. Temporal and spatial variability of emissions. Related to (1), this includes quantification of diel emissions variability, variability between seasons (including special arctic conditions), and emissions from passive vents and edge/surface discontinuities.
4. Methods for measurement and better understanding of temporal variability of methane-oxidizing activity. Stable carbon isotopic methods are promising in this regard. However, there is very little basic understanding of this process in landfill settings at the microbiological level.
5. Quantification of net emissions of non-methane trace components in landfill gas. Also, rates of *in situ* biodegradation by methane-oxidizers and other groups.