TÜV SÜD Industrie Service GmbH · 80684 München · Germany

Industrie Service

Choose certainty.
Add value.

CDM Executive Board

Your reference/letter of	Our reference/name	Tel. extension/E-mail	Fax extension	Date/Document	Page
	IS-CMS-MUC/Ca Javier Castro	+49-89 5791-2686 Javier.Castro@tuev-sued.de	+49-89 5791-2756	2008-03-18	1 of 2

Request for review

Dear Sirs,

Please find below the response to the request for review formulated for the CDM project with the registration number 0799. In case you have any further inquiries please let us know as we kindly assist you.

Yours sincerely,

Javier Castro
Carbon Management Service

Industrie Service

Response to the CDM Executive Board

Issue 1:

1. The flare efficiency of 99.2% was determined from an analysis conducted by a third-party laboratory in June 2007. However, the methodology and the monitoring plan require that the flare efficiency is determined at the time of installation. Clarification is required how this requirement has been met.

Response by TÜV SÜD:
In order to solve this issue the PP agree to apply a 90% flare efficiency from the day of installation until the day the analysis by a third party laboratory was done (June 2007).
This efficiency value can be taken into account as conservative, because the other monitoring measured parameters assures the correct work of the flare under manufacturer conditions (such as temperature, flow rate), assuring that the real efficiency is much higher as 90%, demonstrated also by the late efficiency measure done by a third party. The revised Verification and Certification Report with the new CER calculation are attached to this response.

Response by Project Participant:

Considering that the efficiency measurement by an external laboratory was performed the 21th of June 2007, between March 11 to June 21 a default efficiency of 90% will be used and the estimated efficiency (99.92%) will be used from 22 June until the end of the first verification period. Annexed new version of the monitoring report with changes in the percentage of efficiency. (*Monitoring Report, Version 5*)

Issue 2:

2. The DOE closed a Corrective Action Request regarding the operation of the flare device which works at lower temperature in relation with how the CH4 fraction in the exhaust gases will be reduced. Further clarification is required how the DOE has closed this CAR.

Response by TÜV SÜD:
The CAR about the temperature parameter with an average of 500 C° was related to measured values done in the exhaust gas. The average combustion temperature measured was 967 C°, which assures the correct destruction of CH4, as stated in a report made by a third party laboratory (Servicios y Proyectos Ambientales S.A.) and verified during the on-site visit. A revised Verification Report with additional information how the DOE closed the Corrective Action Request is attached to this response.

Response by Project Participant:

Description of Flare and Burners

In compliance with ACM0001, in order to obtain a demonstrable and very efficient independent combustion with a large turn-over (biogas range flow capacity superior to 1:10 per flare) that allows extension of operational flexibility, in 2006 AS&D Consultores (ASD) developed a special flaring unit (entitled Biotorcha). This unit is an enclosed flare where the residual gas is burned in a rectilinear and horizontal enclosure, which includes a burning system especially designed for high efficiency and a large turn-over, where the air is admitted through a fan. The temperature combustion reaches 800 to 1000ºC, and to avoid NOx emissions, the flared gas is immediately cooled with

Industrie Service

additional air introduced just after complete combustion. The burning system is composed of six Rectangular Line Burners (RLB) that provide a direct fire in-the-duct with a greatly reduced generation of NOx, so ensuring maximum efficiency. Five RLB are connected to a valve that allows burning flow to be reduced from 1.200 to 100 m3/h without altering flaring efficiency. This explains why efficiency is maintained, even if residual gas flow is reduced, and the temperature of flared gases measured inside the duct is cooled and drops down to 150ºC.

It is important to not confuse flame temperature with exhaust gas temperature which is lower and dependent with fresh air ratio introduced after the combustion (see graphic here after). According biogas flow and the number of burner functioning (the thermal energy introduced), the exhaust gases temperature can fluctuate because of an immediate cooling with a constant fresh air flow (different from air combustion).

Efficiency Results

Efficiency calculations have been made in the "Santa Marta" Landfill – Santiago, June 2007 – in the presence of SGS, using a direct method o efficiency calculation with mass flow balance (using a pitot tube for flared gas flow). We have also results of efficiencies obtained with AS&D flares installed in the Valparaiso Landfill ("El Molle" – March 2007) where the method indicated in EB28 Annex 13 has been integrally employed. In both cases, flares were operated by operators in charge (not AS&D), and analysis of exhaust gases made by a certified laboratory (GasValpo S.A.) and results were similar.

Because exhaust gases are diluted with fresh air, methane concentrations are not detectable by conventional and portable analyzer (%vol.). Neither with some chromatograph analyzers (ppm). However, to calculate the methane mass flow rate in EG (TMFG), the minimal detection level of analyzer as the value of volumetric fraction of methane in EG (fvCH4,FG) is taken into account; in other words, considering fvCH4,FG = 10ppm = 10e-5 vol. In October 2007 it has been demonstrated that the 10 ppm value was conservative because new measures made with a more sophisticate analyzer obtain CH4 concentration of 1.3 to 1.6 ppm in exhaust gases[i].

Therefore, efficiency calculations we present are based on three flares[ii] operated in different conditions of exhaust gas temperatures (depending on Residual Gas flow rate and/or velocity of air fan). Results are presented in the graph.

This graph shows that even exhaust gas temperatures are less then 500ºC, all flares can reach al least a 99.9% level of methane destruction, independent of equipment, flared gas temperature, and its associated corollary: rpm of air fan.

For further information regarding plant design and thermodynamics please see attached file *"0705-DT-01r1 - Tecnical Descriptive of AS&D Flares"*

[i] Measures made in Santa Marta – October 12th, 2007.
[ii] Three in Santiago (*Consorcio Santa Marta*) - Chile