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| Your ref.: | Our ref.: | Date: |
|---|---|---|
| CDM Ref 490 | TRIKA/MLEH | 14 August 2007 |

# Response to request for review

## "Catalytic N2O Destruction Project in the Tail Gas of the Nitric Acid Plant of Abu Qir Fertiliser Co." (490)

Dear Members of the CDM Executive Board,

We refer to the requests for review raised by three Board members concerning DNV's request for issuance for CER's for the second periodic verification of the "Catalytic $N_2O$ Destruction Project in the Tail Gas of the Nitric Acid Plant of Abu Qir Fertiliser Co." (490), and we would like to provide the following initial response to the issues raised by the requests for review. We also refer to the response provided by the project participants.

***Request 1:***

*"The monitoring report states that the hydrocarbon oxidation factor has been continuously measured while the verification report mentions it has been calculated. According to the approved methodology and the registered monitoring plan, this parameter is required to be measured. Further clarification is required regarding the monitoring of this parameter."*

**DNV Response:**

In the approved monitoring methodology AM0028 v.1 the following is described:

***"Determination of conversion rates of hydrocarbons:***
*Hydrocarbons can be used as reducing agent. In the case of hydrocarbons with one carbon atom in the molecule ($CH_4$), the hydrocarbon is mainly converted to $CO_2$, while some remains intact. Hydrocarbon reducing agents with two or more carbon atoms in the molecule are completely converted to water, carbon monoxide and carbon dioxide ($H_2O$, CO, $CO_2$). If methane ($CH_4$) is present in the reducing agent, as with natural gas, a part leaves the $N_2O$ destruction facility unconverted and is emitted to atmosphere. The fraction of unconverted methane depends on the amount of methane supplied to the reactor, the reactor operating temperature, and the quantity of catalyst supplied.*
***Case 1: Fraction of Methane not converted will be measured:***
*In order to measure the fraction of unconverted methane, an additional analyser is required. If the project-specific costs of this analyser for $CH_4$ are not unreasonable the methodology recommends the installation of the analyser.*

The project participant uses natural gas [1] and has decided to follow Case 1 as described in the monitoring plan in the registered PDD. In the verification report, page 12, information is given for the measurement of unconverted methane as follows:

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| Concentration of methane at destruction facility outlet ppmv $CH_4$ | **A218002CH4** ppmv | Reported in /3/ | The non converted methane is measured by the NDIR analyser and used to calculate the **HCE_NC** -Non-converted methane emissions (tCO2e), see 2.3.4.<br><br>The concentration of $CH_4$ in the tail gas is continuously measured by non dispersive infrared photometry (NDIR) analyser which is self-calibrated, using a set of certified gases /10/. The calibration gas was analysed to 79 ppmv $CH_4$ and the stability on the calibration gas was dated 17 May 2009. |

The project participant uses this measurement of methane (in ppmv) in the tail gas outlet to calculate the CO2e from non-converted methane by converting the $CH_4$ ppmv to mg/$Nm^3$ and then multiplying the methane concentration in the tail gas with the tail gas volume flow to get the $CH_4$ emissions in tons. This value is then multiplied by $GWP_{CH4}$ to get the emission in tones of CO2e.

The hydrocarbon oxidation factor is automatically determined in an algorithm in the Delta V system (distributed control system) from the following continuously measured parameters:

- $CH_4$ concentration in tail gas outlet (ppmv)
- Tail gas volume flow ($Nm^3$)
- Volume flow of natural gas inlet to the destruction unit (Q_HC in $Nm^3$).

The non-methane hydrocarbons present in the natural gas are regarded as 100% converted and a conservative value of 3.0 is used for the hydrocarbon $CO_2$ emission factor, HC, both for the converted methane and the converted non-methane hydrocarbons. Thus a conservative approach has been used to determine the converted hydrocarbons.

The hydrocarbon oxidation factor ($OXID_{HC}$) is defined as the oxidation factor of the hydrocarbon used as a reducing agent and the factor is expressed in percentage (%). In the verification report (see copy below) it is stated that this parameter is calculated, this phrasing is referring to the determination algorithm in the delta V system based on the continuously measured parameters as explained above.

*Copy from verification report page 12:*

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| **$OXID_{HC}$** Hydrocarbon oxidation factor | - | This parameter is calculated based on the monitoring of the concentration of the unconverted methane in the tail gas. All remaining hydrocarbons (methane) are regarded as 100% converted to $CO_2$. The calculations are correct.<br>The parameter is recorded in the daily reports. |

[1] Egyptian natural gas company, Gasco: Certificate of analysis of natural gas states 94.95% methane

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| **Q_HC**<br>Nm3<br>Hydrocarbon (natural gas reducing agent) | **F218002** | **168 083**<br>Nm3 | The natural gas used was measured with KROHNE H250 volume flow meter. Pressure (P218004) and temperature transmitter (T218004) are installed for the conversion to standard conditions**.**<br><br>On-site check of instrument display was consistent to the values reported from the Delta V system. The reported value is found to be correct. |

Obviously the determination of the hydrocarbon oxidation factor in percentage needs to be determined from measurement of hydrocarbons entering the system and the measurement of the hydrocarbons exiting the system. All relevant measurements for the determination of the oxidation factor have been done by the project participant in this case. It is thus the opinion of DNV that the project proponent is determining this parameter correctly and that the methodology used are fully consistent to the monitoring methodology AM0028 v.1.

***Request 2:***

*"1. The monitoring report states that the hydrocarbon oxidation factor has been continuously measured while the verification report mentions it has been calculated. According to the approved methodology and the registered monitoring plan, this parameter is required to be measured. Further clarification is required regarding the monitoring of this parameter."*

Please refer to the clarification given to Request 1 above.

*"2. The PDD on page 46 mentions "Since also the gauze pressure is an important parameter ----- AFC will either change the pressure measuring device or calibrate it prior to the starting date of the project activity ---- to obtain more accurate pressure measurement." The verification report of the first periodic verification does not indicate whether this was done. The monitoring as well as verification reports of the current crediting period also do not clarify whether this was done. The project participant should clarify whether the pressure measuring devices were changed or calibrated in the report and DOE should verify/certify it."*

**DNV Response:**

References to the documentation of the calibration of the gauze pressure are given in both of the verification reports (for first and second period). In page 9 of the second verification report the below information is given for this parameter Pg,d. The pressure measuring device P-21353 was calibrated during implementation of the project, the identification of the reference document is given in reference no. 11 (see copy below). In reference 11 the pressure device P-21353 is stated ammonia oxidation pressure instead of "Actual operating pressure AOR", however the Tag.No. is the same and it gives the identification of the device that was calibrated.

*Copy from verification report:*

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| **Pg,d** Actual operating pressure AOR on day d (Pa) | **P- 21353** | Average: **3.79** Min.: 3.67 Max.: 3.90 | All measurements are within the permitted range, except for 16 February where the nitric acid stopped and the data from the whole day was excluded<br>The pressure transmitter was calibrated during the implementation of the CDM project /11/. The next calibration was performed 3-4 May 2007, /24/, this will be in the next monitoring period. |

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| /11/ | Calibration documents from Abu Qir Fertilisers Co. Instrumentation and measurement procedure QSPR 409/2/E, document no. 409/2/E/F3:<br>Ammonia flow to AOR, flow meter: FI- 21401<br>Ammonia oxidation reactor thermocouples TI-21014/15 and TI-21020/21<br>Ammonia oxidation pressure P-21353<br>Nitric acid production flow transmitter: FT- 21411 |

DNV did receive the documentation of the calibration done prior to the start up of the project activity already during the first periodic verification and the calibration was verified at that time. In addition, DNV has also received and verified the documentation of the calibration done during the shut down 3 May 2007. Hence it is the opinion of DNV that the "Actual operating pressure AOR" measured by the pressure transmitter P-21353 is indeed calibrated and thus in compliance to the description given in the PDD.

**Request 3**

*"The monitoring report states that the hydrocarbon oxidation factor has been continuously measured while the verification report mentions it has been calculated. According to the approved methodology and the registered monitoring plan, this parameter is required to be measured. Further clarification is required regarding the monitoring of this parameter."*

Please refer to the clarification given to Request 1 above.

We sincerely hope that the Board accepts our above explanations.

Yours faithfully
for DET NORSKE VERITAS CERTIFICATION AS

Michael Lehmann
*Technical Director*
International Climate Change Service

Trine Kopperud
*Project manager*