CDM: Response form for Request for revision of approved methodologies (version 01.1)

Date of Meth Panel meeting:	23 - 27 June 2008
Title and number of Request for revision	Inclusion of in-situ aeration of landfills AM_REV_0091

Summary of the query:

Please use the space below to summarize the request for revision on the related approved methodologies.

This request for revision refers to AM0025 "Avoided emissions from organic waste through alternative waste treatment processes" requesting that the methodology be expanded to project activities where **in-situ aeration of landfills** occurs.

The "In-situ" aeration and stabilization process turns the normally anaerobic conditions of the landfill to an aerobic state by aeration of the landfilled waste.

The "In-situ" aeration process comprises the following modules:

- Air injection system: air compressors, header, a grid of air injection wells including the required regulator and measure devices, valves etc.
- Water injection system (if applicable): holding tanks for water and/or leachate, supply line, main header, a grid of moisture injection wells, including control devices as electric solenoid devices etc.
- A grid of sampling and monitoring wells, where relevant process parameters are monitored continuously or periodically, as e.g. methane and oxygen content in the exhaust gas, moisture in the landfilled waste etc.

By injecting air and moisture, favourable conditions for aerobic decomposition in the landfill body are provided. This leads to a rapid degradation of the organic content of the landfilled waste and the retardation of anaerobic activity. As a consequence of the project activity, methane emissions from landfilled waste are avoided. After two to four years of air and moisture injection, the waste is left in a soil-like and quasi-inert condition, so that only marginal methane emissions are to be expected in the long term. The landfill can be regarded as remediated.

In-situ aeration has already been successfully applied to numerous landfills in industrialized countries, as e.g. in the United States, Canada and Germany. Governments and experts have recognized that in-situ treatment is a proactive strategy to substantially reduce emissions of landfills after closure and that it should therefore be promoted. The process is especially suitable for poorly managed dump sites with no or only little infrastructure, which are left unmanaged and therefore contaminate the environment and put human health at risk by its gaseous and liquid emissions. As this is a situation, which is frequently found in non-Annex I-countries, this approach is of great interest there; a technology transfer is thus highly desirable.

In order to make AM0025 applicable to in-situ alternative treatment, some fundamental differences between off-site and in-situ treatment have to be considered:

- This project type is only applicable for **closed landfills** and if the most plausible baseline scenario is that the landfill would be left unmanaged and without proper after-closure care.
- The **waste** treated by in-situ aeration of the landfill is **old**, existing waste - in contrast to fresh waste

which is treated in off-site treatment as composting etc. Therefore, special attention has to be drawn on the assessment of the waste characteristics by sampling and degradability analysis in order to determine baseline emissions.

- The waste is left on the landfill after treatment and might **still generate** some small residual methane emissions. These residual methane emissions have to be monitored by sampling and degradability analysis and have to be accounted for as project emissions.

Due to this differences, the following procedures and scenarios were added to AM0025:

- Alternative scenarios for the in-situ treatment were added in order to include technical options which are commonly discussed for closed landfills (as e.g. retrofitting of the landfill with a LFG collection and combustion system or landfill mining).
- The applicability of the project type was limited to closed landfills or cells, where business-as-usual (meaning no after-closure care) is the most plausible option. If landfill gas capture and combustion is the most plausible baseline scenario, this methodology is not applicable as this would require different procedures to calculate baseline emissions.
- The calculation of project emissions requires a new procedure. While project emissions due to electricity use or fuel consumption can be calculated as already defined in version 10 of AM0025, a calculation procedure was added in order to account for residual methane emissions of the treated waste. These residual methane emissions are calculated based on degradability analysis (sampling and L0 analysis) and an adjusted version of the first order decay model as detailed in the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". Thereby, the Methane Correction Factor MCF may be adjusted in function of the real operating conditions of the landfill in terms of aerobic/anaerobic environment. Nitrous oxide emissions can be determined based on (periodic) sampling or using standard default factors for composting.
- Corresponding to the project emission calculation, baseline emissions should as well be determined based on degradability analysis just before the start of the project activity (sampling and L0 analysis) and an adjusted version of the first order decay model as detailed in the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". This approach is very consistent as baseline and project emissions are based on the same model and corresponding entry data. Nevertheless, the ex-ante determination of baseline emissions might be realized using the standard tool and the standard default values given in the mentioned tool, whereby the calculation has to be realized from the first year of landfill operation to the year for which emissions are calculated.

Corresponding to the new scenarios and calculation procedures, the following parameters have to be monitored during in-situ treatment:

- L0 – Potential Methane Generation Capacity, determined as Biochemical Methane Potential (BMP). Along with the L0 analysis, a local value for k (decay rate) can be calculated as methane generation rate. These values have to be determined by statistically significant sampling at regular intervals.
- The amount of landfilled waste has to determined on a reliable data basis (historical weighbridge data or geodetic survey and bulk density determination)
- Emissions of methane and nitrous oxide, by measuring fugitive emissions and emissions from venting wells (normalized volume and concentrations) at regular intervals.

Recommendation by the Meth Panel:

(a) Please use the space below to provide amendments /changes (in your expert view, if necessary).

The Meth Panel recommends **not to accept this request for revision**. It is clearly stated in the applicability conditions section of AM0025 that it is applicable where a "project activity involves one or a combination of the following waste treatment options for the ***fresh waste*** that in a given year would have otherwise been disposed of in a landfill.", while this request for revision is for "landfilled waste on closed landfills or closed landfill cells that would have otherwise been left unmanaged". The characteristics of this project activity and those where AM0025 is applicable are different. The major difference lies in the baseline scenario determination in addition to the ability of estimating different waste components to be able to determine emissions from the landfill.

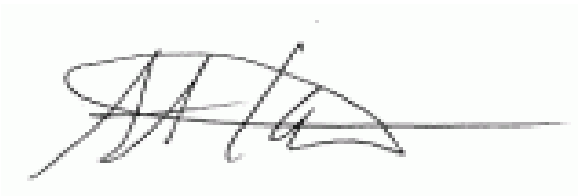
The suggested methodology to estimate Methane Correction Factor (MCF) entails measurement of the volume of fugitive CH_4 and N_2O emissions, which is not elaborate enough. The revision does not provide details on the procedures of conducting such measurements and whether such measurements will be conducted on a continuous or discrete basis to be able to estimate emissions of each complete year during the crediting period.

In addition, the following issues should be addressed:

- It is not mentioned how the methodology will estimate the waste quantities of an old landfill that were placed on a yearly basis since the start of operation of the landfill if data is not available. A very simplified assumption is used in the associated CDM-PDD, which considers that the waste is equally divided per year since the start of landfill operation.
- Procedures to determine the characteristics of the landfill waste by means of statistically significant sampling and analysis are not elaborate enough and should be further developed.
- Specific guidance on additionality assessment should be provided, which should factor-in the revenues from land reclamation in case investment analysis is used.
- It has been noted that different approaches for landfill aeration worldwide are documented; including semi-aerobic landfills from Japan, low-pressure aeration in Europe practiced at old landfills as well as aerated bioreactor landfills in the US. Further description of the aeration method (to be used) is needed.

The project proponents are encouraged to present a new methodology, which would be applicable to existing waste treated by aeration in the landfills taking into account the issues raised above.

(b) Please use the space below for providing guidance, as per Para 93 of EB25 Report, on what type of projects need to revise the PDD as a consequence of the suggested revision, if the recommendation is to revise the methodology.
Not applicable.
Answer to authors of the request for revision by the Meth Panel : Please use the space below to provide an answer to the authors of the above query
See recommendation above.



Signature of Meth Panel Chair ……..
Date: 27/06/2008 *(Akihiro Kuroki)*

Signature of Meth Panel Vice-Chair ……..
Date: 27/06/2008 *(Philip Gwage)*

Information to be completed by the secretariat	
F-CDM-AM	AM_REV_0091
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