CDM: Proposed New Methodology
Meth Panel recommendation to the Executive Board

To be completed by UNFCCC Secretariat

Date of Meth Panel meeting:	
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Signature of Meth Panel Chair ……………………………………………..
Date:

Signature of Meth Panel Vice-Chair ……………………………………………..
Date:

Information to be completed by the secretariat

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NM0xxx Version ## (to be completed by UNFCCC)

CLEAN DEVELOPMENT MECHANISM
PROPOSED NEW BASELINE AND MONITORING METHODOLOGIES
(CDM-NM)
(Version 03.1)

CONTENTS

Instructions for using this form

In using this form, please follow the guidance established in the following documents:

- Guidelines for completing the project design document (CDM-PDD) and proposed new baseline and monitoring methodologies (CDM-NM);
- Technical guidelines for the development of new baseline and monitoring methodologies (contained in part III of the above);
- Relevant methodological guidance by the Executive Board.

This guidance can be found at <https://cdm.unfccc.int/Reference/Guidclarif/index.html>

Formatting Instructions:

- The form provides the formatted headings which should be used throughout the document;
- Please note that each paragraph in section C and D should have a paragraph number, as demonstrated through example. When adding further paragraphs, please ensure it is numbered;
- Please use word equation editor to write equations;
- Please format figures, tables and footnotes to update automatically;
- Please note the footnotes have a separate format (Times New Roman - size 10).[1]

Please complete sections B to E. In section C, the text shaded in grey shall not be changed, whereas other text is used as an example and may be changed or deleted.

[1] Format for footnotes.

Section A. Recommendation by the Methodological Panel (to be completed by the Meth Panel)

Recommendation (preliminary or final / approval or rejection / consolidation)

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2. Major changes required

>>

3. Minor changes required

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Section B. Summary and applicability of the baseline and monitoring methodology

1. Methodology title (for baseline and monitoring), submission date and version number

Avoidance of methane emissions from closed landfills by on-site aeration of existing wastes
Version 01
XX.XX.2009

2. If this methodology is based on a previous submission or an approved methodology, please state the reference numbers (NMXXXX/AMXXXX/ACMXXXX) here. Explain briefly the main differences and their rationale.

1. This methodology is applicable to landfill where methane emissions are released to atmosphere in the absence of the project activity. Hence this methodology refers to approved baseline and monitoring methodologies below:
   - ACM0001 “Consolidated baseline and monitoring methodology for landfill gas project activities” (Version 9.1)
   - AM0025 “Avoided emissions from organic waste through alternative waste treatment processes” (Version 11)

2. These methodologies adopt “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” (Version 04) to calculate the amount of methane emissions that would be generated from disposal of waste at the solid waste disposal site in the absence of the project activity. In this methodology estimation of baseline emissions and project emissions are based on a first order decay (FOD) model to be applied this methodological tool.

3. This methodology differs from ACM0001 and AM0025 since avoidance of methane emission is not realized through collection of landfill gas or conventional composting or some such. Instead, to avoid methane generation, anaerobic conditions of existing wastes in landfills are converted to aerobic conditions in which aerobic degradation of organic matters in existing wastes are accelerated by in-situ aeration as remediate treatment of waste at a solid waste disposal sites.

4. This methodology requires adopting “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (Version 01). The electricity consumption on-site is an important emission source in the project activity. In addition, this methodology takes into account potential revenues from land reclamation in the framework of an investment analysis on the basis of “Tool for the demonstration and assessment of additionality” (Version 05.2).

3. Summary description of the methodology, including major baseline and monitoring methodological steps

Chooses the baseline scenario

5. This methodology refers to the latest version of "Tool for the demonstration and assessment of additionality". The following are candidates of reasonable baseline scenario as way of dealing with closed landfills considering mandatory laws and regulations. In this methodology the most plausible baseline scenario should be identified to be "The atmospheric release of methane generated by landfills".
   - The atmospheric release of methane generated by landfills (business-as-usual)
   - retrofit with landfill gas collection and combustion system with or without energy generation
   - composting treatment of wastes mined from landfills for selling or recycling
   - The project activity (on-site aeration) not to be implemented as a CDM project

Demonstrates additionality

6. This methodology takes into account potential revenues from land reclamation in the framework of an investment analysis on the basis of "Tool for the demonstration and assessment of additionality" (Version 05.2). The project activity not implemented as a CDM project is identified not to be a financially attractive practice and not to be a common practice.

Calculates baseline emissions

7. This methodology applies "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" to calculate the amount of methane emissions that would be generated from landfills in the absence of the project activity. The first order decay (FOD) model is applied to calculation of baseline emissions and for definitions reasonable parameters in FOD model, optional procedures are proposed, in which the estimation of weighted average age of wastes (for x and y), the laboratory analysis of waste samples (for DOC_f and DOC_j) and the measurement of methane content of LFG (for F and MCF) will be able to be adopted.

Calculates project emissions

8. For calculation of project emissions are considered as following.
   - Ex-ante estimation of methane emissions based on the FOD model should be neglected since methane correction factor (MCF) for landfill body in aerobic condition is assumed to be 0.
   - Actual residual methane emissions should be ensured to be negligible by monitoring LFG from air extraction wells and surface of landfills after implementation of project activity.
   - Preferably completion of aerobic degradation of organic matters should be ensured by sampling waste.
   - Electricity consumptions and/or fossil fuel combustions to activate on-site aeration machines should be taken into account.

Calculates leakage

9. The net change of anthropogenic emission outside the project boundary will not occur because all activities (on-site aeration of existing wastes in the landfill body) is implemented within project site and no waste materials are transferred from the site.

Identifies and collects monitoring data

13. In monitoring methodology followings are major submissions and explained in detail.

- The baseline emissions should be estimated ex-ante based on the FOD model and IPCC default values. Optionally parameters adopted the FOD model could be assessed and redefined on-site by waste sampling and (if applicable) laboratory analysis for determination of DOC_f*DOC_j. And just before project activity F*MCF could be assessed and redefined by monitoring of vented methane emissions on-site.

- The project emissions also should be estimated ex-ante based on the FOD model. Optionally during project activity F*MCF could be assessed and redefined by monitoring of vented methane emissions on-site. Besides by monitoring both of vented methane emissions and (if applicable) surface emissions the project participants could measure project emissions themselves directly.

- The procedures of monitoring methane emissions from venting pipes and landfills surface are provided in this methodology based on international standards.

Calculates emissions reductions

10. The net emission reduction from the project activity is calculated by subtracting project emissions from baseline emissions.

Section C. Proposed new baseline and monitoring methodology

Draft baseline and monitoring methodology AMXXXX

"Avoidance of methane emissions from closed landfills by on-site aeration of existing wastes"

I. SOURCE, DEFINITIONS AND APPLICABILITY

Sources

This consolidated baseline and monitoring methodology is based on elements from the following approved baseline and monitoring methodologies and proposed new methodologies:

- ACM0001 "Consolidated baseline and monitoring methodology for landfill gas project activities" (Version 9.1)
- AM0025 "Avoided emissions from organic waste through alternative waste treatment processes" (Version 11)

This methodology also refers to the latest approved versions of the following tools:

- Tool for the demonstration and assessment of additionality
- Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site
- Tool to calculate the emission factor for an electricity system
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption

For more information regarding the proposed new methodologies and the tools as well as their consideration by the Executive Board please refer to http://cdm.unfccc.int/goto/MPappmeth.

Selected approach from paragraph 48 of the CDM modalities and procedures

1. "Existing actual or historical emissions, as applicable" **or**
2. "Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment"

Definitions: Please provide definitions of key terms that are used in this proposed new methodology

3. For the purpose of this methodology, the following definitions apply:

- Aerobic condition: The condition where aerobic decomposition of non-fossilized and biodegradable organic material (in Biomass, industrial wastes and municipal wastes) is accelerated through aerobically growing micro organisms are catalyzed by providing adequate oxygen under keeping appropriate moisture and temperature of the materials. Consequently negligible amount of methane is generated and almost all gas generation is occupied by carbon dioxide.

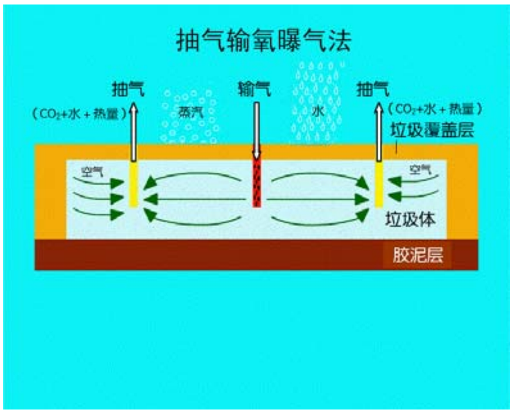

Figure 1: Illustration of On-site Aeration of Existing Wastes in Landfills

Applicability conditions

4. This methodology applies to project activities that aerobic treatment of existing wastes is realized through on-site aeration aiming at remediation of biochemical condition in landfills and avoiding methane generation from anaerobic degradation process of organic matters.

5. The methodology is applicable under the following conditions:

- Dumping of wastes at the landfill site has already been finished and the landfill is closed;
- Biodegradable materials mainly constitute existing wastes (e.g., municipal solid wastes);
- For project proponents sampling and monitoring technique are available to identify wastes biochemical characteristic and to ensure landfills aerobic condition being realized;
- Related equipments and machinery (e.g., venting pipes and blower machines) and energy (electricity and/or fossil fuel) necessary to project activity are available;
- Mandatory environmental regulations requiring collection and flaring of LFG do not exist or the collection and flaring rates do not exceed 50%;

- Project proponents should identify or assume the land use planning after completion of the project activity based on proper basis.

6. In addition, the applicability conditions included in the tools referred to above apply.

7. Finally, this methodology is only applicable if the application of the procedure to identify the baseline scenario results in that the total or partial atmospheric release of methane generated from landfills is the most plausible baseline scenario.

II. BASELINE METHODOLOGY PROCEDURE

Project boundary

8. The spatial extent of the project boundary encompasses the physical delineation of landfill site where wastes are treated, and on-site electricity consumption and/or generation. The greenhouse gases included in or excluded from the project boundary are shown in Table 1.

Table 1: Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	Emissions from decomposition of waste at the landfill site	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted
		CH_4	Yes	The major source of emissions in the baseline
		N_2O	No	N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of this gas is conservative
Project activity	Residue emissions from decomposition of waste at the landfill site	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted
		CH_4	Yes	May not be aerobic degradation process completed. Residual CH_4 emission may be occurred.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from on-site electricity use	CO_2	Yes	May be an important emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	On-site fossil fuel consumption due to the project activity	CO_2	Yes	May be an important emission source.
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.

Identification of the baseline scenario

9. Project participants shall apply the following steps to identify the baseline scenario:

Step 1: Identification of alternative scenarios

12. Project participants should use Step 1 of the latest version of the "Tool for the demonstration and assessment of additionality", to identify all realistic and credible baseline alternatives. In doing so, mandatory laws and regulations related to the management of landfill sites should be taken into account. Alternative scenarios for treatments and/or controls of closed landfill sites should include the followings:

- The atmospheric release of LFG generated from anaerobic degradation process of organic wastes at landfill sites (business-as-usual);
- The retrofitting with landfill gas collection and combustion system to comply with regulations or contractual requirements with or without energy generation;
- The composting treatment of wastes excavated from landfills for recycling or disposing;
- The project activity (on-site aerobic treatment of existing wastes) without registration as CDM project activity.

Step 2: Step 2 and/or Step 3 of the latest approved version of the "Tool for demonstration and assessment of additionality" shall be used to assess which of these alternatives should be excluded from further consideration (e.g. alternatives facing prohibitive barriers or those clearly economically unattractive).

Step 3: Where more than one credible and plausible alternative remains, project participants shall, as a conservative assumption, use the alternative baseline scenario that result in the lowest baseline emissions as the most likely baseline scenario. The least emission alternative will be identified for each component of the baseline scenario. In assessing these scenarios, any regulatory or contractual requirements should be taken into consideration.

Note: The methodology is only applicable if the most plausible scenario for the landfill gas is identified as either the atmospheric release of landfill gas and/or landfill gas is partially captured (with or without subsequent flaring).

Additionality: Please describe the procedure for demonstrating additionality

14. The additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, which is available on the UNFCCC CDM website[2].

15. In investment analysis, the project participants should demonstrate that the project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive. If there is some expectation that the project participants derive revenues from the project, the assessment should rely on identifying the financial indicator of alternative scenarios, such as IRR, NPV and the like. Then project participants should consider revenues by utilizing of land after finishing of project activity (i.e. on-site aerobic treatment at landfills). The revenues should be estimated by considering possible land use plan and land value. Meanwhile if there is not any expectation that the project participants derive revenues from the project, simple cost analysis is applicable without land use revenues after project activity.

16. In common practice analysis, the project participants should demonstrate that the technology applied to project activity to deal with municipal solid wastes at closed landfills (i.e. on-site aeration of existing wastes) is state of the art and not common practice in the host country.

Baseline emissions

17. To calculate the baseline emissions project participants shall use the following equation:

$$BE_y = (MB_y - MD_{reg,y}) \quad (1)$$

Where:

BE_y Is the baseline emissions in year y (tCO_2e)

MB_y Is the methane produced in the absence of project activity in year y (tCO_2e)

$MD_{reg,y}$ Is methane that would be destroyed in the absence of the project activity in year y (tCO_2e)

Adjustment Factor (AF)

18. In cases where regulatory of contractual requirements do not specify MD_{reg}, an Adjustment Factor (AF) shall be used and justified, taking into account the project context. In doing so, the project participant should take into account that some of the methane generated by the landfill may be captured and destroyed to comply with other relevant regulations or contractual requirements, or to address safety and odour concerns.

$$MD_{reg,y} = MB_y * AF \quad (2)$$

Where:

[2] Please refer to:<http://cdm.unfccc.int/goto/MPappmeth>

AF Is Adjustment Factor for MB_y (%)

19. The parameter AF shall be estimated as follows:

- In cases where a specific system for collection and destruction of methane is mandated by regulatory or contractual requirements, the ratio between the destruction efficiency of that system and the destruction efficiency of the system used in the project activity shall be used;

- In cases where a specific percentage of the "generated" amount of methane to be collected and destroyed is specified in the contract or mandated by the regulation, this percentage divided by an assumed efficiency for the collection and destruction system used in the project activity shall be used.

20. The 'Adjustment Factor' shall be revised at the start of each new crediting period taking into account the amount of GHG flaring that occurs as part of common industry practice and/or regulation at that point in the future.

Rate of compliance

21. In cases where there are regulations that mandate the use of one of the project activity treatment options and which is not being enforced, the baseline scenario is identified as a gradual improvement of waste management practices to the acceptable technical options expected over a period of time to comply with the MSW Management Rules. The adjusted baseline emissions ($BE_{y,a}$) are calculated as follows:

$$BE_{y,a} = BE_y * (1 - RATE^{Compliance}_y) \quad (3)$$

Where:

BE_y Is the CO_2-equivalent emissions as determined from equation (1).

$RATE^{Compliance}_y$ Is the local-level compliance rate of the MSW Management Rules in that year y. The compliance rate shall be lower than 50%; if it exceeds 50% the project activity shall receive no further credit.

22. In such cases $BE_{y,a}$ should replace BE_y in Equation (1) to estimate emission reductions. The compliance ratio $RATE^{Compliance}_y$ shall be monitored ex post based on the official reports for instance annual reports provided by municipal bodies.

Methane generation from the landfill in the absence of the project activity (MB_y)

23. The amount of methane that is generated each year (MB_y) is calculated as per the latest version of the approved "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" considering the following additional equation:

$$MB_y = BE_{CH4,SWDS,y} \quad (4)$$

Where:

$BE_{CH4,SWDS,y}$ Is the methane generation from the landfill in the absence of the project activity at year y, calculated as per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site". The tool estimates methane generation adjusted for, using adjustment factor (f) any landfill gas in the baseline that would have been captured and destroyed to comply with relevant regulations or contractual requirements, or to address safety and odour concerns. As this is already accounted for in Equation (1), "f" in the tool shall be assigned a value 0. (tCO_2e)

Option A

24. Where different waste type j of existing waste disposed of in the landfill are avoided from anaerobic digestion, the amount of different waste types ($A_{j,x}$) could be determine based on landfill operation record and/or waste sampling, as follows:

$$A_{j,x} = A_x \cdot \frac{\sum_{n=1}^{z} p_{n,j,x}}{z} \qquad (5)$$

Where:

$A_{j,x}$ Is the amount of organic waste type j of existing wastes disposed of into the landfill in the year x (tonnes/year), this is the value to be used for variable $W_{j,x}$ in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site".

A_x Total amount of existing waste disposed of into landfill in year x (tons)

x Year during the landfill operation period: x runs from the first year of the landfill operation period (x=1) to the year y for which avoided emissions are calculated (x=y)

$p_{n,j,x}$ Weight fraction of the waste type j in the sample n collected from the existing waste layers which is disposed of into the landfill in year x

z Number of samples collected from the existing waste layers disposed of in year x

25. Project participants could estimate the mean age of the wastes contained in the disposal site (ā). It may be estimated as the weighted average age considering the yearly amount of wastes deposited in the landfill site since its beginning of operation up to the benchmark year (x=1) as follows:

$$\bar{a} = \frac{1 \cdot A_1 + 2 \cdot A_2 + 3 \cdot A_3 + \cdots + a \cdot A_a}{A_1 + A_2 + A_3 + \cdots + A_a} = \frac{\sum_{a=1}^{a\,max} A_a \cdot a}{\sum_{a=1}^{a\,max} A_a} \qquad (6)$$

Where:

ā Weighted mean age of the wastes present in the landfill prior to the project start

a Years before project start, starting in the first year of waste disposal (a=1) up to the maximal age of the wastes contained in the landfill at the project start ($a=a_{max}$)

A_a Total amount of waste disposals in the landfill in each year "a". It shall be obtained from recorded data of waste disposals, or estimated according to the level of the activity that generated the wastes (tons)

26. If the yearly amount of waste deposited in the landfill cannot be estimated, then an arithmetic mean age may be used ($a=0.5*a_{max}$). By using this option, the baseline emissions at any year "y" during the crediting period are calculated using the same formula as provided in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site", the exponential term for the First Order Decay Model "exp[-k_j.(y-x)]" will be corrected for the mean age, and will be substituted by "exp[-k_j.(y-x+ā)]".

Option B

27. The existing wastes in landfills are already digested partially, which depend on time span from disposal of waste. Therefore fraction of degradable organic carbon (DOC) and biochemical methane potential (BMP) of municipal solid waste (MSW) components of existing wastes is already decreased, compared with fresh wastes in the aftermath of disposal of wastes into landfills. If project participants consider fraction of decayed organic carbon in advance of project activity through using sampling of existing wastes to determine parameters for the First Order Decay (FOD) Model. Project participants should quantify these parameter uncertainties at the 95% confidence level, and the product of "DOD_f" and "DOC_j" and x is determined as follows:

DOC_f*DOC_j Deducted fraction of degradable organic carbon (by weight) in the existing waste type j, which is determined through the laboratory analyzing MSW samples from landfills at the begging of project activity.

x year during the project activity (i.e. crediting) period: x runs from the first year of the project activity (x=1) to the year y for which avoided emissions are calculated (x=y)

Option C

28. Through measuring of the methane volume fraction of the LFG generated from the landfill in anaerobic condition, project participants can adjust "F" and "MCF" for the First Order Decay (FOD) Model and the product of "F" and "MCF" is determined as follows:

F*MCF Fraction of methane in the LFG (volume fraction) from venting wells installed into the landfill body in anaerobic condition.

Project emissions

29. Project emissions include emissions from electricity consumption, emission from fossil fuel combustion (if applicable), and emission of residual methane gas generated from the landfill (if any). Project emissions are calculated as follows:

$$PE_y = PE_{FC,y} + PE_{EC,y} + PE_{RM,y} \tag{7}$$

Where:

PE_y	Project emissions in year *y* (tCO_2/yr)
$PE_{EC,y}$	Project emissions from electricity consumption in year y (tCO_2/yr)
$PE_{FC,y}$	Project emissions from fossil fuel combustion in year *y* (tCO_2/yr)
$PE_{RM,y}$	Project emissions of residual methane gas generated from the landfill in incomplete aerobic condition (tCO_2e/yr)

30. Project emissions are calculated in the following steps:

Step 1: Determination of project emissions from electricity consumption

Step 2: Determination of project emissions from fossil fuel combustion (if applicable)

Step 3: Determination of project emissions of residual methane gas generated from the landfill in incomplete aerobic condition (if any)

Sub-step 3a: Ex-ante estimation of methane emissions is based on the FOD model, and the emissions should be negligible since methane correction factor (MCF) for the landfill in aerobic condition can be assumed to be 0.

Sub-step 3b: Actual residual methane emissions should be ensured to be negligible by monitoring of LFG from air extraction wells and surface of landfills after implementation of project activity (on-site aeration).

Step 1: Determination of project emissions from electricity consumption

31. Where the project activity involves electricity consumption, CO_2 emissions are calculated as follows:

$$PE_{EC,y} = EG_{PJ,FF,y} * CEF_{elec} \tag{8}$$

Where:

$EG_{PJ,FF,y}$ Is the amount of electricity generated in an on-site fossil fuel fired power plant or consumed from the grid as a result of the project activity, measured using an electricity meter (MWh)

CEF_{elec} Is the carbon emission factor for electricity generation in the project activity (tCO_2/MWh)

32. In cases where electricity generated in an on-site fossil fuel fired power plant, project participants should use, as CEF_{elec}, the default emission factor for diesel generator with a capacity of more than 200kW for small-scale project activities ($0.8tCO^2/MWh$, see AMS-I.D, Table I.D.1 in the simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories).

33. In cases where electricity is purchased from the grid, the emission factor CEF_{elec} should be calculated according to latest version of the "Tool to calculate the emission factor for an electricity system".

Step 2: Determination of project emissions from fossil fuel combustion

34. Project participants shall account for CO_2 emissions from any on-site fuel combustion. Emissions are calculated from the quantity of fuel used and the specific CO_2-emission factor of the fuel, as follows:

$$PE_{FC,y} = F_{cons,y} * NCV_{fuel} * EF_{fuel}$$

Where:

$F_{cons,y}$ Is the fuel consumption on-site in year y (l or kg)

NCV_{fuel} Is the net calorific value of the fuel (MJ/l or MJ/kg)

EF_{fuel} Is the CO_2 emission factor of the fuel (tCO_2/MJ)

35. Local values should be preferred as default values for the net calorific values and CO_2 emission factors. If local values are not available, project participants may use IPCC default values for the net calorific values and CO_2 emission factors.

Step 3: Determination of project emissions from of residual methane gas generated from the landfill

36. Theoretically no methane generation occur from landfill in aerobic condition realized through on-site aeration. However project participants should ensure the complete avoidance of methane emissions from the landfill in the project activity, and should take into account of residual methane emissions from the landfill in accidentally incomplete aerobic condition, during the crediting period.

Ex-ante estimation of methane emissions based on the FOD model

Option A

37. Ex-ante estimation of the project emissions at any year "y" during the crediting period are calculated using the same formula as provided in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site". The "MCF" value for the First Order Decay Model is depending on landfill site type, project participants can take it that the project emissions are negligible by assuming "MCF" value to be 0.0 in aerobic condition.

$MCF_{PJ,Ea}$ Methane correction factor in Ex-ante estimation of project emissions from landfills in aerobic condition. If the existing waste is treated aerobically, emissions are assumed to be zero.

Determination of actual residual methane emissions by monitoring of LFG

Option B

38. Through measuring of the methane volume fraction of the LFG from the venting wells installed into landfill in complete or incomplete aerobic condition, project participants can calculate the actual residual methane emissions by adopting the First Order Decay Model, and by adjusting parameters "F" and "MCF" for the FOD Model as follows:

F*MCF Fraction of methane in the LFG (volume fraction) from venting wells installed into the landfill in complete or incomplete aerobic condition. This parameter reflects the landfill condition (in complete aerobic or incomplete aerobic) under on-site aeration operation.

Option C

39. emissions from overall site should be calculated by aggregating emissions from venting wells to be installed into the landfill body and emissions from the landfill surface as follows:

$$PE_{RM,y} = GWP_{CH4} \cdot \left(\sum_{m} VE_{CH4,m,y} \cdot VD_{CH4,m,y} + \sum_{n} SE_{CH4,n,y} \cdot SD_{CH4,n,y} \right) \quad (9)$$

Where:

GWP_{CH4} Global Warming Potential (GWP) of methane, valid for the relevant commitment period (tCO_2e/tCH_4)

$VE_{CH4,m,y}$ Volume of venting methane emissions from venting well m during the year y (m^3)

$VD_{CH4,m,y}$ Methane concentration of venting emissions from venting well m during the year y (tCH_4/m^3)

$SE_{CH4,n,y}$ Volume of surface methane emissions from surface area n during the year y (m^3)

$SD_{CH4,n,y}$ Methane concentration of surface emissions from surface area n during the year y (tCH_4/m^3)

Leakage

40. No leakage effects need to be accounted under this methodology. On-site aeration is implemented within the landfill site and the treated waste will not transferred.

Emission reductions

41. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (10)$$

Where:

ER_y Emission reductions in year *y* (tCO_2e/yr)

BE_y Baseline emissions in year *y* (tCO_2e/yr)

PE_y Project emissions in year *y* ($t\ CO_2/yr$)

42. If the sum of PE_y is smaller than 1% of BE_y in the first full operation year of a crediting period, the project participants may assume a fixed percentage of 1% for PE_y combined for the remaining years of the crediting period.

Changes required for methodology implementation in 2nd and 3rd crediting periods

43. If there have been changes in the regulations with respect to waste disposal or industrial practices, the adjustment factor AF in the baseline emissions (used in equation 2 above) shall be re-estimated. And if there have been changes in the purposes and/or revenues from land use after project activity, project participants shall conduct anew investment analysis. Note, that adjustment will be needed at the time of renewal of the crediting period.

Data and parameters not monitored

44. In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools (e.g. parameter "DOC_f" in the latest version of the approved "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site") referred to in this methodology apply.

Data / parameter:	Regulatory requirements relating to landfill gas projects
Data unit:	--
Description:	Regulatory requirements relating to landfill gas projects
Source of data:	The DNA shall be contacted to provide information regarding host country regulation.
Measurement procedures (if any):	
Any comment:	The information though recorded annually, is used for changes to the adjustment factor (AF) or directly $MD_{reg,y}$ at renewal of the credit period. Relevant regulations for LFG project activity shall be updated at renewal of each credit period. Changes to regulation should be converted to the amount of methane that would have been destroyed/combusted during the year in the absence of the project activity ($MD_{reg,y}$). Project participants should explain how regulations are translated into that amount of gas.

Data / parameter:	AF
Data unit:	%
Description:	Methane destroyed due to regulatory or other requirements.
Source of data:	Local and/or national authorities
Measurement procedures (if any):	
Any comment:	Changes in regulatory requirements, relating to the baseline landfill(s) need to be monitored in order to update the adjustment factor (AF), or directly MD_{reg}. This is done at the beginning of each crediting period.

Data / parameter:	$RATE^{Compliance}_{y}$
Data unit:	Number
Description:	Rate of compliance
Source of data:	Municipal bodies
Measurement procedures (if any):	The compliance rate is based on the annual reporting of the municipal bodies issuing these reports. The state-level aggregation involves all landfill sites in the country. If the rate exceeds 50%, no CERs can be claimed.
Any comment:	

Data / parameter:	$BE_{CH4,SWDS,y}$
Data unit:	tCO_2e
Description:	Methane generation from the landfill in the absence of the project activity at year y
Source of data:	Calculated as per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Measurement procedures (if any):	As per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Any comment:	Used for ex ante estimation of the amount of methane that would have been avoided during the year

Data / parameter:	A_a
Data unit:	tons
Description:	Total amount of waste disposals in the landfill in year a.
Source of data:	Recorded data of waste disposals
Measurement procedures (if any):	
Any comment:	

Data / parameter:	$MCF_{PJ,Ea}$
Data unit:	--
Description:	Methane correction factor in Ex-ante estimation of project emissions
Source of data:	
Measurement procedures (if any):	Value "0.0" for aerobic managed solid waste disposal sites is used for $MCF_{PJ,Ea}$
Any comment:	

Data / parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential of CH_4
Source of data:	IPCC
Measurement procedures (if any):	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions.
Any comment:	

III. MONITORING METHODOLOGY

45. All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated otherwise in the tables below. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

46. The baseline emissions of anaerobic methane generation should be calculated based on the FOD model. The characteristics of existing wastes (i.e. the different types of waste j with respectively

different decay rates k_j and different fractions of degradable organic carbon (DOC_j)) should be identified based on the actual disposal records provided by the landfill operator. Basically the time scale x is starting with the first year after the start of the landfill operation until the end of the year y, for which baseline emissions are calculated.

47. Optionally the baseline emissions based on the FOD model could be assessed by sampling wastes (biochemical methane potential analysis) and/or by monitoring of LFG from the venting pipes (without air injection operation). The existing waste samples shall be chosen in a manner that ensures representativeness of the landfill body (i.e. extend and depth of landfill) estimation with 20% uncertainty at 95% confidence level.

48. Preferably monitoring involves an annual assessment of the conditions at the solid waste disposal site and the project emissions of residual methane generation. Completion of aerobic degradation of organic matters in wastes should be ensured by sampling wastes (biochemical methane potential analysis) and/or by monitoring of LFG. The LFG monitoring methodology is based on direct measurement of the amount of LFG from both venting pipes and capping surface.

49. The amount of landfill gas emissions from each venting pipes m is measured (in m^3, by using a flow meter) continuously or at least quarterly. And the fraction of methane in the LFG should be measured with a continuous gas analyzer (in tCH_4/m^3, using a flame ionisation detector) or, alternatively, conducting periodical measurements with a minimum of four quarterly measurements per year.

50. Simultaneously monitoring of temperature and pressure of the LFG are required to determine the amount of the LFG and the density of methane gas in the LFG. However no separate monitoring of temperature and pressure is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes and density of methane in normalized cubic meters.

51. The monitoring result of residual methane emission should be taken account of for suitable controlling and managing to adapt air flow rate, air injection pressure, air injection period and optimum moisture during the on-site aeration operation.

52. The average amount of landfill gas emissions from each capping surface area n and the methane concentration is measured by using a flux box survey (with a flow meter and a flame ionisation detector attached a flux box, and a logger recording data) at particular time interval is conducted by project participants (the licence holder and/or permit operator). Flux density of the methane gas is calculated as follows:

$$Q = \frac{V}{A} \times (dc / dt) \qquad (12)$$

Where:

Q	Flux density of the methane gas ($mg/m^2/sec$)
V	Internal flux box volume (m^3)
A	Flux box footprint (m^2)

dc/dt Rate of change of methane gas concentration in the chamber with time ($mg/m^3/sec$)

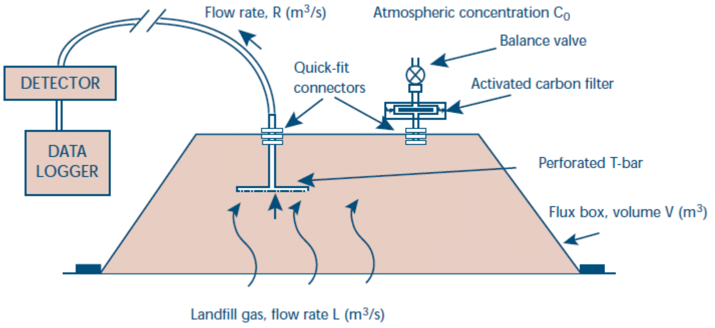

Figure 2: Illustration of flux chamber measurement

53. The number of required flux measurements (n) depends on the size of the zone (Z m^2) and, based on USEPA (1986), is calculated as follows:

$$n = 6 + 0.15\sqrt{Z} \tag{13}$$

54. The quantities of electricity imported and fossil fuels required to operate the project activity, including the blower equipments for the aeration system should be monitored. 100% of the data should be monitored if not indicated differently in the comments in the tables bellow.

55. In addition, the monitoring provisions in the tools referred to in this methodology apply.

Data and parameters monitored

Data / parameter:	$A_{j,x}$
Data unit:	tons
Description:	Amount of existing organic waste type j disposed of in the landfill in the year x
Source of data:	The actual disposal records provided by the landfill operator and /or on-site measurement by project participants
Measurement procedures (if any):	If the actual disposal records are not available, project participant should measure the extent and the depth of the landfill by surveying and boring.
Monitoring frequency:	Identified once before the begging of project activity
QA/QC procedures:	
Any comment:	

Data / parameter:	A_x
Data unit:	tons
Description:	Total amount of existing organic waste disposed of into landfill in year x
Source of data:	The actual disposal records provided by the landfill operator and /or on-site measurement by project participants
Measurement procedures (if any):	If the actual disposal records are not available, project participant should measure the extent and the depth of the landfill by surveying and boring.
Monitoring frequency:	Identified once before the begging of project activity
QA/QC procedures:	
Any comment:	

Data / parameter:	$P_{n,j,x}$
Data unit:	-
Description:	Weight fraction of the waste type j in the sample n collected from the existing waste layers to have been disposed of into the landfill in year x
Source of data:	Sample measurements by project participants.
Measurement procedures (if any):	Sample the existing waste, using the waste categories j, as provided in the table for DOC_j and k_j, and weigh each waste fraction. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency:	Identified once before the begging of project activity
QA/QC procedures:	
Any comment:	This parameter only needs to be monitored if the existing wastes in disposal include several waste categories j, as categorized in the tables for DOC_j and k_j.

Data / parameter:	z
Data unit:	-
Description:	Number of samples collected from the existing waste layers disposed of in year x
Source of data:	Project participants
Measurement procedures (if any):	The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency:	Identified once before the begging of project activity
QA/QC procedures:	
Any comment:	This parameter only needs to be monitored if the existing wastes in disposal include several waste categories j, as categorized in the tables for DOC_j and k_j.

Data / parameter:	DOC_f*DOC_j
Data unit:	-
Description:	Actual fraction of degradable organic carbon content (i.e. biochemical methane potential) by weight in the existing municipal solid waste type j
Source of data:	Project participants
Measurement procedures (if any):	Determine through the laboratory analyzing of wastes samples from the landfill. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency:	The first time before the project activity begging and the second time before the project activity finishing
QA/QC procedures:	
Any comment:	More frequent sampling is encouraged

Data / parameter:	F*MCF
Data unit:	m^3CH_4/m^3LFG
Description:	Fraction of methane in the LFG (volume fraction) from venting wells installed into the landfill body
Source of data:	To be measured continuously or periodically by project participants using certified equipment (e.g. a flow meter and a flame ionization detector).
Measurement procedures (if any):	Shall be measured using equipment that can directly measure methane content in the LFG, estimation of methane content of LFG based on measurement of other constituents of the LFG such as CO_2 is not permitted. Preferably measured by continuous gas quality analyzer. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency:	Continuous or periodical (at least quarterly)
QA/QC procedures:	The gas analyser should be subject to a regular maintenance and testing regime to ensure accuracy
Any comment:	The fraction of methane in the LFG should be measured with a continuous analyzer or, alternatively, conducting periodical measurements with a minimum 4 quarterly measurements per year.

Data / parameter:	$VE_{CH4,m,y}$
Data unit:	m^3
Description:	Volume of venting methane emissions from venting well m during the year y
Source of data:	Project participants
Measurement procedures (if any):	Measured by a flow meter. Data to be aggregated yearly. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency:	Continuous or periodical (at least quarterly)
QA/QC procedures:	Flow meters should be subjected to a regular maintenance and testing regime to ensure accuracy
Any comment:	More frequent sampling is encouraged

Data / parameter:	$VD_{CH4,m,y}$
Data unit:	tCH_4/m^3
Description:	Methane concentration of venting emissions from venting well m during the year y
Source of data:	Project participants
Measurement procedures (if any):	Measured by a continuous gas quality analyser or a flame ionisation detector. Data to be aggregated yearly. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency:	Continuous or periodical (at least quarterly)
QA/QC procedures:	Flame ionisation detectors or gas quality analyser should be subjected to a regular maintenance and testing regime to ensure accuracy
Any comment:	More frequent sampling is encouraged

Data / parameter:	$SE_{CH4,n,y}$
Data unit:	m^3
Description:	Volume of surface methane emissions from surface area n during the year y
Source of data:	Project participants
Measurement procedures (if any):	Measured by a flow meter to be attached a flux box. Data to be aggregated yearly. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency:	Continuous or periodical (at least quarterly)
QA/QC procedures:	Flow meters should be subjected to a regular maintenance and testing regime to ensure accuracy
Any comment:	More frequent sampling is encouraged

Data / parameter:	$SD_{CH4,n,y}$
Data unit:	tCH_4/m^3
Description:	Methane concentration of surface emissions from surface area n during the year y
Source of data:	Project participants
Measurement procedures (if any):	Measured by a continuous gas quality analyser or a flame ionisation detector to be attached a flux box. Data to be aggregated yearly. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency:	Continuous or periodical (at least quarterly)
QA/QC procedures:	Flame ionisation detectors should be subjected to a regular maintenance and testing regime to ensure accuracy
Any comment:	More frequent sampling is encouraged

Data / parameter:	T
Data unit:	°C
Description:	Temperature of the landfill gas
Source of data:	Project participants
Measurement procedures (if any):	Measured to determine the density of methane. No separate monitoring of temperature is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters.
Monitoring frequency:	Continuous or periodical (at least quarterly)
QA/QC procedures:	Measuring instruments should be subjected to a regular maintenance and testing regime in accordance to appropriate national/international standards.
Any comment:	

Data / parameter:	P
Data unit:	Pa
Description:	Pressure of the landfill gas
Source of data:	Project participants
Measurement procedures (if any):	Measured to determine the density of methane. No separate monitoring of pressure is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters.
Monitoring frequency:	Continuous or periodical (at least quarterly)
QA/QC procedures:	Measuring instruments should be subjected to a regular maintenance and testing regime in accordance to appropriate national/international standards.
Any comment:	

Data / parameter:	$EG_{PJ,FF,y}$
Data unit:	MWh
Description:	Quantity of electricity generated in an on-site fossil fuel fired power plant or consumed from the grid as a result of the project activity during the year y
Source of data:	On-site measurements and electricity invoices
Measurement procedures (if any):	Electricity meter
Monitoring frequency:	Continuously
QA/QC procedures:	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. Measurement results should be cross-checked with the quantity of invoices from the grid operator.
Any comment:	

Data / parameter:	CEF_{elec}
Data unit:	tCO_2/MWh
Description:	Emission factor for the production of electricity in the project activity
Source of data:	Publicly available documents from utility or electricity regulator
Measurement procedures (if any):	A default of 0.8 can be used if electricity in the project is produced using captive power plant. In case the project source is grid, emission factor shall be estimated as described in "Tool to calculate the emission factor for an electricity system".
Monitoring frequency:	Annually or ex-ante
QA/QC procedures:	Calculated as per appropriate methodology at the start of crediting period
Any comment:	

Data / parameter:	$F_{cons,y}$
Data unit:	Mass or volume units of fuel
Description:	Fuel consumption on-site during year 'y' of the crediting period
Source of data:	Purchase invoices and/or metering
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	The amount of fuel will be derived from the paid fuel invoices (administrative obligation).
Any comment:	

Data / parameter:	NCV_{fuel}
Data unit:	MJ/l or MJ/kg
Description:	Net calorific value of fossil fuel
Source of data:	The source of data should be the following, in order of preference: project specific data, country specific data or IPCC default value. As per guidance from the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Measurement procedures (if any):	
Monitoring frequency:	Annually or ex-ante
QA/QC procedures:	
Any comment:	For fossil fuel that is used in the project electricity generation

Data / parameter:	EF_{fuel}
Data unit:	tCO_2/MJ
Description:	CO_2 emission factor of fossil fuel
Source of data:	The source of data should be the following, in order of preference: project specific data, country specific data or IPCC default value. As per guidance from the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Measurement procedures (if any):	
Monitoring frequency:	Annually or ex-ante
QA/QC procedures:	
Any comment:	Fossil fuel that is used in the project captive power plant

IV. REFERENCES AND ANY OTHER INFORMATION

Oonk H., Weenk A., Coops O., Luning L., (1994): Validation of landfill gas formation models; EWAB 9427; NOVEM, Utrecht, The Netherlands.

Owens & Chenowyth (1993): Biochemical Methane Potential of Municipal Solid Waste (MSW) Components.

UK Environment Agency, (2004): Guidance on monitoring landfill gas surface emissions.

Section D. Explanations / justifications to the proposed new baseline and monitoring methodology

Selected approach from paragraph 48 of the CDM modalities and procedures

56. The selected baseline is based on the "Existing actual or historical emissions, as applicable" or "Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment". Predominately municipal solid waste is disposed of in landfill site and methane gas emissions generated through anaerobic digestion is released to the atmosphere in the developing countries. Thus the on-site aeration as existing waste treatment technique could be applied to avoid the methane emissions from the closed landfills.

Definitions

57. Almost all terms except "aerobic condition" are common in general or in CDM glossary. The "aerobic condition" means the condition where aerobic decomposition of non-fossilized and biodegradable organic material is accelerated through biological activity of aerobic micro organisms. The "aerobic condition" is realized by providing adequate oxygen and keeping appropriate moisture and temperature in the landfill body.

Applicability conditions

58. This methodology is applicable to on-site aeration project activities in closed landfill sites, where the baseline scenario is the partial or total atmospheric release of the gas and the project activities include situation such as:

- Disposing of wastes at the landfill site has already been finished and the landfill is closed;
- Biodegradable materials mainly constitute existing wastes in the landfill site;
- Mandatory environmental regulations requiring collection and flaring of LFG do not exist or the collection and flaring rates do not exceed 50%;
- Equipments, machined and energy source related to project activity are available;
- Monitoring technologies to identify the waste biochemical characteristics and to control the landfill aerobic conditions are available;
- Plausible purposes of land use after the project activity in the landfill site could be predictable based on certain evidence (e.g. government' city plan, experience of neighbour local area, etc.);

Project boundary

59. The spatial extent of the project boundary encompasses the physical delineation of closed landfill site where existing wastes are aerobically treated, and on-site energy use to activate aeration equipments and machines.

Identification of the baseline scenario

60. Project participants should use Step 1 of the latest version of the "Tool for the demonstration and assessment of additionality", to identify all realistic and credible alternatives to the project activity. Whereby all relevant sectoral policies and national regulations related to the operation and management of the landfill sites should be taken into account. Alternative scenarios for the treatment of existing wastes at landfill site should include the atmospheric release of LFG, the retrofitting with LFG collection system, the composting treatment of excavated wastes, and the project activity (i.e. on-site aeration).

61. Step 2 and/or Step 3 shall be used to assess which alternatives could be excluded from further consideration. Project participants could exclude the alternatives facing prohibitive barriers (investment barriers, technological barriers, barriers due to prevailing practice, etc.) or those to be financially unattractive.

62. Where more than one credible and plausible alternative remains, project participants shall, as a conservative assumption, use the alternative baseline scenario that result in the lowest baseline emissions as the most likely baseline scenario. The least emission alternative will be identified for each component of the baseline scenario. In assessing these scenarios, any regulatory or contractual requirements should be taken into consideration.

Additionality

63. The additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality".

64. In investment analysis, the project participants should demonstrate that the project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive by identifying the financial indicator (e.g. IRR, NPV etc.) to be compared with those for alternative scenarios. Then project participants should consider revenues by land use after the project activity (i.e. on-site aeration). The revenues should be estimated by considering the city plan and the land value, therefore the simple cost analysis is not applicable in case of considering land use revenues after the project activity.

65. However profitable land use (e.g. commercial facility, industrial plant, etc.) after treatment of closed landfills might not be common so far due to inherent characteristics of landfills (e.g low stability, toxic contamination, and so on). In case of no revenues from land use after the project activity due to land use for public area (e.g. green space, natural park, sport facility, etc.), project participants could apply the simple cost analysis.

66. In common practice analysis, the project participants should demonstrate that the technologies to be applied in the project activity to treatment municipal solid wastes at closed landfills (i.e. on-site aeration) is state of the art and is not common in the host country.

Baseline emissions

67. In this methodology baseline emissions in the absence of the project activity should be calculated based on the FOD model to be applied in the latest version of "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site". Project participants could calculate precisely ex-ante and assess in practice the baseline emissions from landfill site in anaerobic condition by identifying reasonable parameters in FOD model, where the optional procedures could be applied as follows;

- **(Option A)** Based on landfill operation records and/or waste samplings, the amount of existing waste of different type and different age (i.e. $A_{j,x}$ replacing $W_{j.x}$ in the FOD model) could be estimated ex-ante;

- **(Option B)** by sampling and laboratory analysis of existing wastes, the remaining fraction of degradable organic carbon (i.e. DOC_f*DOC_j in the FOD model) could be directly determined based on statistically significant mean value at 95% confidence level;

- **(Option C)** by measuring of volume fraction of methane in the LFG to be discharged from the venting wells installed in the landfill, F*MCF in the FOD model could be directly determined based on statistically significant mean value at 95% confidence level;.

Project emissions

68. In ex-ante estimation project participant could assume methane emissions from the landfill in aerobic condition to be negligible. However during project implementation period, the fact that aerobic degradation of organic matter is realized and that actual residual methane emission is negligible should be ensured by monitoring of LFG from the venting wells and (if applicable) from the landfill surface as follows:

- **(Option A)** Ex-ante estimation of methane emissions based on the FOD model could be negligible by assuming methane correction factor (MCF) for landfill in complete aerobic condition to be 0;
- **(Option B)** By measuring of the methane volume fraction of the LFG from the venting wells installed into landfill in aerobic condition and adjusting parameters "F" and "MCF" in the FOD Model, the actual residual methane emissions could be calculated theoretically;
- **(Option C)** By measuring of the residual methane emissions in the LFG from venting wells installed into the landfill and emissions from the landfill surface and aggregation both of the vented emission and the surface emission , residual methane emissions from overall site could be calculated directly.

69. Electricity consumptions and/or fossil fuel combustions (from grid, captive power plant, or diesel generators) to activate on-site aeration equipments and machines (e.g. air compressors, water pumps, etc.) should be taken into account as project emissions.

Leakage

70. The net change of anthropogenic emission outside the project boundary will not occur because all activities (i.e. on-site aeration of existing wastes in the closed landfill site) is implemented within project site and the conditions surrounding the landfill site will not change (e.g. no waste materials are transferred from the site).

Emission reductions

71. The net emission reduction from the project activity is calculated by subtracting the project emissions from the baseline emissions.

Changes required for methodology implementation in 2nd and 3rd crediting periods

72. If there have been changes in the regulations with respect to waste disposal or industrial practices, the adjustment factor AF in the baseline emissions (used in equation 2 above) shall be re-estimated. And if there have been changes in the purposes and/or revenues from land use after project activity, project participants shall conduct anew investment analysis. Note, that adjustment will be needed at the time of renewal of the crediting period.

Monitoring methodology, including data and parameters not monitored

73. In monitoring methodology followings are major submissions and explained in detail.

- The baseline emissions should be estimated ex-ante based on the FOD model and IPCC default values. Optionally parameters adopted the FOD model could be assessed and redefined on-site by waste sampling and (if applicable) laboratory analysis for determination of DOC_f*DOC_j. And just before project activity F*MCF could be assessed and redefined by monitoring of vented methane emissions on-site.

- The project emissions also should be estimated ex-ante based on the FOD model. Optionally during project activity F*MCF could be assessed and redefined by monitoring of vented methane emissions on-site. Besides by monitoring both of vented methane emissions and (if applicable) surface emissions the project participants could measure project emissions themselves directly.

- The procedures of monitoring methane emissions from venting pipes and landfills surface are provided in this methodology based on international standards.

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History of the document

Version	Date	Nature of revision(s)
03.1	20 May 2008	• Second bullet of formatting instructions changed to refer to Sections C and D, rather than Section B; • Change in numbering of paragraphs.
03	EB 38, Annex 6 14 March 2008	• Revision of the structure of the document to reflect the sections of a standard approved baseline methodology. • Section A. Recommendation by the Methodological Panel • Section B. Summary and applicability of the baseline and monitoring methodology • Section C. Proposed new baseline and monitoring methodology • Section D. Explanations / justifications to the proposed new baseline and monitoring methodology
02	EB 32, Annex 17 22 June 2007	• The form “CDM-NM” was merged with the recommendation form “F-CDM-NMmp”. The F-CDM-NMmp discontinued to be used. • The change was adopted in line with the revised “Procedures for submission and consideration of a proposed new methodology” in order to simplify and streamline the process of consideration of new methodologies.
01	EB 08, Annex 02 29 September 2006	Initial adoption