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Members of the CDM Executive Board
UNFCCC Secretariat
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24 November 2008

Dear Members of the CDM Executive Board,

Request for review – "Jinan Landfill Gas to Energy Project" (0933)

Please find below our response to the issues raised in the request for review for this project.

1. The DOE is requested to clarify how it verified that the clarification by the meth panel (AM_CLA_0095) on the application of lower bound of 95% confidence interval had been followed, since the monitoring of methane fraction in LFG was not conducted continuously [1]

Project Proponent response: Although this question is addressed to the DOE, we would like to provide the following clarifications:

Clarification AM_CLA_0095 sought to clarify what a "*statistically significant number of samples*" was, since this needed to be defined ex-ante [2]. The Meth Panel has defined that a minimum of 4 samples per year need to be taken in the case of periodic measurements. The minimum requirement for periodic measurements has thus been defined by the Meth Panel. The monitoring frequency of methane in the Jinan landfill consists of 623 measurements, with at least one measurement taken every 8 hours, which is at a factor 150 times higher than the minimum sample size required by the clarification. The measuring frequency gives a good representative spread methane concentrations covering the morning, midday and evening periods. A systematic error in the assessment of average methane is thus excluded.

The statistical parameters of these values are as follows:
Mean: 53.14%
95% confidence interval: 52.94 – 53.34%.

During the monitoring period cumulative flow meters recorded a total of 38,776 Sm^3 of LFG sent to the generators and 2,352,948 Sm^3 to the flare giving a total LFG flow of 2,391,724 Sm^3 (standardized flow at 1 atm and 20 C). Determining $MD_{project}$ in accordance with the clarification on the application of the lower bound 95% confidence interval of the methane concentration gives:

$MD_{project}$ = Total LFG Flow x Lower Bound 95% CI of the CH_4% x density
= 2,391,724 x 52.94% x 0.00067

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= 848 tCH_4

848 tCH_4 is the quantity of CH4 included in the Monitoring Report, demonstrating that the 95% confidence interval around the mean is so narrow that there is no material influence on the average methane concentration.

The same method can be applied to the LFG flow after the cross check, the total crosschecked LFG flow after accounting for flare efficiency would be 2,143,566 Sm^3. Applying the equation would give:

Total LFG Flow x Lower Bound 95% CI of the CH_4% x density
= 2,143,566 x 52.94% x 0.00067
= 760 tCH_4

The crosschecked quantity of methane contained within the LFG according to the Monitoring Report is also 760 tCH_4 (after accounting for flare efficiency), again demonstrating that the 95% confidence interval here has no material influence.

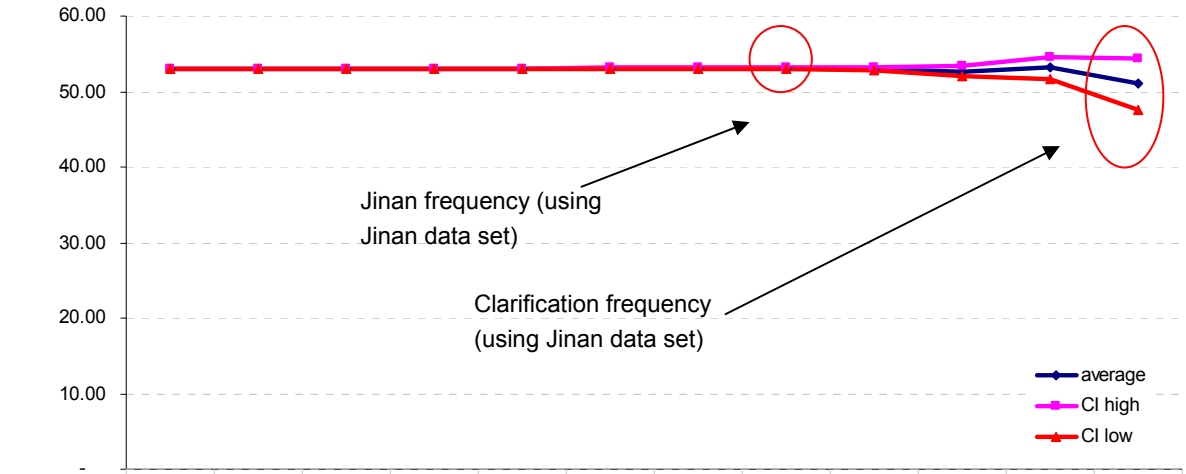
The analysis above shows that the sampling on this project provides an adequate sample size (i.e. it could be considered continuous). When the methane results are subject to the calculations as per ACM0001 version 9.1, no material impact is seen on the emission reduction.

This outcome is best explained by the central limit theorem. This defines that the distribution of all sample means (or proportions) is normal, as long as the sample size is large enough [3] and the averages of the methane concentrations for different simulated methane sampling regimes of the Jinan landfill in the graph [shown below] further emphasizes this point. The graph is produced by using the dataset of methane measurements and a statistical tool (XLSim) to make a statistical simulation, with higher frequencies are simulated by a Monte Carlo statistical analysis [4].

As can be seen only the uncertainty increases; the averages are the same [53%] up to a 1 month sampling frequency. The frequency distribution of methane and the sampling frequency is such that the uncertainty (95% confidence interval bandwidth) increases only marginally up to a 24 hour sampling frequency.

The sampling frequency used in Jinan results in a 0.2% confidence interval range around the mean. In view of the central limit theorem, the absence of any quantitative limits on uncertainty levels and the size of the uncertainty observed, it is derived that a 0.2% confidence interval range has no material effect on the calculation of the emission reductions.

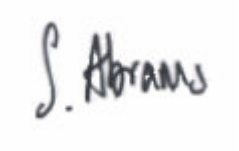
Appropriateness of the chosen method is also supported by the registered PDD, which on Page 15 of the PDD defines $w_{CH4,y}$ as "Average methane fraction of the landfill gas as measured during year y and expressed as a fraction in cubic meter of methane per cubic meter of landfill gas (m3CH4 / m3LFG)" [page 15] in the calculation of MD_{flared} and $MD_{electricity}$



	30 s	60 s	2 min	5 min	30 min	1 hr	4 hr	8 hr	24 hr	1 wk	1 mo	1 Q
average	53.06	53.05	53.05	53.06	53.05	53.10	53.09	53.10	52.98	52.67	53.13	51.00
CI high	53.06	53.06	53.06	53.07	53.08	53.15	53.20	53.26	53.22	53.37	54.55	54.38
CI low	53.05	53.04	53.04	53.04	53.01	53.05	52.98	52.95	52.74	51.97	51.71	47.62

We hope the justification provided above sufficiently addresses the requests and this document shows that this project has both followed the registered PDD and considered the clarification.

Yours sincerely



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1. http://cdm.unfccc.int/Projects/DB/DNV-CUK1171460030.51/iProcess/SGS-UKL1210687983.71/view
2. http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_L7UMMNNYAN4HNWK9PP811YL4CYM3H8
3. Statistics for environmental engineers, Berthouex and Brown, 2002

   "Large enough" means that the sample averages are distributed normally; this can be checked graphically.
4. We went as far as considering 1 million samples per year, corresponding to a 30 second measurement interval. The central limit theorem predicts that the averages are the same for all cases where sufficient samples are taken, which is indeed the case as shown in the graph.
5. Page 15 of the PDD defines wCH4,y as "Average methane fraction of the landfill gas as measured during year y and expressed as a fraction in cubic meter of methane per cubic meter of landfill gas (m3CH4 / m3LFG)" [page 15] in the calculation of MDflared and MDelectricity. Using another value than the average value - as specifically defined in the PDD - would therefore result in a deviation from the validated PDD.

   Moreover, methodology ACM0001 version 4 does not specify in the formulas to be used for the calculation of emission reductions that any other value than the average value for methane concentration is applicable. It specifies that "*The methane destroyed by the project activity (MDproject,y) during a year is determined by monitoring the quantity of methane actually flared and gas used to generate electricity and/or produce thermal energy, if applicable, and the total quantity of methane captured*." The clarification does therefore not explain the monitoring methodology; it introduces a new calculation approach for the baseline calculation. This new approach was introduced as such in methodology ACM0001 version 9.1 and it is assumed by the project developer that this could not be applied retroactively on projects validated under previous versions of ACM0001.